PJ PROSA

SESAR Solution PJ.10-02a1 and PJ.10-02a2: Technical Specification (TS/IRS) V2 V3

Deliverable ID:	**D4.2.020**
Dissemination Level:	**PU**
Project Acronym:	**PJ10 PROSA**
Grant:	**734143**
Call:	**H2020-SESAR-2015-2**
Topic:	**Separation Management En-Route and TMA**
Consortium Coordinator:	**DFS**
Edition Date:	**8 November 2019**
Edition:	**00.01.04**
Template Edition:	**02.00.02**

Founding Members
EUROPEAN UNION EUROCONTROL
SESAR JOINT UNDERTAKING

PJ10 PROSA

IMPROVED PERFORMANCE IN THE PROVISION OF SEPARATION

This TS/IRS is part of a project that has received funding from the SESAR Joint Undertaking under grant agreement No 734143 under European Union's Horizon 2020 research and innovation programme.

Abstract

This Document is the Technical Specification for SESAR Solution PJ.10-02a (PJ.10-02a1 and PJ.10-02a2) that addresses the objective of improving the separation in the En-Route and TMA operational environments by using an improved ground trajectory prediction and customizing these tools to a specific operational environment.

This Technical Specification (TS) contains the technical requirements for the following functions:

- Conflict Detection and Resolution
- Conformance Monitoring

Table of Contents

Abstract 2
1 Executive summary 5
2 Introduction 7
2.1 Purpose of the document 7
2.2 Scope 7
2.3 Intended readership 8
2.4 Background 8
2.5 Structure of the document 9
2.6 Glossary of terms 9
2.7 Acronyms and Terminology 18
3 SESAR Solution Impacts on Architecture 24
3.1 Target Solution Architecture 24
3.2 Changes imposed by the SESAR Solution on the baseline Architecture 40
4 Technical Specifications 43
4.1 Functional architecture overview 43
4.2 Functional and non-Functional Requirements 59
5 Implementation Options 235
6 Assumptions 236
7 References and Applicable Documents 237
7.1 Applicable Documents 237
7.2 Reference Documents 238
Appendix A Service Description Document (SDD) 240
Appendix B Service Technical Design Document (STDD) 241

List of Tables

Table 1: Glossary 18
Table 2: Acronyms and terminology 23
Table 3: SESAR Solution PJ.10-02a2 Scope and related Functional Blocks/roles & Enablers 26
Table 4: SESAR Solution PJ.10-02a1 Scope and related Functional Blocks/roles & Enablers 29
Table 5: Relation between Activities and Functions 30

Table 6: List of Enablers not covered by the SESAR Solution 34

Table 7: List of deviations in the SESAR Solution 35

Table 8: List of Functional Blocks involved in “Provide Planning Separation Assurance ” 36

Table 9: List of Functional Blocks involved in “Provide Tactical Separation Assurance” 37

Table 10: List of Functional Blocks involved in “Clearance Adherence Monitoring ” 38

Table 11: List of Capability Configuration required for the SESAR Solution 40

Table 12: List of changes in the PJ.10-02a2 - V2 enablers due to the SESAR Solution 41

Table 13: List of changes in the PJ.10-02a1 - V3 enablers due to the SESAR Solution 42

Table 14: Relation between Function and Functional Blocks/Systems/Role 45

Table 15: Functions used in “Conformance Monitoring in En-Route or TMA” Resource Orchestration Model 48

Table 16: Functions used in “Planned Conflict Detection in En-Route or TMA” Resource Orchestration Model 51

Table 17: Functions used in “Tactical Conflict Detection in En-Route or TMA” Resource Orchestration Model 55

Table 18: Functions used in “Planned Conflict Solving using Lateral Closed Loop Clearances” Resource Orchestration Model 58

Table 19: Implementation Options 235

List of Figures

Figure 1: En-Route/APP ATC Functional Blocks 29

Figure 2: Resource Connectivity Model 46

Figure 3: Conformance Monitoring in En-Route or TMA Resource Orchestration Model 48

Figure 4: Planned Conflict Detection in En-Route or TMA Resource Orchestration Model 51

Figure 5: Tactical Conflict Detection in En-Route or TMA Resource Orchestration Model 54

Figure 6: Planned Conflict Solving using Lateral Closed Loop Clearances Resource Orchestration Model 56

Figure 7: Infrastructure connectivity model 59

1 Executive summary

The PJ.10-02a Improved Performance in the Provision of Separation is a continuation of the work performed in SESAR 1. It had first an initial phase where V2 validations took place and a V2 datapack was produced. In this final phase, the solution has been split into two sub-solutions:

- PJ.10-02a1 "*Integrated tactical and medium conflict detection & resolution (CD&R) services and conformance monitoring tools for En-Route and TMA "*: it continues the work developed in the previous phase with the goal to achieve V3 maturity.
- PJ.10-02a2 "*Improved performance in the provision of separation **with** use of ADS-C/EPP data*": it continues the research in the improvement of conformance monitoring and conflict detection tools by means of using of ADS-C data. V2 maturity is expected to be achieved.

This document contains the Technical Specifications of the tools addressed in PJ.10-02a to be used by Planner Controller (PC) and Executive Controller (EC) to help them to ensure a proper separation and avoid potential conflicts. These tools are:

- TC-aid tools:
    - Detect conflicts based on aircraft's tactical trajectories.
    - What-if and What-else functions: Assist TC to take decisions to avoid or resolve conflicts.
- PC-aid tools:
    - Detect potential conflicts based on aircraft's planned trajectories and entry/exit coordination data.
    - What-if functions: Assist PC to take decisions to avoid or resolve potential conflicts.
- Conformance Monitoring tools:
    - Detect if aircraft is deviating from ATCO issued horizontal or vertical clearance, such as "continue flying route", "cleared flight level", etc.

These tools can be used in either En-Route or TMA airspaces. They also can be used in a fixed route or free routing environment.

This SESAR solution improves:

- Conflict Detection tools:
    - Improve conflict detection by means of a better ground trajectory prediction improved by:
        - Reducing uncertainty of aircraft future position by taking into account:
            - Wind data at current position obtained through the use of Mode-S enhanced data downloaded from aircraft or from Meteo Service Providers.

- Use of various data elements extracted from ADS-C reports downloaded from the aircraft (such as Gross mass, Speed schedule, EPP, Air Vector, etc.)
- Use of ATC clearances such as CFL with ROCD in ground trajectory computation.

- Improve conflict detection performance by means of aircraft derived data such as Mode-S enhanced data (e.g. selected flight level in the cockpit) or ADS-C (e.g. Speed predictions in EPP data).

- Conformance Monitoring Tools:

  - Enlarge scope of application by considering specific:
    - ATC clearances, e.g. CFL with ROCD
    - Aircraft Derived Data such as Mode-S enhanced data (e.g. selected flight level in the cockpit).
    - Use of ADS-C reports to forecast a future deviation between the expected trajectory and the aircraft's intent trajectory.

2 Introduction

This is the Technical Specification for SESAR Solution PJ.10-02a (PJ.10-02a1 and PJ.10-02a2), main input documents have been:

- 10.04.01-D78-Conflict Detection and Resolution Requirements Refinement - R5 [38]
- 10.04.02-D44-Consolidated Conformance Monitoring System Requirements [39]
- SESAR Solution 10-02a V2 SPR INTEROP OSED [42]
- PJ10-D4.1.020-SESAR Solution PJ.10-02a FINAL Technical Specification (TS IRS) V2 TRL4-00.02.01 [44]
- OSED V3 [43]

2.1 Purpose of the document

This document provides the requirements specification, covering functional, non-functional and interface requirements related to SESAR Solution PJ.10-02a (PJ.10-02a1 and PJ.10-02a2).

The SESAR Solution Development Life Cycle aims to structure and perform the work at project level and progressively increase SESAR Solution maturity, with the final objective of delivering a SESAR Solution data-pack for industrialisation and deployment. The Technical specifications (TS/IRS) represent one of the key parts of this SESAR Solution data-pack.

This document is used to capture and consolidate the set of Technical Requirements needed to improve/update current separation and conformance monitoring tools. It includes requirements for conflict detection (including what-if and what-else functionalities) and conformance monitoring.

This is the final version of this document.

2.2 Scope

This is the TS/IRS for SESAR Solution PJ.10-02a (PJ.10-02a1 and PJ.10-02a2) for the TRL-6 maturity level for the prototypes used in the following validation activities:

- EXE-10.02a-V3-VALP-001
- EXE-10.02a-V3-VALP-002
- EXE-10.02a-V3-VALP-003
- EXE-10.02a-V3-VALP-004
- EXE-10-02a-V3-VALP-005

This Technical Specification has TRL-4 maturity level for the prototypes used in the following validation activities, as they did not reach V3 in wave 1:

- EXE-10-02a-V3-VALP-006
- EXE-10-02a-V3-VALP-007

This final Technical Specification covers functional and non-functional requirements considering the results from the V2 and V3 validation exercises and constitute the technical reference for the V2 and the V3 Data Pack of the solution.

2.3 Intended readership

Being a SESAR Technological solution, this Technical Specification is of interest of all enabled SESAR ATM Solutions, especially the followings:

- PJ.01-03: Dynamic and Enhanced Routes and Airspace
- PJ.08-01: Management of Dynamic Airspace configurations
- PJ.08-02: Dynamic Airspace Configuration supporting moving areas
- PJ.10-01a: High Productivity Controller Team Organisation
- PJ.10-01b: Flight Centred ATC
- PJ.10-01c: Collaborative Control
- PJ.10-02b: Advanced Separation Management
- PJ.10-05: IFR RPAS Integration
- PJ.10-06: Generic' (non-geographical) Controller Validations
- PJ.14-02-01: FCI Terrestrial Data Link
- PJ.14-02-04: FCI* Network Technologies incl. voice solutions and military interfacing
- PJ.15-08: Trajectory Prediction Service
- PJ.16-04: Workstation, Controller productivity
- PJ.18-02: Integration of trajectory management processes in planning and execution
- PJ.18-06: Performance Based Trajectory Prediction

It is also of interest for:

- Transverse and federating projects:
    - PJ.06-01: Optimized traffic management to enable Free Routing in high and very high complexity environments.
    - PJ.06-02 : Management of Performance Based Free Routing in lower Airspace
    - PJ.18.06 : Performance Based Trajectory Prediction
- Stakeholders

Airspace Users e.g. airlines, military authorities, etc...

2.4 Background

This document is a continuation of the work performed in the PJ.10-02a V2 phase [44], the main goal is to achieve V3 maturity on the conflict detection tools as well as the conformance monitoring tools deployed in a TMA environment, except for those prototypes using ADS-C data.

As detailed in the PJ.10-02a V2 TS [44], previous work in SESAR 1 was performed in projects 04.07.02 [41], 05.07.02 [40], 10.04.01 [38], 10.04.02 [39] and Solution #27.

As the main background, SESAR1 project 04.07.02 [41], 05.07.02 [40], 10.04.01 [38] and 10.04.02 [39] studied two services related to Separation provision:

- The TC Aid service, which has been V3-validated in En-Route environment and which now needs to be extended in scope and functionalities and be V3 validated in a TMA environment;

- The PC Aid service, which has been V2-validated;

SESAR1 Project 04.07.02[41] and 05.07.02 [40] also described some Monitoring Aids, which have been V3-validated in En-Route Environment in SESAR1.

2.5 Structure of the document

This document is structured in these parts:

- Executive summary, which includes a brief description of the scope of the PJ.10-02a (PJ.10-02a1 and PJ.10-02a2) solution

- Introduction, indicates what already exists and what is new with a brief description of the scope of the document.

- Section 3 addresses the scope of the Technical specification, technical systems, functional block(s), system ports and roles under the scope of this SESAR Solution. Diagrams to give an overview of the functional block(s)'s + context significant interfaces crossing the functional block's boundaries can be included, OIs/Enablers coverage. Changes in the OIs/ENs, Use Cases -- How the technical systems, functional block(s)… will be used (related to operational documents (SPR-INTEROP/OSED). Also are identified the Capability Configurations, Changes needed from the architecture baseline in EATMA to realise the Capabilities (Using Technical Systems, /Functional Blocks, Functions and Roles).

- Section 4: Functions needed to realise the Solution and provides a functional view of how the technical systems, functional block(s), system ports and roles that participate in realising the operational needs. How the relevant resources interact in different (sub)-Operating Environments to achieve the needed Capabilities, How the resources interact, Diagram describing how the systems interact at the infrastructure level, Service(s) used by the SESAR Solution, System context in which the Services are deployed, Technology used to realise the Services, Functional and non-Functional Requirements.

- Section 5: Options (if available) that can be chosen when implementing the solution (e.g. local / central deployment, service alternatives etc.)

- Section 6: Any assumption made that have an impact on the technical specifications described in section 5

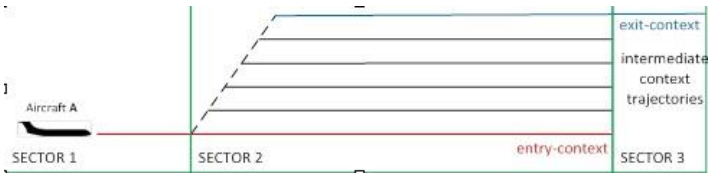
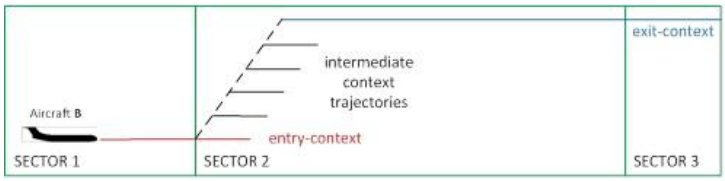
- Section 7: Documents (name, reference, source project) the TS has to comply to or to be used as additional inputs.

- Appendix A: Not applicable for this solution.

- Appendix B: Not applicable for this solution.

2.6 Glossary of terms

Term	Definition	Source of the definition
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. Note: 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."	10.04.02-D44-Consolidated Conformance Monitoring System Requirements [39]
ASTERIX 62	All Purpose STructured Eurocontrol suRveillance Information Exchange is a standard for the exchange of air traffic services (ATS) information. Category 62 describes the message structure for the transmission of System Track Data to a user.	EUROCONTROL [45]
Catch-up conflict geometry	If the absolute value of the angle between the courses of the two involved trajectories at the CPA is less than "conflict geometry angle" defined value.	PJ.10-2a Technical Specification
Cluster	A set of one or more Encounters that should be treated as a whole when determining their resolution	Solution #27
Conflict	Any situation involving aircraft and hazards in which the applicable separation minima may be compromised. Note: this term relates to potential infringements of separation minima. More specifically, it is used in the context of ATCO activities where actions are performed in order to anticipate and resolve conflicts 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.	Solution #27
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."	10.04.02-D44-Consolidated Conformance Monitoring System Requirements [39]

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:  	Context Trajectory
Correlated flight	Flight plan with a planned trajectory correlated with a radar track	10.04.02-D44-Consolidated Conformance Monitoring System Requirements [39]

Crossing conflict geometry	If the absolute value of the angle between the courses of the two involved trajectories at the CPA is between "conflict geometry angle" defined value and 180 minus "conflict geometry angle" defined value. This is the same as to say if it cannot be classified neither as "Head-on conflict geometry" nor "Catch-up conflict geometry".	PJ.10-02a Technical Specification
CTA/RTA	"An ATM imposed time constraint on a defined merging point associated with an arrival runway. Note: This constraint is sent by the ground system to the aircraft."	10.04.02-D44-Consolidated Conformance Monitoring System Requirements [39]
CTO	"An ATM imposed time constraint over a point. Note: This constraint is sent by the ground system to the aircraft."	10.04.02-D44-Consolidated Conformance Monitoring System Requirements [39]
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. Note: Encounters relate 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).	Solution #27
[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 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.	10.04.02-D44-Consolidated Conformance Monitoring System Requirements [39]

	Exit = A Trajectory that is built at levels associated with the sector 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. "	
Environment Trajectory	The Trajectory of an Environmental Flight	10.04.02-D44-Consolidated Conformance Monitoring System Requirements [39]
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.	10.04.02-D44-Consolidated Conformance Monitoring System Requirements [39]
GRIB	General Regularly distributed Information in Binary form is a concise data format commonly used in meteorology to store historical and forecast weather data. It is standardized by the World Meteorological Organization's Commission for Basic Systems.	World Meteorological Organization [46] [47]
Head-on conflict geometry	If the absolute value of the angle between the courses of the two involved trajectories at the CPA is between 180 and 180 minus "conflict geometry angle" defined value.	PJ.10-02a Technical Specification
Lateral Separation	Separation expressed in terms of horizontal distance and function of angular convergence/divergence between tracks	10.04.01-D78-Conflict Detection and Resolution Requirements

		Refinement [38]
Minimum Lateral Separation	The lateral separation threshold above which the separation minima are fulfilled	10.04.01-D78-Conflict Detection and Resolution Requirements Refinement [38]
Minimum Vertical Separation	"The vertical separation threshold above which the separation minima are fulfilled Note: 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 over the RVSM airspace."	10.04.01-D78-Conflict Detection and Resolution Requirements Refinement [38]
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."	10.04.02-D44-Consolidated Conformance Monitoring System Requirements [39]
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	10.04.02-D44-Consolidated Conformance Monitoring System Requirements [39]

	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."	
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.	10.04.01-D78-Conflict Detection and Resolution Requirements Refinement [38]
Route	The 2D trajectory of an aircraft, expressed as significant points, ATS routes or geographical points.	EATM Glossary
Sector	A part of airspace controlled by a team of controllers, defined, notably, by its geographical co-ordinates and its assigned radio frequency	EATM Glossary
Separation	Spacing between an aircraft and a hazard.	Solution #27
Separation Criteria	A generic term that covers the Separation Minima and the thresholds used for problem identification.	Solution #27
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. Note: 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. Note: 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	Solution #27

Separation Minima	The minimum displacements between an aircraft and a hazard, which maintain the risk of collision at an acceptable level of safety. Note: ICAO Doc 9689 describes the methodology to be used for the determination of Separation Minima	Solution #27 ICAO Doc 9689
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. "	10.04.02-D44-Consolidated Conformance Monitoring System Requirements [39]
State Vector	A vector describing the state of an object in terms of its position co-ordinates, ground speed, course, accelerations and mode-of-flight	EATM Glossary
Subject Flight	A flight that has been explicitly selected by the Controller concerned.	10.04.02-D44-Consolidated Conformance Monitoring System Requirements [39]
System Track	A generic entity representing the surveillance data as transmitted by the surveillance system	EATM Glossary
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 warnings. Note: The Tactical Trajectory supports the tactical ATC operations when the flight follows its normal behaviour"	10.04.02-D44-Consolidated Conformance Monitoring System Requirements [39]

[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. 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). 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). During periods where a Deviation Trajectory is necessary it may also be used by TC/PC CD&R Aid."	10.04.02-D44-Consolidated Conformance Monitoring System Requirements [39]
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."	10.04.02-D44-Consolidated Conformance Monitoring System Requirements [39]
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: 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	10.04.02-D44-Consolidated Conformance Monitoring System Requirements [39]

	system to build the vertical profile and the lateral transitions."	
Vertical Separation	Separation expressed in units of vertical distance	10.04.01-D78-Conflict Detection and Resolution Requirements Refinement [38]
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	Solution #27
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	Solution #27

Table 1: Glossary

2.7 Acronyms and Terminology

Term	Definition
2D, 3D, 4D	Two Dimensional, Three Dimensional, Four Dimensional
4D TM	Four dimensional Trajectory Management
4DTRAD	Four Dimensional TRAjectory Data link
A/C	Aircraft
ACC	Area Control Centre
ADAP	Adaptation Database
ADD	Aircraft Derived Data

ADD	Architecture Definition Document
ADEP	Aerodrome of Departure
ADES	Aerodrome of Destination
ADS-B	Automatic Dependent Surveillance-Broadcast
ADS-C	Automatic Dependent Surveillance-Contract
AFL	Actual Flight Level
AGDS	Air-Ground Datalink Services (Functional Block)
AMAN	Arrival MANager
ANSP	Air Navigation Service Provider
AOI	Area of Interest
AOR	Area of Responsibility
APP	Approach
ARES	Airspace Reservation
ASTERIX	All Purpose STructured Eurocontrol suRveillance Information EXchange
ATC	Air Traffic Control
ATCO	Air Traffic Controller
ATIS	Automatic Terminal Information Service
ATM	Air Traffic Management
ATS	Air Traffic Services
ATSEP	Air Traffic Safety Electronics Personnel
ATSU	Air Traffic Services Unit
CC	Capability Configuration
CCD	Continuous Climb Departure
CD	Conflict Detection
CDA	Continuous Descent Approach
CDO	Continuous Descent Operations
CD&R	Conflict Detection & Resolution
CFL	Cleared (Current) Flight Level
CFMU	Central Flow Management Unit
CHMI	Controller Human Machine Interaction Management (Functional Block)
CNS	Communications, Navigation and Surveillance

CONF	Conflict Mgt (Functional Block)
COP	Coordination Point
COTR	Co-ordination and Transfer
CPA	Closest Point of Approach
CPDLC	Controller Pilot Data Link Communication
CTA	Control Time of Arrival
CTO	Control Time Over
CWP	Controller Working Position
DAP	Downlink Aircraft Parameter
DER	Departure End of the Runway
DFS	Deutsche Flugsicherung GmbH (German ANSP)
DMAN	Departure MANager
DOD	Detailed Operational Description
DRA	Direct-Route Airspace
EATMA	European ATM Architecture
E-ATMS	European Air Traffic Management System
ENAIRE	Spain ANSP
EPP	Extended Projected Profile
ENR	En Route
ERATO	En Route Air Trafic Organizer
ETA	Estimated Time of Arrival
ETFMS	Enhanced Tactical Flow Management System
ETO	Estimated Time Over
EUROCAE	EURopean Organization for Civil Aviation Equipment
FAA	Federal Aviation Administration
FASTI	First ATC Support Tools Implementation (programme)
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

FP	Flight Plan
FRA	Free-Route Airspace
FTS	Fast Time Simulation
GA	General Aviation
GAT	General Air Traffic
GRIB	General Regularly distributed Information in Binary form
HDG	Heading
HMI	Human-Machine Interface
IAS	Indicated Air Speed
IBP	Industry-Based Prototypes
ICAO	International Civil Aviation Organisation
IER	Information Exchange Requirement
IFR	Instrument Flight Rules
INTEROP	Interoperability Requirements
IOP	Interoperability
iRBT	Initial Reference Business Trajectory
IRS	Interface Requirements Specification
ISRM	Information Services Reference Model
ITEC	Interoperability Through European Collaboration
MONA	MONitoring Aids
MSA	Minimum Sector Altitude
MSA	Multi Sector Area
MSAW	Minimum Sector Altitude Warning
MSP	Multi Sector Planning
MTCD	Medium-Term Conflict Detection
NAF	NATO Architecture Framework
NATS	National Air Traffic Services (UK ANSP)
NFL	eNtry Flight Level
NoTT	No Tactical Trajectory
NOV	NAF Operational View
NSOV	NAF Service Oriented View

NSV	NAF System View
OAT	Operational Air Traffic
OI	Operational Improvement
OSED	Operational Service and Environment Definition
PC	Planning Controller
PIR	Project Initiation Report
PIRM	Programme Information Reference Model
QoS	Quality of Service
RBT	Reference Business Trajectory
RNP	Required Navigation Performance
ROCD	Rate of Climb/Descent
RTA	Requested Time of Arrival
RTE VIA	Route via
RTS	Real Time Simulation
RVSM	Reduced Vertical Separation Minimum
SAR	Safety Assessment Report
SDD	Service Description Document
SDPDS	Surveillance Data Processing and Distribution System
SESAR	Single European Sky ATM Research Programme
SESAR Programme	The programme which defines the Research and Development activities and Projects for the SJU.
SFL	Supplementary Flight Level
SID	Standard Instrument Departure
SJU	SESAR Joint Undertaking (Agency of the European Commission)
SJU Work Programme	The programme which addresses all activities of the SESAR Joint Undertaking Agency.
SoaML	Service Oriented Architecture Modelling Language
SOI	Separation Of Interest
SPO	Single Person Operation
SPR	Safety and Performance Requirements
SSR	Secondary Surveillance Radar
STAR	STandard instrument ARrival

STCA	Short-Term Conflict Alert
SUR	Surveillance Data Processing and Distribution System
SWIM	System Wide Information Model
TAD	Technical Architecture Description
TC	Tactical Controller
TCT	Tactical Controller Tool
TFL	Transfer Flight Level
TMA	Terminal Manoeuvring Area
TOAC	Time Of Arrival Control
TOC	Top Of Climb
TOD	Top Of Descent
TP	Trajectory Prediction
TP&M	Trajectory Prediction and Management
TRA	Temporary Reserved Airspace
TRL	Technology Readiness Level
TSA	Temporary Segregated Area
UAC	Upper Airspace Control
UIR	Upper Flight Information Region
UML	Unified Modelling Language
VFR	Visual Flight Rules
VSP	Variable System Parameter
V&V	Validation and Verification
WILCO	Will Comply
WP	Work Package
WSDL	Web Services Definition Language
XFL	Exit Flight Level
XSD	XML Schema Definition

Table 2: Acronyms and terminology

3 SESAR Solution Impacts on Architecture

3.1 Target Solution Architecture

3.1.1 SESAR Solution(s) Overview

This Document is the Technical Specification for SESAR Solution PJ.10-02a (PJ.10-02a1 and PJ.10-02a2) that addresses the objective of improving the separation in the En-Route and TMA operational environments.

