Final Project Report

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Abstract

Project 08.03.10, Information Service Modelling deliverables, has delivered one of the main elements of the SWIM concept by producing ISRM (Information Service Reference Model), consisting of a portfolio of 40 designed logical services together with a well-tested ISRM Foundation with rules and guidelines for the design of logical services. Project 08.03.10 has in a significant way contributed to the development of the SWIM concept, which is a key enabler in fulfilling the overall high-level goals of the SES. The developed artefacts ISRM, ISRM Foundation and SDCM are all potential candidates for standardisation both globally and on a regional level. The concept has been matured to such a level that it is ready to be handed over to deployment under the SESAR Deployment Manager and can be used in fulfilling the requirements of the PCP IR 716/2014.

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This deliverable consists of SJU foreground.

Acronyms

Acronym	Definition
ATM	Air Traffic Management
AIRM	ATM Information Reference Model
CCB	Change Control Board
CP	Collaboration Project
EA	Enterprise Architect
FAA	Federal Aviation Administration
IM	Information Management
IR	Implementing Rule
ISRM	Information Service Reference Model
OI step	Operational Improvement step
PCP	Pilot Common Project
SCG	Service Coordination Group
SDD	Service Description Document
SDCM	Service Description Conceptual Model
SES	Single European Sky
SESAR	Single European Sky Air Traffic Management Research
SWIM	System Wide Information Management
ToR	Terms of Reference

1 Project Overview

Project 08.03.10, Information Service Modelling deliverables, has delivered one of the main elements of the SWIM concept [4] (System Wide Information Management), for the European ATM community by producing a well-tested ISRM (Information Service Reference Model) Foundation with rules and guidelines for the design of logical services together with the Information Service Reference model, ISRM, consisting of a portfolio of 40 designed logical services.

1.1 Project progress and contribution to the Master Plan

The SWIM concept is a key enabler to achieve the high-level goals of the SES (Single European Sky) through promoting enhanced interoperability on different levels. This is a paradigm shift of Information Management done by standardisation of information, information exchanges and all the related governance activities. The services in the ISRM ensure operational and semantical interoperability through standardisation.

Project 08.03.10 has made major contributions to the definition and development of the SWIM concept and the introduction of service orientation in the SESAR programme. This included the settlement and definition of service orientation in the programme through the document “Service scope and approach” [5], and supporting the definition of a programme wide development process for services in the document “Working method on services” [6].

This process was then applied in the P08.03.10 Fast track initiative where architectural-, operational-, SWIM- and system projects worked in coordination to develop the defined artefacts throughout the service life cycle. The fast tracks were later on formalised in service activities governed through a programme wide coordination forum called the SCG (Service Coordination Group). The establishment of the SCG and the development of the corresponding service roadmap was a joint effort of P08.03.10 and others.

The three main deliveries from P08.03.10 are

- ISRM, consisting of a coherent set of 40 designed logical services
- ISRM Foundation, consisting of directive documents and guidelines for the production of logical services
- SDCM (Service Description Conceptual Model), a high level service concept specification developed in collaboration with FAA

These deliverables has contributed to the SES Master plan through the SWIM OI steps defined in the table below. This was based on the Integrated Roadmap Dataset 15.

Code	Name	Project contribution	Maturity at project start	Maturity at project end
IS-0901-A	SWIM for Step 1	Development of ISRM Services.	V1	V3
MET-0101	Enhanced MET observations, nowcasts and forecasts provided by ATM-MET systems for Step 1	Development of ISRM Services.	V1	V3

Furthermore the ISRM Services has been used in a number of validation exercises supporting different operational concepts realising other Operational Improvement steps as well. These support different SESAR solutions. A summary of SESAR solutions and related 08.03.10 contributions can be found in the table below.

SESAR solution	Name	Project contribution (ISRM service)	Related OI step	Part of PCP
#05	Extended AMAN horizon	ArrivalManagementInformation	IS-0901-A TS-0305-A	Yes
#06	CTA in medium density/medium complexity environments	SharedFlightObject ATCFlightObjectControl ReportAircraftTrajectory ReportAircraftETAMinMax	TS-0103	No
#17	Advanced short-term ATFCM measures	METHazardEnrouteForecast METHazardEnrouteObservation	IS-0901-A DCB-0308	Yes
#28	Initial ground-ground interoperability	SharedFlightObject ATCFlightObjectControl	CM-0201-A	Yes
#31	Variable profile military reserved areas and enhanced civil-military collaboration	ARESActivation ARESPreActivation ARESDeactivation ARESRelease ARESQuery OATFlightDataDistribution OATFlightPlanSubmission	IS-0901-A AOM-0206-A	Yes
#34	Digital integrated briefing	IntegratedDigitalBreifing TAF METAR AerodromeMapInformation AeronauticalInformationFeature AeronauticalInformatinMap AirportFlightInformationPublication	IS-0205	No
#35	Meteorological information exchange	AirportMETForecast AirportMETAlert METAR TAF METREPORT SNOWTAM METGriddedForecast METHazardEnRouteForecast	MET-0101 IS-0901-A	Yes

