European ATM Service Description for the METAR Service

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Abstract

The METAR service covers the dissemination of standard ICAO METAR bulletins over SWIM to a wide range of subscribing ATM users. This service aims therefore at bringing the benefits of increased interoperability via SWIM to the MET Community of Interest. Service design has been performed in the context of Service Activity SVA003 entailing Airport Meteorological and Surface Contamination services.

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Rational for rejection

Document History

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00.01.01	29/05/2014	Update		Minor fixings after verification process.
00.01.02	09/09/2014	Release		Updated to reflect SJU assessment
00.02.00	13/11/2015	Release		Updated for ISRM1.4.
00.02.01	17/12/2015	Final		Updated based on SJU comments
00.03.00	09/05/2016	Final		Updated to ISRM Foundation 00.07.00 and based on requirements for ISRM 2.0
00.03.01	20/07/2016	Final update		Updated according to 08.03.10-D65_SJU_Assessment_report_08.03.10_response

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This deliverable consists of SJU foreground.

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Executive summary

This document is the result of the "Service Design" step of the B.4.3 Working Method on Services for the METAR Service. The document provides a comprehensive logical specification for system engineers on how to realize the dissemination of MET data over SWIM.

The METAR service covers the dissemination of standard ICAO METAR bulletins over SWIM to a wide range of subscribing ATM users. This service aims therefore at bringing the benefits of increased interoperability via SWIM into the MET community of interest. Service design has been performed in the context of the SESAR Service Activity "SVA003" entailing Airport Meteorological and Surface Contamination services.

SVA003 has happened in the frame of the SESAR MET Coordination Group and has seen the participation of a good number of different partners, both Operational and System, from OFA5.1.1 (WP6 and WP12) and WP11.2.

Edition 1.1 of this SDD was firstly published in ISRM 1.3. Edition 2.0 was produced for ISRM 1.4 and was used as reference for SESAR validation exercise EXE-06.03.01-VP-669 (SESAR R5). This edition wraps all quality improvements for delivery with the final SESAR ISRM 2.0.

1 Introduction

1.1 Purpose of the document

The purpose of this SDD is to provide a complete logical description of the METAR Service, its operational context, its basic architectural features, its dynamical aspects, its operations and the data provided. All these aspects are presented as model views according to the ISRM UML EATMA Profile, which organize knowledge about a service into views inspired by the NAF Framework.

This SDD serves as a complement to a model based description and supports the configuration management process by providing well-defined baselines.

The logical service model presented in this SDD edition is part of the ISRM 2.0 release, and provides a blueprint which service developers must follow in order to create SWIM-Compliant implementations of the METAR Service.

The service presented will be a part of the Service Portfolio. The Service Portfolio presents all services that are available or are planned to become available at a high level.

1.2 Intended readership

SESAR Deployment Manager, SCG, the OPS and SYS projects participating in the SVA003 Team, Service Architects, Information Architects, System Engineers and Developers in pursuing architecting, design and development activities.

1.3 Inputs from other projects

NA

1.4 Glossary of terms

NA

1.5 Acronyms and Terminology

1.5.1 Acronyms

Term	Definition
ADD	Architecture Description Document
ATM	Air Traffic Management
CC	Capability Configuration
EATMA	European Air Traffic Management Architecture
E-ATMS	European Air Traffic Management System
FAA	Federal Aviation Administration
IER	Information Exchange Requirement

Term	Definition
ISRM	Information Service Reference Model
IWXXM	ICAO Weather Information Exchange Model
METAR	METeorological Air Report
MET	Meteorology or meteorological
MG	ISRM Modelling Guidelines
NAF	NATO Architecture Framework
NSOV	NATO Service Oriented View
NOV	NATO Operational View
NSV	NATO System View
OSED	Operational Service and Environment Definition
QoS	Quality of Service
SAR	Service Allocation Report
SCG	Service Coordination Group
SDD	Service Description Document
SESAR	Single European Sky ATM Research Programme
SESAR Programme	The programme which defines the Research and Development activities and Projects for the SJU.
SIR	Service Identification Report
SJU	SESAR Joint Undertaking (Agency of the European Commission)
SJU Work Programme	The programme which addresses all activities of the SESAR Joint Undertaking Agency.
SPECI	Aerodrome special meteorological report
SWIM	System Wide Information Management
UML	Unified Modelling Language
V&V	Validation and Verification
VOLMET	Meteorological information for aircraft in flight