By means of the use of improved services and aircraft data it is possible to determine the future positions of an aircraft with less uncertainty, this improvement in the trajectory prediction is obtained using downlinked aircraft data such as ADS-C EPP and/or Mode-S information. The improvement in the performance of the conformance monitoring service, conflict detection tools and resolution tools is achieved using an improved trajectory prediction.

An improvement in the separation tools allow to reduce the number of nuisance alerts thus enhancing the accuracy of conflict detection, with direct benefits on the workload of the Executive / Planner controller, increasing the capabilities of the separation services and giving all the data useful to solve potential conflicts in advance. This improvement also allows diversifying the operational environments where the separation services can be used.

The following sections describe the Technical Specifications.

PJ.10-02a2 - V2 Enablers

The following table identifies all the Enablers belonging to the OIs that have been allocated to the SESAR Solution PJ.10-02a2 in EATMA Dataset 20 Draft (EATMA V13.0) [2] that will reach V2 maturity. The ones in **bold format** are mandatory Enablers.

SESAR Solution ID and Title	Functional Blocks/Role impacted by the SESAR Solution (from EATMA)	Enabler ID (from EATMA)	Enabler Title (from EATMA)	Enabler coverage
PJ.10-02a2 Improved performance in the provision of separation with use of ADS-C/EPP data		**A/C-37a**	**Downlink of trajectory data according to contract terms (ADS-C) compliant to ATN baseline 2 (FANS 3/C)**	**Not Addressed (V3 already validated)**
		A/C-48a	**Air broadcast of aircraft position/vector (ADS-B OUT)**	**Not Addressed (V3 already validated)**

			compliant with DO260B	
		CTE-S03b	**ADS-B station for RAD and APT surveillance**	**Not Addressed (V3 already validated)**
		ER APP ATC 82	Enhance EN/APP ACC to use eFPL data	Not Addressed
	Trajectory Prediction and Management	**ER APP ATC 100**	**4D Trajectory Management in Step 1 - Synchronization of Air and Ground Trajectories**	**Used in this solution, but addressed in PJ.18-06**
	Trajectory Prediction and Management **Conflict management** **Controller Human Machine Interaction Management ER/APP**	**ER APP ATC 104b**	**Adapt Controller Conflict Detection and Resolution Tools to Use Enhanced Trajectory Prediction**	**Fully**
	Monitoring Aids	**ER APP ATC 104d**	**Adapt Controller Conformance Monitoring Tools to Use Enhanced Trajectory Prediction**	**Fully**
		ER APP ATC 149a	Air-Ground Datalink Exchange to Support i4D - Extended Projected Profile (EPP)	Not Addressed (V3 already validated)
		ER APP ATC 160	ATC to ATC Flight Data Exchange Using The Flight Object	Not Addressed

Table 3: SESAR Solution PJ.10-02a2 Scope and related Functional Blocks/roles & Enablers

PJ.10-02a1 - V3 Enablers

The following table identifies all the Enablers belonging to the OIs that have been allocated to the SESAR Solution PJ.10-02a1 in EATMA Dataset 20 Draft (EATMA V13.0) [2] that will reach V3 maturity. The ones in **bold format** are mandatory Enablers.

SESAR Solution ID and Title	Functional Blocks/Role impacted by the SESAR Solution (from EATMA)	Enabler ID (from EATMA)	Enabler Title (from EATMA)	Enabler coverage
PJ.10-02a1 Integrated tactical and medium conflict detection & resolution (CD&R) services and conformance monitoring tools for En-Route and TMA[1]		**A/C-37a**	**Downlink of trajectory data according to contract terms (ADS-C) compliant to ATN baseline 2 (FANS 3/C)**	**Not Addressed (V3 already validated)**
		A/C-48a	**Air broadcast of aircraft position/vector (ADS-B OUT) compliant with DO260B**	**Not Addressed (V3 already validated)**

[1] CR 03624 is in progress to change PJ.10-02a1 solution name “Improved performance in the provision of separation without use of ADS-C/EPP data” to “Integrated tactical and medium conflict detection & resolution (CD&R) services and conformance monitoring tools for En-Route and TMA”

		CTE-S03b	**ADS-B station for RAD and APT surveillance**	**Not Addressed (V3 already validated)**
	Conflict management **Controller Human Machine Interaction Management ER/APP**	**APP ATC 155**	**ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA**	**Fully**
	Surveillance **Monitoring Aids** **Controller Human Machine Interaction Management ER/APP**	**APP ATC 168**	**ATC System Support for Advanced Conformance Monitoring in the TMA**	**Fully**
	Trajectory Prediction and Management **Conflict management**	**ER APP ATC 104**	**Adapt Controller Conflict Detection and Resolution Tools to Use Enhanced Ground-Based Trajectory Prediction**	**Fully**
		ER APP ATC 104b	Adapt Controller Conflict Detection and Resolution Tools to Use	Not addressed. V2 enabler

			Enhanced Trajectory Prediction	addressed in PJ.10-02a2.
	Monitoring Aids	**ER APP ATC 104c**	**Adapt Controller Conformance Monitoring Tools to Use Enhanced Ground-Based Trajectory Prediction**	**Fully**
		ER APP ATC 104d	Adapt Controller Conformance Monitoring Tools to Use Enhanced Trajectory Prediction	Not addressed. V2 enabler addressed in PJ.10-02a2.
		ER APP ATC 160	ATC to ATC Flight Data Exchange Using The Flight Object	Not Addressed
		ER APP ATC 82	Enhance EN/APP ACC to use eFPL data	Not Addressed
	Conflict management Controller Human Machine Interaction Management ER/APP	ER ATC 157b[2]	Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route	Fully
		PRO-046b	**ATC Procedures for Using Advanced System Assistance to Medium Term**	**Not Addressed (procedure enabler)**

[2] CR 03688 to link this enabler to solution PJ.10-02a1 is in progress.

			Conflict Detection and Resolution	

Table 4: SESAR Solution PJ.10-02a1 Scope and related Functional Blocks/roles & Enablers

The main functional blocks impacted by this solution are:

- Trajectory Prediction and Management: computes the tactical and planned trajectories improved by the use of ADD such as Mode-S data and ADS-C reports. Specific details on how the trajectories are computed is in the scope of solution PJ.18-06.
- Conflict management: functions inside this functional block are the one in charge of detecting conflicts using the trajectories provided by the functions in the "Trajectory Prediction and Management" functional block.
- Monitoring Aids: responsible for detecting if an aircraft is out of conformance.
- Controller Human Machine Interaction Management ER/APP: has the functions to show all the conflict details and conformance alerts to ATCO.

Technical system affected by this solution is the "En-Route / Approach ATC", it communicates with other systems using the following system ports:

- "SUR_TRACK_GND at En-Route / Approach ATC" to get surveillance information.

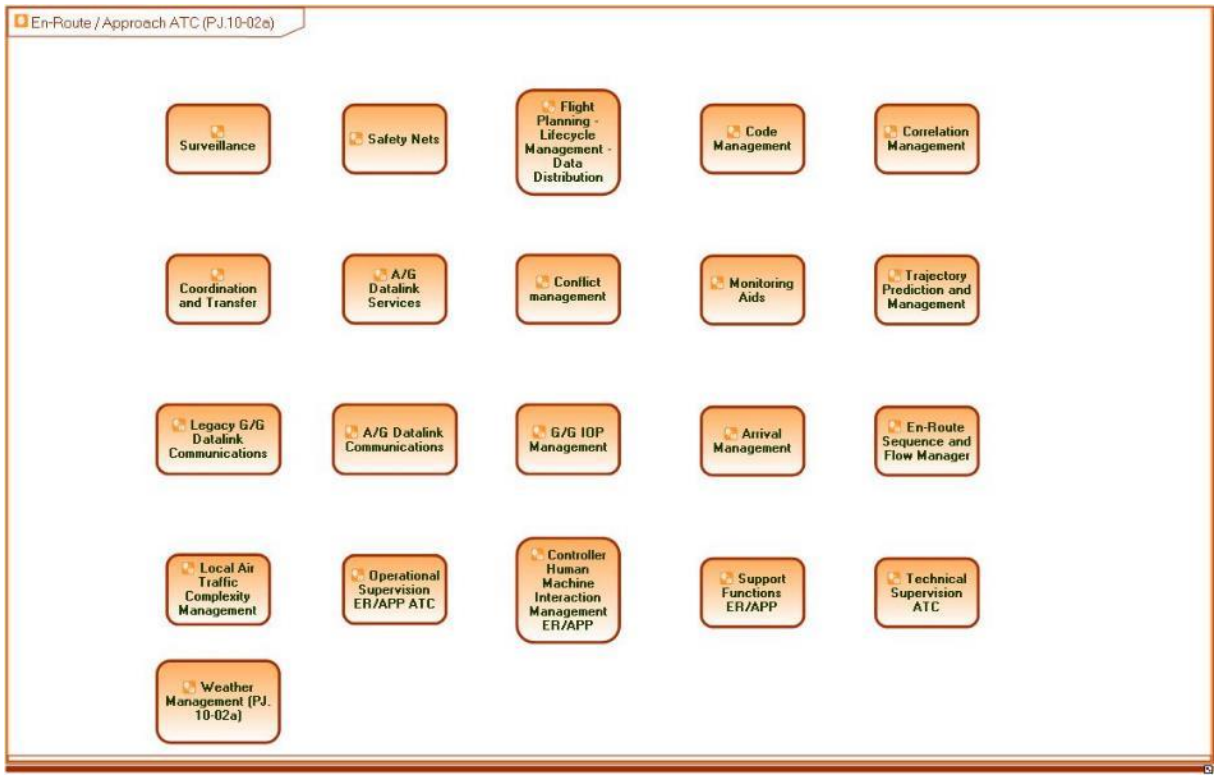


Figure 1: En-Route/APP ATC Functional Blocks

The following table contains the relation between the Activities and the Functions involved in the solution:

Activity	Function
Assess planned/desired profile for problems	Display Planned Conflicts Display Tactical Conflicts Search Planned Conflicts Search Tactical Conflicts
Assess trajectory profile through the AoR for tactical controller suitability	Display Planned Conflicts Search Planned Conflicts
Correct ground data	Flight Plan Change
Determine planning problems at offered entry conditions	Display Planned Conflicts Search Planned Conflicts
Determine safe potential exit coordination	Display Planned Conflicts Search Planned Conflicts
Establish necessary separation	Display What-Else Results Search Tactical Conflicts
Monitor clearance implementation	Analyze Conformance Display Conformance State
Monitor trajectory adherence to clearance and detect deviations	Analyze Conformance Display Conformance State
Select clearance to achieve desired profile	Display What-Else Results Search Tactical Conflicts
Select clearance to respect agreed constraints or coordinations	Display What-Else Results Search Tactical Conflicts

Table 5: Relation between Activities and Functions

3.1.1.1 Deviations with respect to the SESAR Solution(s) definition

This section identifies the deviations between the Enablers allocated to the solution and the variations occurred during the TS writing.

Based on EATMA Dataset 20 Draft (EATMA V13.0) [2] at the present moment there are the following deviations.

Enabler ID	Enabler Title	Enabler Description	Reason
ER APP ATC 104a	Adapt Controller Conflict Detection and Resolution Tools to Use Enhanced Ground-Based Trajectory Prediction	Controller tools are adapted to use an enhanced Trajectory Prediction model obtained through the use of improved data (e.g. extended flight plan, downlinked aircraft parameters [Mode-S or ADS-B], met data). Current and frequently changing aircraft kinematic parameters shall be used to improve the 4D trajectory prediction. The resulting improvement in the 4D trajectory prediction provides greater accuracy of information used by conflict detection and resolution tools. The trajectory prediction algorithm is improved through the use of ADD such as: - Selected altitude and vertical rate: to improve modelling of vertical maneuvers - Air speed, true air speed: to improve modelling of ground speed and ETO calculation. - Magnetic heading, roll angle and track angle rate: to improve modelling of turn maneuvers. Conflict detection (aircraft to aircraft and aircraft to airspace) and resolution is adapted to the variable degree of reliability of the different sources of trajectory information.	Remove reference to eFPL and MET as they were not validated (CR 03662).
ER APP ATC 104b	Adapt Controller Conflict Detection and Resolution Tools to Use Enhanced Trajectory Prediction	Controller tools are adapted to use an enhanced Trajectory Prediction model obtained through the use of improved data (e.g. extended flight plan, downlinked aircraft parameters [Mode-S or ADS-B], extended projected profile, met data). Current and frequently changing aircraft kinematic parameters and aircraft intent data shall be used to improve the 4D trajectory prediction. The resulting improvement in the 4D trajectory prediction provides greater	Remove reference to eFPL and MET as they were not validated. Use of ADS-C to enrich enabler description (CR 03664).

		accuracy of information used by conflict detection and resolution tools. The trajectory prediction algorithm is improved through the use of ADD such as: - Selected altitude and vertical rate: to improve modelling of vertical maneuvers - Short term intent: to improve modelling of the immediate future route intent and ETOs. - Air speed, true air speed: to improve modelling of ground speed and ETO calculation. - Magnetic heading, roll angle and track angle rate: to improve modelling of turn maneuvers. Conflict detection (aircraft to aircraft and aircraft to airspace) and resolution is adapted to the variable degree of reliability of the different sources of trajectory information.	
ER APP ATC 104c	Adapt Controller Conformance Monitoring Tools to Use Enhanced Ground-Based Trajectory Prediction	Controller tools are adapted to use an enhanced Trajectory Prediction model obtained through the use of improved data (e.g. extended flight plan, downlinked aircraft parameters [Mode-S or ADS-B], met data). Current and frequently changing aircraft kinematic parameters shall be used to improve monitoring aids. Monitoring of route conformance is improved through the use of downlinked aircraft parameters [Mode S or ADS-B] such as heading, track angle and track angle rate. Monitoring of assigned level conformance is improved through the use of downlinked aircraft parameters [Mode S or ADS-B] such as vertical rate and selected altitude.	Remove reference to eFPL and MET as they were not validated (CR 03667).

ER APP ATC 104d	Adapt Controller Conformance Monitoring Tools to Use Enhanced Trajectory Prediction	Controller tools are adapted to use an enhanced Trajectory Prediction model obtained through the use of improved data (e.g. extended flight plan, downlinked aircraft parameters [Mode-S or ADS-B], extended projected profile, met data). Current and frequently changing aircraft kinematic parameters and aircraft intent data shall be used to improve monitoring aids. Monitoring of route conformance is improved through the use of ADD such as heading, track angle and track angle rate. Monitoring of assigned level conformance is improved through the use of ADD such as vertical rate and selected altitude.	Remove reference to eFPL and MET as they were not validated. Use of ADS-C to enrich enabler description. (CR 03668)
APP ATC 155	ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA	ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA	Remove “medium term” from description (CR 03247).
A/C 37a	Downlink of trajectory data according to contract terms (ADS-C) compliant to ATN baseline 2 (FANS 3/C)	Downlink of trajectory data (waypoints or pseudo waypoints with associated constraints and/or estimates, gross mass, min/max speed, etc. as defined in WG78/SC214 standards) according to contract terms (e.g. change of route and/or constraints, deviation of onboard predictions more than thresholds specified by ATC, or on request or on periodic basis) e.g. via ADS-C (EPP or ETA min/max).	Set as optional to OI CM-0206 (CR 03684)

A/C-48a	Air broadcast of aircraft position/vector (ADS-B OUT) compliant with DO260B	Air broadcast of aircraft position/vector (ADS-B OUT) compliant with DO260B	Set as optional to OIs CM-0209, CM-0209b, CM-0210 and CM-0210b (CR 03686, CR 03689, CR 03687, CR 03690)
CTE-S03b	ADS-B Station for RAD and APT surveillance	ADS-B station for provision of Radar and Airport surveillance, compliant with EUROCAE ED129A and receiving ED-102A squitter format.	Set as optional to OIs CM-0210 and CM-0210b (CR 03687, CR 03690).
ER ATC 157b	Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route	Conflict Management is updated to integrate conflicts derived from multiple trajectory types in order to detect sector entry, in-sector, and exit conflicts, as well as conflicts for aircraft on open clearances or deviating from their planned trajectory. Resolution is assisted by indicating available and occupied levels and allowing the user to probe for conflicts on a what-if trajectory. Controller HMI is upgraded to provide the conflict information for the planning activity.	To be linked to OI CM-0211 (CR 03688).
ER ATC 157	Enhanced ATC System Support to the Tactical Controller for Conflict Detection and Resolution in En-Route	Conflict Management is updated to integrate conflicts derived from multiple trajectory types in order to detect sector entry, in-sector, and exit conflicts, as well as conflicts for aircraft on open clearances or deviating from their planned trajectory. Resolution is assisted by indicating available and occupied levels and allowing the user to probe for conflicts on a what-if trajectory. Controller HMI is upgraded to provide the conflict information for the tactical controller.	To be removed from OI CM-0211 (CR 03688).

Table 6: List of Enablers not covered by the SESAR Solution

The following deviations have been also identified in this solution. Although they are not directly related to enablers, they have been listed in this section because of their importance.

Deviation Description	Change Request to fix it
PJ.10-02a1 solution name was agreed to be changed from "Improved performance in the provision of separation without use of ADS-C/EPP data" to "Integrated tactical and medium conflict detection & resolution (CD&R) services and conformance monitoring tools for En-Route and TMA"	CR 03696

Table 7: List of deviations in the SESAR Solution

3.1.1.2 Relevant Use Cases

The improvements to the Ground Predicted Trajectory is achieved by integrating and using the downlinked ADD (e.g. ADS-C EPP, Mode-S, etc.) along with surveillance data in the Ground TP. Thanks to these trajectory improvements, the ATC support tools can better anticipate the traffic situation and provide accurate conflict data to the controllers. The evidence for these improvements is seen in the increase of usable time to controllers for analysing problems and choosing the best solution, considering various conditions, constraints and flight efficiency aspects.

A more accurate trajectory helps reducing false alerts, thereby enhancing the accuracy of conflict detection. The EC/PC involved in the separation process are advised of detected conflicts calculated with respect to the current position of the involved aircraft and their respective trajectories as predicted by the Ground systems. The developed ATC tools facilitate EC/PC in implementing the solution by:

- Defining a solution including selection of the appropriate separation mode and guarantee the separation within the appropriate conflict horizon.
- Communicating the solution and initiating any required trajectory modification,
- Process of ATC coordination (Intra-sector as well as Inter-sector) by advanced HMI functions which are able to display common conflict list/data & trajectory revisions.
- Ability to test conflict resolution even before the flight is under their responsibility, thanks to CD/R with the what-if functionality, allows PC to assess the impact of the planned clearance in order to maintain the correct separation.

Three relevant use cases are identified in the OSED [43] in section 3.3.2:

3.1.1.2.1 Provide Planning Separation Assurance

The following functional blocks are involved in this use case:

Functional Block	Description

Flight Planning - Lifecycle Management - Data Distribution	Provides flight plan data, such as planned route.
A/G Datalink Communications[3]	Provides ADS-C reports[4]
Coordination and Transfer	Provides entry and exit agreed coordination data
Trajectory Prediction and Management	Compute a more accurate planned trajectory using ADS-C reports.
Conflict Managements	Detect problems at Entry/Exit of the sector and along planned flight trajectory
Controller Human Machine Interaction Management ER/APP	Display planned conflicts to ATCO, ATCO will monitor or solve the conflict

Table 8: List of Functional Blocks involved in "Provide Planning Separation Assurance "

In this use-case, the main role is played by ATC Sector Planning Controller, but ATC Sector Executive Controller can also contribute significantly in any of the identified actions.

The whole use case is focused in the En-Route / Approach ATC technical system, no system ports are directly affected.

Other system involved in this use case is Aircraft, but its contribution is out of scope of this solution.

3.1.1.2.2 Provide Tactical Separation Assurance

The following functional blocks are involved in this use case:

Functional Block	Description
Surveillance	Provide surveillance data such as aircraft position, speed, Mode-S data, etc. from primary and secondary radar.

