Final System Specifications update after Validation

Document information	
Project Title	Ground Weather Monitoring System
Project Number	15.04.09.c
Project Manager	Selex ES GmbH
Deliverable Name	Final System Specifications update after Validation
Deliverable ID	Del 17
Edition	00.01.06
Template Version	03.00.00
Task contributors	
Selex	

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Abstract

This deliverable is the final update after validation exercise (EXE-669) of the final technical specification D08 of 15.04.09.c. It presents an update of validated requirements. Furthermore, it gives a full reference for the basis on which prototype development has been conducted. It replaces D01, D02, D06 and D08. It takes into account the MET architecture on the local aerodrome level that has been described in the 11.02 TAD. It lists the system requirements derived from consolidated operational MET requirements released by project 11.2.1 and operational requirements released by OFA05.01.01.

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Rational for rejection
None.

Document History

Edition	Date	Status	Author	Justification
00.00.01	16.05.2014	draft	[redacted]	New Document
00.00.02	28.05.2014	draft		including SPR
00.00.03	05.06.2014	draft		including latest MET TAD
00.00.04	11.06.2014	draft		Use Case updated
00.00.05	24.06.2014	reviewed draft		comments from TechnoSky
00.00.06	01.07.2014	reviewed draft		AU comments
00.01.00	10.07.2014	final version		no comments from [redacted] and 11.2; version for submission
00.01.01	23.09.2014	revised document		Comments from SJU
00.01.02	16/10/2014	final revised document		resubmitted
00.01.03	09.03.2016	Final Version		resubmitted
00.01.04	22/03/2016	Final Version		Finalized after clarification
00.01.05	22/03/2016	Final Version		Finalized after Review
00.01.06	26/04/2016	Final Version		SJU comments included

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This deliverable consists of SJU foreground.

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Executive summary

This document provides the fourth and last iteration of the technical specification of the Ground Weather Monitoring System (GWMS) after the final validation (EXE-06.03.01-VP-669 of OFA 05.01.01). It has the sole purpose of finalizing the requirement statuses with respect to their having been validated or not. Since at the time of writing this deliverable the formal validation report has not been delivered, yet, the assumption with respect to the tag <validated > is that if a requirement has been important to the execution of the exercise and therefore, since the exercise has been an overall success, the requirement is considered validated. Some requirements, however, could not be traced to operational requirements, but nevertheless deemed important. These are only set to <validated> if they have been absolutely vital to the exercise. By default, they have been kept <in progress>.

The development of the Ground Weather Monitoring System (GWMS) prototype follows standard system engineering rules and starts with the requirements collection. This is primarily based on the consolidated MET requirements (throughout all SESAR projects) collected by 11.02.01 for the local MET prototype, as well as on the dedicated documents (OSED, SPR, INTEROP) of OFA05.01.01. Therefore, the content is based on available OSED, SPR, INTEROP, TAD documents from P11.02.01 [7][8][9][10][11] and OFA05.01.01 [12][13][14][14]. The general MET architecture as agreed before between SWP11.02, B.04.03, OFA05.01.01 and 15.04.09.c is still valid, although refined, and the basis for the GWMS specification.

Since weather monitoring is not only restricted to operational projects, also TS documents from other system projects are taken into account if they require (special) weather information for their systems (see Table 1). This is a proactive way of starting the work of serving all local stakeholders with suitable MET data. To wit, it should be noted that, although 15.04.09.c has been associated with OFA05.01.01 in SESAR1 and development of MET products has focused primarily on APOC needs, it is not a restriction of the GWMS concept but solely due to the fact that APOC emerged as the exemplary user environment in SESAR1. Expansion of product scope in terms of meteorological content, translation to operational or service tailoring is foreseen in the architecture.

1 Introduction

1.1 Purpose of the document

This document provides the fourth and last iteration of the technical description of the Ground Weather Monitoring System (GWMS). The content is based on available OSED, SPR, INTEROP, TAD documents from P11.02.01 [7][8][9][11] and OFA05.01.01 [12][13][14]. In addition, since weather monitoring is not only restricted to operational projects, also TS documents from other system projects are taken into account if they require (special) weather information for their systems (see Table 1).

This final version of the GWMS technical specification has the sole purpose of finalizing the requirement statuses with respect to their having been validated or not. Since at the time of writing this deliverable the formal validation report has not been delivered, yet, the assumption with respect to the tag <validated > is that a requirement has been important to the execution of the exercise and therefore, since the exercise has been an overall success as came out in the wrap up session, the requirement is considered validated.

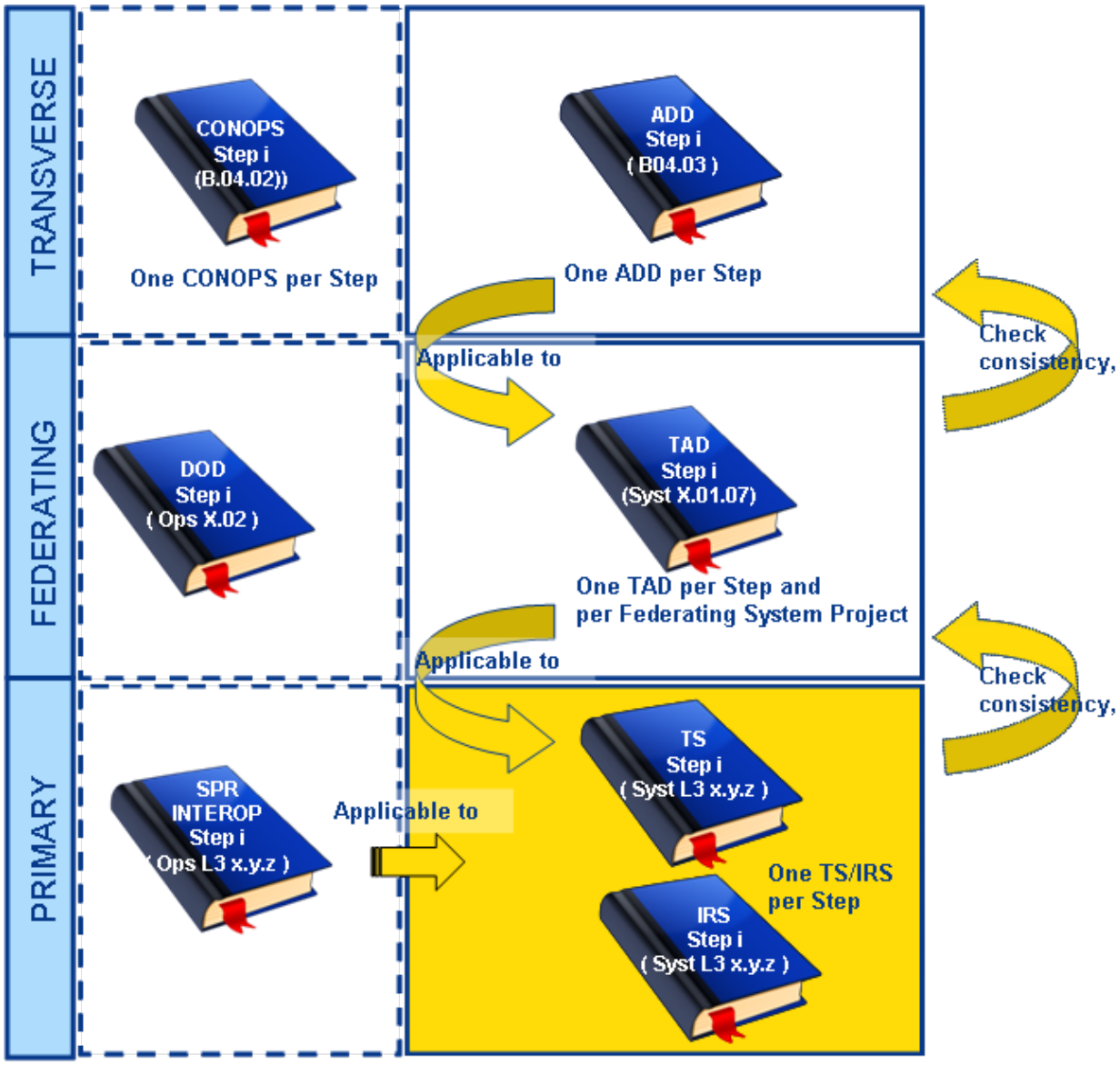

Figure 1: TS document with regards to the other SESAR deliverables

In the CNS domain, WP15 project 15.04.01 was acting as interim Federating System Project but no TAD has been produced. Since project 15.04.01 has been completed, Sub-WP 15.04 took the role of the Federating System Project. However, as per final agreement reached in the MET issue resolution process [15], project 15.04.09.c is subject to the TAD produced by 11.2 [9].

1.2 Intended readership

This document is of interest for all projects whose requirements have been used to generate system requirements for the GWMS. The list can be found in Table 1 in the next section. Since 11.02 is acting as Federating System project for MET it will be already involved at an early stage in the review process as well as projects 11.2.1 and 11.2.2. In addition, 12.01.07 and OFA05.01.01 projects as well as other OFAs potentially in need of high resolution MET data for the execution phase at the aerodrome may be interested to read this document (most probably WP06 and WP12 projects).

1.3 Inputs from other projects

The first technical specification of the GWMS was based on several documents from OPS as well as SYS projects. The consolidated view of operational MET requirements now available is based on the OSED of P11.02.01 [7] and has been used as the source representing the needs of all projects. However, in addition to this, OFA05.01.01 released a combined OSED containing a lot of operational MET requirements that will undergo formal consolidation by 11.02.01 later in the programme schedule. In order to include these requirements already, the OFA05.01.01 OSED [12] has been used as a second primary source. Where possible requirements are linked to INTEROP or SPR using only OSED if there is no adequate representation of the requirement in the other documents. 11.02.01 INTEROP could not be used since it states only the interoperability of the FB MISC and is not yet submitted in its final version.

