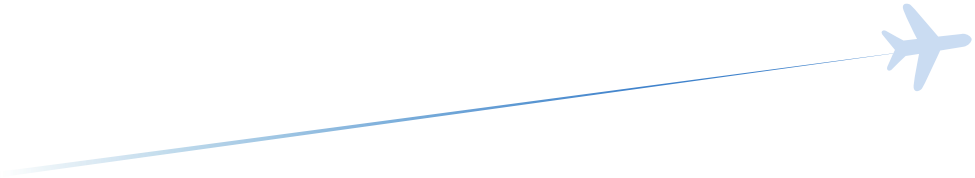

Business Model of the Aeronautical Information Common Service TRL6

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Copyright Statement

COSER

COMMON SERVICES

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Abstract

The present document is the TRL6 Business Model document– *Deliverable* D6.2.050 Business Model (TRL6) – under the task T6.2.050 *Business Modelling development* for Work Package WP6 "Aeronautical Information Service" of PJ.15.

The business model aims to capture and reflect the expectations from the stakeholders regarding the provision of an Aeronautical Information Service. It highlights the proposed value, the potential consumers and customers, the quality of service and a rough analysis of performance benefits, among others.

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1 Executive Summary

The Aeronautical Information Common Service provides capabilities necessary to provide aeronautical data in digital form to be used by different ATM systems. The output is an AIXM-compliant dataset whose subsets can be retrieved by individual requests demanding specific geographical areas, attributes or functional features.

PJ.15-10 explores ways of improving overall cost efficiency for delivering the necessary capability to the interested stakeholders under a COSER pattern. This document describes the definition of Business Model for the Aeronautical Information Service COSER in TRL6.

Mature and applicable user stories related to the production of aeronautical data for TRL6, are described and analysed, identifying the drivers and benefits of the usage of the Common Service.

The list of user stories TRL6 validated as part of the solution is as follows:

- Production of other aeronautical data
    - Maps generation.
    - Aerodrome mapping information definition and distribution
    - Meta-information allowing offline capabilities, dynamic scalability and safe filtering
- Services for ATC systems
    - ATC dataset preparation

The business case for Aeronautical Information Service COSER has a strong link with the Pilot Common Project [2] which mandates among others, *"Aeronautical information feature on request. Filtering possible by feature type, name and an advanced filter with spatial, temporal and logical operators"* using the yellow SWIM TI Profile in a series of ATSUs in Europe.

Assuming that users could consume the capability from a series of competing providers available within Europe, provision of Aeronautical Data deploying a COSER could result in:

- the requirement to deploy fewer engineered capabilities - ANSPs will only bear a cost consistent with the services they receive,
- service improvement roadmap across Europe is consistent and the associated costs are spread across common service ANSP consumers,
- facilitation of the extension of the PCP requirements to other States not originally addressed by the Implementing Rule.

Consequently, the benefit relates to:

- cost reduction through lower number of system deployments and technical systems to be securely maintained in operation,
- synchronisation of the evolutionary roadmap enabling consistency of concept and

- increased geographical coverage of the Solution because new incentives,
- increased safety due to increased data consistency within and amongst stakeholders due to harmonisation and consistent application of identical quality standards

The benefits however should grow incrementally according to the spread of deployment of the common service: a local deployment will offer less benefits especially in terms of costs than a wider deployment ate European or Worldwide level.

The primary SESAR KPIs addressed is cost-efficiency via CEF3. However, through the availability of a cost-efficient and validated COSER, additional ANSPs to those obliged by the PCP are encouraged to consume the service and a quicker implementation of Static and Dynamic Aeronautical Data capabilities could be envisaged. This would have temporary benefits on other SESAR KPIs additional to cost reduction.

The various benefits are amplified in the Scenarios and User Stories in the subsequent sections of this document.

For TRL6 the Cost Benefit Analysis is provided in a separate deliverable.

2 Introduction

2.1 Purpose of the document

The concept of a Common Service was introduced in SESAR to address the need to reduce the cost of European Air Traffic Management (ATM). ATM is highly fragmented with each State having their own Air Navigation Service Providers (ANSP). Cross border provision of Air Traffic Services being limited to only a few local examples. As each ANSP provides much the same type of service, they all have similar capabilities and deployed systems. Common Services can potentially reduce the overall cost of ATM by making it possible for similar organisations to consume a service from one provider by giving them the same capability they would normally have provided themselves, but at a lower cost. This benefit can either be realised by the direct consumer, in many cases the ANSPs, or by their customers by broadening their choice of supplier.