[3] The A/G Datalink Communications also include CPDLC capabilities; however, as it is used as a communication mean between pilot and controller to implement the conflict resolution, it is out of the scope of this technical specification.

[4] Only implemented in the V2 prototypes supporting ADS-C (PJ.10-02a2).

Flight Planning - Lifecycle Management - Data Distribution	Provides flight plan data, such as planned route, current clearance, etc…
A/G Datalink Communications[5]	Provides ADS-C reports[6]
Monitoring Aids	Provides flight conformance state.
Trajectory Prediction and Management	Compute a more accurate tactical trajectory using ADS-C reports and Mode-S data
Conflict Managements	Detect tactical conflicts, evaluate what-else clearances.
Controller Human Machine Interaction Management ER/APP	Allow ATCO to request what-else probing for a flight. Display tactical conflicts to ATCO, display what-else results. ATCO will solve conflict and/or give free-conflict clearances

Table 9: List of Functional Blocks involved in "Provide Tactical Separation Assurance"

In this use-case, the main role is played by ATC Sector Executive Controller, but ATC Sector Planning Controller can also contribute significantly in any of the identified actions since he/she supports EC.

The whole use case is focused in the En-Route / Approach ATC technical system, it uses the following system port:

- "SUR_TRACK_GND at En-Route / Approach ATC" to get surveillance information.

Other systems such as Primary Radar, Secondary Radar and Aircraft are involved in the use case, but their contribution is out of scope of this solution.

3.1.1.2.3 Clearance Adherence Monitoring

The following functional blocks are involved in this use case:

Functional Block	Description

[5] The A/G Datalink Communications also include CPDLC capabilities; however, as it is used as a communication mean between pilot and controller to implement the conflict resolution, it is out of the scope of this technical specification.

[6] Only implemented in the V2 prototypes supporting ADS-C (PJ.10-02a2)

Surveillance	Provide surveillance data such as aircraft position, speed, Mode-S data, etc. from primary and secondary radar.
Flight Planning - Lifecycle Management - Data Distribution	Provides flight plan data, such as planned route, current clearance, etc…
A/G Datalink Communications[7]	Provides ADS-C reports[8]
Monitoring Aids	Analyze if the aircraft is following the cleared route plan and/or ATCO's clearances
Controller Human Machine Interaction Management ER/APP	Display conformance alerts to ATCO

Table 10: List of Functional Blocks involved in "Clearance Adherence Monitoring "

In this use-case, the main role is played by ATC Sector Executive Controller, but ATC Sector Planning Controller can also contribute significantly in any of the identified actions since he/she supports EC.

The whole use case is focused in the En-Route / Approach ATC technical system, it uses the following system ports:

- "SUR_TRACK_GND at En-Route / Approach ATC" to get surveillance information.

Other systems such as Primary Radar, Secondary Radar and Aircraft are involved in the use case, but their contribution is out of scope of this solution.

3.1.1.3 Applicable standards and regulations

Regulations

There is no specific topic in the field of the regulatory framework to be considered within the SESAR Solution PJ.10-02a (PJ.10-02a1 and PJ.10-02a2), beyond the applicable regulations currently existing.

Standards

[7] The A/G Datalink Communications also include CPDLC capabilities; however, as it is used as a communication mean between pilot and controller to implement the conflict resolution, it is out of the scope of this technical specification.

[8] Only implemented in the V2 prototypes supporting ADS-C (PJ.10-02a2)

For the improvements that take benefits from ADS-C data, it is critical that ADS-C standards and/or the use of ADS-C data by the Ground systems. The information exchange between Air and Ground is based on the usage of already existing standard: EUROCAE ATN B2: ED-228A and ED-229A.

Also for the usage of the surveillance data, the information exchange uses the existing ASTERIX data format [45].

GRIB standard is used as well to obtain weather data [46] [47].

3.1.2 Capability Configurations required for the SESAR Solution

SESAR Solution ID and Title	Capability Configurations (CCs) (from EATMA)	Sub-Operating Environment(s) where the CCs operate	Capabilities (from EATMA)	Nodes (from EATMA)	Stakeholders (from EATMA)
PJ.10-02a (PJ.10-02a1 and PJ.10-02a2) Separation Management En-Route and TMA	APP ACC	TMA / High Complexity TMA / Medium Complexity	Conflict Management/ Collision Avoidance / Mid-Air Collision Avoidance Conflict Management/ Separation Provision / Aircraft-to-Aircraft Separation Provision Information Management / Trajectory Management / Trajectory Conformance Monitoring	ATS Operations / En-Route/Approach ATS	Civil ATS Approach Service Provider Civil Scheduled Aviation Civil General Aviation
	ER ACC	En-Route / High Complexity En-Route / Medium Complexity	Conflict Management/ Collision Avoidance / Mid-Air Collision Avoidance Conflict Management/ Separation Provision / Aircraft-to-Aircraft Separation Provision Traffic Synchronisation / Spacing / Minimum Pair Separation Provision	ATS Operations / En-Route/Approach ATS	Civil ATS En-Route Service Provider Civil Scheduled Aviation Civil General Aviation

			Traffic Synchronisation / Spacing / Aircraft-to-Aircraft Spacing Monitoring Information Management / Trajectory Management / Trajectory Conformance Monitoring		
	Surveillance Infrastructure En-Route	En-Route / High Complexity En-Route / Medium Complexity	CNS / Surveillance		Civil ATS En-Route Service Provider
	Surveillance Infrastructure TMA	TMA / High Complexity TMA / Medium Complexity	CNS / Surveillance		Civil ATS Approach Service Provider
	Non-ATM MET Service Providers (External)	TMA / High Complexity TMA / Medium Complexity En-Route / High Complexity En-Route / Medium Complexity	Information Management / Aeronautical and Meteorological Information Management / Meteorological Observation and Forecasting Provision	Meteorological Service Provision	Civil ATS En-Route Service Provider Civil ATS Approach Service Provider Civil MET Service Provider
	Civil Aircraft	En-Route TMA	Clearance/Instruction Management;	Flight Deck	Airspace users

Table 11: List of Capability Configuration required for the SESAR Solution

3.2 Changes imposed by the SESAR Solution on the baseline Architecture

PJ.10-02a2 - V2 Enablers

Enabler ID (from EATMA)	Enabler Title (from EATMA)	Changes

ER APP ATC 100	4D Trajectory Management by Synchronization of Air and Ground Trajectories through EPP	"Compute Planned Trajectory" Function contained in "Trajectory Prediction and Management" Functional Block shall be modified to use ADS-C data (mainly EPP) to compute a more accurate planned trajectory.
ER APP ATC 104b	Adapt Controller Conflict Detection and Resolution Tools to Use Enhanced Trajectory Prediction	"Compute Planned Trajectory" Function contained in "Trajectory Prediction and Management" Functional Block shall be modified to use Mode-S data, ADS-C information and weather data (GRIB) to compute a more accurate planned trajectory.
		"Compute Tactical Trajectory" Function contained in "Trajectory Prediction and Management" Functional Block shall be modified to use Mode-S data, ADS-C information and weather data (GRIB) to compute a more accurate tactical trajectory.
ER APP ATC 104d	Adapt Controller Conformance Monitoring Tools to Use Enhanced Trajectory Prediction	"Analyze Conformance" Function contained in "Monitoring Aids" functional block shall be modified to use Mode-S data to improve conformance performance, and ADS-C data (mainly EPP) to foresee out of conformance alerts.

Table 12: List of changes in the PJ.10-02a2 - V2 enablers due to the SESAR Solution

PJ.10-02a1 - V3 Enablers

Enabler ID (from EATMA)	Enabler Title (from EATMA)	Changes
APP ATC 155	ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA	"Search Planned Conflicts" and "Search Tactical Conflicts" Functions contained in "Conflict management" Functional Block shall be modified to support a TMA environment.
		"Display Planned Conflicts" and "Display Tactical Conflicts" Functions contained in "Controller Human Machine Interaction Management ER/APP" Functional Block shall be customized to a TMA environment.
APP ATC 168	ATC System Support for Advanced Conformance Monitoring in the TMA	"Asterix62 Processing" Function contained in "Monitoring Aids" Functional Block shall be modified to extract Mode-S data.
		"Analyze Conformance" Function contained in "Monitoring Aids" functional block shall be modified to support a TMA environment.

		"Display Conformance State" Function contained in "Monitoring Aids" functional block shall be modified and customized to a TMA environment to display conformance alerts.
ER APP ATC 104	Adapt Controller Conflict Detection and Resolution Tools to Use Enhanced Ground-Based Trajectory Prediction	"Compute Planned Trajectory" Function contained in "Trajectory Prediction and Management" Functional Block shall be modified to use Mode-S data and weather data (GRIB) to compute a more accurate planned trajectory.
		"Compute Tactical Trajectory" Function contained in "Trajectory Prediction and Management" Functional Block shall be modified to use Mode-S data and weather data (GRIB) to compute a more accurate tactical trajectory.
ER APP ATC 104c	Adapt Controller Conformance Monitoring Tools to Use Enhanced Ground-Based Trajectory Prediction	"Analyze Conformance" Function contained in "Monitoring Aids" functional block shall be modified to use Mode-S data to improve conformance performance.
ER ATC 157b[9]	Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route	"Search Planned Conflicts" Function contained in "Conflict management" Functional Block shall be modified to support En-Route environment.
		"Display Planned Conflicts" Function contained in "Controller Human Machine Interaction Management ER/APP" Functional Block shall be customized to an En-Route environment.

Table 13: List of changes in the PJ.10-02a1 - V3 enablers due to the SESAR Solution

[9] CR 03688 to link this enabler to solution PJ.10-02a1 is in progress.

4 Technical Specifications

4.1 Functional architecture overview

This TS is mainly focused in the following functional blocks:

- Conflict management
- Monitoring Aids
- Controller Human Machine Interaction Management ER/APP

In this solution, the following functional blocks also play a very important role:

- A/G Datalink Communications
- Coordination and Transfer
- Flight Planning - Lifecycle Management - Data Distribution
- Surveillance
- Trajectory Prediction and Management
- Weather Management

The following table contains the relation between Functions and Functional Blocks/Systems/Role used in this solution:

Function	Functional Block	System	Role
Accept Probe (PJ.10-02a);			ATC Planning Controller (PJ.10-02a)
Accept Route Change Request (PJ.10-02a);			ATC Planning Controller (PJ.10-02a)
Analyze Conformance	Monitoring Aids		
Assess Planning Conflict (PJ.10-02a);			ATC Planning Controller (PJ.10-02a)
Assess Probe Results (10-02a);			ATC Planning Controller (PJ.10-02a)
Assess Route Change Request;			ATC Planning Controller (PJ.10-02a)
Asterix62 Processing	Surveillance		
Cancel Probe (PJ.10-02a);			ATC Planning Controller (PJ.10-02a)
Compute Planned Trajectory	Trajectory Prediction and Management		
Compute Tactical Trajectory	Trajectory Prediction and Management		
Coordination Agreed Data	Coordination and Transfer		

Display Conformance State	Controller Human Machine Interaction Management ER/APP		
Display Entry Coordination;	Controller Human Machine Interaction Management ER/APP		
Display Planned Conflicts	Controller Human Machine Interaction Management ER/APP		
Display Probed Conflict (PJ.10-02a);	Controller Human Machine Interaction Management ER/APP		
Display Tactical Conflicts	Controller Human Machine Interaction Management ER/APP		
Display What-Else Results	Controller Human Machine Interaction Management ER/APP		
Input Abrogate Coordination (PJ.10-02a);	Controller Human Machine Interaction Management ER/APP		
Input Accept Probe (PJ.10-02a);	Controller Human Machine Interaction Management ER/APP		
Input Accept Route Change Request (PJ.10-02a);	Controller Human Machine Interaction Management ER/APP		
Input Cancel Probe (PJ.10-02a);	Controller Human Machine Interaction Management ER/APP		
Input Probe New Entry Coordination Conditions (PJ.10-02a);	Controller Human Machine Interaction Management ER/APP		
Flight Plan Change	Flight Planning - Lifecycle Management - Data Distribution		
Planned Conflicts Actions Input	Controller Human Machine Interaction Management ER/APP		

Process ADS-C Report[10]	A/G Datalink Communications		
Process GRIB	Weather Management		
Reject Route Change Request (PJ.10-02a);			ATC Planning Controller (PJ.10-02a)
Request What-Else	Controller Human Machine Interaction Management ER/APP		
Search Planned Conflicts	Conflict management		
Search Tactical Conflicts	Conflict management		
Upload GRIB File			ATSEP

Table 14: Relation between Function and Functional Blocks/Systems/Role

4.1.1 Resource Connectivity Model

This diagram (Figure 2: Resource Connectivity Model) contains the different architectural elements interacting through Resource Interactions to describe this solution.

It includes the realization of Use Cases:

- Conformance Monitoring
- Planned Conflict Detection
- Tactical Conflict Detection
- Planned Conflict Solving using Lateral Closed Loop Clearances

[10] Only on those prototypes addressing ADS-C

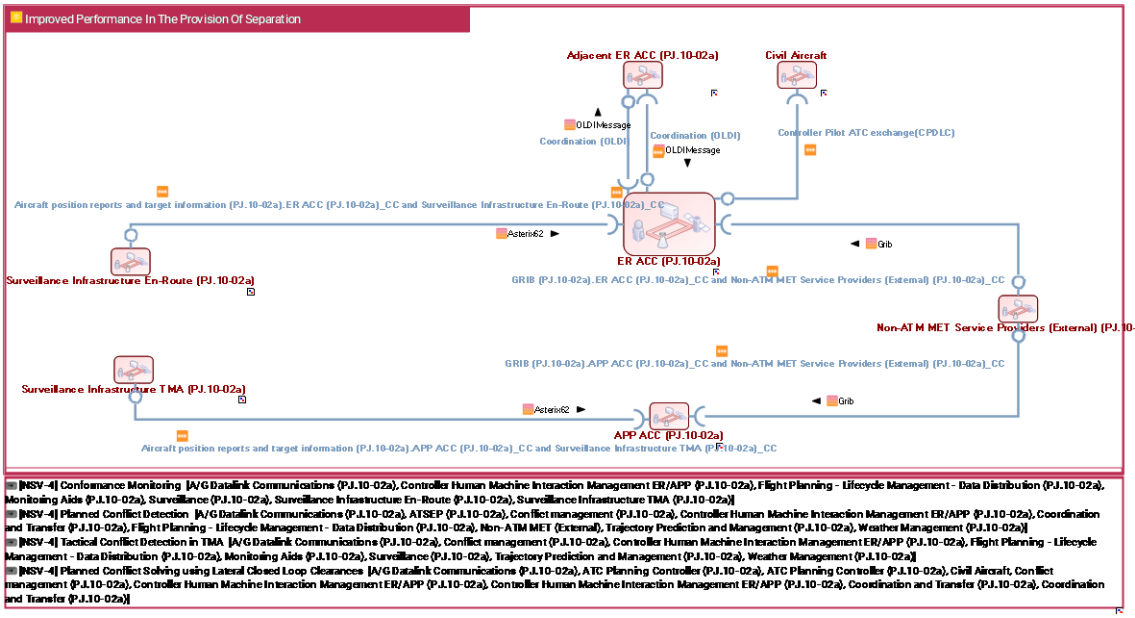


Figure 2: Resource Connectivity Model

4.1.2 Resource Orchestration view

The following Function Context Diagrams show the sequence of Functions among Functional Blocks/Roles. They are focused in the APP ACC Capability Configurator, but the same diagrams would apply to the ER ACC Capability Configurator.

4.1.2.1 Conformance Monitoring in En-Route or TMA

This diagram (Figure 3: Conformance Monitoring in En-Route or TMA Resource Orchestration Model) describes the conformance monitoring process: check if the aircraft (track) is not flying according to horizontal and/or vertical clearance, i.e. according to a cleared route, a cleared flight level, etc...

Mode-S enhanced data and ADS-C reports[11] downloaded from aircraft can also be used too to check adherence to clearance and planned route.

[11] Only implemented in the V2 prototypes supporting ADS-C (PJ.10-02a2)

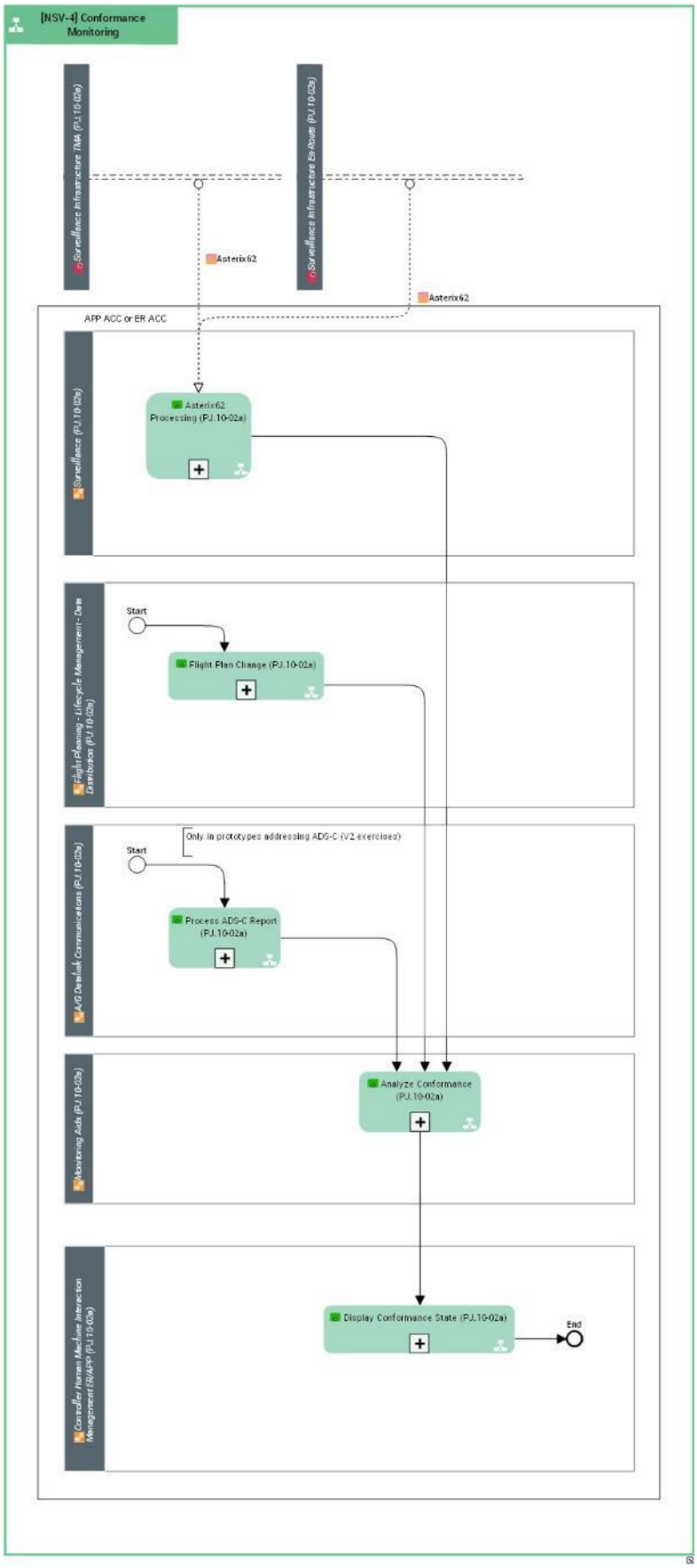

[NSV-4] Conformance Monitoring
Surveillance Infrastructure TMA (PJ.10-02b)
Surveillance Infrastructure En-Route (PJ.10-02b)
Asterix62
Asterix62
APP ACC or ER ACC
Surveillance (PJ.10-02b)
Asterix62 Processing (PJ.10-02a)
Flight Planning - Lifecycle Management - Data Distribution (PJ.10-02b)
Start
Flight Plan Change (PJ.10-02a)
A/G Datalink Communications (PJ.10-02b)
Only in prototypes addressing ADS-C (V2 exercises)
Start
Process ADS-C Report (PJ.10-02a)
Monitoring Aids (PJ.10-02b)
Analyze Conformance (PJ.10-02a)
Controller Human Machine Interaction Management ER/APP (PJ.10-02b)
Display Conformance State (PJ.10-02a)
End

Figure 3: Conformance Monitoring in En-Route or TMA Resource Orchestration Model

Function	Description
Analyze Conformance (PJ.10-02a)	Analyze the conformance monitoring of an aircraft: it evaluates the compliance of current horizontal and vertical clearances, i.e.: adherence to its planned route and vertical manoeuvre according to Cleared Flight Level.
Asterix62 Processing (PJ.10-02a)	Process and validate Asterix 62 information received. Send processed data to other functions.
Display Conformance State (PJ.10-02a)	Display (or undisplay) the different conformance monitoring alerts (vertical, horizontal, etc...)
Flight Plan Change (PJ.10-02a)	This function distributes flight plan data (including tactical clearance and planned trajectory) whenever there is a change.
Process ADS-C Report (PJ.10-02a)[12]	Process ADS-C data (e.g. EPP and speed schedule) received from aircraft. More information in PJ.18-06b

Table 15: Functions used in "Conformance Monitoring in En-Route or TMA" Resource Orchestration Model

4.1.2.2 Planned Conflict Detection in En-Route or TMA

This diagram (Figure 4: Planned Conflict Detection in En-Route or TMA Resource Orchestration Model) describes the planned conflict detection process, which has three steps as follows:

- Build planned trajectory by means of:
  - Flight plan data
  - Meteorological Data (GRIB)
  - ADS-C data (out of scope of this solution, more information in PJ.18-06a)[13]
- Detect planned conflicts by means of:
  - Planned trajectories previously computed.
  - Coordination agreed data, such as Entry Flight Level, Exit Flight Level, etc...

[12] Only on those prototypes addressing ADS-C

[13] Only implemented in the V2 prototypes supporting ADS-C (PJ.10-02a2)

- Display result in CWP

In addition, ATCO actions related with planned conflicts are described.