1.5.2 Terminology

Term	Definition	Source
Capability	Capability is the ability of one or more of the enterprise's resources to deliver a specified type of effect or a specified course of action to the enterprise stakeholders.	EATMA Guidance Material [13]
Capability Configuration	A Capability Configuration is a combination of Roles and Systems configured to provide a Capability derived from operational and/or business need(s) of a stakeholder type.	EATMA Guidance Material [13]
Node	A logical entity that performs Activities. Note: nodes are specified independently of any physical realisation.	EATMA Guidance Material [13]
Service	The contractual provision of something (a non-physical object), by one, for the use of one or more others. Services involve interactions between providers and consumers, which may be performed in a digital form (data exchanges) or through voice communication or written processes and procedures.	EATMA Guidance Material [13]
Service function	A type of activity describing the functionality of a Service.	EATMA Guidance Material [13]
Service interface	The mechanism by which a service communicates	EATMA Guidance Material [13]

2 Service identification

Name	METAR
ID	{9E5C7BA4-F83A-4ada-A846-2485840CF380}
Version	3.0
Keywords	METAR, Airport Meteorological Observation, MET ICAO Product
Architect(s)	██████████ FINMECCANICA

Lifecycle status	Date	References
Identified	12/12/2013	See reference [3]
Allocated	21/02/2014	See reference [4]
Designed	31/05/2016	This document
Validated	03/03/2016	See reference [17]
IOC	*Date for Initial Operational Capability*	*Reference to technical enabler hosting the service in the ATM master plan*
FOC	*Date for Full Operational Capability*	*Reference to technical enabler hosting the service in the ATM master plan*

3 Operational and Business context

The METAR is a routine observation made at an aerodrome throughout the day. METAR observations are made (and distributed) at intervals of one hour or, if so determined by regional air navigation agreement, at intervals of one half-hour. The information contained in METAR and SPECI is identical. SPECI is issued when conditions merit a non-routine report on conditions at an aerodrome. METARs are a routine reports produced for dissemination beyond the aerodrome of origin, and are mainly intended for flight planning, VOLMET broadcasts and D-VOLMET. See ICAO Annex 3 [14].

The requirements for the provision of a service for dissemination of the METAR/SPECI bulletins of interest for airport operations and the full business and operational context for this service is given by the P06.05.04 OSED[1][2]. It is also been described in the SVA003 Service Identification Report (SIR) [3] and has been elaborated further in the SVA003 Service Allocation Report (SAR) [4]. These documents in particular have already covered:

- a description of what ATM goals and problems the service addresses;
- business level capabilities that the service will realise;
- the positioning of the service into the SESAR technical Architecture (ADD and TADs);
- the link to Operational Improvements;
- the list of IERs, operational and non-functional requirements from source documents;
- the relevance to the SESAR MET Coordination Group, and the linkage to the "2013 MET Issue Resolution";
- the prototyping and validation triggers from within the Programme.

3.1 Information Exchange Requirements

Name: NAV METAR Requirements Traceability
Author:
Version: 3.0
Created: 17.04.2014 00:00:00
Updated: 10.05.2016 00:00:00
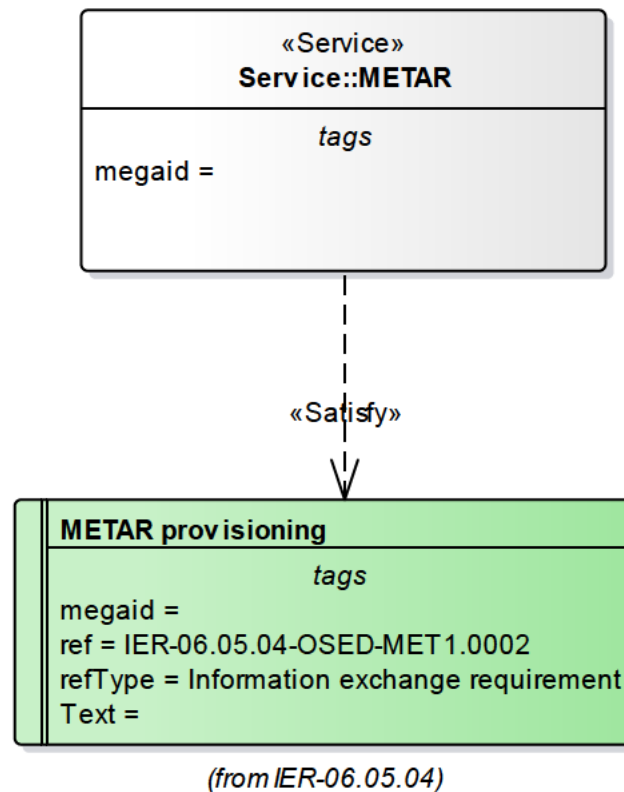
Figure 1: NAV METAR Service Requirements Traceability IER Diagram