Project 12.05.02 needs wind shear alerts for their Controller Working Position.. This special need is also taken into account concerning wind shear products. An internal ICD describes required content and format of data [16].

OFA/Project ID	OFA/Project Name	Used Deliverables	Content
OFA05.01.01 (06.05.03, 06.05.05, 06.06.01, 06.02.02)	Airport Operations Management	D08 OSED V2.2 D11 INTEROP V2 D12 INTEROP V2	MET related REQ
OFA 05.01.01 (12.02.01, 12.06.02, 12.06.03, 12.07.05)	Airport Operations Management	12.06.03: D07 TS 12.07.05: D05 TS	MET for APOC and iCWP
11.02.01	Requirements for MET Information	D19 MET OSED part A, Local OUE, ed. 00.01.00 D20 MET SPR part A, Local OUE, ed. 00.01.00 D21 MET INTEROP, ed. 00.01.01 D31 MET TAD, ed. 00.02.00	Operational MET requirements TAD
12.05.02 (now merged into 12.05.04)	Airport Safety Nets and wind-shear detection and alert for Controllers	SESAR_ICD_1252_Met_alerts_05 Internal Document	Definition of wind shear messages: content and format

Table 1: List of projects providing input for TS

1.4 Structure of the document

This document follows completely the structure pre-defined by the TS template of SJU. After the introduction section in chapter 1, the functional block is described in chapter 2. The refined functional and non-functional requirements are listed in chapter 3. The document closes with the assumptions in chapter 4 and references in chapter 5.

1.5 Requirements Definitions – General Guidance

The requirements have been developed according to the Requirements and V&V Guidelines [2]. The guidance was followed using the latest SESAR toolbox [1].

The requirement collection starts with a break-down of the major capabilities of the GWMS and therefore orientates itself to functional requirements. For the major capabilities see also section 2.3, Figure 6.

In order to enable the import of SE Data in the SESAR SE Repository, the description used the layout described in Templates and Toolbox User Manual [3].

The layout is illustrated below:

[REQ]

Identifier	
Requirement	
Title	
Status	
Rationale	
Category	
Validation Method	
Verification Method	

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	Enabler code	<Full>
<SATISFIES>	<ATMS Requirement>	INTEROP or SPR Requirement Identifier	<Full>
<ALLOCATED_TO>	<Functional block>	Functional block Identifier	N/A
<APPLIES_TO>	<Operational Focus Area>	Operational Focus Area Identifier	N/A
<CHANGED_BECAUSE_OF>	<Change Order>	Change reference	N/A
<ALLOCATED_TO>	<Project>	Project Identifier	N/A

Table 2: Requirements layout

1.6 Functional block Purpose

Air Traffic Management shall be as smooth and safe as possible. Especially in light aviation, adverse weather is still one of the major causes of severe accidents (see section 4.5 in [17]). For this reason all possible influencing parameters have to be taken into account. Weather is still one of the major reasons for delays in today's European air traffic [18] [19]. ICAO Annex 3 [20] states the main MET parameters and phenomena to be monitored at airports and gives also recommendations about available sensors and systems. Nevertheless, such recommendations are of general nature and sometimes it is hard to apply them for airports and their individual problems as well as complex MET conditions. Therefore, the GWMS aims to improve the detection, monitoring and short term forecasting of MET hazards.

The GWMS will use data from MET sensors installed at the airport and also from external data sources like e.g. consolidated model output in order to produce dedicated aerodrome products with a maximum of spatial and temporal resolution. A substantial part will be data fusion: combining the output of two or more sensors/data sources to provide improved or new products which enhance the situational awareness of weather at the airport. The feasibility of this has to be clarified on a case by case basis and will also vary from deployment to deployment. That is, even if it may not be

appropriate in one location with a particular sensor set up and particular issues, it may be in the future when technology either of sensors or algorithms (or both) has evolved. The single node collecting all the data enables system growth by implementing only minor amendments.

It also aims at higher reliability and availability in all-weather conditions (e.g. data fusion of Doppler Lidar and Doppler Radar for all-weather wind shear detection). Beside the general information about the current weather at the aerodrome in real-time (e.g. wind, temperature, etc.), detailed information about convective phenomena (thunderstorms, gust fronts, heavy rain, etc.), wind shear, winter weather, etc. will be provided. The functionality is based on the requirements received from operational and system projects within SESAR and the pre-work done in projects 15.4.9.a and 15.4.9.b which described potential synergies of data from different sensors.

Although the GWMS is allocated to WP15, CNS, in the formal SESAR architecture, the system actually belongs to the MET domain (4D Weather Cube domain system, local OUE). The recipients are not from a specific domain, but rather distributed across the complete airport. Therefore, it is only sensible that 15.04.09.c is now subject to the TAD of 11.2 [11]. Its scope which is to be complementary to the implementation of the local prototype of 11.2.2 is described in the next chapter in connection with the description of finally agreed functional blocks. The GWMS and the 11.2.2 local prototype support the functional block T01 “ICAO Annex 3 Regulatory MET Information” and the functional block T02 “Local MET Information & Warnings” (see chapter 2.1).

1.7 Functional block Overview

The GWMS shall fulfil the requirements with respect to MET parameters relevant to the local aerodrome. Specifically, its meteorological products will be based on local MET observations as opposed to consolidated products for the local domain provided by 11.02.02 prototypes that will be based on the general MET infrastructure. Thus, GWMS and 11.02.02 face the same requirements in terms of MET parameters to be supplied, but their products are complementary with respect to forecast horizon, temporal and spatial resolution and in terms of some observational phenomena that can be resolved (e.g. wind shear detection). The GWMS will provide observation and short term forecast products supported by the local airport MET sensor suite. However, in terms of forecasts it has to be evaluated during the prototype development for each required parameter, if local observations can provide an added value with respect to the consolidated product. For some parameters listed in the requirements, this will not be the case and the product will only cover the current state of the atmosphere. However, the system of systems architecture (Figure 2) will hide this complexity from the user who will be provided with a consistent and unbroken view in terms of time. Thus, together these systems will be able to deliver the full scope of products needed for safe and efficient air traffic management in the local domain.

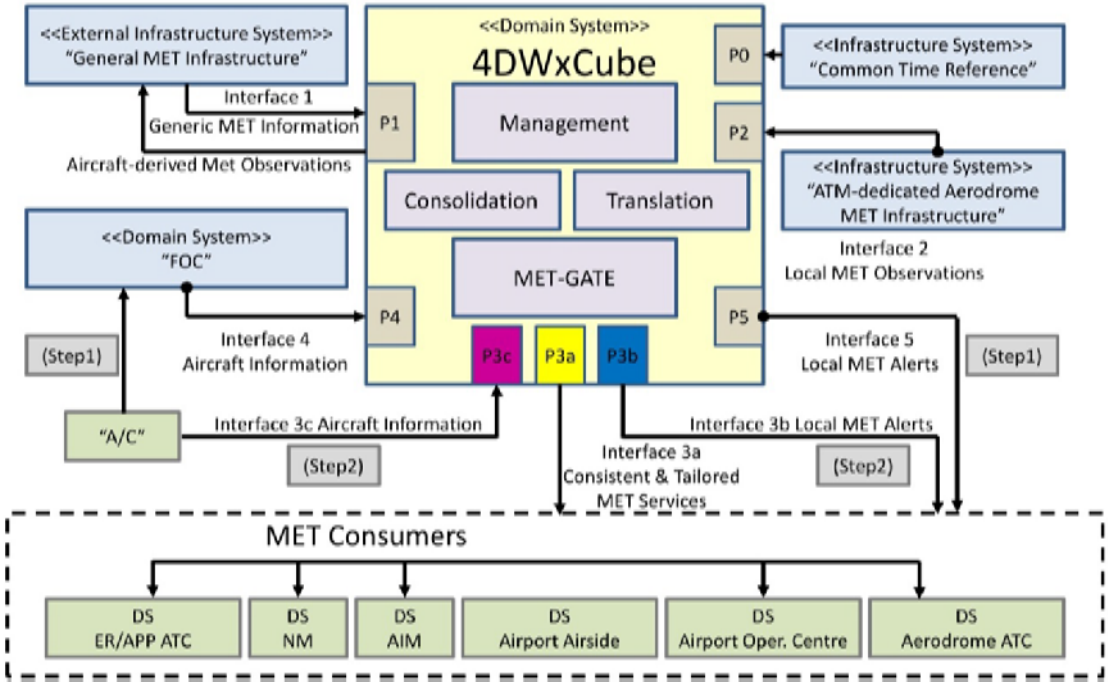

Figure 2: Overview of the "4DWxCube" DS [11]

The complete functional breakdown of the domain system "4DWxCube" can be seen in Figure 3. The GWMS prototype is part of the Tailoring Functional Block T01 "ICAO Annex 3 Regulatory MET Information" and T02 "Local MET Information & Alerts". Further details about the interactions and dependencies between functional blocks can be found in chapter 2.1.