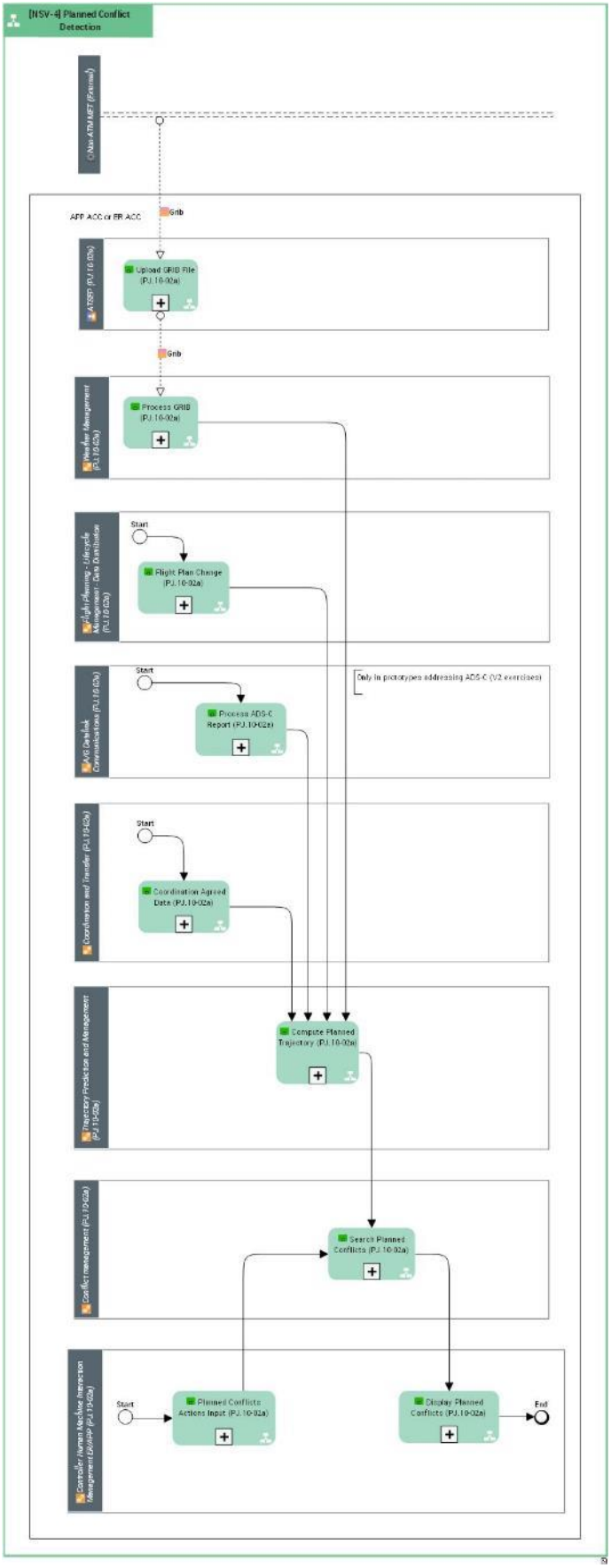

[NSV-4] Planned Conflict Detection
Grib
Upload GRIB File (PJ.10-02a)
Grib
Process GRIB (PJ.10-02a)
Start
Flight Plan Change (PJ.10-02a)
Start
Only in prototypes addressing ADS-C (V2 exercises)
Process ADS-C Report (PJ.10-02a)
Start
Coordination Agreed Data (PJ.10-02a)
Compute Planned Trajectory (PJ.10-02a)
Search Planned Conflicts (PJ.10-02a)
Start
Planned Conflicts Actions Input (PJ.10-02a)
Display Planned Conflicts (PJ.10-02a)
End

Figure 4: Planned Conflict Detection in En-Route or TMA Resource Orchestration Model

Function	Description
Compute Planned Trajectory (PJ.10-02a)	- Build planned trajectory by means of: * Flight plan data (using BADA) * Meteorological Data (GRIB) * ADS-C data (out of scope of this solution, more information in PJ.18-06a)
Coordination Agreed Data (PJ.10-02a)	Get coordination agreed data such as NFL, XFL, etc....
Display Planned Conflicts (PJ.10-02a)	Display (or undisplay) the planned conflicts detected
Flight Plan Change (PJ.10-02a)	This function distributes flight plan data (including tactical clearance and planned trajectory) whenever there is a change.
Planned Conflicts Actions Input (PJ.10-02a)	Actions from ATCO related with planned conflicts, such as: - Acknowledge a conflict - Request a new conflcit search
Process ADS-C Report (PJ.10-02a)[14]	Process ADS-C data (e.g. EPP and speed schedule) received from aircraft. More information in PJ.18-06b
Process GRIB (PJ.10-02a)	Process a GRIB file to extract weather forecast information
Search Planned Conflicts (PJ.10-02a)	- Detect planned conflicts by means of: * Planned trajectories previously computed. * Coordination agreed data, such as EntryFlightLevel , ExitFlightLevel, etc...
Upload GRIB File (PJ.10-02a)	Upload a GRIB file into the system

Table 16: Functions used in "Planned Conflict Detection in En-Route or TMA" Resource Orchestration Model

[14] Only on those prototypes addressing ADS-C

4.1.2.3 Tactical Conflict Detection in En-Route or TMA

This diagram (Figure 5: Tactical Conflict Detection in En-Route or TMA Resource Orchestration Model) describes the tactical conflict detection process, which has 3 steps as follows:

- Build tactical trajectory by means of:
    - Flight plan data
    - Meteorological Data (GRIB)
    - Surveillance data (actual position, current speed, Mode S data, etc...)
    - ADS-C data (out of scope of this solution, more information in PJ.18-06a)[15]
    - Conformance alerts
- Detect tactical conflicts using tactical trajectories
- Display result in CWP

If a flight has the "what-else" functionality active it will create n tactical trajectories (speculative trajectories) for all the allowed combination of CFL, headings, etc...

In addition, ATCO what-else request is described.

[15] Only implemented in the V2 prototypes supporting ADS-C (PJ.10-02a2)

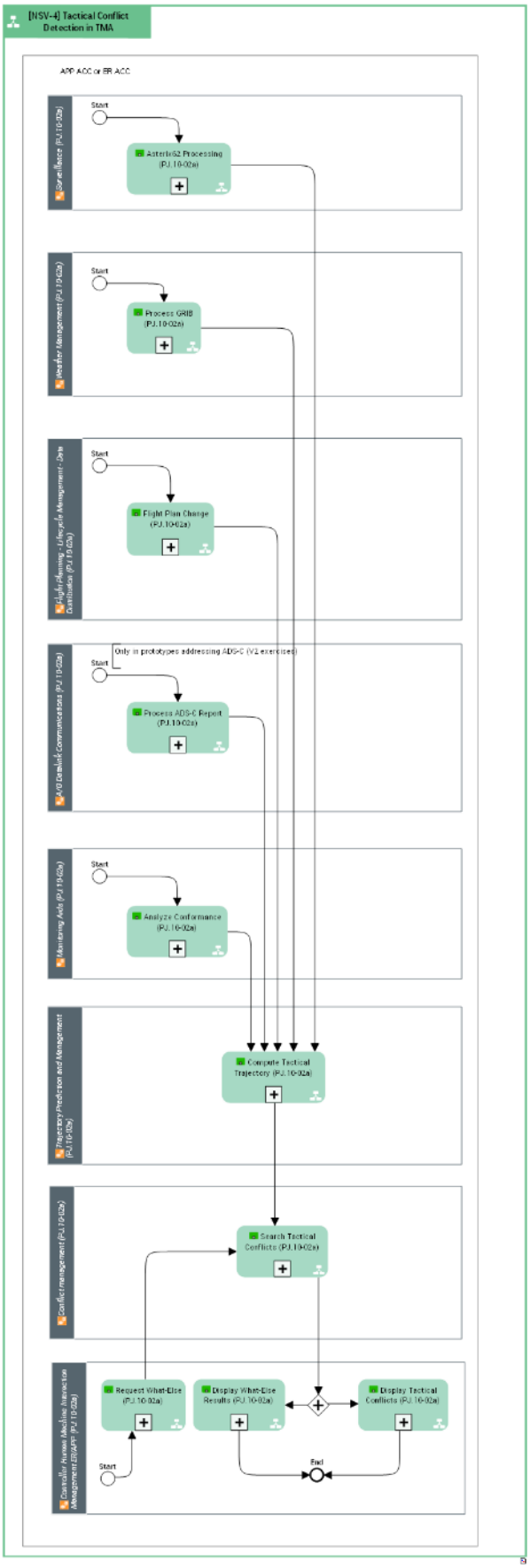

[NSV-4] Tactical Conflict Detection in TMA
APP ACC or ER ACC
Start
Asterix62 Processing (PJ.10-02a)
Process GRIB (PJ.10-02a)
Flight Plan Change (PJ.10-02a)
Only in prototypes addressing ADS-C (V2 exercises)
Process ADS-C Report (PJ.10-02a)
Analyze Conformance (PJ.10-02a)
Compute Tactical Trajectory (PJ.10-02a)
Search Tactical Conflicts (PJ.10-02a)
Request What-Else (PJ.10-02a)
Display What-Else Results (PJ.10-02a)
Display Tactical Conflicts (PJ.10-02a)
End

Figure 5: Tactical Conflict Detection in En-Route or TMA Resource Orchestration Model

Function	Description
Analyze Conformance (PJ.10-02a)	Analyze the conformance monitoring of an aircraft: it evaluates the compliance of current horizontal and vertical clearances, i.e.: adherence to its planned route and vertical manoeuvre according to Cleared Flight Level.
Asterix62 Processing (PJ.10-02a)	Process and validate Asterix 62 information received. Send processed data to other functions.
Compute Tactical Trajectory (PJ.10-02a)	- Build tactical trajectories by means of: * Flight plan data (using BADA) * Meteorological Data (GRIB) * Surveillance data (actual position, current speed, Mode S data, etc...) * ADS-C data (out of scope of this solution, more information in PJ.18-06a) It will create deviation tactical trajectories if flight has vertical/horizontal conformance alerts. If a flight has the "what-else" functionality active it will create n tactical trajectories (speculative trajectories) for all the allowed combination of CFL, headings, etc...
Display Tactical Conflicts (PJ.10-02a)	Display (or undisplay) the tactical conflicts detected
Display What-Else Results (PJ.10-02a)	Display the result of a what-else probing.
Flight Plan Change (PJ.10-02a)	This function distributes flight plan data (including tactical clearance and planned trajectory) whenever there is a change.

Process ADS-C Report (PJ.10-02a)[16]	Process ADS-C data (e.g. EPP and speed schedule) received from aircraft. More information in PJ.18-06b
Process GRIB (PJ.10-02a)	Process a GRIB file to extract weather forecast information
Request What-Else (PJ.10-02a)	Request (or clear) a what-else for a flight
Search Tactical Conflicts (PJ.10-02a)	- Detect tactical conflicts by means of: * Tactical trajectories previously computed * Deviation trajectories (if flight is out of conformance) * Speculative trajectories (if flight has what-else active).

Table 17: Functions used in "Tactical Conflict Detection in En-Route or TMA" Resource Orchestration Model

4.1.2.4 Planned Conflict Solving using Lateral Closed Loop Clearances

This diagram (Figure 6: Planned Conflict Solving using Lateral Closed Loop Clearances Resource Orchestration Model) describes the conflict resolution process performed by Planner Controller using datalink closed loop clearance ("RTE VIA").

[16] Only on those prototypes addressing ADS-C

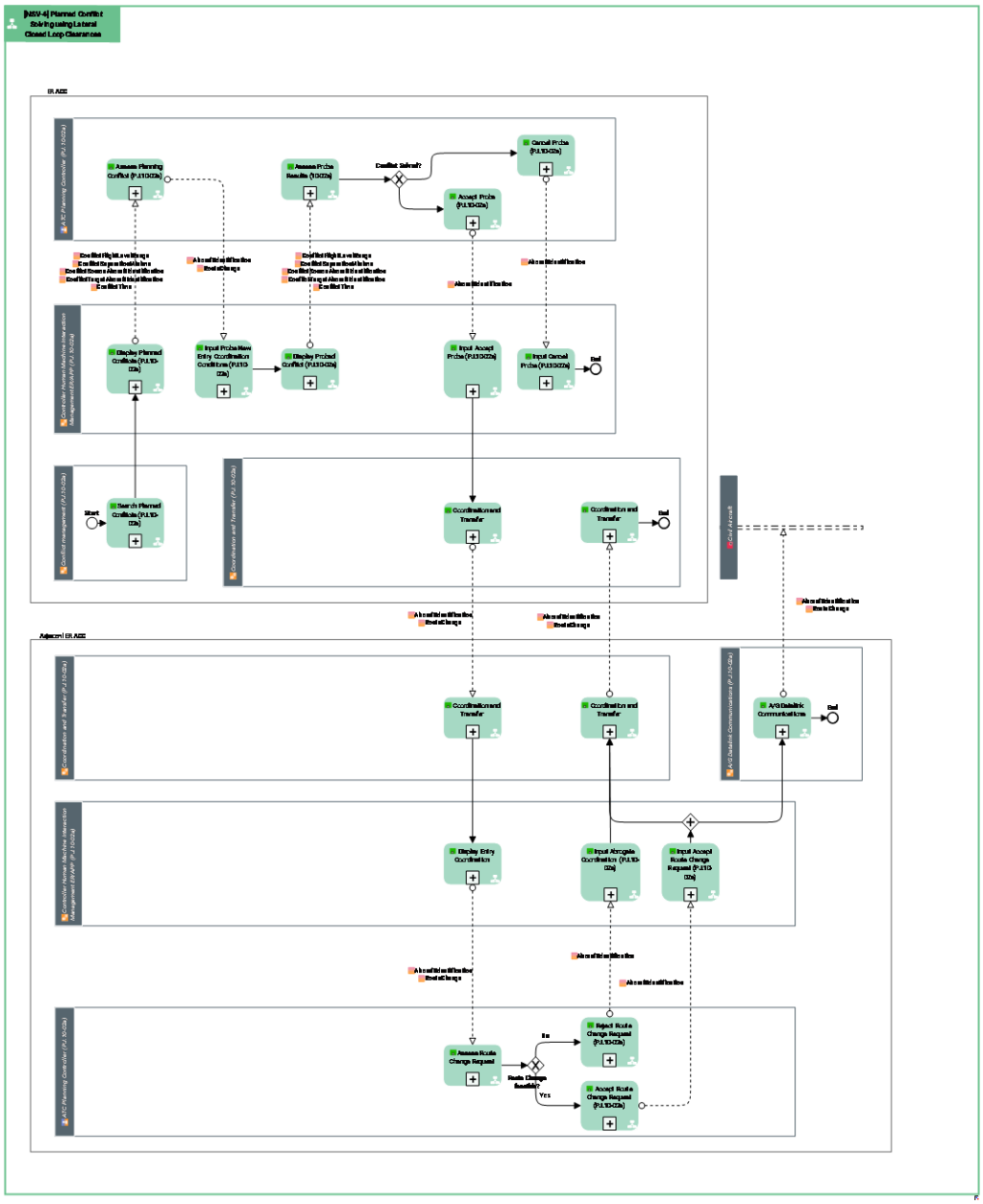


Figure 6: Planned Conflict Solving using Lateral Closed Loop Clearances Resource Orchestration Model

Function	Description
A/G Datalink Communications	The Air-Ground Datalink Communication functional block comprises the communication function (as defined in 10.07.01-D03) that provides the means to exchange air-ground datalink communication and surveillance messages through standardised datalink communication protocols, relayed by external air-ground

	data communication networks (i.e. the ATN and/or the ACARS networks). This comprises: · translating the generic datalink communications internal protocol (i.e. CM, CPDLC, ADS-C and DFIS) into the two main standard communication protocols (i.e. the ATN/OSI protocol and/or the ACARS based protocols); · Ensuring the reception and transmission of the standardised datalink message on the air-ground communication network via the ATN and ACARS ground stacks.
Accept Probe (PJ.10-02a)	ATCO confirm a requested probe.
Accept Route Change Request (PJ.10-02a)	If accepted, the route clearance is automatically converted into a CPDLC message (UM79 - "CLEARED TO... VIA...") and uplinked to the aircraft. An acceptance is also sent to the downstream sector.
Assess Planning Conflict (PJ.10-02a)	ATCO assess the planning conflict
Assess Probe Results (10-02a)	ATCO assesses probe (what-if) result.
Assess Route Change Request	The upstream Planner or Executive controller assesses the proposed route clearance and its impact on their traffic.
Cancel Probe (PJ.10-02a)	ATCO cancel a requested probe.
Coordination and Transfer	The Coordination & Transfer functional block comprises the management of coordination and transfer of flights between "internal" sectors and with external ATSUs, civil/military coordination, pre-departure clearance coordination, and the processing of oceanic clearances. The type of connection with the coordination partner (e.g. internal sector, OLDI ATSU, Flight Object ATSU) is largely transparent to the Coordination and Transfer functional block as the coordination and transfer process is common to all. C&T addresses the following aspects: · Identification of the sectors/units that are interested in the flight (i.e. that will either control the flight or for which part or all of the flight needs to be coordinated or informed) based on the airspace intersections, as provided by TP&M, together with other data such as flight category (GAT/OAT), rules (IFV/VFR), ADEP/ADES, distance flown in the sector, etc · Synchronization of the transfer of frequency with ACM when needed · Synchronisation of the SSR code with the upstream centre (in conjunction with GGDC) · Identification of LOAs to be used · Check that coordinated entry/exit conditions are achievable (e.g. from planned trajectory) and generate consequent warnings · Identification of the executive data at the transfer time (i.e. CFL, Assigned ROCD, Assigned Heading…)

Display Entry Coordination	Display entry coordination proposal
Display Planned Conflicts (PJ.10-02a)	Display (or undisplay) the planned conflicts detected
Display Probed Conflict (PJ.10-02a)	Display the planned conflicts detected with a what-if subject/environment flight plan.
Input Abrogate Coordination (PJ.10-02a)	Planning Controller inputs abrogation of the coordination via the HMI.
Input Accept Probe (PJ.10-02a)	ATCO input the confirmation of a requested probe.
Input Accept Route Change Request (PJ.10-02a)	Route clearance is automatically converted into a CPDLC message (UM79 - "CLEARED TO... VIA...") and uplinked to the aircraft. An acceptance is also sent to the downstream sector.
Input Cancel Probe (PJ.10-02a)	ATCO input the cancelation of a requested probe.
Input Probe New Entry Coordination Conditions (PJ.10-02a)	Planning Controller probes (what-if) new entry coordination conditions (new route) to assess the impact of it without affecting the actual flight. After evaluating the impact, ATCO may confirm/implement or cancel.
Reject Route Change Request (PJ.10-02a)	A route clearance request might be rejected if the ATCO is too busy to consider it, or has a conflict with that aircraft.
Search Planned Conflicts (PJ.10-02a)	- Detect planned conflicts by means of: * Planned trajectories previously computed. * Coordination agreed data, such as EntryFlightLevel , ExitFlightLevel, etc...

Table 18: Functions used in "Planned Conflict Solving using Lateral Closed Loop Clearances" Resource Orchestration Model

4.1.3 Infrastructure connectivity model

The following Infrastructure Connectivity Diagrams describe how the technical infrastructure physically connects the different Technical Systems in order to realize the logical Resource Interactions.

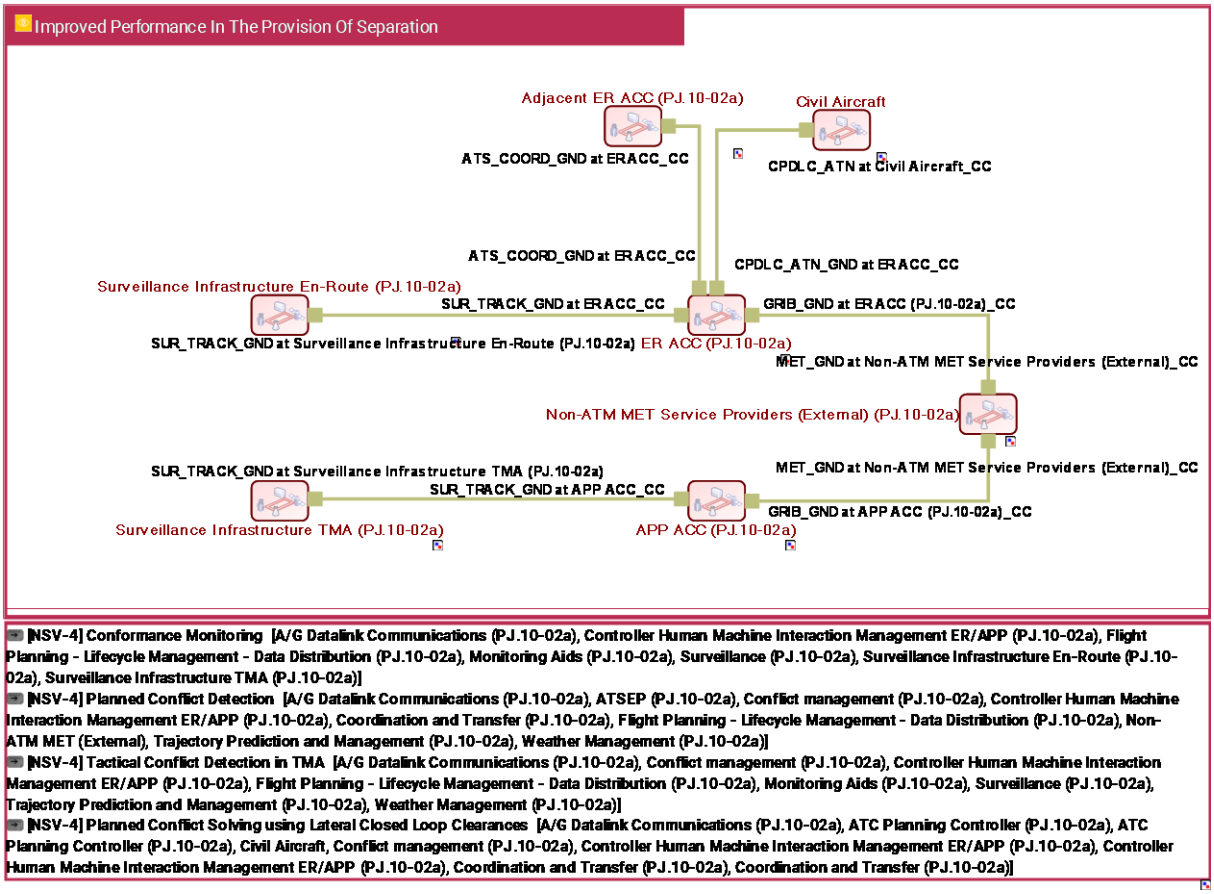


Figure 7: Infrastructure connectivity model

4.1.4 Service view

4.1.4.1 Service description

As legacy technologies (ASTERIX 62, GRIB meteorological standard, etc.) are used, no new services have been defined.

4.1.4.2 Service Provisioning

This section is not applicable in this solution.

4.1.4.3 Service Realization

This section is not applicable in this solution.

4.2 Functional and non-Functional Requirements

The main purpose of these requirements is to create a reference for the development of prototypes that supported the V2 and V3 validations exercises.

Most of the following requirements came from SESAR1 (10.04.01 [38] and 10.04.02 [39]) as they did not reach a V3 maturity in En-Route and/or TMA environment. In this solution they have been implemented and tested in the V3 validation exercises in En-Route and/or TMA environment.