This document is related to the study of the Aeronautical Information common service. It intends to explore which are the best business options the common service would be useful to fulfil. It follows the method develop by SESAR 1 as part of the document "Common Services Foundation method" to draw the business model.

2.2 Intended readership

The intended audience for this document is the SESAR Joint Undertaking, the partners in the SESAR 2020 programme, the ATM stakeholders (e.g. airspace users, ANSPs, airports, airspace industry) with those third parties directly affected by its findings and the contributors having possible dependencies with the solution such as PJ.11 and PJ.18.

Other ATM projects and/or architectural projects and solutions within the SESAR 2020 programme may also have an interest.

2.3 Glossary of Basic Concepts

Term	Definition	Source
Business case	A tool to provide decision makers with the information they need to make a fully informed decision on whether funding should be provided and/or whether an investment should proceed	SESAR P16.06.06
Business model	A framework for creating economic, social, and/or other forms of value. The term' business model' is thus used for a broad range of informal and formal descriptions to represent core aspects of a business, including purpose, offerings, strategies, infrastructure, organizational structures, trading practices, and operational processes and policies.	EUROCONTROL ATM Lexicon

Capability	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.	SESAR2020 PJ19.05 EATMA Guidance Material Version 9.0
Centralised (service) - a particular type of Common Service	A Centralised Service is an ANS support service exercised at pan-European and central network level for harmonisation and cost-efficiency purpose avoiding multiplication of investments, leading to reduced infrastructure costs, supporting the ANSPs and the Member States of the EU to come closer or actually achieving the EU cost efficiency performance targets.	EUROCONTROL
Common Service	A service providing a capability in the same form to consumers that might otherwise have been undertaken by themselves'	SESAR B04.05 D02
Consumer	A user of a service	SESAR B04.05 D02
Cost Benefit Analysis	A Cost Benefit Analysis is a process of quantifying in economic terms the costs and benefits of a project or a program over a certain period, and those of its alternatives (within the same period), in order to have a single scale of comparison for unbiased evaluation. A CBA is a neutral financial tool that helps decision-makers to compare an investment with other possible investments and/or to make a choice between different options / scenarios and to select the one that offers the best value for money while considering all the key criteria for the decision. A CBA is a tool used within the Business Case Process to provide financial inputs	16.06.06-D68-New CBA Model and Methods 2015-Part 1 of 2
Customer	A consumer of a service under a specific contract.	SESAR B04.05 D02
Deployment Package	Deployment Packages comprise Operational Improvement Steps and Enablers selected to satisfy Performance Needs of Operating Environments in the European ATM System by providing performance benefits confirmed by validation results.	SESAR WP C, though un-reviewed
Node	A logical entity that performs activities. Note: nodes are specified independently of any physical realisation.	SESAR2020 PJ19.05 EATMA Guidance Material Version 9.0
Security and safety in the context of a Common Service	Non-Functional Requirements (NFR) and Quality of service (QoS) requirements can be specified at various levels of maturity and from different viewpoints such as from the collaborative enterprise, the logical level, technology and engineering perspectives. Conceptually, NFR and QoS are not always distinguishable. Common Services will focus at the first two viewpoints	ISRM – Modelling guidelines
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	SESAR2020 PJ19.05 EATMA Guidance Material Version 9.0

	through voice communication or written processes and procedures.	
Service contract (SLA)	A service contract represents an agreement between the stakeholders involved for how a service is to be provided and consumed. A service contract is specified through the service interface, the QoS and Service policies.	SESAR B.04.03 – Working method on service
Service instance	Service which has been implemented in accordance with its specification in the service catalogue (during the SESAR Development Phase, the service definitions are available in the ISRM) by a service provider (by itself or contracted to a third party).	SESAR B.04.03 – Working method on service
Service Provider	An organisation supplying services to one or more internal or external consumers.	SESAR B.04.05 – D02
Service taxonomy	The service taxonomy describes the categorisation of services provided between ATM stakeholders. It is used to organise the responsibilities of the service design as well as to provide a means of identifying services in the run-time environment.	SESAR B.04.03 – Working method on service
Stakeholder	A stakeholder is an individual, team, or organization (or classes thereof) with interest in, or concerns relative to, an enterprise (e.g. the European ATM). Concerns are those interests, which pertain to the enterprise's development, its operation or any other aspect that is critical or otherwise important to one or more stakeholders.	SESAR2020 PJ19.05 EATMA Guidance Material Version 9.0