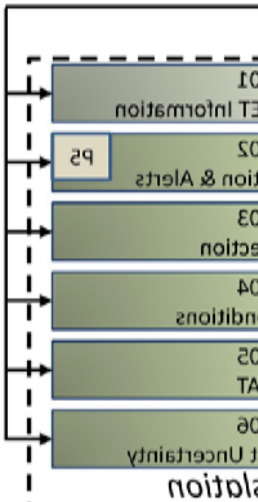

Figure 3: "4DWxCube" DS Functional Breakdown [11]

Within the functional block T01 “ICAO Annex 3 Regulatory MET Information” various MET products and services are delivered in support of international air navigation. They are intended to enable safe flights and do not focus on enhancing performance areas (e.g. capacity) or to enable efficient collaborative decision making in the first place. This will be covered with the functional block T02.

Within the functional block T02 “Local MET Information & Alerts”, hazards which limit airport capacity and have significant impact on the operation shall be monitored. Data from adequate sources have to be acquired and a gateway has to be built to handle the data from each input including input coming from the Consolidation Functional Blocks (see chapter 2.1). Incoming data have to be checked for completeness and quality. Data will be transferred into a desired format and stored for a defined period of time. Data storage is for potential checking if an error occurred, specific analysis for an incident/accident or running simulations.

Standard MET parameters (e.g. pressure, temperature, wind, etc.) will be provided as well as products describing MET phenomena (e.g. thunderstorm). If feasible, the focus is on combination of sensor data. This may include complementary sensors to achieve an all-weather capability or combining the output directly for better estimation of the MET conditions including onset, duration, termination, and severity.

The output will be in an agreed format so that stakeholders can directly use the information. The format will be defined by AIXM/IWXXM standards and the SWIM capabilities (WP14). Output provision to SWIM will be via the Functional Block “MET Gate”. Visualisation of the products is currently intended only for verification purposes, but for a later deployment a visualisation for the MET expert will be mandatory. HMIs for visualisation of MET data for ATM (text, graphics, etc.) have to be developed by other projects (stakeholders e.g. 12.06.03) extracting the information from SWIM or getting it directly from GWMS using port P5 of the 4DWxCube DS (Figure 2).

1.8 Glossary of terms

N/A

1.9 Acronyms and Terminology

Term	Definition
4DWxCube	4D Weather Cube
A-CDM	Airport-Collaborative Decision Making
ADD	Architecture Definition Document
AIXM	Aeronautical Information Exchange Model
AOP	Airport Operations Plan
APOC	Airport Operation Centre
ATC	Air Traffic Control
ATM	Air Traffic Management
ATMS	Air Traffic Management System
AUs	Airspace Users
CB	Cumulonimbus – Thunderstorm cloud

Term	Definition
CDM	Collaborative Decision Making
CNS	Communication, Navigation and Surveillance
DCB	Demand and Capacity Balancing
DOD	Detailed Operational Description
DS	Domain System
E-ATMS	European Air Traffic Management System
EDR	Eddy Dissipation Rate
EVS	Enhanced Vision System
GUI	Graphical User Interface
GWMS	Ground Weather Monitoring System
HMI	Human Machine Interface
ICAO	International Civil Aviation Organisation
ICD	Interface Control Document
iCWP	Integrated Controller Working Position
IRS	Interface Requirements Specification
INTEROP	Interoperability Requirements
IWIS	Improved Weather Information System
LLWAS	Low Level Wind Shear Alert System
MET	meteorological, Meteorology
NWP	Numerical Weather Prediction
OFA	Operational Focus Area
OPS	Operational projects
OSED	Operational Service and Environment Definition
OUE	Operational User Environments
PIR	Project Initiation Report
REQ	Requirement(s)
SE	System Engineering

Term	Definition
SESAR	Single European Sky ATM Research Programme
SJU	SESAR Joint Undertaking (Agency of the European Commission)
SJU Work Programme	The programme which addresses all activities of the SESAR Joint Undertaking Agency.
SESAR Programme	The programme which defines the Research and Development activities and Projects for the SJU.
SPR	Safety and Performance Requirements
SWIM	System Wide Information Management
SWP	Sub-Work Package
SYS	System projects
TS	Technical Specification
TAD	Technical Architecture Description
UML	Unified Modelling Language
VP	Verification Plan
VFR	Visual Flight Rules
WISADS	Weather Information System for Airport Decision Support
WMO	World Meteorological Organisation
WP	Work Package
WXXM	Weather Information Exchange Model
XML	eXtensible Markup Language

2 General Functional block Description

2.1 Context

The GWMS system belongs to the 4DWxCube Domain system and therein is responsible for providing an integrated solution of all MET observations at the airport and to fuse these with appropriate global information such as lightning observations from European networks and NWP model information. From this pool of information it generates meteorological products for the execution phase i.e. that represent the current state of the atmosphere or the very near future if the local observations provide an advantage in performance over consolidated information. For example, this is very obvious for dedicated airport weather radar observations of convection near the airport. As development of appropriate strategies to support this kind of very short term local forecasts progresses, the GWMS has to be easily extensible to account for latest developments in the field. This whole explanation is the precise meaning of the wording “in support of the execution phase” used in the requirements of this TS.

Thus, the GWMS is a stand-alone local system and provides that part of the functionality of FB’s T01 and T02 of the domain system 4DWxCube that deals mainly with the local MET infrastructure of an airport. Therefore, interfaces have to be established to port 2 in order to receive data from the Infrastructure System “ATM-dedicated Aerodrome MET Infrastructure” and to port 5 for sending data directly to airport stakeholders. In order to publish MET products on SWIM, it also needs direct or indirect access to ports of kind 3 (a-c). Indirectly, this link can be established via the MET Gate system (11.02.02) within the 4DWxCube DS (see Figure 2 and Figure 3) or via the IWIS system (12.07.05) within OFA05.01.01 using also port 6.

The GWMS uses a server system to receive inputs from the various MET sources. The scope of the GWMS is the synergetic processing of their content in order to provide ATM with general purpose products of highest spatial and temporal resolution, supporting the execution phase of the airport. The phrase “general purpose” implies that these products should not have a relation to a specific ATM process, although have a clear-cut ATM relevant content. The adaptation to specific processes such as those defined in OFA05.01.01 is then for example done by the WISADS system of 12.06.03 by using specially required thresholds. In practice however, it appeared during V2 development and support to V2 validation of OFA05.01.01 that some adaptation needs to be already done on the MET side due to technical reasons. One example is the current and future spatial coverage of METAR precipitation types that was explicitly required by 06.05.05 to be relevant thresholds for the application of warning rules. Therefore, the quantitative thresholds to determine these types are used by the GWMS to produce georeferenced polygons that are then used by WISADS to apply configurable warning rules. In principal one could still argue that the term general purpose applies here, since the thresholds for METAR precipitation types are not set by individual airport processes, but the message here is that the interpretation should not be to strict and adaptable to the actual needs and constraints. This is closely related to the borderline between what is referred to as “Translation” and “Impact Assessment” of MET information [11]. It might be argued that the application of commonly accepted thresholds such as those defined by ICAO or the runway layout of an airport still belongs to Translation, whereas application of individual thresholds based on performance of specific operational processes that vary a lot from location to location, incorporate current operational states of the airport such as runway configurations and may be frequently adapted, applies to Impact Assessment.

The set of MET phenomena covered in the functional blocks T01 (Figure 4) and T02 (Figure 5), respectively, are also dealt with by 11.02.02. However, the actual products the GWMS provides are based on local sensors, although they may be enriched with input from the consolidated national and pan European products from the consolidation functional blocks (see Figure 5). Therefore, they close the gap between the global (regional/sub-regional) and the local scale observations. Basically, the sensors that can be integrated by the GWMS comprise all kinds of in situ and remote sensing equipment that has some benefit for the characterisation of relevant phenomena. The details of this have been elaborated in the predecessor project 15.04.09.a.

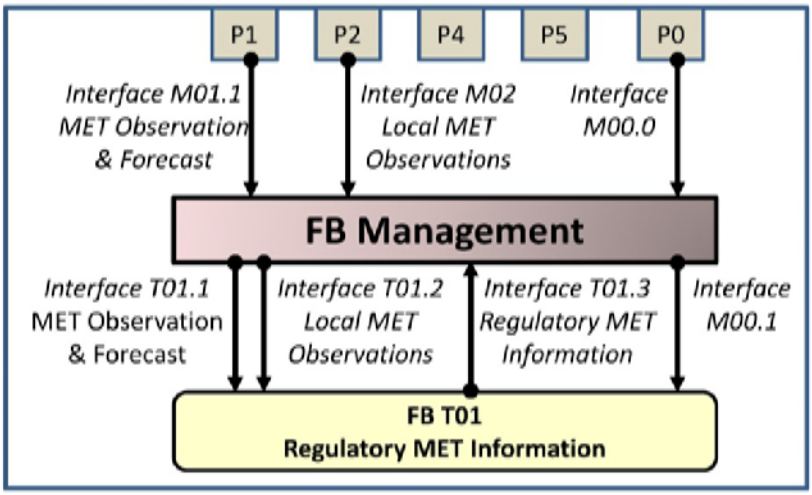

Figure 4: FB T01, taken from 11.02 TAD [11]