3.2 Other Requirements

3.2.1 Non-Functional Requirements

NA

3.2.2 Relevant Industrial Standards

The relevant industrial standard envisaged in the validation exercise EXE-06.03.01-VP-669 was IWXXM 1.1 [15] for the modelling of the service message.

3.2.3 Nodes

The EATMA nodes specified in the service are shown in the NOV-2 METAR Service To Nodes Mapping diagram.

Name: NOV-2 METAR Service To Nodes Mapping
Author:
Version: 3.0
Created: 09.09.2015 00:00:00
Updated: 10.05.2016 00:00:00
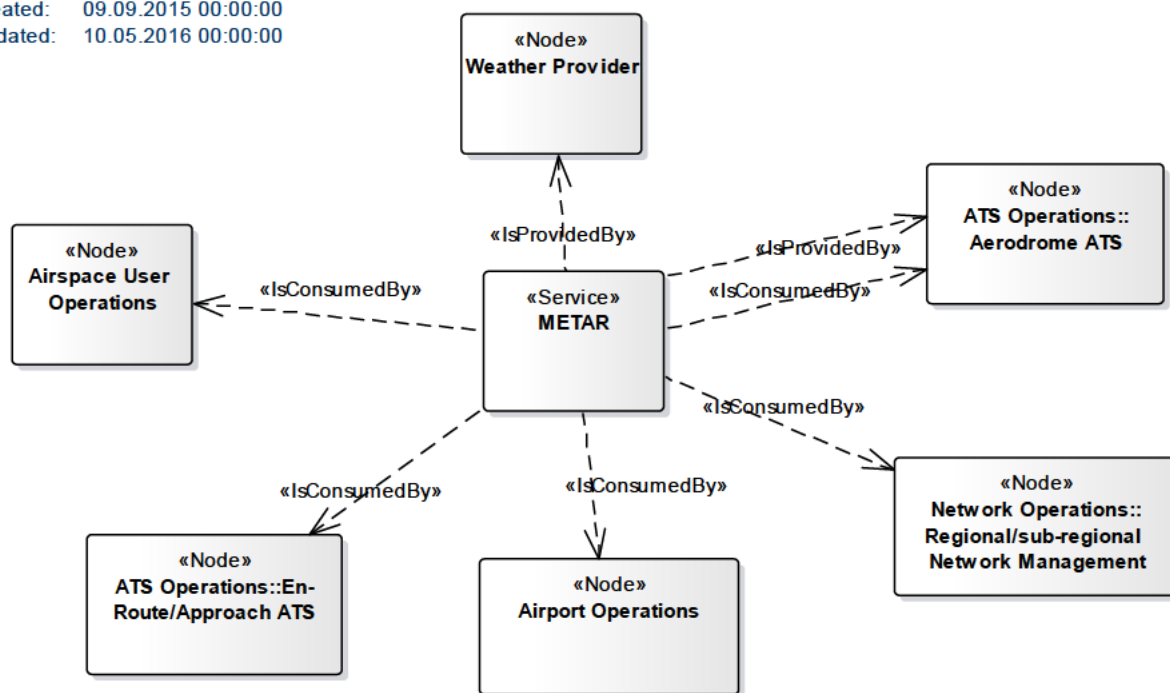
Figure 2: NOV-2 METAR Service to Nodes Mapping diagram

4 Service overview

4.1 Service Taxonomy

The service taxonomy is described in the ISRM Service Portfolio document [5].

4.2 Service Levels (NfRs)

NA.