Table 1: Glossary of Basic Concepts

2.4 Acronyms and Terminology

Term	Definition
ACC	Area Control Center
ADQ	Aeronautical Data Quality
AIC	Aeronautical Information Circulars
AIFS	Aeronautical Information Feature on request
AIM	Aeronautical Information Management
AIP	Aeronautical Information Publication
AIS	Aeronautical Information Service
AIXM	Aeronautical Information Exchange Model
ANS	Air Navigation Service
ANSP	Air Navigation Service Provider
APP	Approach
ARES	Airspace Reservation/Restriction
ATCO	Air Traffic Control Operator
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
ATS	Air Traffic Services
ATSU	Air Traffic Services Unit
FAB	Functional Airspace Block
CBA	Cost Benefit Analysis
CDU	Control Display Unit
CEF	Connecting Europe Facility
COSER	Common Service
DOW	Description of Work
EAD	European AIS Database
EATMA	European ATM Architecture

EATMN	European Air Traffic Management Network
E-ATMS	European Air Traffic Management System
ECAC	European Civil Aviation Conference
FAB	Functional Airspace Block
FMS	Flight Management System
FOC	Flight Operation Centre
FOC	Full Operational Capability
ICAO	International Civil Aviation Organisation
IO	Implementation Objective
IOC	Initial Operational Capability
IP1/DB	Implementation Package 1 / Deployment Baseline
IR	Implementing Regulation
ISRM	Information Service Reference model
iSWIM	Initial System Wide Information Management
KPA	Key Performance Area
KPI	Key Performance Indicator
LSSIP	Local Single Sky ImPlementation
MAWP	Multi-Annual Work Programme
MUAC	Maastricht Upper Area Control Centre
NFR	Non-Functional Requirements
NOTAM	NOtice To AirMen
N/A	Not Applicable
OSED	Operational Service Environment Description
OBJ	Implementation Objective
OI	Operational Improvement
PANS	Procedures for Air Navigation Services
PAR	Performance Assessment Report

PCP	Pilot Common Project
PCP IR	Pilot Common Project Implementing Regulation
PENS	Pan-European Network Service
PERM	Permanent
PRB	Performance Review Body
QoS	Quality of Service
RBT	Reference Business / Mission Trajectory
SAD	Static Aeronautical Data
SDM	Service Delivery Management
SESAR	Single European Sky ATM Research Programme
SID	Standard Instrument Departure
SJU	SESAR Joint Undertaking (Agency of the European Commission)
SJU Work Programme	The programme which addresses all activities of the SESAR Joint Undertaking Agency.
SESAR Programme	The programme which defines the Research and Development activities and Projects for the SJU.
SLA	Service-Level Agreement
SOA	Service-Oriented Architecture
STAR	STandard ARrival
SWIM	System Wide Information Management
SWIM-TI	SWIM Technical Infrastructure
TMA	Terminal Manoeuvring Area
TWR	Tower
UAV	Unmanned Aerial Vehicle
WOC	Wing Operation Centre
WP	Work Package

Table 2: Acronyms

3 Scope of the Business Model

3.1 Aeronautical Information Service

3.1.1 Scope

The function of the "Aeronautical Information Service" is to provide static and dynamic aeronautical data in digital form to be used by different ATM systems. The output is an AIXM-compliant dataset whose subsets can be retrieved by individual requests demanding specific geographical areas, attributes or functional features.

The purpose of this service is very close and even overlapping the already identified "AeronauticalInformationFeature" service in the EATMA. It is also very close to the service requested in the PCP (EU IR 716/2014 [2]) for "Aeronautical information exchange" on the Initial System Wide Information Management (iSWIM) over the yellow profile and defined as:

> Aeronautical information feature on request. Filtering possible by feature type, name and an advanced filter with spatial, temporal and logical operators.