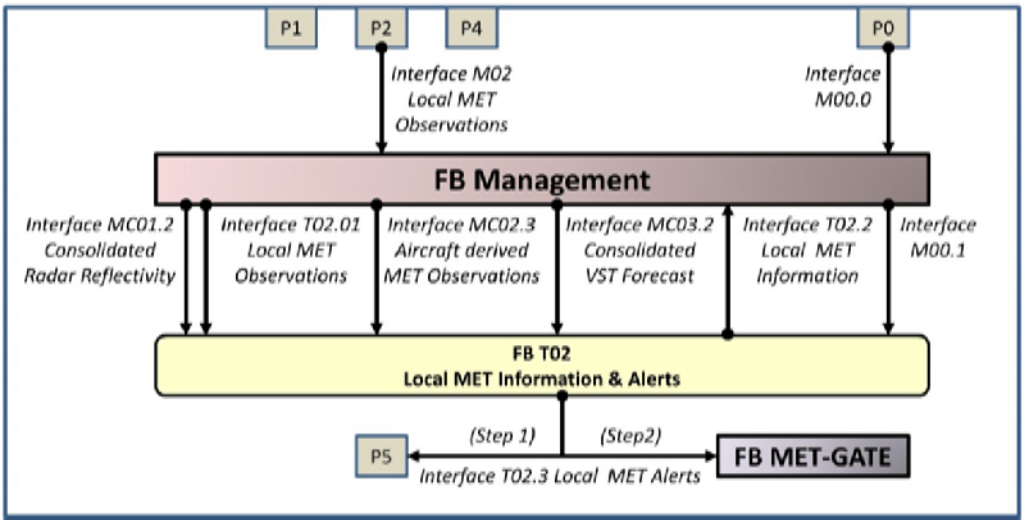

Figure 5: FB T02, taken from 11.02 TAD [11]

MET products provided by the GWMS system can be formally subdivided into two classes conforming to FB T01 and FB T02, respectively. This does, however, not demarcate any actual boundary within the system. The difference is just that in T01 ICAO Annex 3 observation products will be derived only from the local infrastructure (port 2, see Figure 4), since they usually do not require any additional global information. Everything that comes on top is formally assigned to T02 and may use information coming from consolidation FB's (see Figure 5). It should be noted that this distinction is rather artificial in terms of the GWMS system, since its products are derived from one set of MET requirements that implicitly includes ICAO Annex 3 [20].

2.2 Functional block Modes and States

The GWMS has two modes in which it can operate:

- Online Mode: system is operating according to settings
  - System input is received / sensors are connected
  - System output is sent to domain system ports
- Offline Test/Training Mode
  - Use of simulated data or historical dataset as input

- Output delivered to ports

The system can be configured according to user defined preferences. This includes settings for products, which sensors are used for product generation, dissemination to intended recipients, etc. Here it has to be made clear that if a particular sensor has not been accounted for in the past, it is not possible to configure the system to account for it, but it has to be implemented first. The GWMS allows for this kind of extensions that might be necessary to develop for a particular deployment scenario. Note, however, that this amounts only to writing a converter in case the sensor delivers a data type that is stated in the requirements listed in this document.

If the GWMS is working according to these settings, the system and the specified functionalities are online. This can include that some parts of the complete system are “offline” but if this is according to settings, the system is in a normal state (see below) and online. If the system is online and some parts are unintentionally not working, this refers than to a fault state defined below.

The complete system can be “off” which means that no real-time input is processed and no output is delivered to recipients outside the system itself. A test data set or simulations may be used to check new products or the configuration with a new sensor. Updates are installed in this mode.

Basically, two states are possible for the GWMS:

- Nominal state: all features working according to settings
- Fault state:
  - Fault input → corrupted data, data formatting or storage failure
  - Fault sensor → no product; degraded product (if based on more than one sensor; this includes a switch of processing strategy) but still working
  - Fault product → product generation failed
  - Fault output → dissemination limited or failed

In the nominal state the system’s functionalities are working according to the defined settings. A fault state must be distinguished due to different circumstances. Fault input stands for a sensor failure which could result in data gaps or invalid data. Also the formatting could be defective and therefore provision of wrong input to the product generation module is possible. If the storage does not work, simulations cannot be run from stored data.

If a sensor does not deliver any data, the product generation is affected. If the product/provided MET parameter rely only on this sensor the provision fails completely. If the sensor is used together with other input sources, the product may be still available but with a degraded performance. E.g. Radar can provide wind shear information, but a product based on an additional LLWAS would be timelier and could confirm the remote sensing data yielding much higher reliability.

If the product generation fails we have a complete product fault and the recipients will not get data and products they subscribed to. With “fault output” we define that the product is available *but the* dissemination does not work according to settings/specifications.

2.3 Major Functional block Capabilities

From the context explicated above, one can derive three main capabilities that the GWMS has to provide. These have to provide collection and processing of data from the different sources in order to provide products for the required MET parameters, dissemination of these products to the different ports, and configuration of specific settings (products in terms of some details regarding the algorithms used by the MET expert user, airport specific sensors suite, and general system settings).

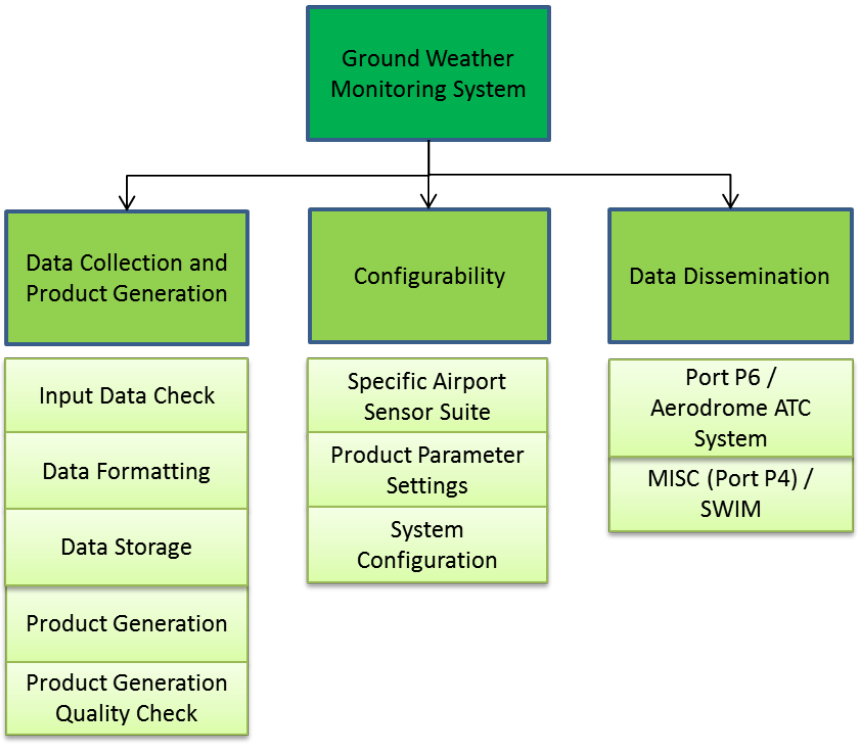

Figure 6: GWMS main capabilities and their breakdown

Another important issue to tackle is the variety of possible sensor suites that one can encounter at airports. The amount of equipment may be very basic or it may also comprise novel remote sensing equipment such as Doppler Lidars, wind profilers or dedicated airport weather radars. Therefore, the system needs to be configurable with respect to this. Although already mentioned above, it should be stressed that particular airport installation may have new sensors to be accounted for, since they have not been implemented in the past. This entails development of a piece of software connecting the sensor to the GWMS. Of course, this also affects the portfolio of products that can be provided (ICAO Annex 3 products contributing to FB T01 should be always available).

A sensor may provide its data directly to the GWMS server system or via another workstation where the software operating the sensor is installed. The GWMS itself has to make sure that a sensor is connected and alive, represent data with required accuracy and perform formatting for further processing and data storage.

2.4 User Characteristics

A fixed definition of “users” is not available for the GWMS. The “end-users” of local MET information are of course stakeholders like airports, airlines, controllers, APOC, etc. Those users in general can receive products and data delivered by the system. In chapter 4.2 of the 11.02.01 OSED [7] specific roles and responsibilities to interact with a MET Service Provider have been listed, although it is noted that no such role has been defined in the respective operational documents. However, the need for MET information has been clearly uttered. Direct users of GWMS products that have been clearly identified are the 11.02.02 MISC and 12.07.05 IWIS, the designated airport MET office (not represented in SESAR) and potentially other users that receive GWMS products directly via port 6 (e.g. wind shear alerts used by the CWP built in 12.05.04). However, in principle any ATM user can subscribe to GWMS products once they are published on SWIM. The MET expert will use the data for monitoring with automatic warning systems such as WISADS (12.06.03) which is a major consumer of GWMS products. 12.06.03 builds also the link to APOC users, as well as for an enhancement of their capability to give advice to ATM/ATC stakeholders. IWIS and the MISC will forward GWMS products to SWIM where they can be subscribed by any stakeholder.

2.5 Operational Scenarios

The GWMS contributes to the high level scenario *"MET Scenario in Execution phase"* as per MET DoD [22]. The Execution Phase is the effective phase of operations and (near-)real time planning and decision making. This can be further specified by use cases associated solely with the local OUE as stated in the 11.02.01 OSED [7]. Namely, these use cases are UC-MET-EX01-L, UC-MET-EX02-L and UC-MET-EX03-L and comprise the provision of forecasts for adverse and nominal weather as well as observations, respectively. In particular, these use cases shall produce the following output:

UC-MET-EX01-L:

- Agreed information on forecasted adverse weather events to various users at given time intervals, including probabilistic information
- Update of adverse weather forecast at any given time if significant changes occur
- Warnings
- Nowcast Services, e.g. fusion of observations and forecasts

UC-MET-EX02-L:

- Agreed information on forecasted nominal weather to various users at given time intervals

UC-MET-EX03-L:

- Agreed information on actual adverse weather to various users at given time intervals
- Agreed information on actual nominal weather to various users at given time intervals
- Update of actual adverse weather conditions at any given time if significant changes occur
- Radar products to various users
- Satellite products
- Lightning observations
- Composite graphical observational products

2.6 Functional

2.6.1 Functional decomposition

2.6.1.1 Functional decomposition for GWMS part of FB T01

Out of the list of functions given in the 11.02.01 TAD, the functions mentioned in Table 3 to be provided by the MET authority in FB T01 can be tackled using GWMS output.