		METHazardEnRouteObservation		
#37	Extended flight plan	ExtendedFlightPlanSubmission FlightPlanDataDistribution OATFlightDataDistribution OATFlightPlanSubmission	IS-0901-A AUO-0203-A	Yes
#46	Initial SWIM technology solution	All 40 ISRM Services	IS-0901-A	Yes
	Transversal SESAR solution	ISRM Foundation v00.08.00	IS-0901-A	Yes

The development was based on a number of iterations where each enhanced version of ISRM Foundation was used and thus tested for design of new and updated logical services. The feedback was then valuable input for the next version of the ISRM foundation.

The changes in the ISRM and ISRM Foundation were formally handled in a change process.

Besides the iterative development of ISRM and ISRM foundation, the tool support was also iteratively enhanced. Starting with selection of a recommended common modelling tool (Sparx Enterprise Architect), the tool support then evolved to include

- A common accessible version controlled repository
- Semi-automatic document production of SDDs
- Scripts for automatic model verification
- A modelling toolbox to guide the modeller in creating different kinds of model diagrams

The Identification and Design of logical services was based on operational and architectural input from, and in collaboration with, different SESAR projects using the common development process, “working method on services” and the priorities for different service identification and design activities were set on programme level by the SCG.

In order to ensure semantic interoperability the message payloads of each service operation was mapped to the AIRM (ATM Information Reference Model) in collaboration with information architects. The feedback from service development was used in the further enhancement of the AIRM. As a contributor to the AIRM, P08.03.10 has been a member of the AIRM CCB.

Besides the main deliverables described above, the result of a CP work together with FAA, the SDCM, has been taken developed to promote international collaboration and possible global standardisation through the ICAO IM panel. The structure of the ISRM is adjusted to align to the SDCM in a mappable way, and this mapping is described in a separate deliverable from P08.03.10.

1.2 Project achievements

Establishing and defining the SWIM concept in SESAR1.

Production of specific information services part of already developed solutions, many related to PCP requirements. One already in operational use E-AMAN launched by NATS for operations at Heathrow airport. The ISRM is also a strong candidate for re-use as input for future solutions developed in SESAR2020.

Development of ISRM Foundation which defines the rules and guidelines for development of new ISRM services both in SESAR2020 and in deployment.

Contribution to the European and global SWIM concept standardisation through the input of key SWIM material such as the SDCM to the ICAO Information Management Panel and ISRM Foundation to a future SESAR DM SWIM Governance body.

In ISRM Foundation, the following documents are included:

- ISRM Primer
- ISRM Configuration Management Plan
- ISRM Foundation Rulebook
- ISRM Modelling Guidelines
- ISRM Consolidation Guidelines
- ISRM Tooling Guidelines
- ISRM Verification Guidelines

Version 00.07.00 (used for ISRM 2.0) was the 10th iteration of ISRM Foundation, of which 6 were formally delivered to SJU, and that version of ISRM Foundation Rulebook included 60 rules for which 65% automated verification has been implemented.

In addition, a version 00.08.00 is delivered for post-SESAR1 use. This version can be adapted for working processes aligned to any specific context.

ISRM 2.0 is the 11th iteration of the ISRM and includes 40 designed logical services. The Design of these services is found in the UML model, but also in SDDs, one description document per service. An overview of the services is found in the ISRM Service Portfolio document [10], which also includes a multifaceted taxonomy that can be used for searching for logical services using different aspects.

A stakeholder therefore has different options to get needed information, either by exploring the design model, or by reading the ISRM Service Portfolio document for an overview or an SDD for detailed information. In this way a technical design for implementation of a service is based on the relevant logical service(s).

An important use of the services in the ISRM is as means of compliance for SWIM Compliance assessment, and as such, a number of services have been used as a part of SESAR validation exercises. The assessed services have reached different compliance levels with the most successful so far reaching the highest level of compliance for 8 included services. In this exercise, many ISRM services were implemented and used in realistic operational scenarios.

The deployment of the ATM functionalities mandated by the PCP – in particular the deployment of AF5 iSWIM – will build on the results of project 08.03.10 including the ISRM and the ISRM Foundation. These documents will be handed over to the SWIM Governance project under the Deployment Manager and serve as a baseline for iSWIM implementation and its evolution.