The main task of the Aeronautical Information Service is to provide static and dynamic information like the last operational status of airspace or route activation, and to deal with permanent or long term data. This service will provide static information traditionally available in the AIP. This includes the PERM NOTAMs as static data changes. PERM NOTAMs are in fact Static Data that are published by NOTAM only because they do not fit into the traditional publication cycle. Such changes are usually incorporated in the sequent AIP amendment. Using a digital service would allow to include such information as far as it is available.

The Service has evolved in the TRL-6 phase to provide also dynamic information in the AIXM format (Digital NOTAM).

The new ICAO PANS-AIM allows replacing part of the AIP by the access to data sets:

- Aeronautical data set (AIP)
- Terrain and obstacle data set
- Aerodrome mapping data set
- Instrument flight procedure design data set

Those data sets could be provided by this service.

The current EATMA contains some modelling artefacts for the Aeronautical Information Management in the system or service layers, but nothing in the business or operation layers despite the fact that this service has been detected in SESAR1. The impact on the existing architecture, if any, is reflected in the High Level Architecture deliverable.

This business model analysis is focusing mainly in ground systems aspects, impact on other domains needs further work.

3.1.2 Service Pattern

The Capabilities can be considered to be provided through standardisation, outsourcing, consolidation or partnerships. It can also be deployed at a single location (centralised service) or at multiple locations (distributed services).

3.1.3 Expected Benefits

The benefits are expected to be different depending on the way the common Service will be deployed. 2 major axes can be foreseen:

- A geographical axis: the common service can be deployed:
    - At a local level: providing static and dynamic aeronautical data within a local area (typically a country)
    - At a sub-regional level: providing static and dynamic aeronautical data within a sub-region (could be a FAB, grouping of countries or grouping of ANSPs)
    - At a regional level: providing static and dynamic aeronautical data within a region (e.g. ECAC area)
    - Worldwide: providing static and dynamic aeronautical data for the entire world

    With this scheme, expected benefits are described in the Table 3.
- A provider axis: there could be only one provider for a dedicated geographical area, or there could be several providers for a dedicated geographical area. In the first case, we could see the common service as a “centralised” service, in the latter case as a “distributed” service where providers can be in competition, providing more or less the same aeronautical data but with different quality or price. In this scheme, the expected benefits are only in terms of costs: it is expected that competition between the providers could lower the costs of operation.

Another less business oriented “Timeliness axis” could also provide benefits as the common service may improve timeliness availability of some information.

The following table summarises the benefits identified for the Common Service as described in [7].

KPA (KPI)		Performance Benefits Expectation Local deployment	Performance Benefits Expectations Sub-Regional Level deployment	Performance Benefits Expectations Regional Level deployment	Performance Benefits Expectations Worldwide Level deployment
Predictability (Flight Duration Variability, against RBT)		None	None	None	None
Flexibility		None	None	None	None
Safety	**Mitigation of safety risk**	Low	Low	Low	Low
Human Performance		None	None	None	None
Interoperability		None	None	None	None
Cost Efficiency	**Cost of operation**	Low	Medium	High	High
Cost Efficiency	**ATCO Productivity**	None	None	None	None
	Technology Cost	Low	Medium	High	High

Table 3: Expected Benefits

Cost of operation can be reduced by reduction of human intervention necessary to manually update and extract the relevant info for AIP. Additional cost reduction from reduction of deployment and maintenance costs

3.1.4 Projects Involved

Possible projects involved are:

- PJ.15 Common Services
- PJ16 Virtual Centre
- PJ.18 4D Trajectory Management

In particular, the specific solutions that may make of the common service are reported in the following table.

Project/Solution	Title	Dependency
PJ.16-03	CWP-HMI Virtual Centre	This solution may make use of the Common service through SOA approach.
PJ.18-04a	18-04a: AIM information[1]	This solution may make use of the Common service for a validation exercise.

Table 4: Solutions Involved

3.2 Description of the OI Steps and related SESAR solutions

3.2.1 SDM-OI Steps

The Common Service does not address operational improvements itself. It is aiming at the improved cost efficiency of the provision of a necessary capability. It is envisaged to create an “SDM” OI Step reflecting this fact.