4.3 Service Functions and Capabilities

Name: NSOV-4 METAR Service to Operational Activities Mapping
Author:
Version: 3.0
Created: 15.04.2014 00:00:00
Updated: 10.05.2016 00:00:00
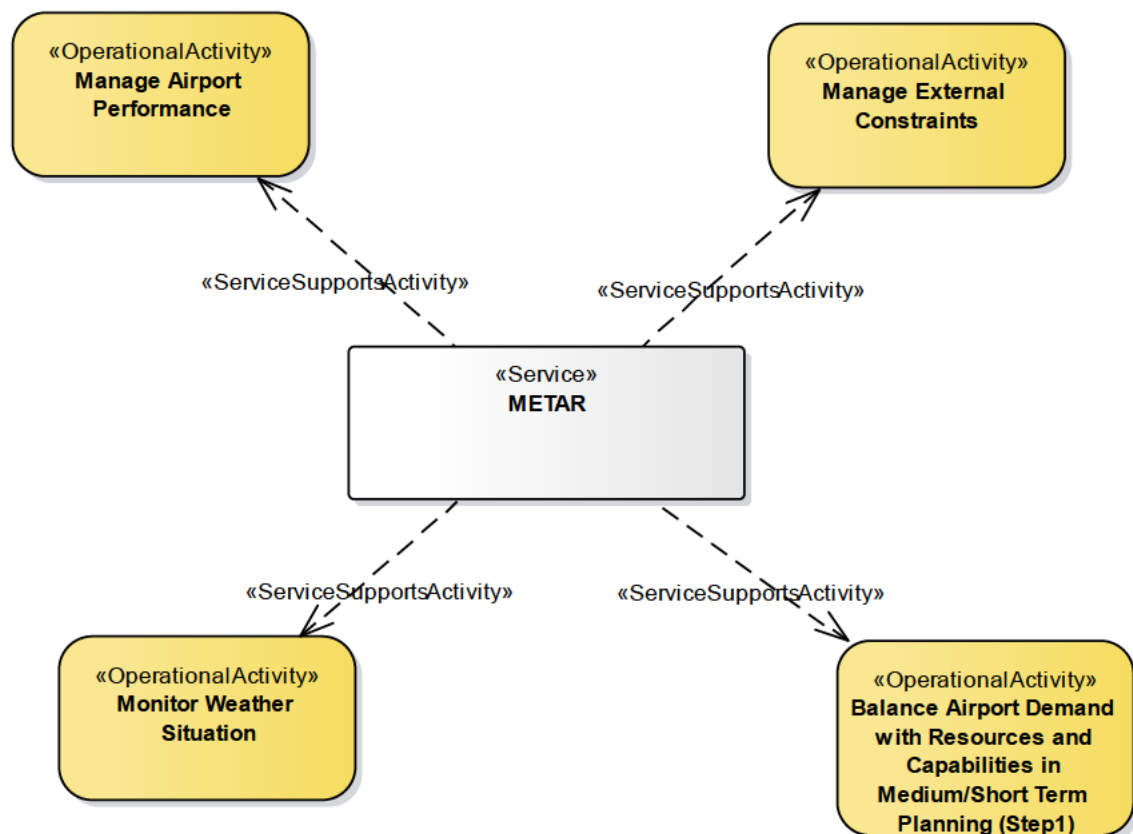
Figure 3: NSOV-4 METAR Service to Operational Activities Mapping diagram

For the service to capabilities mapping, see the NSOV-2 Service Interface Definition diagram in Section 4.4.

4.4 Service Interfaces

The service is based on a single pub/sub interface. The METARPublisher service interface definition allows the consumer to subscribe or unsubscribe to the data, while the METARSubscriber service interface definition allows the service provider to publish the message containing the data. The messages for subscription and unsubscription are only logical abstract wrappers, since the actual management of the publication mechanism is done at the level of the SWIM Technical Infrastructure.

Figure 4: NSOV-2 METAR Service Interface Definition diagram

ServiceInterface	ServiceInterfaceDefinition	ServiceInterfaceOperation	Role
METARProvider	METARPublisher	subscribeToMETAR	provided
METARProvider	METARPublisher	unsubscribeFromMETAR	provided
METARProvider	METARSubscriber	publishMETAR	required