MET product or service	OUE	Identified user(s)	MET Providers
Real-time measured and/or observed weather parameters	Local	TWR & APP	AMS
Local routine & special reports	Local	TWR & APP Airport managements	AMS
Forecast for take-off	Local	Operators & flight crew members	AMO
Aerodrome warnings	Local	TWR & APP Operators & flight crew members Airport managements	AMO
Wind shear warnings & alerts	Local	TWR Operators & flight crew	AMS AMO
Additional MET information, agreed locally	Local	TWR & APP	AMO
Aerodrome climatological tables & summaries	Local	All stakeholders on request	AMO

MET product or service	OUE	Identified user(s)	MET Providers
Ground-based weather radar information	Local Sub-regional	ATS units Operators & flight crew members	AMO

Table 3: ICAO Annex 3 MET products and services for local OUE as stated by 11.02.01 TAD

The functions of FB T01 for the local OUE relate as follows to the GWMS:

"Real-time measured and/or observed weather parameters" is the primary source of information processed by the GWMS. Therefore, these products can be provided with minimum processing in a consistent manner (e.g. allowing for local particularities like having more than one sensor for the same parameter).

"Local routine & special reports" will not be provided directly by the GWMS, but its output is a major source of information for this function.

"Forecast for take-off" can be served depending on local arrangements, since these are not further specified. Thunderstorm movement may be interesting for this.

"Aerodrome warnings" are also not directly issued by the GWMS, but it is a major source of information for these (depending on local sensor suite).

"Wind shear warnings & alerts" will be issued directly by the GWMS, provided sensors for this are implemented (Doppler Weather Radar, Doppler Lidar, LLWAS).

"Additional MET information, agreed locally" depends on what is locally required and what monitoring capabilities are installed.

"Aerodrome climatological tables & summaries" can be filled with aerodrome observations collected by the GWMS.

"Ground-based weather radar information" is a cornerstone of the GWMS.

2.6.1.2 Functional decomposition for GWMS part of FB T02

Concerning FB T02, the relevant functions mentioned in the 11.02.01 TAD can be extracted as follows:

Collection of local MET observations performed by the "ATM-dedicated Aerodrome MET Infrastructure".

Extension of the validity of local observations to a very short term horizon (2h); local observations can be fused with larger scale observations and very short term forecast that are accessible from FBs C01, C02 and C03.

Safety relevant information: among local observations, a subset is dedicated to safety (cross wind, wake vortex, wind shear, lightning, etc).

2.6.2 Functional analysis

No further analysis can be given here, since the 11.02.01 TAD gives no further breakdown. Additionally, the GWMS's contribution to above mentioned functions is established by a unidirectional flow of information from MET input sources, such as local sensors, to products supplied. There may be cross links in particular situations, but then they are based on common source and not on influence on each other. This might ensure avoidance of redundancies in terms of algorithms inside the GWMS, but this should not be of importance here.

All interactions with other FB's have been described already in the context 2.1. Please refer to Figure 4 and Figure 5, respectively.

2.7 Service View

The SWIM services conforming to Service Activities SVA003 [24] and SVA012 (AirportMETAlert Service) [23] are being supplied with data from the GWMS. In the case of SVA012, alerts are being added generated on the ATM impact assessment side, if they are not subject to general regulatory material (e.g. wind shear and microburst based on ICAO rules).

3 Functional block Functional and non-Functional Requirements

3.1 Capabilities

The functional requirements have been obtained mapping the operational MET requirements to the system capabilities. Different requirements for observation, forecast and probability (see REQ Trace) of one MET parameter (e.g. precipitation) have been combined using the phrase “in support of the execution phase at the aerodrome”. This is to adopt the approach that both projects, 15.04.09.c and 11.02.02, will generate products for the local aerodrome which will complement each other in terms of spatial and temporal coverage or used forecasting techniques (very short term forecast using extrapolation/tracking versus NWP models). No clear line can be drawn between the two projects respectively their products, there will be a smooth transition and the users can select which products suits them better in terms of temporal and spatial granularity via the 4DWxCube DS and the respective ports used to retrieve data.

The approach taken supports the user’s view of MET products for which weather should be one unbroken process in terms of time and space as it is in reality. However, in the view from a technical perspective, there is a fundamental difference between observations and the attempt to project the current state of the atmosphere into the future. The aim is therefore to hide this technical complexity for the user by the 4DWxCube DS concept.

Concerning the GWMS technical architecture, however, this approach means that the required MET parameters shall be covered at least by an observation product complemented by a very short term forecast using the local measurements and additional data, whenever this presents an added value compared to existent consolidated products (e.g. better spatial resolution). If possible, the forecast should be associated with a statement of a normalised probability distribution, since this is a recurrent theme in all operational MET requirements.

3.1.1 Data Collection and Product Generation Requirements

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0010
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes for surface wind speed in support of the execution phase at the aerodrome.
Title	Local average surface wind speed
Status	<Validated>
Rationale	OSED, INTEROP
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.1101	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0006	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0020

Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes for surface wind direction in support of the execution phase at the aerodrome.
Title	Local average surface wind direction
Status	<Validated>
Rationale	OSED, INTEROP
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.1102	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0004	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0005	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0030
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes for wind gust in support of the execution phase at the aerodrome.
Title	Local wind gusts
Status	<Validated>
Rationale	OSED, INTEROP
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.1103	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0007	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0040
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes for wind speed aloft in support of the execution phase at the aerodrome.
Title	Local Wind speed aloft
Status	<Validated>
Rationale	OSED, INTEROP
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.2101	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0013	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0050
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes for wind direction aloft in support of the execution phase at the aerodrome.
Title	Local Wind direction aloft
Status	<Validated>
Rationale	OSED, INTEROP
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.2102	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0012	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0014	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0060
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes to provide RVR in support of the execution phase at the aerodrome.
Title	Local RVR
Status	<Validated>
Rationale	OSED, INTEROP
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.1109	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0018	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0070
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes on surface visibility, in support of the execution phase at the aerodrome.
Title	Local Visibility (surface)
Status	<Validated>
Rationale	OSED, INTEROP
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.1108	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0017	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0080
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes on cloud base height in support of the execution phase at the aerodrome.
Title	Local Cloud base height
Status	<Validated>
Rationale	OSED, INTEROP
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.1110	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0001	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0085
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes on cloud amount in support of the execution phase at the aerodrome.
Title	Local Cloud amount
Status	<Validated>
Rationale	OSED, INTEROP

Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.1111	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0003	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0090
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes for precipitation (type, characteristics and qualitative and quantitative intensity) in support of the execution phase at the aerodrome. It should contain the following information: • quantitative precipitation intensity in [mm/h] • precipitation amount • precipitation duration • liquid precipitation probability • snow fall probability • freezing rain probability • probabilities for precipitation intensity • probabilities for precipitation amount • probabilities for snow fall amount
Title	Local precipitation
Status	<Validated>
Rationale	OSED, INTEROP
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.1114	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.1214	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.1314	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0023	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0024	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0110
Requirement	The system shall collect data from all locally relevant sources available and

	generate products fit for impact assessment purposes for 2 m air temperature in support of the execution phase at the aerodrome.
Title	Local 2m temperature
Status	<Validated>
Rationale	OSED, INTEROP
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.1116	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0019	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0120
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes for convective activity (intensity of associated precipitation and movement) in support of the execution phase at the aerodrome.
Title	Local convective activity
Status	<Validated>
Rationale	OSED, INTEROP
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.3101	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.3201	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0025	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0121
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes for lightning in support of the execution phase at the aerodrome.
Title	Local lightning
Status	<Validated>
Rationale	OSED, INTEROP
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.3102	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0025	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0130
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes for low-level wind shear in support of the execution phase at the aerodrome.
Title	Local Wind shear
Status	<Validated>
Rationale	OSED, INTEROP
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.4104	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0027	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0140
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes for low-level turbulence in support of the execution phase at the aerodrome.
Title	Local Turbulence
Status	<Validated>
Rationale	OSED, INTEROP
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.4105	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0026	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0150
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes for 2 m dew point temperature in support of the execution phase at the aerodrome.
Title	Local dew point temperature
Status	<Validated>
Rationale	OSED, INTEROP
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.1118	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0020	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0160
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes for relative humidity in support of the execution phase at the aerodrome.
Title	Local relative humidity
Status	<Validated>
Rationale	OSED, INTEROP
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.1119	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0022	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0170
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes for air pressure (QNH & QFE) in support of the execution phase at the aerodrome.
Title	Local air pressure
Status	<Validated>
Rationale	OSED, INTEROP
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.1120	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.1121	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0015	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0016	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0180
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes for surface headwind in support of the execution phase at the aerodrome.
Title	Local surface headwind
Status	<Validated>
Rationale	OSED, INTEROP
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.1104	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0009	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0181
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes for surface gust headwind in support of the execution phase at the aerodrome.
Title	Local surface gust headwind
Status	<Validated>
Rationale	OSED, INTEROP
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.1105	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0009	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0182
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes for headwind aloft in support of the execution phase at the aerodrome.
Title	Local headwind aloft
Status	<Validated>
Rationale	OSED
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.2103	<Full>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0190
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes for surface crosswind in support of the execution phase at the aerodrome.
Title	Local surface crosswind
Status	<Validated>
Rationale	OSED, INTEROP
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.1106	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0008	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0191
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes for surface gust crosswind in support of the execution phase at the aerodrome.
Title	Local surface gust crosswind
Status	<Validated>
Rationale	OSED, INTEROP

Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.1107	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0008	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0192
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes for crosswind aloft in support of the execution phase at the aerodrome.
Title	Local crosswind aloft
Status	<Validated>
Rationale	OSED
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC2.2104	<Full>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110-0200
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes for ceiling or vertical visibility in support of the execution phase at the aerodrome.
Title	Local Ceiling or vertical visibility
Status	<Validated>
Rationale	OSED, INTEROP
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.1112	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.1113	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0002	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A

<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0210
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes for runway surface temperature in support of the execution phase at the aerodrome.
Title	Local surface temperature
Status	<Validated>
Rationale	OSED, INTEROP
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.1117	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0021	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03110.0220
Requirement	The system shall collect data from all locally relevant sources available and generate products fit for impact assessment purposes for low level temperature inversions in support of the execution phase at the aerodrome.
Title	Local temperature inversion
Status	<Validated>
Rationale	OSED, INTEROP
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.4106	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0028	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

3.1.2 Configurability Requirements

The GWMS as a meteorological system has to be configurable in terms of sensors available at the respective airport. Airports are differently equipped depending on what MET requirements they have to support their operations in addition to the standard provision based on ICAO Annex 3 [20]. This has an effect on the products provided by the GWMS as well. For instance, wind profile can be based

either on AMDAR, wind profiler, radar, or lidar measurements using single profiles or combining them to one.

Therefore, the GWMS provides the capability to configure the input sources for products as well as product settings themselves. This ranges from how the input is processed to defining thresholds used in product algorithms (e.g. different dBZ or mm/h classes for precipitation classification).

Configurability is an elementary capability of the GWMS but no traceable requirements exists for such a characteristic. Therefore, no requirements are formulated here. Some of the configurability possibilities are reflected via the requirements formulated in section Performance Characteristics 3.3.

3.1.3 Data Dissemination Requirements

One option is to send time critical weather information directly to clients. This will not go through SWIM. This direct data transfer without SWIM was already the solution for V2 validation exercises, STEP1. It seems at the moment with respect to V3 validation exercise planning, that the MISC prototype and therefore SWIM interface will also not be in place. But the requirement is stated here.

[REQ]

Identifier	REQ-15.04.09.c-TS-03130.0010
Requirement	The system shall send local MET warnings and time critical products directly to client systems via Port 6 of the 4DWxCube DS.
Title	Product Dissemination
Status	<Validated>
Rationale	ICD 1252 MET alerts, Internal document; TAD, INTEROP
Category	<Functional>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET1.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET1.0006	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET1.0009	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET3.0001	<Partial>
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03130.0020
Requirement	The system shall send the generated MET products to the MISC within the 4DWxCube DS.
Title	Product Dissemination
Status	<In Progress>
Rationale	TAD, IRS MISC was not part of validation platform No operational REQ for this, but believed technically important
Category	<Functional>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A

<ALLOCATED_TO>	<Functional block>	T02	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

3.2 Adaptability

The GWMS design allows expanding in terms of

- the range of sensors used as input
- generated products (in dependence on input of sensors)
- adaptability of products (in dependence on sensors used to generate a product)
- data dissemination to stakeholder systems

These features will not be tested during verification or validation exercises. Data sets will be properly prepared to support those exercises since actual weather may not be supportive in most cases (e.g. thunderstorm does not occur).What can be tested is the failure of one or more sensors. This has been done already in V2. Products may not be generated at all or be degraded. This has to be marked in a clear and unambiguous way. This requirement is allocated to Safety (see section 3.4).

3.3 Performance Characteristics

Generic requirements are formulated below to cover the demands on e.g. accuracy for all MET parameters and are based on requirements received from 11.2.1 SPR [8]. Specifications of those requirements for some MET parameters are only included if directly specified by the SPR. This means keeping the prototype open for different data sources with different settings.

[REQ]Identifier	REQ-15.04.09.c-TS-03300.0010
Requirement	The system shall provide the content of the weather products, Wind Shear Warnings and Wind Shear Alert in accordance to ICAO Annex 3.
Title	Accordance to ICAO Annex 3
Status	<Validated>
Rationale	SPR, INTEROP
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-0301	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET1.0001	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

3.3.1 Accuracy Requirements

As example for user specifications with respect to accuracy the table provided by project 06.05.05 can be used (see below). This table served as input to set default values for V2 validation exercises of OFA05.01.01.

proposed default values rules engine v:

[REQ]

Identifier	REQ-15.04.09.c-TS-03310.0010

Requirement	The system shall provide products with accuracy at least as required by ICAO Annex 3.
Title	Product accuracy
Status	<Validated>
Rationale	SPR, INTEROP
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-1201	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET1.0001	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03310.0020
Requirement	The 2 m air temperature shall have an accuracy of 0.1°C.
Title	Observed 2 m temperature accuracy
Status	<Validated>
Rationale	SPR, INTEROP, OSED
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-1202	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0019	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.05-OSED-MET2.0043	<Full>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03310.0030
Requirement	The 2 m dew point temperature shall have an accuracy of 0.1°C.
Title	Observed dew point temperature accuracy
Status	<Validated>
Rationale	SPR, INTEROP, OSED
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-1204	<Full>

<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0020	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.05-OSED-MET2.0047	<Full>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03310.0040
Requirement	The runway surface temperature shall have an accuracy of 0.1°C.
Title	Observed surface temperature accuracy
Status	<Validated>
Rationale	SPR, INTEROP, OSED
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-1203	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0021	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.05-OSED-MET2.0051	<Full>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03310.0050
Requirement	The system shall provide the observed cloud base height with an accuracy of ±10 m up to 100 m, ± 10 % above 100 m.
Title	Accuracy cloud base height
Status	<In Progress>
Rationale	SPR
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-1205	<Full>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03310.0060
Requirement	The system shall provide the observed cloud amount with an accuracy of ±1 okta, in the range of 0/8-8/8.
Title	Accuracy cloud amount

Status	<In Progress>
Rationale	SPR not validated by the stakeholder
Category	<Performance>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-1206	<Full>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

3.3.2 Time range, time resolution and update rate Requirements

[REQ]

Identifier	REQ-15.04.09.c-TS-03320.0010
Requirement	The system shall provide weather products, Wind Shear Warnings and Wind shear alert with an issue time / update rate in accordance to ICAO Annex 3 and ICAO Doc 7754.
Title	Accordance to ICAO
Status	<Validated>
Rationale	SPR
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-0302	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET1.0001	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03320.0020
Requirement	The system shall provide observed MET information with an update rate of 10 seconds if not specified otherwise.
Title	Update rate general requirement
Status	<Validated>
Rationale	SPR, the actual update rate is dependent on the local airport sensor suite;
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance

<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-1301	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.05-SPR-MET1.0008	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03320.0030
Requirement	The system shall provide observed RVR information with an update rate of at least 30 seconds.
Title	Update rate RVR
Status	<Validated>
Rationale	SPR, the actual update rate is dependent on the local airport sensor suite;
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-1302	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.05-OSED-MET2.0089	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03320.0040
Requirement	The system shall provide forecast surface wind speed, direction and gust, visibility, RVR and ceiling with an update rate of 10 minutes.
Title	Update rate forecast general
Status	<Validated>
Rationale	SPR, the actual update rate and forecast products are coming from the 11.2 Model Counted as validated, because supplied in this way to IWIS during validation
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-1303	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03320.0060
Requirement	The system shall provide the forecast MET information with a default time resolution (granularity) of 1 hour between T+0 and T+6hr..
Title	Time resolution forecast general
Status	<Validated>
Rationale	SPR, the actual time resolution is dependent on the local airport settings
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-1305	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-2303	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-3302	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-4302	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.05-SPR-MET1.0017	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03320.0070
Requirement	The system shall provide the forecast RVR information with a time resolution (granularity) of 15 minutes between T+0 and T+2.
Title	Time resolution forecast RVR
Status	<Deleted>
Rationale	SPR, OSED; the actual time resolution is dependent on the local airport settings
Category	<Performance>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-1306	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.05-OSED-MET2.0090	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03320.0080
Requirement	The system shall provide wind speed aloft and wind direction aloft information with an update rate of 10 minutes.
Title	Update rate wind aloft
Status	<In Progress>
Rationale	SPR, the actual update rate is dependent on the local airport settings
Category	<Performance>
Validation Method	<Shadow Mode>

Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-2301	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03320.0090
Requirement	The system shall provide information on observed convective activity (including lightning) immediately after detection.
Title	Convection observation
Status	<Validated>
Rationale	SPR, INTEROP
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-3303	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET1.0009	<Full>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03320.0100
Requirement	The system shall consider lightning as ended 10 minutes after the last lighting stroke.
Title	Observed Lightning end time
Status	<Validated>
Rationale	SPR, INTEROP
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-3304	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-STPF.1003	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

3.3.3 Area of interest and spatial resolution Requirements

[REQ]

Identifier	REQ-15.04.09.c-TS-03330.0010
Requirement	The system shall provide observed and forecast MET information for the area of interest which is the airport if not otherwise specified.
Title	Area of interest general
Status	<Validated>
Rationale	SPR, definition is dependent on actual airport settings Counted as validated because it was basic to the data supply during validation
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-1311	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-4311	<Full>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03330.0020
Requirement	The system shall observe and forecast each parameter representative for the whole airport and its vicinity if not otherwise specified.
Title	Horizontal resolution general
Status	<Validated>
Rationale	SPR, definition is dependent on actual airport settings Counted as validated because it was basic to the data supply during validation
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-1312	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-2312	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-4312	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03330.0030
Requirement	The system shall observe and forecast for each runway surface wind speed, direction and gust.
Title	Horizontal resolution surface wind
Status	<Validated>