Additional requirements to define the improvement of conflict detection/conformance monitoring using ADD have also been added, they have implemented and tested in V2 or V3 prototypes depending on whether they used ADS-C data or not respectively.

A requirement labelled as "<validated>" means that the requirement is verified and involved in a validation exercise that achieved V3. For these validated requirements, the rationale indicates the related validation exercise.

All technical requirements are available in the SE-DMF tool in the solution folder and have been exported to this document.

Requirements identifier follows the following naming convention:

REQ-10.02a-TS-<FF>.<Number>

where <FF> is:

- CM: Conformance Monitoring
- PTT: Conflict detection, requirement that fulfills both PC Aid and TC Aid tools.
- PT: PC Aid tool
- TT: TC Aid tool

4.2.1 PJ.10-02a1 - V3 Requirements

4.2.1.1 Conformance Monitoring

[REQ]

Identifier	REQ-10.02a1-TS-CM.001
Title	Eligibility for conformance monitoring
Requirement	All correlated flights with a planned or a tactical trajectory shall be eligible for Conformance Monitoring.
Status	<validated>

Rationale	Flight plan correlated with an ADS-C track, will be eligible too. Planned trajectories modified upon controller clearances will be eligible too. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<ALLOCATED_TO>	<Functional block>	Flight Planning - Lifecycle Management - Data Distribution (PJ.10-02a) Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Flight Plan Change (PJ.10-02a) Analyze Conformance (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-CM.002
Title	Continuous monitoring of track data and clearance data
Requirement	For a flight eligible for conformance monitoring, the conformance monitoring function shall compare track state vector of an aircraft with FP clearance data when track data or FP clearance data are updated.
Status	<validated>

Rationale	Track state vector is track data provided periodically by the surveillance. In the event that the track data is not received for a time parameter (associated to the track distribution period), the flight is considered as not-correlated (due to track lost) so it is not subject to conformance monitoring. The FP clearance data is provided as a trajectory or as a horizontal and a vertical clearance. Both data defines two 4D positions to be compared to obtain a conformance status. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-IER0.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-IER0.0003
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a) Surveillance (PJ.10-02a) Flight Planning - Lifecycle Management - Data Distribution (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Flight Plan Change (PJ.10-02a) Analyze Conformance (PJ.10-02a) Asterix62 Processing (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-CM.006
Title	Route Deviation Detection for a flight plan.
Requirement	When the track is outside of the flight path and the track is also outside the radius around a waypoint of the flight route, the Conformance Monitoring function shall detect a route deviation.
Status	<validated>
Rationale	Track will be identified as outside of the flight path, if the distance between the horizontal position of the track and its perpendicular projection on the planned trajectory or tactical trajectory is bigger than a distance parameter. Thresholds for distance between the horizontal position of the track and its perpendicular projection on the (planned or tactical) trajectory and threshold for radius around the waypoint can be defined as different parameters. This requirement specifies the case when no heading clearance is ongoing; in case there is a heading clearance applied to a flight, the conformance monitoring detects a route deviation if the flight heading does not comply the cleared one. Conformance Monitoring will check route deviation at a rate of at least once per a VSP configurable time. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-CMON.0003

<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-CMON.004
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-CM.007
Title	Removal of lateral deviation warning after new route assigned from the controller
Requirement	Upon controller entry, to a flight in lateral deviation, of a new assigned route, heading with which the system track is in conformance, the conformance monitoring shall remove the lateral deviation warning.
Status	<validated>
Rationale	When flight plan data is changed conformance monitoring will remove old alerts if they are no longer valid. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a)

<ALLOCATED_TO>	<Enabler>	APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-CM.008
Title	Route Deviation Removal.
Requirement	For a flight with a Route Deviation, the Conformance Monitoring shall remove the route deviation if the track is inside the flight path.
Status	<validated>
Rationale	In this case Route Deviation is removed due to the track returning inside the flight path (without any new clearance coming from the controller) This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-CMON.0003
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-CM.009
Title	Vertical Rate Deviation Detection
Requirement	For a flight in vertical manoeuvre to a not reached CFL, the Conformance Monitoring function shall detect a vertical rate deviation if the following conditions are fulfilled: a) No CFL deviation or level bust is detected, and b) vertical latency time after a new vertical clearance has been elapsed, and c) the new CFL is not reached, and d) actual vertical rate is: 1) If cleared vertical rate type is “less or equal than“: actual vertical rate is greater than cleared vertical rate plus a threshold parameter 2) If cleared vertical rate type is “equal or greater than“: actual vertical rate is lower than cleared vertical rate minus a threshold parameter. 3) If cleared vertical rate type is “between“: actual vertical rate is lower than cleared lower vertical rate minus a threshold parameter or actual vertical rate is greater than upper cleared vertical rate plus a threshold parameter. 4) If cleared vertical rate type is “fixed“: actual vertical rate is lower than vertical rate minus a threshold parameter or actual vertical rate is greater than cleared vertical rate plus a threshold parameter.
Status	<validated>
Rationale	A CFL is reached when the difference between AFL and CFL is lower than a threshold. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier

<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-CMON.0005
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0008
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-CM.010
Title	Vertical Rate Deviation removal due to flight.
Requirement	For a flight with a Vertical Rate Deviation, the Conformance Monitoring shall discard the Vertical Rate Deviation, if any of the following conditions is fulfilled: a) CFL is reached (difference between AFL and CFL is lower than a threshold) b) actual vertical rate is 1) If cleared vertical rate type is “less or equal than“: actual vertical rate is lower than cleared vertical rate plus a threshold parameter 2) If cleared vertical rate type is “equal or greater than“: actual vertical rate is greater than cleared vertical rate minus a threshold parameter. 3) If cleared vertical rate type is “between“: actual vertical rate is greater than cleared lower vertical rate minus a threshold parameter or actual vertical rate is lower than upper cleared vertical rate plus a threshold parameter. 4) If cleared vertical rate type is “fixed“: actual vertical rate is greater than vertical rate minus a threshold parameter or actual vertical rate is lower than cleared vertical rate plus a threshold parameter.
Status	<validated>

Rationale	As a summary, a Vertical Deviation is removed when it is no longer detected, so the detection conditions are no longer fulfilled. Consequently, conditions to discard a Vertical Rate Deviation are the negative case of the Vertical Rate Deviation Detection conditions. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-CMON.0005
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-CMON.0007
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-CM.011
Title	CFL Deviation Detection for CFL Reached
Requirement	For a CFL previously reached, the Conformance Monitoring shall detect a CFL deviation if the AFL differs from the CFL by more of a threshold.
Status	<validated>

Rationale	A CFL is reached from the moment when the difference between AFL and CFL is lower than a threshold. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-CMON.0005
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-CMON.0006
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-CM.012
Title	CFL Deviation Detection for CFL Not Reached
Requirement	For a CFL not reached, the Conformance Monitoring shall detect a CFL deviation if current AFL is outside a band level between the previous AFL and the CFL.
Status	<validated>

Rationale	A CFL is not reached from the moment that it is input to the moment when the difference between AFL and CFL is lower than a threshold. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-CMON.0005
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-CMON.0006
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-CM.013
Title	CFL Deviation removal due to flight return to cleared level.
Requirement	For a flight with a CFL Deviation, if the AFL differs from the CFL by less than a threshold, the Conformance Monitoring shall discard the CFL Deviation.
Status	<validated>

Rationale	The CFL Deviation may be removed due to a new CFL (CFL is updated) or due to the flight returning to current CFL (AFL is updated). Both cases are included in this requirement. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-CMON.0005
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-CM.018
Title	Mode S Selected Altitude Deviation Detection with clearance latency.
Requirement	Upon a latency time after a new vertical clearance has been elapsed, if the Mode S Selected Altitude differs to CFL, the Conformance Monitoring function shall detect a Mode S Altitude Deviation.
Status	<validated>

Rationale	In order to avoid that Mode S Selected Altitude Deviation is raised every time a new CFL is input, a time latency condition is added. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-004
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0002
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0009
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER APP ATC 104c_Adapt Controller Conformance Monitoring Tools to Use Enhanced Ground-Based Trajectory Prediction APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-CM.019
Title	Mode S Selected Altitude Deviation removal
Requirement	For a flight with a Mode S Altitude Deviation, if the Mode S Selected Altitude is equal to CFL, the Conformance Monitoring shall remove the Mode S Altitude Deviation.
Status	<validated>

Rationale	Deviation removal condition may be achieved due to a CFL updated or due to a Mode S Selected Altitude, both cases will achieve the deviation removal. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-004
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0002
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0009
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER APP ATC 104c_Adapt Controller Conformance Monitoring Tools to Use Enhanced Ground-Based Trajectory Prediction APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-CM.021
Title	Displaying availability of non-conformance warnings.
Requirement	All detected deviations shall be available to be displayed as non-conformance warnings in the respective position sector.
Status	<validated>

Rationale	All detected deviations has to be available to be displayed, that does not mean than all detected deviation has to be displayed (may be configured, adapted, or manually inhibited). This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0033
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Conformance State (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER APP ATC 104c_Adapt Controller Conformance Monitoring Tools to Use Enhanced Ground-Based Trajectory Prediction APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-CM.022
Title	Availability of type of trajectory deviation for non-conformance warning.
Requirement	The type of the detected deviation shall be available for presentation for a displayed non-conformance warning to the respective position sector.

Status	<validated>
Rationale	The precise non-conformance warnings to be defined and which deviations generate each warning display are implementation. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-SAFE.0010
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0033
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Conformance State (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-CM.023
Title	Presentation and removal of conformance warning
Requirement	Whenever conformance monitoring warning is provided, it shall be made available for presentation to the respective position sector, until it is removed by the Conformance Monitoring function.
Status	<validated>

Rationale	The non-conformance warning to be distributed, displayed and removed to the interested position sector. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0033
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a) Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Conformance State (PJ.10-02a) Analyze Conformance (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-CM.024
Title	Conformance monitoring capacity
Requirement	The conformance monitoring shall be able to manage at least 200 flights per control area (TMA or ACC).
Status	<validated>

Rationale	The number of managed flights per control area includes flights under control (in live status) or within the look ahead time per each control area. Capacity for future flights (not within the look ahead time) or additional control areas are outside this number. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-CM.025
Title	Data items from a non-conformance warning
Requirement	The Conformance Monitoring shall at least produce the following Deviation Detection data items in case of a non-conformance warning: • Type of non-conformance • Non-conformance measure • Time of non-conformance
Status	<validated>

Rationale	Type of non-conformance (e.g. lateral conformance, vertical rate conformance), Non-Conformance Measure (e.g. lateral left deviation, lateral right deviation), Time of non-conformance (when the non-conformance starts). This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional> , <IER>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-IER0.0006
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-CM.026
Title	Conditions for Deviation Trajectory calculation trigger
Requirement	Upon detection of a NoTT Deviation, a Route Deviation, a Speed Deviation, a CFL Deviation, a Vertical Deviation, a Mode S Selected Altitude Deviation or a Level Bust Deviation for a flight, Conformance Monitoring shall report the deviation detected in order to trigger the deviation trajectory calculation for the flight.
Status	<validated>

Rationale	Any deviation will trigger the Deviation Trajectory instead the Tactical Trajectory calculation. This trigger will include whose deviations are detected in order to be applied in the deviation trajectory calculation. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-CMON.0003
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA ER APP ATC 104c_Adapt Controller Conformance Monitoring Tools to Use Enhanced Ground-Based Trajectory Prediction

[REQ]

Identifier	REQ-10.02a1-TS-CM.027
Title	Tactical Trajectory Calculation Trigger due to absence of deviation
Requirement	If all deviations for a flight are removed, the Conformance Monitoring shall report the absence of deviations to the TP&M for triggering the tactical trajectory calculation for the flight.
Status	<validated>

Rationale	Conformance monitoring will report the absence of vertical and/or lateral deviation (both or any of them) to TP&M in order to calculate the tactical trajectory. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-CM.028
Title	Processing of planned trajectory and controller clearances data
Requirement	The Conformance Monitoring shall receive and use the planned trajectory (and every update of it) and controller clearances data for a flight as long as a system flight plan is available.
Status	<validated>

Rationale	The trajectory information used by Conformance Monitoring is implementation detail. For example, list of points with: - Latitude/Longitude - Level - Time - Associated constraints, if any Controller clearance such as CFL, CFL with specific ROCD, etc. is used as well. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-IER0.0003
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0012
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a) Flight Planning - Lifecycle Management - Data Distribution (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-CM.029
Title	Threshold inputs
Requirement	The Conformance Monitoring shall accept vertical and lateral threshold values.
Status	<validated>
Rationale	Vertical and lateral threshold represents threshold inputs taken into account to compute deviation. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-CMON.004
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-CM.030
Title	Lateral deviation warning removal
Requirement	The CWP shall allow the controller to assign a new route or heading with which the system track is in conformance in order to remove the deviation warning for a flight in lateral deviation

Status	<validated>
Rationale	When new track information is received the Conformance Monitoring will assess the conformance state of the flight and will remove all deviations that are no longer valid. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a) Flight Planning - Lifecycle Management - Data Distribution (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a) Flight Plan Change (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-CM.031
Title	Display of the non-conformance warnings due to deviations
Requirement	The CWP shall display non-conformance warnings to the controller when deviations are detected.
Status	<validated>

Rationale	When new track information is received the Conformance Monitoring will assess the conformance state of the flight and will show all deviations found. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0033
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Conformance State (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-CM.032
Title	Display of the type of deviation in a non-conformance warning
Requirement	The CWP shall display the type of deviation detected for a non-conformance warning.
Status	<validated>

Rationale	Different kind of representations will allow the user to know what kind of deviation was found. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0033
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Conformance State (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-CM.033
Title	Display and remove the monitoring warning.
Requirement	The CWP shall display a conformance monitoring warning until it is removed by the Conformance Monitoring Function.
Status	<validated>

Rationale	When new track information is received the Conformance Monitoring will assess the conformance state of the flight and will remove all warnings that are no longer valid. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0033
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Conformance State (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-CM.034
Title	Display deviations between actual track and controller clearance.
Requirement	The CWP shall display the following deviations between actual track data and controller clearance data: a) Route deviation (ROUTE); b) Vertical rate deviation (RATE); c) Cleared flight level deviation (CFL); d) No valid Flight Plan data

Status	<validated>
Rationale	The controller should be aware of the deviations above described detected between the radar track and its clearances. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004 (partially) - EXE-10.02a-V3-VALP-005
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Conformance State (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 168_ATC System Support for Advanced Conformance Monitoring in the TMA

4.2.1.2 Conflict detection

4.2.1.2.1 PC and TC Aid Tools

[REQ]

Identifier	REQ-10.02a1-TS-PTT.001
Title	Thresholds depending on aircraft equipment
Requirement	The Conflict Management functional block shall provide the capability to configure different lateral and vertical separation parameters depending on the aircraft equipment.

Status	<validated>
Rationale	Depending on the capability of equipment on-board the aircraft, it may be necessary/appropriate to use different separation parameters than the nominal values specified for the sector. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-PERF.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0010
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-TC00.XXXX
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a) Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.002
Title	Look-ahead horizon depending on flight phase
Requirement	The Conflict Management functional block shall provide the capability to configure different look-ahead horizon depending on the flight phase.

Status	<validated>
Rationale	Different look-ahead horizon may apply between approach phase and En-Route phase. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-PERF.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0010
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0011
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a) Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.003
Title	Graphical HMI Interface requirement
Requirement	The Conflict Management functional block shall handle all the interactions that are relevant for encounter management coming from CHMI.
Status	<validated>

Rationale	These functions depend on the chosen system architecture (centralized vs. decentralized). While some system designs may require implementing a portion of these functions in the CONF functional block, other solutions may allow the functions to be fully implemented in the CHMI functional block. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-SAFE.0006
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0019
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a) Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.004
Title	CD&R service enable/disable capability
Requirement	The Conflict Management functional block shall allow to enable and to disable the display of CD&R Services for Planner Controller and for Tactical Controller on each CWP which is CD&R equipped
Status	<validated>

Rationale	It is necessary to provide the capability to switch on or off the TC-Aid and/or PC-Aid on each CWP. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0015
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route

[REQ]

Identifier	REQ-10.02a1-TS-PTT.013
Title	Alert display when conflicting trajectories are detected.
Requirement	The CWP shall display an alert when any conflicting trajectories are detected.
Status	<validated>

Rationale	In order to capture the controller's attention, the detection of conflicting trajectories should generate an alert that can be either acoustic and/or visual. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0012
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0016
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Tactical Conflicts (PJ.10-02a) Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.014
Title	Display a graph trajectory data

Requirement	The CWP shall display in a graphical presentation the trajectory data of the flights involved in an encounter.
Status	<validated>
Rationale	Trajectory data related to the encounter is needed by the controller to assess it. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0013
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a) Display Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.015

Title	CWP to clearly identify encounters detected using What-if probes
Requirement	The CWP shall display an encounter detected in a What-If-Probing in a different way than those detected using just operationally valid flight plans.
Status	<validated>
Rationale	The what-if probes are displayed in a different manner to allow the controller the correct distinction between the real trajectories and the tentative ones. CWP, when performing a what-if, need to display tentative interactions and other interactions in a different manner, so that the controllers can distinguish them properly and not provoke any misunderstanding. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0001
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a) Display Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.016
Title	Display differently what-else speculative encounters than other encounters.
Requirement	The CWP shall provide the result of the what-else probe function, displaying the speculative encounters in a different way from the other encounters detected for the planning and tactical trajectories.
Status	<validated>
Rationale	To avoid the misunderstanding of the Controller and to help an easier and faster understanding of the situation, speculative encounters should be displayed differently from planning/tactical encounters. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0008
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Tactical Conflicts (PJ.10-02a) Display What-Else Results (PJ.10-02a) Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.019
Title	The CWP to display What-if/What-else probes for a flight
Requirement	The CWP shall allow an eligible operator to perform the following Probe orders (i.e. what-if, what-else) on an eligible flight: - Flight level probes. - Route probes, either Direct probes or 2D RNP probes. - Heading probes. - Speed probes.
Status	<validated>
Rationale	The CWP displays and allows the controller to interact with the Probe orders functionalities. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 (partially) - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005 (partially)
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0019
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0012
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0021
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0013
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a)

		Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.059
Title	Combined clearances probing
Requirement	System shall allow probing several clearances in a unique what-if session displaying the overall conflict detection.
Status	<validated>
Rationale	Displaying conflict detection result taking into account several clearance (i.e. lateral and vertical combined clearances) would increase safety. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-004
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0021
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0013
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a) Search Planned Conflicts (PJ.10-02a)

[REQ]

Identifier	REQ-10.02a1-TS-PTT.023
Title	Conflict management what-if capacity
Requirement	The conflict management function shall be able to manage simultaneously at least 1 tentative trajectory per each controller working position.
Status	<validated>
Rationale	Capacity requirement for what-if conflict management. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0019
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0009
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a) Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.024
Title	Conflict management what-if capacity

Requirement	The conflict management function shall be able to manage simultaneously 1 tentative trajectory per flight plan.
Status	<validated>
Rationale	A controller could request a what-if (so a tentative trajectory) per each flight plan. They won't be assessed between them for conflicts (only a tentative with “real” trajectories). This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0019
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0009
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a) Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.025
Title	Conflict management what-else capacity

Requirement	The conflict management function shall be able to manage simultaneously 1 what-else probe per each controller working position.
Status	<validated>
Rationale	In a what-else probe, the number of speculative trajectories to be simultaneous per the flight plan is defined by the tactical action (a CFL, a heading …) and the different number of alternatives to be displayed. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0019
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.036
Title	Adaptation Data Verification
Requirement	The Conflict Management functional block shall verify that all the adaptation data relevant for CD&R processing is in accordance with the formats and types expressed in the ADAP Database.