The SDCM deliverable [11], produced together with FAA gives a conceptual description of a service. The deliverable also describes how the ISRM structure relates to that model.

1.3 Project Deliverables

The following table presents the relevant deliverables that have been produced by the project.

Reference	Title	Description
D44	ISRM Foundation 00.07.00	In ISRM Foundation (used in SESAR1) the following documents are included: • ISRM Primer • ISRM Configuration Management Plan • ISRM Foundation Rulebook • ISRM Modelling Guidelines • ISRM Consolidation Guidelines

		• ISRM Tooling Guidelines • ISRM Verification Guidelines
D65	ISRM 2.0	In the delivery the following artefacts are included • Delivery Report • UML model • Service Portfolio • For each service an SDD and verification reports(s) ISRM 2.0 is based on ISRM Foundation 00.07.00 40 logical services within • Aeronautical information domain • Flight information domain • Weather information domain • Network information domain • Airport information domain
D45	ISRM Foundation 00.08.00	In ISRM Foundation (for post-SESAR1 use) the following documents are included: • ISRM Primer • ISRM Foundation Rulebook • ISRM Modelling Guidelines
D66	SDCM 2.0	A document with an introduction to SDCM and a short description on the mapping between ISRM structure and SDCM.
D20-003	T02 Final Activity Report	An overview of the activities related to OFA-Ops Services Coordination and Planning
D50	T05 Final Activity Report	An overview of the activities related to Service Production

1.4 Contribution to Standardisation

The project deliverables listed above, ISRM Foundation, ISRM and SDCM are all in a state to contribute to different standardisations. Parts of ISRM foundation and ISRM are identified by Deployment Manager, SWIM governance project as standards or guidance material to be used. Other standardisation bodies interested in P08.03.10 deliverables are EUROCAE and ICAO IM Panel.

- ISRM Rule book identified in SWIM Foundation [7], for Deployment Manager, SWIM Governance project, as Governing standard
- ISRM Modelling Guidelines and ISRM Verification Guidelines identified in SWIM Foundation [7], for Deployment Manager, SWIM Governance project, as Guidance material.
- ISRM 00.02.00 model and corresponding SDD documents identified in SWIM Foundation [7], for Deployment Manager, SWIM Governance project, as Governing standard.
- SDD template has been identified as Guidance material in SWIM Foundation [7].
- In EUROCAE, there is a large interest for ISRM as a base for standardisation with ArrivalManagement-Information service and IntegratedDigitalBriefing service as a start.
- SDCM 00.02.00 is a possible candidate to ICAO IM Panel, standardisation of the concept of a service.

1.5 Project Conclusion and Recommendations

Project 08.03.10 has successfully delivered in line with the objectives set out at the beginning of SESAR, and the project outputs can now be handed over with confidence to SES deployment, treated as input to SESAR 2020 and as input to the further globalisation of SWIM. The project has in a significant way contributed to the development of the SWIM concept which is a key enabler in fulfilling the overall high level goals of the SES. The developed artefacts ISRM, ISRM Foundation and SDCM are all potential candidates for standardisation both globally and on a regional level. The concept has been matured to such a level that it is ready to be handed over to deployment under the SESAR Deployment Manager and can be used in fulfilling the requirements of the PCP IR 716/2014.

Project Recommendations:

1. Use the delivered ISRM, and ISRM Foundation as input for SESAR2020.
2. Hand over the delivered ISRM, ISRM Foundation and SDCM to SESAR Deployment Manager for governance and further evolution together with input from SESAR2020 and other stakeholders.

2 References

[1] SESAR Programme Management Plan, Edition 03.00.01

[2] European ATM Master Plan

[3] Multilateral Framework Agreement ("MFA") signed between the SJU, EUROCONTROL and its 15 selected members on August 11, 2009, amended on 14 June 2010, 19 October 2010 and 2 July 2012

[4] 08.01.01, SWIM ConOps, D42, Version 00.04.05, 06/05/2014

[5] B.04.03, Service scope and approach, D11, Version 00.01.00, 10/05/2011

[6] B.04.03, Working method on Services Edition 2014, D100, Version 00.05.00, 05/05/2015

[7] 08.01.01, SWIM Foundation Primer,

[8] 08.03.10, ISRM Foundation, D44, Version 00.07.00, 01/12/2015

[9] 08.03.10, ISRM Foundation, Version 00.08.00, 31/05/2016

[10]08.03.10, ISRM, Version 00.02.00, 31/05/2016

[11]08.03.10, SDCM, Version 00.02.00, 31/05/2016

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