Rationale	SPR Counted as validated because it was basic to the data supply during validation
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-1313	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03330.0040
Requirement	The system shall observe at and forecast for each runway (direction) the surface crosswind, headwind, gust crosswind and gust headwind.
Title	Horizontal resolution surface wind components
Status	<Validated>
Rationale	SPR, INTEROP
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-1314	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0008	
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0009	
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03330.0050
Requirement	The system shall observe at and forecast for each runway visibility.
Title	Horizontal resolution visibility
Status	<In Progress>
Rationale	SPR Not validated, the 11.2 Model does not provide visibility forecast.
Category	<Performance>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-1315	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A

<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03330.0060
Requirement	The system shall observe RVR at the TDZ, MID and END position of each runway.
Title	Horizontal resolution RVR observation
Status	<Validated>
Rationale	SPR, INTEROP
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-1316	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0018	<Full>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03330.0070
Requirement	The system shall forecast RVR for each runway.
Title	Horizontal resolution RVR forecast
Status	<Deleted>
Rationale	SPR, INTEROP The 11.2 Model does not provide RVR forecast.
Category	<Performance>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-1317	<None>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0018	<Full>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03330.0080
Requirement	The system shall observe runway surface temperature at the TDZ of each runway.
Title	horizontal resolution observed surface temperature
Status	<In Progress>
Rationale	SPR, INTEROP; dependent on actual airport settings and sensor suite Not validated because surface temperature at TDZ not in data set
Category	<Performance>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-1318	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0021	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03330.0090
Requirement	The system shall forecast runway surface temperature for each runway.
Title	horizontal resolution surface temperature forecast
Status	<In Progress>
Rationale	SPR, INTEROP; dependent on actual airport settings and sensor suite Not validated because surface temperature not in data set
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-1319	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0021	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03330.0100
Requirement	The system shall observe and forecast MET information aloft for an area of minimum 10 NM around the airport extending from the surface up to 5000 ft.
Title	area of interest MET aloft general
Status	<Validated>
Rationale	SPR, INTEROP; the actual settings are airport dependent
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-2311	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0012	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0013	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0014	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03330.0110
Requirement	The system shall provide the vertical resolution of the MET information as follows: 500 ft up to 2000 ft 1000 ft up to 5000 ft
Title	Vertical resolution general
Status	<Validated>
Rationale	SPR, actual settings depend on airport settings
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-2313	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0011	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0012	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03330.0120
Requirement	The system shall provide MET aloft information with a slant resolution of 0.5 NM.
Title	slant resolution general
Status	<Deleted>
Rationale	SPR, actual settings depend on airport settings
Category	<Performance>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-2314	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03330.0130
Requirement	The system shall observe and forecast convective activity (thunderstorm information) and observe lightning with a default area of minimum 120 NM, respectively, around the airport centre.
Title	area of interest thunderstorm
Status	<Validated>
Rationale	SPR, INTEROP; actual settings depend on airport settings
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-3311	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-3313	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-STPF.1003	<Full>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

Without Area validation.

[REQ]

Identifier	REQ-15.04.09.c-TS-03330.0140
Requirement	The system shall observe and forecast low-level wind shear in the final approach area for each runway (direction).
Title	horizontal resolution low-level wind shear
Status	<Validated>
Rationale	SPR, INTEROP Partly, No LLWAS forecast provided by 11.2 Model.
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-4313	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0027	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03330.0150
Requirement	The system shall observe and forecast low-level turbulence in the final approach area for each runway (direction).
Title	horizontal resolution low-level turbulence
Status	<Validated>
Rationale	SPR
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-4314	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0026	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

No turbulence forecast provided by 11.2 Model.

3.3.4 (Probability) Threshold Requirements

[REQ]

Identifier	REQ-15.04.09.c-TS-03340.0010
Requirement	The system shall allow setting if probability forecasts for precipitation shall be generated.
Title	probability forecast precipitation general
Status	<In Progress>
Rationale	SPR, determined locally at each airport
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-1331	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03340.0020
Requirement	The system shall allow setting the thresholds for probability forecasts for precipitation.
Title	probability forecasts thresholds general
Status	<Validated>
Rationale	SPR, determined locally at each airport.
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-1332	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-STPF.1002	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

3.3.5 Parameter specific Requirements

[REQ]

Identifier	REQ-15.04.09.c-TS-03350.0010
Requirement	The type of convective activity shall be indicated in line with ICAO Annex 3 terminology (isolated, occasional, frequent, squall line).
Title	Convective activity addition description
Status	<Validated>
Rationale	SPR

Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-3331	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET1.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0025	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance

[REQ]

Identifier	REQ-15.04.09.c-TS-03350.0020
Requirement	The precipitation type and intensity associated with a thunderstorm shall be in accordance with ICAO Annex 3.
Title	Thunderstorm precipitation
Status	<Validated>
Rationale	SPR
Category	<Performance>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-3332	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET1.0001	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-06.05.04-INTEROP-MET2.0025	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

3.4 Safety & Security

This section specifies the security requirements of the functional block, e.g. Specify the security and privacy requirements, including access limitations to the functional block, and of data protection and recovery methods.

It should also specify the safety requirements of the functional block. The Safety analysis should be performed according to respective standards. The requirements should be classified according to their safety criticality.

3.4.1 Security Requirements

[REQ]

Identifier	REQ-15.04.09.c-TS-03410.0010
Requirement	The system shall allow only persons with administrator access rights to configure the system, product generation and data dissemination.
Title	Access rights
Status	<Validated>

Rationale	Secure system working Counted as validated because it was shown during validation that log in was necessary for this
Category	<Security>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1.9103	<Full>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03410.0020
Requirement	The system shall archive the collected data and generated products for a configurable time.
Title	archive data
Status	<In Progress>
Rationale	SPR
Category	<Security>
Validation Method	
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-OSED-LOC1.5005	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1-5301	<Full>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03410.0030
Requirement	The system shall back-up the storage of data (e.g. via mirrored hard disk) and provide data recovery tools.
Title	Storage back-up
Status	<In Progress>
Rationale	Back-up of relevant data Was not validated during the exercise by the stakeholder No operational REQ for this, but believed technically important
Category	<Security>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A

<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

3.4.2 Safety Requirements

A dedicated task (Task 4) conducted the safety analysis [21]. Outcomes of this assessment are applicable failure modes of the GWMS. They could not be further followed towards safety objectives defined by their potential operational impact, since no description of the operational environment has been given to date.

According to the MET architecture as shown in Figure 2 the output of GWMS will be sent to ports 6 and/or 4b. 15.04.09.c is subject to the 11.2 TAD [11]. Therefore, the SPR of 11.2.1 [8] was screened to formulate safety requirements for GWMS since it states the safety and performance requirements for the MET prototype for the local operational user environment. The following quotation is extracted from the 11.2.1 SPR [8] and states the problem of defining safety requirements with respect to MET Information:

Because of the fact that very few MET related safety requirements have been identified by WP6 projects up to now, P11.02.01 suggests to have a thorough risk analysis and safety assessment of incorrect, corrupt or missing MET information (observations or forecast) provided in support of local airport and ATM operations, performed by WP16, OFA 05.01.01, OFA 01.03.01, OFA 06.01.01 and airspace users with assistance of P11.02.01. Such assessment is required in order to quantify the MET related safety targets and to develop MET related safety requirements. It is envisaged that such requirements would take the form as the one identified in P05.06.03: "The probability of Meteorological service providing wrong pressure to ATS shall be no more than 1.0 E-06 per final approach". It is envisaged that more mature MET related safety requirements will be included in the next iteration of this MET-SPR.

Therefore, it may be required to revise the safety requirements again in future.

[REQ]

Identifier	REQ-15.04.09.c-TS-03420.0010
Requirement	The system shall flag a product as not available and provide a warning if it cannot be generated, is out of date or corrupted in support of the execution phase at the aerodrome.
Title	Flag product
Status	<Validated>
Rationale	Users need to be informed if products are not available. Counted as validated because it was basic to the data supply during validation
Category	<Safety>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1.9101	<Full>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1.9104	<Full>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

3.5 Maintainability

N/A

3.6 Reliability

[REQ]

Identifier	REQ-15.04.09.c-TS-03600.0010
Requirement	The system shall use dual server technology (hot/cold) to guarantee uninterruptible operation.
Title	Uninterruptible operation
Status	<In Progress>
Rationale	Essential for smooth airport operations This requirement was not validated by the stakeholder. No operational REQ for this, but believed technically important
Category	<Reliability>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03600.0020
Requirement	The system shall use secure communications lines with back-up capabilities to ensure reliable data dissemination to recipients.
Title	Secure communication lines
Status	<In Progress>
Rationale	Essential that stakeholders get always their data This requirement was not validated by the stakeholder. No operational REQ for this, but believed to be important
Category	<Reliability>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03600.0030
Requirement	The system shall meet the same hardware requirements as current systems in use:

	• All weather functionality • Working 24 hours • Back-up capability
Title	Reliability issues
Status	<In Progress>
Rationale	Continuous working is essential for weather monitoring. Was not validated by the stakeholder. No operational REQ for this, but believed technically important
Category	<Reliability>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03600.0040
Requirement	The system shall work and deliver reliable data in all weather conditions.
Title	Reliable data in all weather
Status	<In Progress>
Rationale	Airport must operate in almost all weather conditions. Was not validated by the stakeholder No operational REQ for this, but believed technically important
Category	<Reliability>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