Status	<validated>
Rationale	It is necessary to verify the Adaptation Data. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-PERF.0001
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a) Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.037
Title	CD&R coordination service availability
Requirement	The Conflict Management functional block shall provide CD&R services for an aircraft if one of the following is true: 1. The planned trajectory of the aircraft passes through the sector AOI 2. The aircraft is manually selected.
Status	<validated>

Rationale	A basic requirement for the proposed CD&R concept that limits the CD&R service to the relevant flights. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0005
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-SAFE.0004
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0004
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0004
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0002
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a) Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.038
Title	Separation of interest parameters per type of airspace

Requirement	The Conflict Management functional block shall provide the capability to configure different lateral and vertical separation of interest parameters and trajectory look-ahead horizon for different airspace volumes.
Status	<validated>
Rationale	This may reflect military areas, holding volumes or certain parts of a sector for which other separation minima apply. For planning conflict detection, a possible choice of parameters could be a trajectory look-ahead horizon starting from the end of tactical conflict detection horizon, and up to at least 15 minutes. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-PERF.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0010
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0011
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-TC00.XXXX
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a) Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.039
Title	Encounter Detection scope
Requirement	The Conflict Management functional block shall perform encounter detection for pairs of flights within a configurable trajectory look-ahead horizon for all the eligible trajectories based on the following defined separation of interest criteria: - Lateral separation of interest - Longitudinal separation of interest - Vertical separation of interest - Vertical separation of interest in RVSM region for RVSM-equipped flights
Status	<validated>
Rationale	Proximity between flights is computed considering the separation criteria. Note that the separation of interest is always greater than or equal to the separation minima. Also, a lower vertical separation of interest can be used in RVSM regions, but only for RVSM-equipped flights. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a

<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0006
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0002
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0029
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a) Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.040
Title	Encounter removal
Requirement	The Conflict Management functional block shall discard a detected encounter between a pair of aircraft once the required vertical and horizontal separation of interest parameters have been achieved.
Status	<validated>
Rationale	Ensure attentions are focused on current encounters. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier

<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-SAFE.0010
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0005
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-SAFE.0005
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a) Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.041
Title	Encounter detection dependant on trajectory uncertainty
Requirement	The Conflict Management functional block shall provide the capability to add dynamic trajectory uncertainty to the separation of interest parameters in order to allow the uncertainty to grow in each dimension with increasing look-ahead time.
Status	<validated>
Rationale	Whether or not showing a conflict is useful depends on its uncertainty. There may be some cases where it is useful that the uncertainty varies as a function of remaining time to conflict. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 (partially) - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005 (partially)
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-PC00.0009
<ALLOCATED_TO>	<Functional block>	Trajectory Prediction and Management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Compute Planned Trajectory (PJ.10-02a) Compute Tactical Trajectory (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.042
Title	Separation of interest parameters according to flight phase
Requirement	The Conflict Management functional block shall provide the capability to define different separation of interest parameters depending on tactical or planned trajectory information used for the detection of an encounter.
Status	<validated>
Rationale	A possible implementation of this requirement is to output the uncertainty as a discrete and standardised number that correspond to fixed separation values, for each segment of the trajectory. CD&R would choose the appropriate separation of interest parameter according to the standardised uncertainty defined for each segment of the trajectory. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0007
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0010
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-TC00.XXXX
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a) Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.043
Title	Vertical separation of interest parameters and RVSM
Requirement	The Conflict Management functional block shall provide the capability to define vertical bands with separation of interest parameters different from the nominal values used for the sector (but not less than the separation minima) in order to optimize the benefit of the separation tools.
Status	<validated>

Rationale	"It may sometimes be useful/needed to apply different separation of interest variables. Examples of use cases includes: 1. The definition of a vertical separation of interest specifically for RVSM equipped flights in RVSM regions The definition of increased/reduced vertical separation of interest for airspace where high climb rates can be expected. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-PERF.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0010
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-TC00.XXXX
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-TC00.XXXX
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a) Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.044
Title	Vertical separation of interest for non-RVSM approved aircraft.
Requirement	For non-RVSM-approved aircraft operating in RVSM airspace, the non-RVSM separation of interest (vertical separation of interest static parameter) shall have precedence over airspace volume defaults.
Status	<validated>
Rationale	Ensures that non-RVSM separation of interest applies to aircraft flying in RVSM airspace that are not RVSM approved. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0007
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0010
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-TC00.XXXX
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a) Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.045

Title	Encounter detection inhibition areas
Requirement	The Conflict Management functional block shall provide the capability to exclude Airspace volumes from Encounter Detection.
Status	<validated>
Rationale	Enable adaptation of CD&R processing according to airspace patterns. A typical example is to define an area around an approach where CD&R processing is not used. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0007
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0010
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a) Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.046
Title	Graphical HMI requirement

Requirement	The Conflict Management functional block shall provide information for display to the user through a graphical HMI.
Status	<validated>
Rationale	This high-level requirement is included here for clarity purposes. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0012
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a) Display Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.047
Title	CD&R service availability

Requirement	When the Conflict Management functional block provides a CD&R service, it shall be available for every CWP.
Status	<validated>
Rationale	It is necessary to cover all the AOI with the available CD&R services. Activation of the service depends on local ATCO decision. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-SAFE.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-SAFE.0008
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0014
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a) Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a) Search Planned Conflicts (PJ.10-02a) Display Tactical Conflicts (PJ.10-02a) Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.058
Title	Operational status of CD&R services
Requirement	The Conflict Management functional block shall provide the operational status of CD&R services (PC aid, TC aid).
Status	<validated>
Rationale	Controller must be notified in case of service unavailability to apply appropriate procedures. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-SAFE.0011
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-SAFE.0009
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a) Display Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.048

Title	Sector team input data
Requirement	For a given CD&R tool, the Conflict Management functional block shall make the same output available to all controllers of a given sector team.
Status	<validated>
Rationale	If for instance the TC uses the PC-Aid from the TC position, s/he should get access to the same information as the PC gets when using the PC-Aid at the PC position. Note that the detailed HMI/display requirements (such as zoom factor etc.) are outside of PJ.10-02a scope. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-SAFE.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-SAFE.0002
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0008
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a) Display Tactical Conflicts (PJ.10-02a)

<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.049
Title	Controller Team capability for CD&R services
Requirement	The Conflict Management functional block shall provide CD&R services for adapted controller organizations.
Status	<validated>
Rationale	The CD&R services must support different controller organizations, for example single-sector planner, multi-sector planner (MSP) or single person operations (SPO). This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-SAFE.0008
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a) Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.050

Title	Minimum Service Availability
Requirement	The Conflict Management functional block shall provide at least one of the following services in TMA: - CD&R for the Tactical Controller (TC-Aid) - CD&R for the Planner Controller (PC-Aid)
Status	<validated>
Rationale	Depending on the environment, some services are necessary whereas some are not. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0002
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0001
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a) Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.051
Title	Obtaining relevant trajectories

Requirement	The Conflict Management functional block shall receive all the available trajectories for flights that are eligible for CD&R processing from the Trajectory Prediction & Management functional block, including: - Planned sequence trajectory (including uncertainty) - Tactical trajectory (including uncertainty) - Entry trajectory - Exit trajectory - Deviation trajectory - Context trajectory - Tentative trajectory - Speculative trajectory It is assumed that the relevant trajectories reflect the latest CTO, airborne derived data and controller clearances.
Status	<validated>
Rationale	This technical requirement defines the required inputs to the Conflict Management block associated with the traced to OSED requirements, and does not include the actual trajectory generation. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-002 (partially) - EXE-10.02a-V3-VALP-005 (partially for planned and tentative))
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-IER0.0003
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-IER0.0002
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0010
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-SAFE.0003

<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a) Trajectory Prediction and Management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Compute Planned Trajectory (PJ.10-02a) Search Planned Conflicts (PJ.10-02a) Compute Tactical Trajectory (PJ.10-02a) Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.052
Title	Adaptation data input
Requirement	The Conflict Management functional block shall receive Adaptation data from Support Functions.
Status	<validated>
Rationale	Required to configure the system to the operational environment. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-PERF.0001

<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-PERF.0002
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0006
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0007
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a) Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.053
Title	Encounter data output to HMI
Requirement	For each encounter the Conflict Management functional block shall provide the following data: a) Involved aircraft b) Unique encounter ID c) Start of separation infringement (time and position) d) Closest lateral point of approach (time and position) - both laterally and vertically e) End of separation infringement (time and position) f) Relation of conflict data with static data (e.g. sectors involved). g) Closest lateral distance h) Encounter typology i) Encounter geometry j) Severity classification (PC-Aid Only)
Status	<validated>

Rationale	Required for display purposes. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-002 (partially) - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005 (partially)
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0013
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0014
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-SAFE.0007
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0003
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0035
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a) Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.054
Title	Coherent output from CD&R services.
Requirement	Every CD&R service shall output coherent information to the sector team.

Status	<validated>
Rationale	Coherent CD&R information is needed for proper PC and TC cooperation. The PC also functions as an assistant TC, so both controllers have to be provided with coherent data. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-SAFE.0008
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Tactical Conflicts (PJ.10-02a) Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.055
Title	Display a notification when an encounter is detected, updated or deleted.
Requirement	The CWP shall display a notification with the related encounter data as soon as an encounter is detected, updated or deleted.
Status	<validated>

Rationale	Controller must be alerted to changes to the encounter data in a proper timely manner in order to allow him/her to fully analyse the encounter with all the possible data. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0003
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0008
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a) Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a) Display Planned Conflicts (PJ.10-02a) Display Tactical Conflicts (PJ.10-02a) Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.056
Title	Encounters' responsibility identification

Requirement	The CWP shall distinguish between the encounters out of responsibility and those that may require the operator's involvement regarding the TC-Aid and PC-Aid in a given sector team.
Status	<validated>
Rationale	It is important that the CWP clearly identifies encounters that are outside operator's responsibility, especially in case of encounters that have to be solved by an adjacent sector. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0013
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0014
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Tactical Conflicts (PJ.10-02a) Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PTT.057
Title	Use of GRIB data to compute trajectory

Requirement	PC-Aid and TC-Aid shall use trajectories computed taking into account wind and temperature forecast provided in the GRIB data
Status	<validated>
Rationale	Having a more accurate trajectory should improve encounters detection. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005 (partially)
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-IOP0.0003
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-PERF.0003
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-IER0.0003
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-PERF.0004
<ALLOCATED_TO>	<Functional block>	Trajectory Prediction and Management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Compute Tactical Trajectory (PJ.10-02a) Process GRIB (PJ.10-02a) Compute Planned Trajectory (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

4.2.1.2.2 TC Aid Tool

[REQ]

Identifier	REQ-10.02a1-TS-TT.038
Title	Airspace where TC-Aid is applied
Requirement	TC-Aid shall allow to enable CD&R Services within all types of airspace whose boundaries are defined by a geographical area and upper and lower levels.
Status	<validated>
Rationale	CD&R services should be possible to enable in all types of airspace where the airspace is defined by geographical areas and upper and lower levels and may not be the same throughout the whole sector, within free route airspace, within TMA. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0002
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.001
Title	TC-Aid volumes coverage

Requirement	The Conflict Management functional block shall verify that the complete area within the ATSU AOI is covered by TC-Aid volumes including the exclusion volumes.
Status	<validated>
Rationale	It is necessary to cover the whole AOI with the TC-Aid volumes. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0001
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.002
Title	Availability of the Tactical Trajectory
Requirement	The TC-Aid shall provide CD&R services for each flight which has a valid tactical trajectory.
Status	<validated>

Rationale	A valid tactical trajectory for a particular flight is needed in order to predict tactical encounters for that flight. Note that this technical requirement addresses only the CD&R scope of the OSED requirement, and does not include the actual trajectory generation. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0004
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0012
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a) Trajectory Prediction and Management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Compute Tactical Trajectory (PJ.10-02a) Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.003
Title	TC-Aid trajectory truncated.

Requirement	The TC-Aid shall provide tactical encounter detection on that part of the trajectory which falls within the centre AOI as laid down in the environmental data (static data).
Status	<validated>
Rationale	Only the part of the trajectory inside the AOI will be used for conflict search. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-004
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0005
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.004
Title	TC-Aid uses uncertainty.
Requirement	The TC-Aid shall use uncertainty information from a trajectory for any position, this being expressed in terms of lateral, longitudinal and vertical uncertainty to a given confidence level to declare a tactical encounter.
Status	<validated>

Rationale	The TC-Aid will search the conflicts based on the trajectories uncertainty. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0007
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0006
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.005
Title	TC-Aid activation when trajectory list is modified.
Requirement	The TC-Aid shall perform encounter detection when a tactical trajectory or deviation trajectory or entry trajectory is created, updated or deleted.
Status	<validated>

Rationale	When the trajectory list is modified (a new trajectory appears, a trajectory is modified or a trajectory is removed) the conflict calculation must be performed. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0003
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.006
Title	Used trajectories crossings.
Requirement	TC-Aid shall compare tactical, deviation and entry trajectories of a flight with tactical, deviation and entry trajectories of all other flights, except in any of the following cases: - Pairs of deviation trajectories derived from intruder VFR flights. - Entry trajectories entering different executive CWPs.
Status	<validated>

Rationale	Specifies the trajectory crossings that are used to search for conflicts. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0029
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a) Trajectory Prediction and Management (PJ.10-02a) Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a) Compute Tactical Trajectory (PJ.10-02a) Analyze Conformance (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.007
Title	Most severe criteria is used.
Requirement	When comparing two points of two trajectories, if different separation criteria are applicable, the TC-Aid shall use the most severe criteria.
Status	<validated>

Rationale	Sets the rule for separation criteria when more than one is available. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0007
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.008
Title	Tactical Encounter detection definition.
Requirement	TC-Aid shall declare a tactical encounter for a pair of flights if the uncertainty volumes around the predicted aircraft positions are separated by less than the applicable separation of interest within a configurable look-ahead time.
Status	<validated>

Rationale	Defines a tactical encounter for a pair of flights when the separation of interest criterion is not fulfilled. This encounter detection is applied to every class: Tactical Nominal Encounter, Tactical Deviation Encounter and Coordination Encounter. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0007
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-IER0.0005
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0011
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0029
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0030
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0031
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-TC00.XXXX
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.010
Title	Tactical Encounter Calculated Data.

Requirement	For each detected tactical encounter, TC-Aid shall calculate an encounter identity, the identity of flights involved, the class of trajectories involved, the closest approach distance, and the time and nominal position of: - Loss of separation of interest - Loss of Assured Separation - Closest point of Approach - Regaining of Assured Separation - Regaining of separation of interest.
Status	<validated>
Rationale	This requirement specifies the data to be provided for each tactical encounter. "Assured Separation" refers to the point at which the separation minima (legal separation) are infringed. The time of loss of Assured Separation and/or the time of Closest point of Approach can be used to define urgency of encounters. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 (partially) - EXE-10.02a-V3-VALP-003
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0013
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0035
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.011
Title	Tactical Encounter Geometry.
Requirement	For each detected tactical encounter, the TC-Aid shall determine the geometry of the encounter, as either head-on, crossing, catch-up or not applicable.
Status	<validated>
Rationale	This requirement specifies the encounter horizontal geometry in 2D in order to provide to the controller an overview of the encounter. The “not applicable” geometry will be assigned to encounters when at least one of the interacting aircraft’s predictions has no defined direction of flight, for example when being in a hold volume. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0014
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0035
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.012
Title	Vertical altitude determination of a Tactical Encounter.
Requirement	The TC-Aid shall calculate whether a tactical encounter would occur on the climb or descent profile of the aircraft, or whether it would occur only if the aircraft were to level off at the affected level.
Status	<validated>
Rationale	This specifies the aircraft vertical attitude (level, climb or descend) for the flights involved in a tactical encounter. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0013
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.013
Title	What-if is allowed

Requirement	The TC-Aid shall allow the tactical operator to probe for tactical encounters detection of a tactical clearance or a coordination proposal before applying it to the flight plan.
Status	<validated>
Rationale	The controller is allowed to perform a probe before applying a tactical command. A tentative trajectory will be calculated by the TP&M with the tactical clearance or the coordination proposal to be probed. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0009
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0010
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a) Controller Human Machine Interaction Management ER/APP (PJ.10-02a) Trajectory Prediction and Management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Request What-Else (PJ.10-02a) Search Tactical Conflicts (PJ.10-02a) Compute Tactical Trajectory (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.014
Title	What-if is probed against all the trajectories and active TSAs.
Requirement	When a what-if is proposed for a flight, the TC-Aid shall probe that flight's tentative trajectory against all other flights' tactical and deviation trajectories, and against all active TSAs.
Status	<validated>
Rationale	The what-if probes against all the real flights (note that this excludes the other what-if flights) in order to find the impact of a command before the command is performed. Tentative encounters are tactical encounters that involve Tentative Trajectories (generated by a What-if probe) and Tactical or Deviation Trajectories for other flights. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0010
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.015

Title	What-if is marked to the controller.
Requirement	The TC-Aid shall provide the result of the what-if probe to the requesting CWP including the resulting tentative encounters differentiated from the other encounters.
Status	<validated>
Rationale	The what-if probes are marked to the controller to allow the distinction between the real trajectories and the tentative ones. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0011
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.016
Title	Allowed flights for What-if.
Requirement	TC-Aid shall perform Tactical What-if probes for any flight having tactical trajectory upon request by any CWP.

Status	<validated>
Rationale	What-if can be performed for every tactical trajectory in order to probe a command. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0009
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a) Controller Human Machine Interaction Management ER/APP (PJ.10-02a) Trajectory Prediction and Management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Compute Tactical Trajectory (PJ.10-02a) Search Tactical Conflicts (PJ.10-02a) Request What-Else (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.017
Title	What-else functionality.
Requirement	The TC-Aid shall calculate What-else probes for every eligible flights using the speculative trajectories provided by the TP&M.

Status	<validated>
Rationale	What-else functionality will generate speculative trajectories in order to supply this information immediately to the controller when requested. An eligible flight is a flight correlated and assumed by any controller. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0008
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0008
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0032
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-TC00.XXXX
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.019
Title	What-else probe data.

Requirement	For each What-else probe the TC Aid shall provide the following data as response to a controller request: 1) Flight level probes: a) level is conflict free; b) level is blocked; c) level can only be reached if a vertical rate is provided. 2) In case of 1c) the TC-Aid indicates conflict free vertical rates. 3) Route clearance, including Direct Route or 2D RNP routes, and heading probes: a) Route or heading is conflict free; b) Route or heading is not conflict free.
Status	<validated>
Rationale	Establish the data to be provided due to a What-else probe. This functionality should be provided to the controller with a minimum delay time. This can be achieved using a fast calculation algorithm or cyclically performing the calculation for every flight. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0008
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a) Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a) Display What-Else Results (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.020
Title	Encounter Distribution.
Requirement	As soon as a tactical encounter is detected, updated or deleted the TC-Aid shall update all CWPs with the related encounter data.
Status	<validated>
Rationale	The encounter information is distributed in broadcast to all CWPs. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-004
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0003
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a) Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Tactical Conflicts (PJ.10-02a) Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.028
Title	Wind calculation

Requirement	TC-Aid shall use current wind direction and speed that was computed using aircraft Mode-s enhanced data (if available)
Status	<validated>
Rationale	Mode-s enhanced data allows to know the wind direction/speed that an aircraft is facing at that moment. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 (partially) - EXE-10.02a-V3-VALP-003
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-IOP0.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-IER0.0004
<ALLOCATED_TO>	<Functional block>	Trajectory Prediction and Management (PJ.10-02a) Surveillance (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Asterix62 Processing (PJ.10-02a) Compute Tactical Trajectory (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER APP ATC 104_Adapt Controller Conflict Detection and Resolution Tools to Use Enhanced Ground-Based Trajectory Prediction APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.029
Title	Use of wind data in trajectory computation

Requirement	TC-Aid shall use aircraft tactical/deviation trajectories computed taking into account wind direction and speed.
Status	<validated>
Rationale	Using wind direction and speed will improve tactical/deviation trajectories, therefore TC Aid performance will be improved too. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 (partially) - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-IOP0.0003
<ALLOCATED_TO>	<Functional block>	Trajectory Prediction and Management (PJ.10-02a) Weather Management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Compute Tactical Trajectory (PJ.10-02a) Process GRIB (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.030
Title	Use of current aircraft speed in trajectory computation

Requirement	TC-Aid shall use aircraft tactical/deviation trajectories using current IAS, TAS, Mach from Mode-S enhanced data when no speed clearance exists.
Status	<validated>
Rationale	Using current aircraft speed will improve tactical/deviation trajectories, therefore TC Aid performance will be improved too. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 (partially) - EXE-10.02a-V3-VALP-003
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-IOP0.0001
<ALLOCATED_TO>	<Functional block>	Trajectory Prediction and Management (PJ.10-02a) Surveillance (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Compute Tactical Trajectory (PJ.10-02a) Asterix62 Processing (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER APP ATC 104_Adapt Controller Conflict Detection and Resolution Tools to Use Enhanced Ground-Based Trajectory Prediction APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.031
Title	Minimum Service Availability

Requirement	The Conflict Management functional block shall provide, in a TMA ACC, CD&R for the Executive Controller (the TC-Aid tool).
Status	<validated>
Rationale	Tactical Controller Tool is mandatory in TMA environment. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0001
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.032
Title	Tactical Deviation Encounter definition.
Requirement	TC-Aid shall classify as Tactical Deviation Encounter every detected tactical encounter obtained by comparing deviation trajectories (of the subject flight or the environmental flights) with tactical or deviation trajectories.
Status	<validated>

Rationale	A Tactical Deviation Encounter is generated by comparing the deviation trajectory of the subject flight with the Tactical or the Deviation Trajectory of another flight. Detection of the Tactical Deviation Encounter is symmetrical. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0013
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.033
Title	Tactical Nominal Encounter definition.
Requirement	TC-Aid shall classify as Tactical Nominal Encounter every detected tactical encounter obtained by comparing two tactical trajectories.
Status	<validated>

Rationale	A Tactical Nominal Encounter is generated by comparing two Tactical Trajectories. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0013
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.034
Title	Sector responsibility for tactical encounters
Requirement	The TC-Aid shall provide the tactical encounter for display in the sectors crossed by any part of the trajectories included in the encounter, provided that the local management rules are met.
Status	<validated>

Rationale	The tactical encounter information should be displayed in the relevant sector, i.e. the first sector that may realistically resolve the conflict. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0004
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0034
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.035
Title	CWP to display What-if probes
Requirement	The CWP shall allow the operator to probe for tactical encounters detection (i.e. what-if, what-else functions) before issuing a tactical clearance or a coordination proposal to the flight plan.
Status	<validated>

Rationale	The CWP allows performing a probe before applying a tactical command. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 (partially) - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0008
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Request What-Else (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-TT.036
Title	The CWP to display What-if probes for a flight
Requirement	The CWP shall provide access to the tactical What-if probes for any flight having a tactical trajectory.
Status	<validated>

Rationale	The CWP allows that What-if can be performed for every tactical trajectory in order to probe a command. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0009
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

Table 7: Requirements layout

4.2.1.2.3 PC Aid Tool

[REQ]

Identifier	REQ-10.02a1-TS-PT.001
Title	PC-Aid volumes coverage
Requirement	The Conflict Management functional block shall verify that the complete area within the ATSU AOI is covered by PC-Aid volumes including the exclusion volumes.
Status	<validated>

Rationale	It is necessary to cover the whole AOI with the PC-Aid volumes. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0010
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.002
Title	PC-Aid trajectory assessment criteria
Requirement	The PC-Aid shall provide CD&R services for each flight which has a valid planning trajectory.
Status	<validated>

Rationale	A valid planning trajectory for a particular flight is needed in order to predict encounters for that flight. (Note that this technical requirement addresses only the CD&R scope of the OSED requirement, and does not include the actual trajectory generation). This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0007
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0012
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.003
Title	Encounter Smoothing.