OI-SDM-0405

The applicable OI Step is SDM-0405 Aeronautical Information Service

[1] Following the latest version of the PMP (V1.0.0), PJ.18 decided to split the original WP3/18-04 into three independent stand-alone Technological Solutions. The Solution that PJ.15-10 will interact is the new proposed PJ.18-04a AIM Information.

3.2.2 Related OI Steps and SESAR solutions

The solution PJ15.10 is mainly linked to the solution #46 (SWIM Yellow Profile) even if it does not fully address it.

IS-0901-A – SWIM for Step 1

SWIM Step 1 includes the provision of the following capabilities:

- Ground-ground flight coordination and transfer functions between en-route systems based on ED-133 flight object concept (ATC 2 ATC profile).
- Business to Business services to share traffic flow management information (including the capability to fill and validate flight plans) between the Regional NM / AM and APOC, FOC (CFMU B2B Profile).
- Business to Business services to share Aeronautical information between the EAD (as part of Regional NM / AM) and ER-APP-ATC, Airport Airside Operations, FOC/WOC (EAD B2B Profile).

SWIM step 1 also includes the provision of new information exchange standards.

The three profiles will still use their own infrastructures (supervision, security), they are not interoperable.

PJ15.10 is related to the 3rd part of IS-0901-A (Ground-ground flight coordination and traffic flow management information are not addressed).

List of enablers linked to IS-0901-A

- AAMS-06b: ASM support systems enhanced to exchange static and dynamic data and airspace usage data with NM systems in AIXM format
- ATC-STD-01: Ground-Ground flight data exchange
- ER APP ATC 160: ATC to ATC Flight Data Exchange Using the Flight Object
- MIL-0501: Specifications for the interoperability of military ground systems with SWIM
- MIL-0502: Upgrade of military ground systems to allow bi-directional exchanges with non-military IP networks
- REG-0013: Community Specifications for Aerodrome Mapping Data based on ED-99 and ED-119
- REG-0014: TS 16071 upgrade to EN CS on ATC to ATC flight data exchange updated following validation results
- REG-0519: Regulatory Provisions for the harmonised deployment of technical requirements for iSWIM (PCP)
- STD-007: ED-99D user requirements for Aerodrome Mapping Information
- STD-008: ED-119C interchange standards for terrain, obstacle and aerodrome mapping data
- STD-033: Flight Information Exchange Model v4 incl. ICAO FPL 2012, Extended Flight Plan and Flight Objects elements, in accordance with SESAR FIXM Strategy.
- SWIM-APS-01a: Provision of Aeronautical Information services for Step 1
- SWIM-APS-02a: Consumption of Aeronautical Information services for Step 1
- SWIM-APS-03a: Provision of ATFCM Information Services for Step 1
- SWIM-APS-04a: Consumption of ATFCM Information Services for Step 1

- SWIM-APS-05a: Provision and Consumption of Flight Object Sharing services for Step 1
- SWIM-APS-06a: Provision of Airport Ground Sensor Meteorological Information Services
- SWIM-APS-07a: Stakeholder systems consumption of Meteorological Information services for Step 1
- SWIM-GOV-05a: Regulatory Provisions for SWIM roles and responsibilities (organisational requirements)
- SWIM-INFR-01a: High Criticality SWIM Services Infrastructure Support and Connectivity.
- SWIM-INFR-05a: General SWIM Services Infrastructure Support and Connectivity.
- SWIM-NET-01a: SWIM Network Point of Presence
- SWIM-STD-04: SWIM Technical Infrastructure profiles
- SWIM-SUPT-01a: SWIM Supporting Registry Provisions
- SWIM-SUPT-03a: SWIM Supporting Security Provisions
- SWIM-SUPT-05a: SWIM Supporting IP Network Bridging Provisions

4 Business Model Approach

PJ15-10 uses the method described in SESAR B4.5 for processing of Common Services.

The Business Model Canvas [14] defines a business model as describing "the rationale of how an organisation creates, delivers and captures value." It suggests that a business model can be described through nine basic building blocks that show the logic of how a company intends to make money. The nine blocks cover the four main areas of a business: customers, offer, infrastructure and financial viability. The business model is like a blueprint for a strategy to be implemented through organisational structures, processes and systems. The basic canvas is illustrated below.