Table 1: Service Interfaces

5 Service interface specifications

5.1 Service Interface METARProvider

This is the only interface for this service. It implements the Standard Publish/Subscribe Push message exchange pattern and exposes two service interface definitions, one for the provider and one for the consumer side.
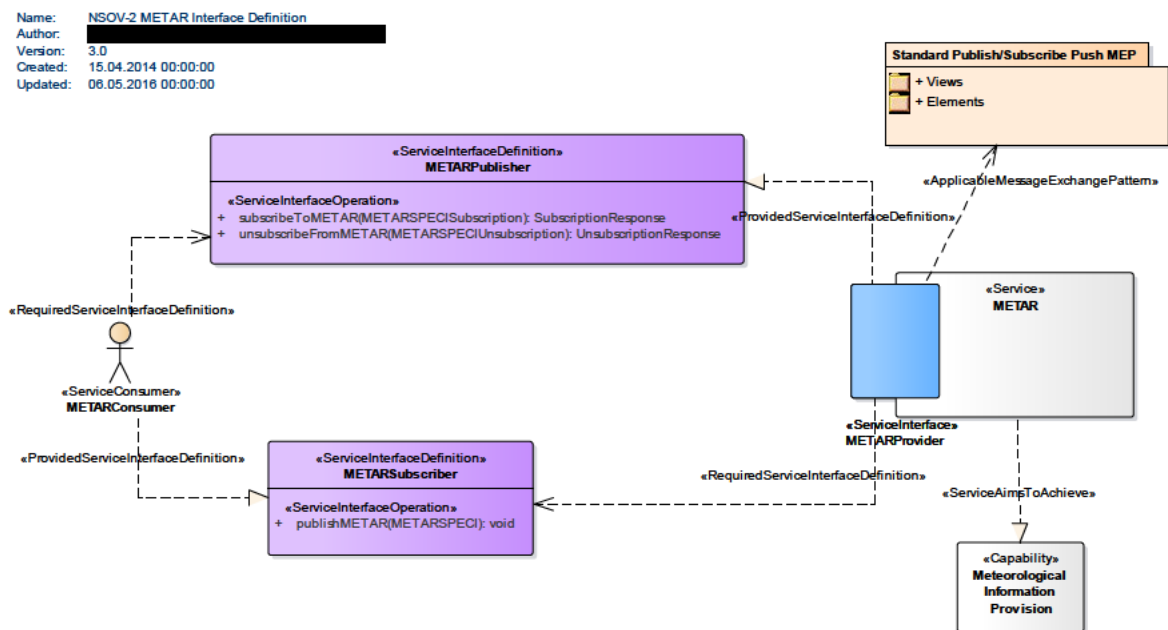
5.1.1 Service Interface Definition METARPublisher

This interface definition enables a consumer to subscribe or unsubscribe from the provision of the service message.

5.1.1.1 Operation subscribeToMETAR

The service operation enables the service consumer to subscribe to a particular METAR/SPECI bulletin.

5.1.1.1.1 Operation Functionality

The service operation enables the consumer to select the desired airport for which he desires a METAR/SPECI bulletin.

5.1.1.1.2 Operation Parameters

The operation is modelled with a return type representing the generic outcome for a subscription.

Element Name	Author	Notes
METARSPECISubscription		Message for the Subscription
SubscriptionResponse		Reply to the subscription operation.

Table 2: Payload elements for the subscribeToMETAR operation

5.1.1.2 Operation unsubscribeFromMETAR

The service operation enables the service consumer to unsubscribe from the service.

5.1.1.2.1 Operation Functionality

The service operation enables the consumer to select the desired airport for which he does not want METAR bulletins anymore.

5.1.1.2.2 Operation Parameters

The operation is modelled with a return type representing the generic outcome for an unsubscription.

Element Name	Author	Notes
METARSPECIUnsubscription		Message for the Unsubscription
UnsubscriptionResponse		Reply to the unsubscription operation.

Table 3: Payload elements for the unsubscribeFromMETAR operation

5.1.2 Service Interface Definition METARSubscriber

This interface definition enables the provider to publish the METAR.

5.1.2.1 Operation publishMETAR

The service operation enables the service consumer to receive a notification for a new METAR which he has subscribed to.

5.1.2.1.1 Operation Functionality

The service operation simply enables the consumer to access a pre-subscribed new METAR available from the MET provider.

5.1.2.1.2 Operation Parameters

The operation is modelled without a return type. The operation has a single input parameter which represents the full service payload as represented above.

The relevant EntityItems are described in the table below, each attribute and relationship is described. The tagged values show the linked AIRM class.

It is to be noted that the service relies upon the logical structure of the IWXXM 1.1 data model. The payload can accommodate both the normal METAR and the SPECI type of bulletin which is disseminated at the occurrence of special MET phenomena at the airport.