Requirement	The Conflict Management functional block shall prevent intermittent termination of encounters due to trajectory fluctuations. The smoothing mechanism will apply to longitudinal, lateral and vertical separations, using a pre-defined variation around the separation criteria.
Status	<validated>
Rationale	A smoothing mechanism will apply to avoid fast conflict changes. It is also applicable to prevent spurious changes in the encounters classification. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-PERF.0001
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.006
Title	Airspace where PC-Aid Service is applied

Requirement	PC-Aid shall allow to enable CD&R Services within all airspace whose boundaries are defined by a geographical area and upper and lower levels.
Status	<validated>
Rationale	CD&R services should be possible to enable in all types of airspace where the airspace is defined by geographical areas and upper and lower levels and may not be the same throughout the whole sector, within free route airspace, within TMA. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0002
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0003
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route

[REQ]

Identifier	REQ-10.02a1-TS-PT.007
Title	Separation of interest depending on airspace

Requirement	PC-Aid shall allow to apply different separation of interest for different volumes of airspace.
Status	<validated>
Rationale	Different airspace volumes may require that a different separation of interest is used to compute encounters. Volumes of airspace refers to sectors whose boundaries are defined by geographical area and upper and lower levels (which may not be the same throughout the whole sector). This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-PERF.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0010
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.008
Title	Planning Encounter Detection

Requirement	PC-Aid shall declare a planning encounter for a pair of flights, if uncertainties around the predicted aircraft positions are separated by less than the separation of interest in the longitudinal, lateral and vertical axis.
Status	<validated>
Rationale	Uncertainties refer to applicable uncertainty volume around the predicted aircraft position(s). PC-Aid will take into account the off-line/fixed uncertainties depending on the particular flight phase (climb, descent or cruise) of the flights involved in the encounter. PC-Aid will take into account also different uncertainties depending on the navigational capabilities of the flights involved in the encounter. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-IER0.0005
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-PERF.0001
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route

		APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.009
Title	Separated Routes
Requirement	PC-Aid shall not declare a planning encounter if the loss of separation between uncertainties around the predicted aircraft positions occurs along ATC routes previously defined as separated in the environmental data.
Status	<validated>
Rationale	Along predefined separated routes the PC-Aid has to ignore separation infringement. This exception is not applicable if the flights are traveling along the same ATC route. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-PERF.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0010
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.066
Title	Encounter with the earliest start time
Requirement	When there are more than one encounter for the same aircraft pair, PC aid shall provide for display only the encounter with the earliest start time.
Status	<validated>
Rationale	To avoid visual clutter. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0015
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route

[REQ]

Identifier	REQ-10.02a1-TS-PT.010
Title	PC-Aid Used Trajectories

Requirement	PC-Aid shall process the following trajectories provided by Trajectory Prediction and Management: - Planned Sequence Trajectories - Coordination Trajectories - Speculative Trajectories - Tentative Trajectories
Status	<validated>
Rationale	PC-Aid must be able to process all trajectories which can be involved in planning encounters. Coordination trajectories are associated to flights which are coordinated into and out of the sector, therefore, if PC-Aid can process coordination trajectories, it means that it is able to provide CD&R services for aircraft as they are coordinated into or out of the sector. Tentative trajectories reflect what-if flight data selected by the controller. Speculative trajectories reflect flight data other than those committed or tentatively selected by the controller (they are produced for the purpose of what-else probing). This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005 partially (no speculative)
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0007

<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0019
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-IER0.0002
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0004
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a) Coordination and Transfer (PJ.10-02a) Trajectory Prediction and Management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a) Coordination Agreed Data (PJ.10-02a) Compute Planned Trajectory (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route

[REQ]

Identifier	REQ-10.02a1-TS-PT.011
Title	Planning encounters detection
Requirement	PC-Aid shall detect planning encounters comparing - either planned sequence trajectories of the flights; - or coordination trajectories of the flights.
Status	<validated>

Rationale	The planning encounters are generated by comparing the specific trajectories of the subject flight and the environmental flights. The characterization of the trajectories is made on the basis of operational concepts provided by the operative project. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0005
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.012
Title	Context trajectory
Requirement	For a subject flight, PC-Aid shall allow to assess context trajectories of environmental flights which will be built for each standard flight level where the flight is expected to fly in the considered planning sector.

Status	<validated>
Rationale	The PC-Aid must be able to make context trajectories for environmental flights. Each flight may have several context trajectories spanning a range of levels. This range of levels represents flights anticipated utilisation of airspace in the sector (i.e. all likely levels at which the flight is expected to fly). This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0005
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.013
Title	Coordination within different sectors
Requirement	PC-Aid shall allow the planning controller to review encounters related to a subject flight.
Status	<validated>

Rationale	The PC-Aid to enable a planning controller encounters review which is typically done for a flight before setting and agreeing to its entry/exit coordination contracts with neighbouring sectors. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0010
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0014
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a) Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a) Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.014
Title	Coordination acceptability within different sectors

Requirement	On the receipt of an offer of entry coordination (from an offering sector) the PC-Aid shall allow the planning controller to assess the acceptability of that offer in a context with other flights notified to the sector.
Status	<validated>
Rationale	PC-Aid shall support planning controller in assessing the suitability of sector entry and exit condition for a flight reviewing the encounters related to that flight. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0019
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0014
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a) Trajectory Prediction and Management (PJ.10-02a) Controller Human Machine Interaction Management ER/APP (PJ.10-02a) Coordination and Transfer (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a) Display Planned Conflicts (PJ.10-02a) Coordination Agreed Data (PJ.10-02a)

<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.015
Title	Tentative Trajectory
Requirement	PC-Aid shall detect tentative encounters between planning and tentative trajectories
Status	<validated>
Rationale	In order to support What-if functionality, the PC-Aid conflict search must include the tentative trajectories. The tentative trajectory is the one created from another trajectory which is in operative use (tactical or planning) that supports what-if probing. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0019
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0007
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a)

<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.016
Title	Tentative Trajectory
Requirement	When a controller applies a What-If probe to a particular flight, PC-Aid shall use the tentative trajectory of this flight for encounter detection computations
Status	<validated>
Rationale	The tentative trajectory for a flight subject to conflict search must be used in the encounter detection algorithms. In the sectors different from the one where the what-if probe is assessed PC-Aid will always take into account the planning trajectory associated with the flight. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-004 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0020
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0021
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a)

<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.017
Title	Removal of Encounters for Discarded What-if Probes
Requirement	When a controller discards a What-if probe for a particular flight, PC-Aid shall remove the tentative encounters associated with the What-if probe
Status	<validated>
Rationale	Depending on the detailed implementation of the What-If Probe, it may be necessary to remove the associated conflicts from the system (a database or similar) if the What-if probe is discarded. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0022
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a)

<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.018
Title	Display
Requirement	PC-Aid shall support the display of information to the user through a graphical HMI at every PC-Aid equipped workstation.
Status	<validated>
Rationale	Display of PC-Aid Service results. Note that individual settings of the PC-Aid tool may be required, particularly of the "Conflict Horizon" parameter. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0012
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0008
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a)

<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.019
Title	Planning encounter information display
Requirement	For each detected planning encounter, PC-Aid shall provide the following information: - encounter identity - aircraft identifications - time of first infringement of separation criteria between aircraft nominal position - time of end of infringement of separation criteria between aircraft nominal positions - time of minimum distance between aircraft nominal positions - minimum distance between aircraft nominal positions - sector(s)/centre(s) where flights are located at minimum separation - encounter geometry - severity classification (an implementation specific combination of some of the parameters listed above)
Status	<validated>
Rationale	Display of PC-Aid Service results for detected planning encounters. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-SAFE.0007
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0013
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0004
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.020
Title	Manual selection of pair of flights for information display
Requirement	For each pair of flights selected manually, PC-Aid shall provide the following information: - Closest lateral distance between the trajectories; - Vertical separation between the trajectories at closest lateral proximity; - Time to closest separation; - Position of each flight at closest separation; - Sector(s)/centre(s) where flights are located at minimum separation
Status	<validated>
Rationale	Display of PC-Aid Service results for manually selected pairs of flights. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0013
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route

[REQ]

Identifier	REQ-10.02a1-TS-PT.067
Title	Encounters on exit conditions not met yet
Requirement	The PC-Aid shall distinguish encounters that result from exit conditions that are not met yet for any of the flight.
Status	<validated>
Rationale	A criteria to determine if exit conditions are met can be CFL differs from XFL. Such encounters are not really problem to be solved but rather situations to be avoided. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0017
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.021
Title	Single flight display
Requirement	PC-Aid shall allow the controller to select a single flight as subject of CD&R presentation and actions.
Status	<validated>
Rationale	The controller should be able to make specific flights a target of the CD&R actions. This requirement does not refer to force a manual conflict detection, it just aims to say that the selected flight will become the subject of conflict detection and resolution at the workstation at which the selection is made. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0012
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.022
Title	Planning encounter monitoring
Requirement	PC-Aid shall support the display of planning encounters according to the evolutions they have over time.
Status	<validated>
Rationale	Encounters may be generated and evolve over time. The PC aid must be able to monitor and display these encounters to the PC in real time This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a

<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0013
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route

[REQ]

Identifier	REQ-10.02a1-TS-PT.023
Title	Refreshing
Requirement	The PC-Aid shall allow to reassess planning encounters manually or cyclically.
Status	<validated>
Rationale	Manual planning encounters reassessment means that reassessment is triggered by a user action. Cyclical planning encounters reassessment means that reassessment occurs when planning encounters information are updated (e.g. latest trajectory information). This is to support the real-time display of planning encounters affecting the current coordinations for aircraft. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0008
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.024
Title	Plan View
Requirement	PC-Aid shall allow to display to the controller the trajectory of a controller-selected flight on the horizontal plane, together with any aircraft to aircraft encounters and aircraft to airspace encounters in which the flight is involved.
Status	<validated>
Rationale	PC-Aid to support display of trajectory and encounter data for a controller-selected flight in the horizontal plane. The presentation of flight trajectories and encounter in the horizontal plane corresponds to the plan view; the plan view is simultaneous to the general radar picture. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 (partly, the DSNA implementation do not take into account aircraft to airspace encounters) - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005

Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0012
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route

[REQ]

Identifier	REQ-10.02a1-TS-PT.025
Title	Tentative encounter display in horizontal plane
Requirement	PC-Aid shall allow to display to the controller tentative encounters in the horizontal plane.
Status	<validated>
Rationale	PC-Aid to support tentative encounter display in the horizontal plane. Note that the horizontal plane corresponds to the plan view This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-005
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0012
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.026
Title	Context traffic display
Requirement	For each subject flight, PC-Aid shall allow to display both horizontal and vertical context traffic, associated with the planning sector.
Status	<validated>
Rationale	Horizontal and vertical traffic is defined by all the planned (and tentative) context flights which may be of interest due to their anticipated vertical and lateral profiles. Context flights are probably not involved in an encounter with the subject flight based on their current clearance or existing coordinated levels but whose vertical and lateral profiles might interfere in planner/ coordination choices for the considered planning-sector. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005 Partially (vertical only)

Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0011
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route

[REQ]

Identifier	REQ-10.02a1-TS-PT.027
Title	Context trajectories display
Requirement	PC-Aid shall assess context trajectories starting from the time that flights are targeted for coordination into a planning-sector.
Status	<validated>
Rationale	Condition for context trajectory. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a

<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0004
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route

[REQ]

Identifier	REQ-10.02a1-TS-PT.028
Title	Filtered Encounters
Requirement	The PC aid shall allow to filter and display encounters only to controller or controllers who have, or will have at a future time, the responsibility to resolve them.
Status	<validated>
Rationale	Encounters displayed to responsible actors only. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0010
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0004
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0006

<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.029
Title	Enable/disable PC-Aid service
Requirement	The CWP shall allow an eligible operator to enable/disable the PC-Aid function.
Status	<validated>
Rationale	The controller has the capability to online enable/disable the PC-Aid function from the CWP. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0001
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a)

<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route

[REQ]

Identifier	REQ-10.02a1-TS-PT.030
Title	CD&R coordination service availability in the CWP
Requirement	The CWP shall allow to manually select a flight, whose planned trajectory passes through the AOR sector, for CD&R services processing.
Status	<validated>
Rationale	The ability to select relevant flights for CD&R processing and CWP display is a basic requirement for the proposed CD&R concept. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0019
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

		ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route

[REQ]

Identifier	REQ-10.02a1-TS-PT.031
Title	Sector team input data access
Requirement	The CWP shall use the same PC-Aid and TC-Aid data for display to a given sector team.
Status	<validated>
Rationale	If for instance the TC uses the PC-Aid from the TC position, s/he should get access to the same information as the PC gets when using the PC-Aid at the PC position. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-SAFE.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0008
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

		ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route

[REQ]

Identifier	REQ-10.02a1-TS-PT.034
Title	Remove coordination trajectories on a cessation of the interrogation probe
Requirement	The CWP shall remove the conflicting trajectories of a subject flight and any interacting environmental flights upon cessation of the interrogation probe of the flight.
Status	<validated>
Rationale	Remove data that is no longer relevant in order to avoid cluttering the screen and drawing attention away from current encounters. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0002
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a) Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a) Search Planned Conflicts (PJ.10-02a)

<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.036
Title	Remove tentative encounters when discarding a what-if probe
Requirement	CWP shall remove the tentative encounters associated with the What-if probe, when a controller discards a What-if probe for the selected flight.
Status	<validated>
Rationale	Data associated with a discarded What-if probe must be removed from display to avoid stealing attention away from current encounters/probes. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0022
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a) Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a)

		Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.037
Title	Encounter data display
Requirement	The CWP shall make available for display at least the most updated information related to each detected encounter: a) Involved aircraft b) Unique encounter ID c) Start of separation infringement (time and position) d) Closest lateral point of approach (time and position) – both laterally and vertically e) End of separation infringement (time and position) f) Closest lateral distance g) Encounter typology h) Encounter geometry j) Severity classification
Status	<validated>
Rationale	The Conflict Management functional block provides the data related to each detected encounter. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-SAFE.0007
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0013
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0006
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0005
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route

[REQ]

Identifier	REQ-10.02a1-TS-PT.038
Title	Open/Close graphical HMI component related to the PC-Aid
Requirement	At any time, each of the CWPs shall allow to Open/Close any available graphical HMI component related to the PC-Aid service.
Status	<validated>
Rationale	The controller has the capability to open/close any available graphical HMI component related to the PC-Aid service according to his needs. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-SAFE.0001
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route

[REQ]

Identifier	REQ-10.02a1-TS-PT.039
Title	Planning encounters displayed in the CWP
Requirement	When PC-Aid service is available, the CWP shall display information related to planning encounters.
Status	<validated>
Rationale	PC-Aid provides information related to planning encounters at every PC-Aid equipped workstation This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier

<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0012
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route

[REQ]

Identifier	REQ-10.02a1-TS-PT.040
Title	CWP Planning encounter information display
Requirement	The CWP shall use and display the following information for each planning encounter detected by the PC-Aid: - encounter identifier - aircraft identifications - time of first infringement of separation criteria between aircraft nominal position - time of end of infringement of separation criteria between aircraft nominal positions - time of minimum distance between aircraft nominal position - minimum distance between aircraft nominal position - sector(s)/centre(s) where flights are located at minimum separation - encounter geometry - severity classification
Status	<validated>
Rationale	The CWP must display the PC-Aid Service results. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 (minus the encounter identification) - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005

Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0013
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-SAFE.0007
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0014
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0005
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.041
Title	CWP displays different encounters detected by PC-Aid.
Requirement	The CWP shall display encounters detected by PC-Aid Service classifying them according to: - proximity - geometry - uncertainty of the predicted aircraft positions.
Status	<validated>

Rationale	To help prioritize the encounters they are classified according to the proximity, geometry and uncertainty of the aircraft positions involved. Proximity is intended as separation minima. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-005 Partially (proximity only)
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0018
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route

[REQ]

Identifier	REQ-10.02a1-TS-PT.042
Title	Planning encounters' filtering
Requirement	The CWP shall allow to filter the planning encounters in order to present them only to the Team, or Teams, controlling the sector(s) that have the responsibility to resolve them.
Status	<validated>

Rationale	The PC-Aid supports the CWP in filtering encounters in order to be displayed only to the Team, or Teams, controlling the sector(s) that have the responsibility to resolve them. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0012
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.043
Title	Plan View
Requirement	The CWP shall display on the horizontal plane the controller-selected flight trajectory and all the aircraft to aircraft/airspace encounters detected by the PC-Aid, in which the selected flight is involved.
Status	<validated>

Rationale	PC-Aid provides to the CWP information about any aircraft to aircraft encounters and aircraft to airspace encounters in which the flight is involved, for display on the general radar picture (plan view). This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0012
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0006
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0005
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route

[REQ]

Identifier	REQ-10.02a1-TS-PT.044
Title	Tentative and speculative encounter display on horizontal plane

Requirement	The CWP shall display on the horizontal plane of a selected-controlled flight all the tentative and speculative planning encounters in which that flight is involved.
Status	<validated>
Rationale	PC-Aid detects all the tentative and speculative planning encounters in which that flight is involved, on the horizontal plane. Note that one of the options to display the encounters is by a direct interaction of the controller manually selecting the concerned flights. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005 Partially (tentative only)
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0012
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-HPRF.0006
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.045
Title	Planning encounters reassessment allowed by the CWP

Requirement	The CWP shall allow an eligible operator to reassess planning encounters by a manual or a cyclical update.
Status	<validated>
Rationale	Manual planning encounters reassessment means that reassessment is triggered in the CWP by a user action. Cyclical planning encounters reassessment means that reassessment occurs when planning encounters information are updated (e.g. latest trajectory information). This is to support the real-time display of planning encounters affecting the current coordinations for aircraft. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0008
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a) Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a) Planned Conflicts Actions Input (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route

		APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.047
Title	Acknowledge manually an encounter detected by PC-Aid
Requirement	The CWP shall allow to acknowledge manually an encounter detected by PC-Aid.
Status	<validated>
Rationale	The acknowledge of an encounter is needed not to skip any of them This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-SAFE.0006
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a) Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Planned Conflicts Actions Input (PJ.10-02a) Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route

		APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.049
Title	CWP as help to the coordination within different sectors
Requirement	The CWP shall display to an eligible operator the current encounters related to a subject flight.
Status	<validated>
Rationale	The PC-Aid to enable a planning controller encounters review which is typically done for a flight before setting and agreeing to its entry/exit coordination contracts with neighbouring sectors. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0012
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.051
Title	Context flights display between entry and exit flight levels when probing a PC Aid Exit level.
Requirement	The CWP shall display all the flights (context flights) that are between the entry level and the proposed exit flight level along the subject flights trajectory when a potential Exit flight level is probed using the PC Aid.
Status	<validated>
Rationale	Controller needs to be aware of all the environment flights when probing a potential flight level. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0012
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a) Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a) Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route

[REQ]

Identifier	REQ-10.02a1-TS-PT.052
Title	Remove coordination rejected from PC-Aid consideration
Requirement	CWP shall remove any coordination that has been rejected from PC-Aid consideration.
Status	<validated>
Rationale	In order not to provoke misunderstandings, all rejected coordinations from the PC-Aid have to be deleted from the CWP. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0008
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a) Conflict management (PJ.10-02a) Coordination and Transfer (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Coordination Agreed Data (PJ.10-02a) Display Planned Conflicts (PJ.10-02a) Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route

[REQ]

Identifier	REQ-10.02a1-TS-PT.053
Title	CWP to facilitate Coordination acceptability within different sectors
Requirement	The CWP shall display the tentative encounters between a flight involved in an entry coordination dialogue to a sector and any other flight already assumed in the same sector, in order to advise the ATCO about the offer acceptability.
Status	<validated>
Rationale	CWP has to display PC-Aid support to planning controller in assessing the suitability of sector entry and exit condition for a flight reviewing the encounters related to that flight. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0012
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a) Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a) Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.054
Title	Allowable Delay of the Display of What-if Probe Results
Requirement	When a controller applies a What-if probe for a particular flight, PC-Aid shall support the display of: a) The tentative trajectory of the subject flight b) The planning trajectories of any flights that form a tentative encounter with the subject flight within an offline defined number of seconds.
Status	<validated>
Rationale	The result of the What-if probe to be displayed within a maximum allowable delay. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0012
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a) Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a) Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

		ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route

[REQ]

Identifier	REQ-10.02a1-TS-PT.058
Title	Availability of the PC-aid service in the CWP
Requirement	The CWP shall have available the PC-Aid regardless of the role assigned to that position.
Status	<validated>
Rationale	Each position has to be able to show the PC-Aid no matter the role it is assigned in that moment to it. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001 - EXE-10.02a-V3-VALP-005
Category	<Safety> , <HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-SAFE.0001
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.063
Title	Acceptability of missed detection for PC-Aid
Requirement	The probability of missed detection of encounter by the PC-Aid shall be no more than 1E-03 per flight hour.
Status	<validated>
Rationale	SPR This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-003
Category	<Safety>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-PERF.0002
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-PERF.0001
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.064
Title	Information displayed when a pair of flights is selected

Requirement	For each pair of flights selected manually, CWP shall display the following PC-Aid information: - The closest lateral distance between the trajectories; - Vertical separation between the trajectories at the closest lateral proximity; - Time to the closest separation; - Position of each flight at the closest separation; - Sector(s)/centre(s) where flights are located at minimum separation
Status	<validated>
Rationale	The PC-Aid Service results must be displayed for manually selected pairs of flights. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 - EXE-10.02a-V3-VALP-003 - EXE-10.02a-V3-VALP-005
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0013
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA

[REQ]

Identifier	REQ-10.02a1-TS-PT.069
Title	CWP encounter probability display
Requirement	The CWP shall display planning encounters classifying them according to the probability to take place if nothing changes in the current situation.
Status	<validated>
Rationale	Encounter probability is determined by means of the trajectories uncertainties involved in the encounter. To help prioritize the encounters they are classified according to the probability to take place if the ATCO and pilot don't change trajectory. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-001
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0018
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	APP ATC 155_ATC System Support to Medium-Term Conflict Detection and Resolution in the TMA ER ATC 157b_Enhanced ATC System Support the Planning Activity for Conflict Detection and Resolution in En-Route

[REQ]

Identifier	REQ-10.02a1-TS-PT.070
Title	RTE VIA clearance

Requirement	System shall allow inputting a RTE VIA clearance: route modification by adding one or more geographic points (not necessarily published waypoints) and the point at which the aircraft re-joints to its original route
Status	<validated>
Rationale	The ATCOs will use the route clearance for conflict resolution or rerouting. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0023
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0025
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0029
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0032
<ALLOCATED_TO>	<Functional block>	Trajectory Prediction and Management (PJ.10-02a) Flight Planning - Lifecycle Management - Data Distribution (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Input Accept Route Change Request Compute Planned Trajectory (PJ.10-02a) Flight Plan Change (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER APP ATC 104_Adapt Controller Conflict Detection and Resolution Tools to Use Enhanced Ground-Based Trajectory Prediction

[REQ]

Identifier	REQ-10.02a1-TS-PT.071
Title	RTE VIA clearance to CPDLC
Requirement	System shall convert a RTE VIA input by the ATCO into a corresponding CPDLC message, ready for uplink to the aircraft.
Status	<validated>
Rationale	Example of message used is UM79 “UM79 CLEARED TO (position) VIA (route clearance)” where (route clearance) is the point selected by the ATCO which is not on the original route and (position) is the re-joining point. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-005
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0030
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0028
<ALLOCATED_TO>	<Functional block>	A/G Datalink Communications (PJ.10-02a) Trajectory Prediction and Management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	A/G Datalink Communications Compute Planned Trajectory (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER APP ATC 104_Adapt Controller Conflict Detection and Resolution Tools to Use Enhanced Ground-Based Trajectory Prediction

4.2.2 PJ.10-02a1 - Non V3 validated requirements

4.2.2.1 Conformance Monitoring

[REQ]

Identifier	REQ-10.02a1-TS-CM.003
Title	Conformance Monitoring at or below 120 meters above DER
Requirement	When flight is following a SID at or below 120 meters above DER (runway), the conformance monitoring shall not detect any warning.
Status	<deleted>
Rationale	The inhibition of Conformance Monitoring in the area at or below 120 meters above DER (Departure End of the Runway) will be performed through geographical filters off line configured. The status of this requirement was set as “deleted” as it was not V3 validated.
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a)

[REQ]

Identifier	REQ-10.02a1-TS-CM.004
Title	Conformance Monitoring warnings according to a dedicated vertical tolerance
Requirement	When a flight is flying a SID between 120 m height above DER and MSA or simply above MSA, the conformance monitoring shall detect warning according to a dedicated vertical tolerance.
Status	<deleted>

Rationale	In case of flight above DER and MSA: - Waypoint with a vertical constraint of “at ”, the vertical tolerance for providing a warning shall be ± 100 ft; - Waypoint with a vertical constraint of “at or above”, the vertical tolerance for providing a warning shall be - 100 ft; - Waypoint with a vertical constraint of “at or below ”, the vertical tolerance for providing a warning shall be + 100 ft. In case of flight above MSA : - Waypoint with a vertical constraint of “at ”, the vertical tolerance for providing a warning shall be ± 150 ft; - Waypoint with a vertical constraint of “at or above”, the vertical tolerance for providing a warning shall be - 150 ft; - Waypoint with a vertical constraint of “at or below ”, the vertical tolerance for providing a warning shall be + 150 ft. The status of this requirement was set as “deleted” as it was not V3 validated.
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a)

[REQ]

Identifier	REQ-10.02a1-TS-CM.005
Title	Conformance monitoring discarding due to NoTT deviation detection

Requirement	Upon a NoTT deviation detection, the Conformance Monitoring shall discard any Route Deviation detection until NoTT deviation is removed.
Status	<deleted>
Rationale	Route Deviation is discarded since no route information is available to check conformance. The status of this requirement was set as “deleted” as it was not V3 validated.
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-CMON.0003
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a)

[REQ]

Identifier	REQ-10.02a1-TS-CM.014
Title	Level Bust Deviation Detection
Requirement	For a flight in vertical manoeuvre close to the CFL, the Conformance Monitoring shall detect a Level Bust deviation if the actual vertical rate exceeds a rate threshold and no CFL Deviation is detected.
Status	<deleted>

Rationale	A flight is considered in a vertical manoeuvre close to the CFL, when the difference between AFL and CFL is lower than an additional threshold. This threshold is independent of the reached CFL defined in other requirements. The status of this requirement was set as “deleted” as it was not V3 validated.
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-CMON.0005
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a)

[REQ]

Identifier	REQ-10.02a1-TS-CM.015
Title	Level Bust Deviation removal due to vertical rate correction.
Requirement	For a flight with a Level Bust Deviation, if actual vertical rate is less than an threshold, the Conformance Monitoring shall discard the Level Bust Deviation.
Status	<deleted>
Rationale	As a summary, a Level Bust Deviation is removed when it is no longer detected, so the detection conditions are no longer fulfilled. Consequently, conditions to discard a Level Bust Deviation are the negative case of the Level Bust Deviation Detection conditions. The status of this requirement was set as “deleted” as it was not V3 validated.

Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-CMON.0005
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a)

[REQ]

Identifier	REQ-10.02a1-TS-CM.016
Title	NoTT Deviation Detection
Requirement	The Conformance Monitoring shall detect a NoTT Deviation if a) no valid route information is available for a flight; or b) the aircraft is beyond or before its cleared (filed) route.
Status	<deleted>
Rationale	In case of NoTT deviation, tactical trajectory cannot be calculated because of missing input data. A flight does not have valid flight data for monitoring when no tactical or deviation trajectory is available. If any of them is calculated, the NoTT deviation is not detected. The status of this requirement was set as “deleted” as it was not V3 validated.
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a

<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-SAFE.0010
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-CMON.0003
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a)

[REQ]

Identifier	REQ-10.02a1-TS-CM.017
Title	NoTT Deviation removal
Requirement	For a flight with a NoTT deviation detected, the Conformance Monitoring shall discard the NoTT Deviation previously detected, if flight is inside the cleared (filed) route.
Status	<deleted>
Rationale	The conditions for NoTT Deviation removal are the opposite (in a logical sense) of the conditions NoTT Deviation detection. The status of this requirement was set as “deleted” as it was not V3 validated.
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a)

[REQ]

Identifier	REQ-10.02a1-TS-CM.020
Title	Mode S Selected Altitude Deviation Detection with pilot latency.

Requirement	Upon a latency time after a Mode S Selected Altitude update has been elapsed, if the Mode S Selected Altitude differs to CFL, the Conformance Monitoring function shall detect a Mode S Altitude Deviation.
Status	<deleted>
Rationale	In order to avoid nuisance Mode S Selected Altitude Deviation if the pilot enters the new clearance faster than the controller, a time latency condition is added. The status of this requirement was set as “deleted” as it was not V3 validated.
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0002
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0009
<ALLOCATED_TO>	<Functional block>	Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a)

[REQ]

Identifier	REQ-10.02a1-TS-CM.035
Title	Display of a warning if deviations between clearance and received Mode S DAP
Requirement	The CWP shall display a warning after reception of Mode S DAP if a deviation is detected between controller clearance and Mode S DAP.
Status	<deleted>

Rationale	Controller should be aware of the incongruence between different sources of information, including the clearances and the Mode S DAP. The status of this requirement was set as “deleted” as it was not V3 validated.
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0009
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Conformance State (PJ.10-02a)

[REQ]

Identifier	REQ-10.02a1-TS-CM.036
Title	Display of a warning if deviations between new clearance and Mode S DAP
Requirement	The CWP shall display warning after a new controller clearance if a deviation is detected between controller clearance and Mode S DAP.
Status	<deleted>
Rationale	Controller should be aware of the incongruence between different sources of information, including the clearances and the Mode S DAP. The status of this requirement was set as “deleted” as it was not V3 validated.
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0009
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Conformance State (PJ.10-02a)

4.2.2.2 Conflict detection

4.2.2.2.1 PC Aid Tool

[REQ]

Identifier	REQ-10.02a1-TS-PT.046
Title	CD&R Services display affecting one single selected Flight.
Requirement	The CWP shall allow the controller to display CD&R information and to interact with the CD&R services that are available for a selected flight.
Status	<deleted>
Rationale	The controller should be able to make specific flights a target of the CD&R actions. This requirement does not refer to force a manual conflict detection, it just aims to say that the selected flight will become the subject of conflict detection and resolution at the workstation at which the selection is made. The status of this requirement was set as “deleted” as it was not V3 validated.
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier

<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0013
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0012
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a) Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Planned Conflicts Actions Input (PJ.10-02a) Search Planned Conflicts (PJ.10-02a)

[REQ]

Identifier	REQ-10.02a1-TS-PT.048
Title	Acknowledge again manually when a minimum distance decreases
Requirement	The CWP shall allow to acknowledge manually again the PC-Aid detected encounter in case the predicted minimum distance decreases more than a predefined parameter value from the predicted minimum distance when encounter is acknowledged.
Status	<deleted>
Rationale	Making the Controller to acknowledge again an encounter ensures that she/he has seen this decrease of distance, which makes it more dangerous. The status of this requirement was set as “deleted” as it was not V3 validated.
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-SAFE.0006
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a) Conflict management (PJ.10-02a)

<ALLOCATED_TO>	<Function>	Planned Conflicts Actions Input (PJ.10-02a) Search Planned Conflicts (PJ.10-02a)

[REQ]

Identifier	REQ-10.02a1-TS-PT.055
Title	Speculative Trajectory
Requirement	PC-Aid shall detect speculative encounters between planning and speculative trajectories
Status	<deleted>
Rationale	In order to support What-else functionality, the PC-Aid conflict search must include the speculative trajectories. Speculative trajectory is the one using the flight data other than those currently committed or tentatively selected by the controller, it supports the what-else probing. The status of this requirement was set as “deleted” as it was not V3 validated.
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0019
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a)

[REQ]

Identifier	REQ-10.02a1-TS-PT.056
Title	Speculative Trajectory

Requirement	When displaying the speculative trajectories, PC-Aid shall support the controller who is assessing the encounters by taking into account all the speculative trajectories within that sector for the flight for which the probe was made.
Status	<deleted>
Rationale	All speculative trajectories for a flight subject to encounter search must be used in the encounter detection algorithms. In the sectors different from the one where the what-else probe is assessed PC-Aid will always take into account the planning trajectory associated with the flight. The status of this requirement was set as “deleted” as it was not V3 validated.
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0012
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a)

[REQ]

Identifier	REQ-10.02a1-TS-PT.057
Title	Allowable Delay of the Display of What-else Probe Results
Requirement	When a controller applies a What-else probe for a particular flight, PC-Aid shall support the display of: a) One speculative trajectory of the subject flight selected by the controller b) The planning trajectories of any flights that form an encounter with the selected speculative trajectory of subject flight within an offline defined number of seconds.
Status	<deleted>

Rationale	The result of the What-else probe to be displayed within a maximum allowable delay. The status of this requirement was set as “deleted” as it was not V3 validated.
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0012
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a) Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a) Search Planned Conflicts (PJ.10-02a)

[REQ]

Identifier	REQ-10.02a1-TS-PT.068
Title	Display of n-aircraft encounters
Requirement	If a flight is involved in a coordination encounter with more than one environmental flight, the CWP shall display the encounters as a single multi-aircraft encounter.
Status	<deleted>
Rationale	To be better aware of encounters, the CWP treats inter-dependant encounters as an unique encounter, so they can be solved as a whole. The status of this requirement was set as “deleted” as it was not V3 validated.
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0016
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Planned Conflicts (PJ.10-02a)

4.2.2.2.2 TC Aid Tool

[REQ]

Identifier	REQ-10.02a1-TS-TT.009
Title	Levels of infringement.
Requirement	TC-Aid shall classify a tactical encounter according to the proximity of the predicted aircraft positions at the Closest Point of Approach (CPA) and the uncertainty surrounding those positions.
Status	<deleted>

Rationale	This requirement classifies the levels of infringement in case of a tactical encounter, however the particular conditions for each one are an implementation issue and they are not described. As an example of severity levels, the following four levels may be used: Conflicting, Potential Conflict, Not Assured and Assured (from higher to lower severity). Classification (according to severity) described in this requirement is independent of the classification defined according the involved trajectories. Note: The classification of a tactical encounter according to the involved trajectories is: * A tactical nominal encounter is a tactical encounter detected between the Tactical Trajectories. * A tactical deviation encounter is a tactical encounter detected between two Deviation Trajectories or between a Tactical and a Deviation Trajectory. A coordination encounter is detected between the Entry Trajectory of a flight plan and the entry trajectory of other flight. The status of this requirement was set as “deleted” as it was not V3 validated.
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-PC00.0013
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a)

[REQ]

Identifier	REQ-10.02a1-TS-TT.040
Title	Time validity of conflict-free instructions
Requirement	When the result of a Tactical What-if probe is conflict free, the TC-Aid shall provide the time validity, i.e. the time interval when the instruction could be applied to be conflict-free.
Status	<deleted>
Rationale	The time validity indicates the time interval during which the envisaged instruction could be applied without creating any conflicts. The status of this requirement was set as “deleted” as it was not V3 validated.
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0013
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a) Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a) Display Tactical Conflicts (PJ.10-02a)

[REQ]

Identifier	REQ-10.02a1-TS-TT.039
Title	Time validity monitoring
Requirement	When the result of a Tactical What-if Probe is conflict free, the CWP shall display a warning if the instruction is not applied a predefined time before the end of its time validity.
Status	<deleted>

Rationale	To warn the controller that the instruction will be soon no longer conflict free. The status of this requirement was set as “deleted” as it was not V3 validated.
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0013
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a) Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display What-Else Results (PJ.10-02a) Search Tactical Conflicts (PJ.10-02a)

[REQ]

Identifier	REQ-10.02a1-TS-TT.018
Title	Speculative Trajectories used for What-else probing.
Requirement	The TC-Aid shall use speculative trajectories against all other trajectories for What-else probing, excluding all speculative and tentative trajectories, and against all active TSAs.
Status	<deleted>

Rationale	For what-else probing for a flight plan the TC-Aid will use the speculative trajectories against Tactical, Deviation and Entry trajectories of other flight plans. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 (partially) The status of this requirement was set as “deleted” as it was not completely V3 validated.
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0008
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Tactical Conflicts (PJ.10-02a)

[REQ]

Identifier	REQ-10.02a1-TS-TT.021
Title	What Else Probe Output data
Requirement	For each What-Else probe the Conflict Management functional block shall output the following data: 1) Flight level probes: a) level is conflict free; b) level is blocked; c) level can only be reached if a vertical rate is provided. 2) In case of 1c) the system shall indicate conflict free vertical rates. 3) Route and heading probes: a) route or heading is conflict free; b) route or heading is not conflict free.

Status	<deleted>
Rationale	Establish the data to be provided due to a What-else probe. This functionality should be provided to the controller with a minimum delay time. This can be achieved using a fast calculation algorithm or cyclically performing the calculation for every flight. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 (partially) The status of this requirement was set as “deleted” as it was not completely V3 validated.
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0008
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a) Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display What-Else Results (PJ.10-02a) Search Tactical Conflicts (PJ.10-02a)

[REQ]

Identifier	REQ-10.02a1-TS-TT.022
Title	The CWP to display different data from What-else probe orders

Requirement	The CWP shall allow an eligible operator, issuing a What-else probe order, to display the following data as response to his request: 1) Flight level probes: a) if level is conflict free; b) if level is blocked; c) if level can only be reached if a vertical rate is provided, displaying the conflict free vertical rates provided by the TC-Aid function. 2) Route (either Direct or 2D RNP) and heading probes: a) if Route or heading is conflict free; b) if Route or heading is not conflict free.
Status	<deleted>
Rationale	Display of data regarding What-else probes when requested by the Controller. This requirement has been implemented in project prototypes used in the following validation exercises: - EXE-10.02a-V3-VALP-002 (partially) The status of this requirement was set as “deleted” as it was not completely V3 validated.
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a1-SPRINTEROP-TC00.0008
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display What-Else Results (PJ.10-02a) Request What-Else (PJ.10-02a)

4.2.3 PJ.10-02a2 - V2 requirements

4.2.3.1 Conformance Monitoring

[REQ]

Identifier	REQ-10.02a2-TS-CM.037
Title	Route Horizontal Deviation Detection for an aircraft equipped with ADS-C
Requirement	If an aircraft is equipped with ADS-C and is flying in lateral managed mode, the Conformance Monitoring function shall detect a discrepancy between flight plan cleared route and EPP.
Status	<in progress>
Rationale	A discrepancy will be detected in advanced before it actually happened, therefore predictability and safety will be improve.
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-CMON.0002
<ALLOCATED_TO>	<Functional block>	A/G Datalink Communications (PJ.10-02a) Monitoring Aids (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Analyze Conformance (PJ.10-02a) Process ADS-C Report (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER APP ATC 104d_Adapt Controller Conformance Monitoring Tools to Use Enhanced Trajectory Prediction

4.2.3.2 PC and TC Aid Tools

[REQ]

Identifier	REQ-10.02a2-TS-PTT.060
Title	ADS-C global availability

Requirement	CWP shall display the global availability of ADS-C information.
Status	<in progress>
Rationale	ATCOs need to be informed immediately in case of non-reliable (or lack of) of ADS-C information as they will apply traffic separation in a different way (increasing personal buffers).
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a2-SPRINTEROP-EPP0.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a2-SPRINTEROP-EPP0.0002
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Display Tactical Conflicts (PJ.10-02a) Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER APP ATC 104b_Adapt Controller Conflict Detection and Resolution Tools to Use Enhanced Trajectory Prediction

[REQ]

Identifier	REQ-10.02a2-TS-PTT.061
Title	Separation of interest parameters depending on the availability of ADS-C information
Requirement	The conflict detection tools shall provide the capability of configure different lateral and vertical separation of interest parameters and trajectory look-ahead horizon depending on the availability of ADS-C information.
Status	<in progress>
Rationale	Since having an improved trajectory with ADS-C information should be more accurate, the conflict detection tools could use different parameters (lower separation parameters, greater look-ahead horizon) from those configured for a non-improved trajectory.

Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a2-SPRINTEROP-EPP0.0003
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a) Search Tactical Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER APP ATC 104b_Adapt Controller Conflict Detection and Resolution Tools to Use Enhanced Trajectory Prediction

[REQ]

Identifier	REQ-10.02a2-TS-PTT.062
Title	Display of aircraft ADS-C information availability in track label
Requirement	CWP shall display if conflict detection tools are using an improved trajectory with ADS-C information when detecting encounters.
Status	<in progress>
Rationale	ATCO situational awareness can improve by knowing if the outcome of the encounter detection process is taking into account an improved trajectory with ADS-C information.
Category	<HMI>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a2-SPRINTEROP-EPP0.0001
<SATISFIES>	< ATMS Requirement>	REQ-10.02a2-SPRINTEROP-EPP0.0002
<ALLOCATED_TO>	<Functional block>	Controller Human Machine Interaction Management ER/APP (PJ.10-02a)

<ALLOCATED_TO>	<Function>	Display Conformance State (PJ.10-02a) Display Planned Conflicts (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER APP ATC 104b_Adapt Controller Conflict Detection and Resolution Tools to Use Enhanced Trajectory Prediction

4.2.3.3 PC Aid Tool

[REQ]

Identifier	REQ-10.02a2-TS-PT.065
Title	Use of ADS-C data to improve planned encounters accuracy
Requirement	PC-Aid shall use a planned trajectory improved in the computation by means of the use of ADS-C data (such as EPP and Speed Schedule)
Status	<in progress>
Rationale	Using outcome of PJ.18-06a to improve trajectory prediction should improve encounters detection.
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a2-SPRINTEROP-IOP0.0002
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-PERF.0003
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-PERF.0004
<ALLOCATED_TO>	<Functional block>	Conflict management (PJ.10-02a) Trajectory Prediction and Management (PJ.10-02a) A/G Datalink Communications (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Search Planned Conflicts (PJ.10-02a) Process ADS-C Report (PJ.10-02a)

		Compute Planned Trajectory (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER APP ATC 104b_Adapt Controller Conflict Detection and Resolution Tools to Use Enhanced Trajectory Prediction

4.2.3.4 TC Aid Tool

[REQ]

Identifier	REQ-10.02a2-TS-TT.037
Title	Use of ADS-C data to improve tactical encounters accuracy
Requirement	TC-Aid shall use a tactical trajectory improved in the computation by means of the use of ADS-C data (such as EPP)
Status	<in progress>
Rationale	Using outcome of PJ.18-06b to improve trajectory prediction should improve encounters detection.
Category	<Functional>

[REQ Trace]

Relationship	Linked Element Type	Identifier
<ALLOCATED_TO>	<SESAR Solution>	Pj10-02a
<SATISFIES>	< ATMS Requirement>	REQ-10.02a2-SPRINTEROP-IOP0.0002
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-PERF.0004
<SATISFIES>	< ATMS Requirement>	REQ-10.02a-SPRINTEROP-PERF.0003
<ALLOCATED_TO>	<Functional block>	A/G Datalink Communications (PJ.10-02a) Trajectory Prediction and Management (PJ.10-02a)
<ALLOCATED_TO>	<Function>	Compute Tactical Trajectory (PJ.10-02a) Process ADS-C Report (PJ.10-02a)
<ALLOCATED_TO>	<Enabler>	ER APP ATC 104b_Adapt Controller Conflict Detection and Resolution Tools to Use Enhanced Trajectory Prediction

5 Implementation Options

PC-Aid and TC-Aid can be deployed to support different concepts, the following table is a summary of the different deployments that separation tools could support:

PC-Aid and TC-Aid can be deployed in En-Route and TMA environment using the following Capability Configurations:

Environment	Capability Configurations
En-Route	ER ACC Surveillance Infrastructure En-Route
TMA	APP ACC Surveillance Infrastructure TMA

Table 19: Implementation Options

If conflict detection tools are required to use an improved trajectory enriched with ADS-C data then they will need to implement the functional block “A/G Datalink Communications” and the modifications in the functional block “Trajectory Prediction and Management”.

6 Assumptions

No assumptions have been taking into account in this Technical Specification.

7 References and Applicable Documents

7.1 Applicable Documents

Content Integration

[1] PJ19 D5.1 deliverable (EATMA Guidance Material Version 9.0)

[2] EATMA Community pages

[3] SESAR ATM Lexicon

Content Development

[4] SESAR2020 Concept of Operations Edition 2017 dated Nov 17

System and Service Development

[5] 08.01.01 D52: SWIM Foundation v2

[6] 08.01.01 D49: SWIM Compliance Criteria

[7] 08.01.03 D47: AIRM v4.1.0

[8] 08.03.10 D45: ISRM Foundation v00.08.00

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

[10] B.04.03 D128 ADD SESAR1

[11] B.04.05 Common Service Foundation Method

Performance Management

[12] PJ19 D4.1 Performance framework (2017) dated Oct 17

[13] PJ19 D4.5 Validation targets (2018)

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

[15] 16.06.06-D68 Part 1 –SESAR Cost Benefit Analysis – Integrated Model

[16] 16.06.06-D51-SESAR_1 Business Case Consolidated_Deliverable-00.01.00 and CBA

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

[18] ATM Cost Breakdown Structure_ed02_2014

[19] Standard Inputs for EUROCONTROL Cost Benefit Analyses

[20]16.06.06_D26-08 ATM CBA Quality Checklist

[21]16.06.06_D26_04_Guidelines_for_Producing_Benefit_and_Impact_Mechanisms

Validation

[22]03.00 D16 WP3 Engineering methodology

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

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

System Engineering

[25]SESAR 2020 Requirements and Validation Guidelines

Safety

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

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

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

[29]SESAR, Resilience Engineering Guidance, May 2016

Human Performance

[30]16.06.05 D 27 HP Reference Material D27

[31]16.04.02 D04 e-HP Repository - Release note

Environment Assessment

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

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

Security

[34]16.06.02 D103 SESAR Security Ref Material Level

[35]16.06.02 D137 Minimum Set of Security Controls (MSSCs).

[36]16.06.02 D131 Security Database Application (CTRL_S)

7.2 Reference Documents

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

[38]10.04.01-D78-Conflict Detection and Resolution Requirements Refinement

[39]10.04.02-D44-Consolidated Conformance Monitoring System Requirements

[40]05.07.02-D77-Preliminary V2 OSED for Step 1

[41]P04 07 02_D28_OSED_4

[42]PJ10-D4.1.010-SPR INTEROP OSED for V2 Part I - 00.01.01

[43]PJ10-D4.2.010-SPR INTEROP OSED for V3 Part I - 00.01.02

[44]PJ10-D4.1.020-SESAR Solution PJ.10-02a FINAL Technical Specification (TS IRS) V2 TRL4-00.02.01

[45]EUROCONTROL STANDARD DOCUMENT FOR SURVEILLANCE DATA EXCHANGE Part 9 : Category 062 SDPS Track Messages, ed. 1.12

[46] https://en.wikipedia.org/wiki/GRIB

[47]https://www.wmo.int/pages/prog/www/WMOCodes/Guides/GRIB/Introduction_GRIB1-GRIB2.pdf

[48] D4.2.110 - PJ10-02a VALR for V3_00_01_00

Appendix A Service Description Document (SDD)

This section is not applicable in this solution.

Appendix B Service Technical Design Document (STDD)

This section is not applicable in this solution.

-END OF DOCUMENT-