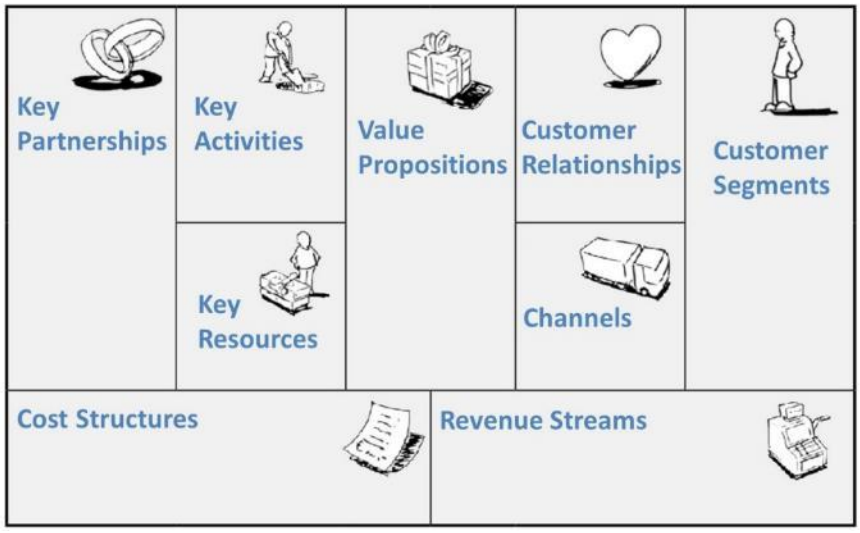


Figure 1: Business Model Canvas

The Business Model Canvas is widely used and many written examples are available on the internet (strategyzer.com). It thus provides a relatively robust approach to examine and describe the main building blocks for a Common Service. More detail is provided in D02 Options for Common Services, the foundation document produced by Project B04.05 and the Reference Material, Business Model Generation.

The building blocks within the canvas are as follows:

- Customer Segments: for who is the Common Service creating value and how does it differentiate its customer segments?
- Value Propositions: what is the value that the Common Services offers to its customers of the different segments?
- Channels: how does the provider of the Common Service interact with its customers and consumers?
- Customer Relationships: what is the provider's relationship with its customers and consumers?
- Revenue Streams: what is the pricing mechanism and where is the revenue derived from?
- Key resources: what resources does the provider require to deliver the Common Service?
- Key Activities: what are the activities and processes that are undertaken on behalf of others, the capability offered as the Common Service?

- Key Partnerships: what capabilities does the provider need from others to enable it to operate?
- Cost Structure: what costs are incurred by the Common Service Provider, how do they relate to each other and the value proposition?

The first step in modelling a Common Services is to clearly identify the business functions being considered and to separate them from other functions that may exist in the same organisation or environment, such as an aerodrome. The separated business function(s) becomes the focus of the Common Service's business model and a guide to the type of business being considered: customer relationship, innovation or infrastructure. Each type of business has different economic, cultural and competitive drivers and the manner for how the business function is separated provides a pattern for delivery. To assist, subject matter experts describe a set of user stories for the business being considered. These are then reviewed by others involved or interested stakeholders. The stories provide a narrative of how the Common Service is seen from different customer perspectives. These perspectives provide an insight into the customer's perceived value of the service and the relationship that they have with the provider. From this overall understanding, the business model can then be described.

5 Business Model Outline

The goal of this chapter is to provide an overview of the business model, addressing general considerations on which area the service would focus. This general outline will then be refined user story per user story in the next chapters of the document.