Name: NSOV-2 METAR Interface Parameter Definition
Author:
Version: 3.0
Created: 27.03.2014 00:00:00
Updated: 10.05.2016 00:00:00

«EntityItem»
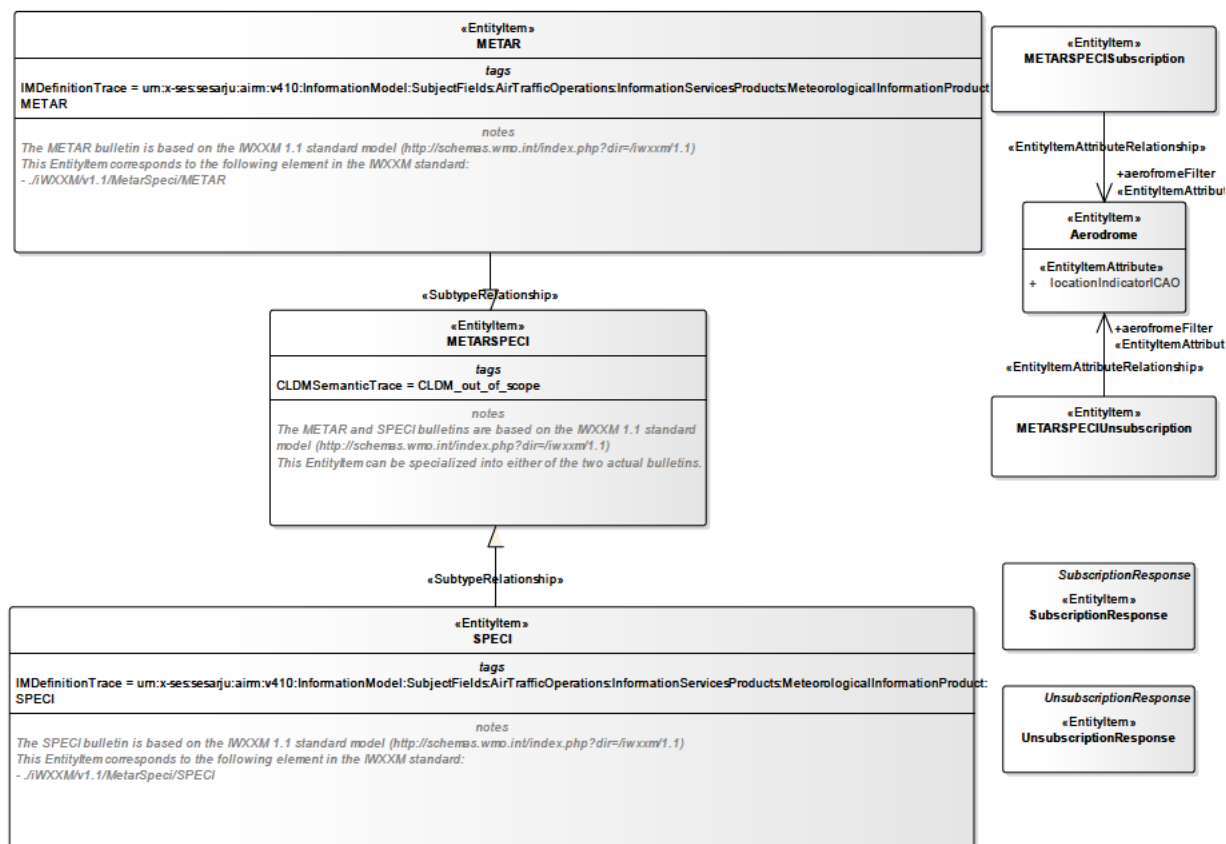**METAR**

tags
IMDefinitionTrace = urn:x-ses:sesarju:airm:v410:InformationModel:SubjectFields:AirTrafficOperations:InformationServicesProducts:MeteorologicalInformationProduct:METAR

notes
The METAR bulletin is based on the IWXXM 1.1 standard model (http://schemas.wmo.int/index.php?dir=/iwxxm/1.1)
This EntityItem corresponds to the following element in the IWXXM standard:
- ../iWXXM/v1.1/MetarSpeci/METAR

«EntityItem»
METARSPECISubscription

«EntityItemAttributeRelationship»

+aerofromeFilter
«EntityItemAttribut

«EntityItem»
Aerodrome

«EntityItemAttribute»
+ locationIndicatorICAO

«SubtypeRelationship»

«EntityItem»
METARSPECI

tags
CLDMSemanticTrace = CLDM_out_of_scope

notes
The METAR and SPECI bulletins are based on the IWXXM 1.1 standard
model (http://schemas.wmo.int/index.php?dir=/iwxxm/1.1)
This EntityItem can be specialized into either of the two actual bulletins.