3.7 Functional block Internal Data Requirements

N/A

3.8 Design and Construction Constraints

[REQ]

Identifier	REQ-15.04.09.c-TS-03800.0010
Requirement	The system shall monitor and provide information (status or log files) about the current system status, changes in configurations, other technical actions, etc.
Title	System status
Status	<In Progress>
Rationale	Overview of system working

Category	<Design>
Validation Method	
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<SATISFIES>	<ATMS Requirement>	REQ-11.02.01-SPR-LOC1.9102	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

REQ]

Identifier	REQ-15.04.09.c-TS-03800.0020
Requirement	The system shall provide alerts in case of malfunctioning.
Title	Alerts in case of malfunctioning
Status	<In Progress>
Rationale	Notify people in case of malfunctioning No operational REQ for this, but believed important
Category	<Design>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03800.0030
Requirement	The system shall continue to work if one or more sensors input are disrupted.
Title	Sensor disruption
Status	<Validated>
Rationale	Other functionalities working and delivering data if others failed No operational REQ for this, but believed technically important Happened during validation
Category	<Design>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03800.0040
Requirement	The system shall continue to work if one or more products are not generated.
Title	Product disruption
Status	<Validated>
Rationale	Other functionalities working and delivering products if others failed Happened during validation No operational REQ for this, but believed technically important
Category	<Design>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03800.0050
Requirement	The system shall continue to work if the dissemination of one or more products failed.
Title	Dissemination disruption
Status	<In Progress>
Rationale	Other functionalities working even if dissemination failed No operational requirement, but believed important Not validated by the stakeholder
Category	<Design>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03800.0060
Requirement	The system shall return to former settings and start working after an unintended restart of the software (e.g. power failure).
Title	Restart of software
Status	<In Progress>
Rationale	Coming back to normal working conditions as soon as possible. No operational requirement, but believed important Not validated by the stakeholder
Category	<Design>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03800.0070
Requirement	The system shall perform reliably under maximum workload.
Title	Maximum workload
Status	<In Progress>
Rationale	Guarantee working with high demand on simultaneous operations No operational requirement, but believed important Not validated by the stakeholder
Category	<Design>
Validation Method	
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03800.0080
Requirement	The system shall use as far as possible ‘Commercial Of The Shelf’ components and open standards.
Title	COTS and standards
Status	<In Progress>
Rationale	Hardware and software standards No operational requirement, but believed important Not validated by the stakeholder
Category	<Design>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03800.0090
Requirement	The hardware shall meet all relevant European health and safety regulations, standards, and codes of practice (including CE marking).
Title	EC regulations
Status	<In Progress>
Rationale	Secure safe operations according to EU regulations No operational requirement, but believed important

	Not validated by the stakeholder
Category	<Design>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03800.0100
Requirement	A high-level programming language shall be used for the system application software.
Title	Programming language
Status	<In Progress>
Rationale	Functionalities programming language No operational requirement, but believed important Not validated by the stakeholder
Category	<Design>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03800.0110
Requirement	The chosen programming language shall be portable to different kind of operating systems and hardware architecture.
Title	Different operating systems
Status	<In Progress>
Rationale	Independency of OS No operational requirement, but believed important Not validated by the stakeholder
Category	<Design>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03800.0120
Requirement	The system shall use an external tool for version control during the development and maintenance of the software components.
Title	Version control
Status	<In Progress>
Rationale	Track changes No operational requirement, but believed important Not validated by the stakeholder
Category	<Design>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03800.0130
Requirement	Every software module which is part of the component shall be subject to version controlling and have its own version number.
Title	Version control
Status	<In Progress>
Rationale	Track changes No operational requirement, but believed important Not validated by the stakeholder
Category	<Design>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03800.0140
Requirement	The update of the software shall be failsafe, i.e. an unsuccessful update shall not lead to a ‘non-working’ component.
Title	Update software
Status	<In Progress>
Rationale	Functionality of software No operational requirement, but believed important Not validated by the stakeholder
Category	<Design>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance

<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03800.0150
Requirement	The operating system shall ensure interoperability with other operating systems and established computing standards.
Title	Operating System
Status	<In Progress>
Rationale	Interoperability No operational requirement, but believed important Not validated by the stakeholder.
Category	<Interoperability>
Verification Method	<Review of Design>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
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<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

3.9 Functional block Interface Requirements

3.9.1 Format Requirements

[REQ]

Identifier	REQ-15.04.09.c-TS-03910.0010
Requirement	The system shall provide data according to standardized data models and formats (IWXXM within AIXM, based on XML).
Title	WXXM format
Status	<In Progress>
Rationale	Agreement for fixed formats essential for data dissemination No operational requirement, but believed important Not validated by the stakeholder
Category	<Interface>
Verification Method	<Inspection>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA 05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

3.9.2 Interface points Requirements

[REQ]

Identifier	REQ-15.04.09.c-TS-03920.0010
Requirement	The system shall have an interface (indirectly via FB MISC, port 4b of DS 4DWxCube) to SWIM to provide MET data for aerodrome area.
Title	SWIM Interface
Status	<In Progress>
Rationale	MET access via SWIM No operational requirement, but believed important Not validated by the stakeholder
Category	<Interface>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
<SATISFIES>	<Enabler>	METEO-04b	<Partial>
<ALLOCATED_TO>	<Functional block>	T01	N/A
<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA 05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

[REQ]

Identifier	REQ-15.04.09.c-TS-03920.0020
Requirement	The system shall have an interface (via port 5 of DS 4DWxCube) to direct consumers of MET data, not using SWIM.
Title	Direct Interface
Status	<Validated>
Rationale	Fast provision of essential MET data No operational requirement, but believed important Was essential in the validation set up, therefore implicitly validated
Category	<Interface>
Validation Method	<Shadow Mode>
Verification Method	<Test>

[REQ Trace]

Relationship	Linked Element Type	Identifier	Compliance
<SATISFIES>	<Enabler>	METEO-03b	<Full>
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<ALLOCATED_TO>	<Functional block>	T02	N/A
<APPLIES_TO>	<Operational Focus Area>	OFA 05.01.01	N/A
<ALLOCATED_TO>	<Project>	15.04.09.c	N/A

4 Assumptions

Since, at the time of writing this deliverable no official VALR has been released for EXE-06.03.01-VP-669, the general assumptions are that a requirement has been validated if it is traced to OFA05.01.01 related operational requirements, given the overall success of the exercise. If this is not the case, this has been stated in the rationale.

Concerning technical requirements which have found no operational counterpart in OFA05.01.01 applicable documents, it is generally assumed that they are nevertheless necessary for building a system that can be deployed and lives up to the state of the art. These requirements by default have been kept in the state <in progress>, unless their fulfilment was vital to the execution of validation exercise EXE-06.03.01-VP-669.

5 References

Reference to main documentation, delete if not required

[1] Template Toolbox 03.01.01
https://extranet.sesarju.eu/Programme%20Library/SESAR%20Template%20Toolbox.dot

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

[3] Templates and Toolbox User Manual 03.01.01
https://extranet.sesarju.eu/Programme%20Library/Templates%20and%20Toolbox%20User%20Manual.doc

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

[5] SESAR Definition Phase – Task 2.4.x Milestone 3 – System Architecture (DLT-0612-244-00-10), September 2007

[6] IEEE / MIL Standards

[7] 11.02.01, D19, MET OSED Part A, Local OUE, Edition 00.01.00

[8] 11.02.01, D20, MET SPR Part A, Local OUE, Edition 00.01.00

[9] 11.02.01, D21, MET INTEROP, Edition 00.01.00

[10]11.02.01, D30, MET TAD, Edition 00.02.04

[11]11.02.01, D31, MET TAD, Edition 00.02.00

[12]06.05.04, D08, OFA05.01.01 OSED, Edition 00.02.02

[13]06.05.04, D11, OFA05.01.01 SPR V2, Edition 00.01.01

[14]06.05.04, D12, OFA05.01.01 INTEROP V2, Edition 00.01.01

[15]B.04.03 MET at the Airport issue folder
https://extranet.sesarju.eu/WP_B/Project_B.04.03/Other%20Documentation/Forms/AllItems.aspx?RootFolder=%2fWP_B%2fProject_B.04.03%2fOther%20Documentation%2f04%20Issue%20Management%2fTECHSB-11%20-%20MET%20at%20the%20Airport%20Issue&FolderCTID=0x0120008D085CD95BBE414DAFA129085DC4A0F3&View={E79AF256-3119-4623-B086-BF0DD33E0CB7}

[16]12.05.02, SESAR_ICD_1252_Met_alerts_05, Internal Document, February 2014.

[17]The SESAR Concept of Operations at a Glance, ed. 00.00.01, provided by AU (Michael Erb), August 2012.

[18]Eurocontrol, CODA Annual Report 2011, March 2012.

[19]Eurocontrol, Network Operations Annual Report 2011, March 2012.

[20]ICAO Annex 3, Meteorological Service for International Air Navigation, 17th ed., July 2010

[21]15.04.09.c, D04, Safety Analysis Report, Edition 00.01.00, March 2013

[22]11.02.01, D18, MET DOD, Edition 00.01.00

[23]DEL 08.03.01 D64, European ATM Service Description for the AirportMETAlert Service, Edition 00.01.01

[24]DEL 08.03.01 D61, European ATM Service Description for the AirportMETObservation Service, Edition 00.01.01

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