Business Model Building Blocks	Description
1. Customer Segments	*For which stakeholders is the Common Service Provider creating value? Are there different types of customer, with different needs?* Customers are all stakeholders that need to know the airspace structure: systems for airline, ATC enroute/approach, airport, airspace designer, procedure designer, UAV pilot … *Are needs different depending on the operating environment?* Needs are different regarding the provided data, not the service itself. *Is the market limited to a local area (e.g. within a country) or a sub-region or a region or can customers be anywhere in the world (global service)?* Airline customer willing to flight in the geographical area covered by the data provided by the service can be anywhere in the world. *What consumer activities are supported by the Common Service and what is the impact upon the Consumers own resource architecture?* Aeronautical information distribution
2. Value Propositions	*What is the Common Service Provider offering: Better performance? Cost reduction? New capability?* *What benefit do the consumers of the Common Services receive? (e.g. lower cost for the availability of a capability)* *What value do the consumer's customers benefit from as a consequence of the Common Service? What is the benefit for airspace users?* The COSER offers a cost reduction and standardisation. It offers cost reduction because it reduces the operating costs of using the Aeronautical Data. Additionally, it offers standardisation because it provides output in digital format. Other benefits like quality improvement or digitalization will, in any case, occur because of the ICAO transition from AIS to AIM. The Aeronautical Information Service applies sophisticated consistency checks that go beyond checks that can be performed solely on individual ANSP systems. Due to the harmonised application of data quality rules, business rules and harmonisation, the Aeronautical Information Service provides significant safety benefits for airspace users and ATM.
3. Channels	*How are customers accessed / reached by the Common Service Provider?* Service with request/response or notification message pattern. *Which kind of infrastructure is required to reach customers? (communication channels, SWIM infrastructure, R/T frequencies, etc.)* SWIM yellow profile.

4. Customer Relationships	*How is the Common Service Provider interacting with the customers? What type of service level agreement is established between them? Which kind of information do they need to exchange? (We should expect to see an operational model of some nature that reflects the interaction between the Common Service provider and the consumer, and this may well introduce new information exchanges and thus services. This should also examine both the normal operations and the non-normal operations that the Common Service Provider needs to support).* *Which kind of customer-provider relationship is established? :* *a) Standardisation? (interfaces are standardised)* *b) Outsourcing? (customer capabilities are transferred)* *c) Consolidation? (providers' capabilities are consolidated)* d) *Partnerships? (providers' capabilities are aggregated).* The interface is standardised with the use of AIXM. The interface is consolidated in Europe with EAD, but not worldwide. Current main providers are Lido, Jeppesen
5. Revenue Streams	*How is the Common Service Provider paid? (Charging customers? Funding? Pricing mechanisms?)* *Is the payment direct from customer to provider or is it indirect?* There are no specific revenue streams related to the new common service. It is direct payment between customer and provider.
6. Key Resources	*What key resources does the Common Service Provider need? (incl. technical systems, human resources and their combinations in capability configurations)* *How are providers' resources intended to be deployed:* *a) at multiple locations (i.e.; distributed resources)* *b) at single location (i.e.; centralised resources)* It will never be centralised worldwide. So the service consumers will always need to cope with distributed resources, at least at regional level and sometimes at national level.
7. Key Activities	*What are the key activities conducted by the Common Service Provider?* Aeronautical information distribution *What operational nodes (business functions) are used? Are any new ones introduced that may not exist in the current operational architecture? What activities do they undertake?* Aeronautical information management conducting aeronautical information collection, quality checking, consolidation, encoding and distribution activities.
8. Key Partnerships	*Who are the key partners and suppliers of the Common Service Provider?* All aeronautical information data provider: surveyors, airport authorities, ANSP themselves (airspace designer, procedure designer), civil aviation authority, military forces, national mapping agencies, … *Which resources would the provider need to acquire from them? What information flows would the provider need to receive from them?* Aeronautical information
9. Cost Structure	*What are the most important costs?*

	Is the Common Service business model mainly cost-driven or value-driven? The most important costs are related to the purchase of source aeronautical information to the different countries. The common service is therefore mainly value driven.

6 Business Model Refinement

Several categories in which the Aeronautical Information common service would be beneficial have been identified in V1 and V2. A subset has been validated and could be considered asTRL6 mature. A list of user validated user stories is provided for each demonstrated category:

-
- Production of other aeronautical data (i.d. usage of static and dynamic aeronautical data provided by the common service to produce other aeronautical data)
    - Maps generation.
    - Aerodrome mapping information definition and distribution
    - Meta-information allowing offline capabilities, dynamic scalability and safe filtering
- Services for ATC systems
    - ATC dataset preparation

Note that we focus on static and dynamic data, the introduction of dynamic data is out of scope of the common service.

The main scope of the Common Service is to provide Aeronautical Data consolidated from different sources (typically national authorities) in a standardized way to customers that will consume the information provided for their own purposes (as described in the user stories). The source data may come in different formats that the Common Service provider should be able to adapt to.