+aerofromeFilter
«EntityItemAttribut

«EntityItemAttributeRelationship»

«EntityItem»
METARSPECIUnsubscription

«SubtypeRelationship»

«EntityItem»
SPECI

tags
IMDefinitionTrace = urn:x-ses:sesarju:airm:v410:InformationModel:SubjectFields:AirTrafficOperations:InformationServicesProducts:MeteorologicalInformationProduct:SPECI

notes
The SPECI bulletin is based on the IWXXM 1.1 standard model (http://schemas.wmo.int/index.php?dir=/iwxxm/1.1)
This EntityItem corresponds to the following element in the IWXXM standard:
- ../iWXXM/v1.1/MetarSpeci/SPECI

SubscriptionResponse
«EntityItem»
SubscriptionResponse

UnsubscriptionResponse
«EntityItem»
UnsubscriptionResponse

Figure 5: NSOV-2 METAR Service Interface Parameter Definition diagram

Element Name	Author	Notes
METAR	▮	The METAR bulletin is based on the IWXXM 1.1 standard model (http://schemas.wmo.int/index.php?dir=/iwxxm/1.1) This EntityItem corresponds to the following element in the IWXXM standard: - ./iWXXM/v1.1/MetarSpeci/METAR

	Element Tagged Value Name	Value
	IMDefinitionTrace	urn:x-ses:sesarju:airm:v410:InformationModel:SubjectFields:AirTrafficOperations:InformationServicesProducts:MeteorologicalInformationProduct:METAR

Element Name	Author	Notes
SPECI	▮	The SPECI bulletin is based on the IWXXM 1.1 standard model (http://schemas.wmo.int/index.php?dir=/iwxxm/1.1) This EntityItem corresponds to the following element in the IWXXM standard: - ./iWXXM/v1.1/MetarSpeci/SPECI

	Element Tagged Value Name	Value
	IMDefinitionTrace	urn:x-ses:sesarju:airm:v410:InformationModel:SubjectFields:AirTrafficOperations:InformationServicesProducts:MeteorologicalInformationProduct:SPECI

Element Name	Author	Notes
METARSPECI	▮	The METAR and SPECI bulletins are based on the IWXXM 1.1 standard model (http://schemas.wmo.int/index.php?dir=/iwxxm/1.1) This EntityItem can be specialized into either of the two actual bulletins.

	Element Tagged Value Name	Value
	CLDMSemanticTrace	CLDM_out_of_scope

Element Name	Author	Notes
Aerodrome	▮	A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

	Element Tagged Value Name	Value
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:BaseInfrastructure:AerodromeInfrastructure:Aerodrome

	Attribute Name	Type	Notes

	locationIndicatorICAO		The four letter ICAO location indicator of the aerodrome/heliport, as listed in ICAO DOC 7910.
	Tagged Value Name	**Value**	
	CLDMSemanticTrace	urn:x-ses:sesarju:airm:v410:ConsolidatedLogicalDataModel:SubjectFields:BaseInfrastructure:AerodromeInfrastructure:Aerodrome@designator	

Table 4: Payload tracing to AIRM

6   Service dynamic behaviour

The interface offers three operations, namely to subscribe/unsubscribe from the publication of the data, and to notify the consumer on the data being available. The service dynamic behaviour can be shown using the NSOV-5c Service-Event diagram created for the purpose. The following diagram shows that the interaction envisaged between provider and consumer is an asynchronous publish/subscribe "push" type MEP.
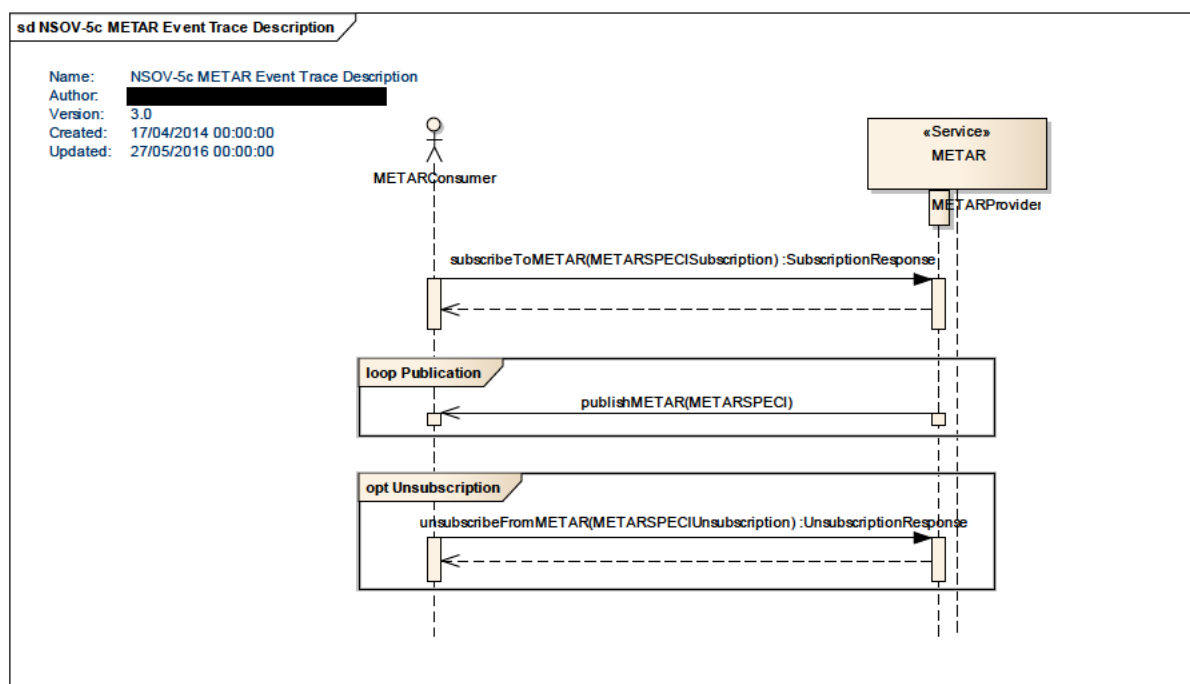
6.1   Service Interface METARProvider

Figure 6: NSOV-5c METAR Service Event Trace Description

7 Service provisioning (optional)

Service prototyping has been performed in the context of MET-related validation exercise EXE-06.03.01-VP-669 in SESAR. The technology so far identified for the technical interface is the OASIS standard Web Service Notification and belongs to the SWIM Yellow Profile. The detailed description of the technical service contract and service implementation for this exercise is part of technical deliverables by project 12.7.5.

8 Validation and Verification

8.1 Verification

Verification was performed according to the ISRM Rulebook [11] and the ISRM Verification Guidance [12].

8.1.1 Verification Results

Verification was performed via manual inspection and assisted by a script developed in 8.3.10. The verification outcome is completely free of errors.

Verification reports are in these files "Designed_Services_-_METARService.xls" and "Designed_Services_-_METARService_Common.xls" available in [16].

8.2 Validation

Validation for this service was performed as part of the SESAR validation exercise EXE-06.03.01-VP-669 in Q1 2016. The outcome is recorded in the Validation report VALR [17].

9 References

Name	Version	Document ID / Location
[1] OFA 05.01.01 Consolidated OSED edition 3 document (Part1)	03.00.00	06.05.04 D16
[2] OFA 05.01.01 Consolidated OSED edition 3 document (Part2)	03.00.00	06.05.04 D16
[3] Service Identification Report - SVA003	00.01.00	08.03.06
[4] B.4.3 Service Allocation - SVA003	00.00.03	B.04.03
[5] ISRM Service Portfolio	00.08.01	08.03.10 D65
[6] Project deliverables template	03.00.00	SJU templates & guidelines package, Project deliverables template
[7] SESAR Operational Service and Environment Definition	03.00.00	SJU templates & guidelines package, OSED template
[8] SESAR Safety and Performance Requirements	03.00.00	SJU templates & guidelines package, SPR template
[9] ISRM Tooling Guidelines	00.07.00	08.03.10 D44
[10] ISRM Modelling Guidelines	00.07.00	08.03.10 D44
[11] ISRM Foundation Rulebook	00.07.00	08.03.10 D44
[12] ISRM Verification Guidelines	00.07.00	08.03.10 D44
[13] European ATM Architecture (EATMA) Guidance Material v4	00.04.02	B.04.01 D66
[14] ICAO Annex 3, Meteorological Service for International Air Navigation	17th Edition, July 2010	www.icao.int
[15] IWXXM	1.1	http://www.wmo.int/pages/prog/www/WIS/wiswiki/tiki-index.php?page=AvXML-1.1-Release
[16] Verification reports for the service	N/A	08.03.10 D65 Verification reports
[17] SESAR P06.03.01 Delivery of VALR EXE669 ENAV proposition	00.01.00	06.03.01 D140

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