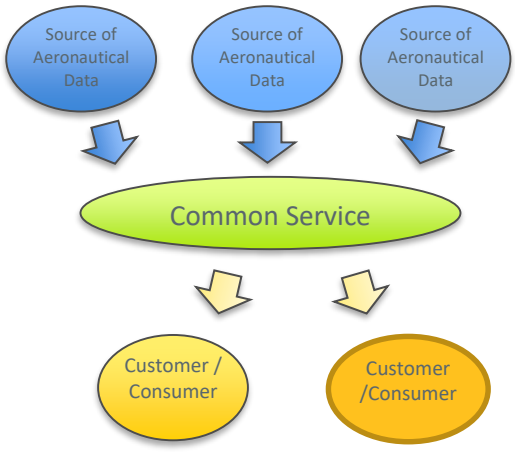


Figure 2: Logical deployment of the Common Service

Everything described in the BM is business driven and cost efficient and is based on what information needs i.e. to be exchanged in real time between modes in the common shared SOA network with the aim to create efficiency, simplification and creating a Service architecture wherein many more services can be added step-by-step. The most valuable architecture must win precedence and today we are building for future needs and tomorrow needs cannot be solved in the same way which up to now has been solitary. It is a huge difference to build a SOA architecture in comparison to a B2B service architecture which is a precursor to today's modern service network.

6.1 User Story: [Production of other aeronautical data] - Maps generation (digital or paper)

6.1.1 User Story description

As a user or maintainer of aeronautical information, I want to visualise aeronautical information following symbolisation standards. The information shall be filtered safely and dynamic symbology shall be used depending on the current scale of the display. I want to be able to work on-line or off-line and I would like to utilize the visualisation for live previews for Quality management purposes and for the production of paper charts.

6.1.2 Business Model Canvas

Business Model Building Blocks	
1. Customer Segments	*For which stakeholders is the Common Service Provider creating value? Are there different types of customer, with different needs?* AIM units, ATC / ATM units, data integrators, aircraft operators, airports, data originators, procedure designers *Are needs different depending on the operating environment?* Depending on the operating environment, different temporality is required for the maps. ATC units require real-time digital maps, whereas data integrators require monthly updated mapping information. Aircraft operators require paper maps or their electronic equivalent for on-board use, while the back-offices require visual representation of real-time information for planning purposes. *Is the market limited to a local area (e.g. within a country) or a sub-region or a region or can customers be anywhere in the world (global service)?* The market is not limited to a local area, but is global. *What consumer activities are supported by the Common Service and what is the impact upon the Consumers own resource architecture?* ATC consumers as well as aircraft operators receive up-to date, consolidated and quality assured information about the airspace geometry, Aerodrome geometry (runways, taxiways, aprons etc.), procedures, routes, airspaces and waypoints. By building on a consolidated data set, the effort for multiple manual manipulations is avoided, the quality of flight planning is

Business Model Building Blocks	
	increased, resulting in better efficiency and lower fuel consumption and the safety of information exchange is increased due to the avoidance of human intervention and media breaks.
2. *Value Propositions*	*What is the Common Service Provider offering: Better performance? Cost reduction? New capability?* For AIM units, data originators, procedure designers and airports, the service provides support to validation and editing of aeronautical information. This results in better operational performance and lower error rates of these units. For ATC / ATM, data integrators, aircraft operators, the service offers visualisation of complex data structures. This improves the presentation of complex aeronautical information and ensures that human errors are avoided or minimised. *What benefit do the consumers of the Common Services receive? (e.g. lower cost for the availability of a capability)? What value do the consumer's customers benefit from as a consequence of the Common Service? What is the benefit for airspace users?* The benefit for consumers is that cost savings can be achieved by avoiding investments into local rendering and visualisation. Instead, systems can rely on highly flexible and validated visualisation from the common service.
3. Channels	*How are customers accessed / reached by the Common Service Provider?* Customers are reached through a network infrastructure for exchanging digital data. *Which kind of infrastructure is required to reach customers? (communication channels, SWIM infrastructure, R/T frequencies, etc.)* Customers are reached through SWIM infrastructure, using the yellow profile protocol on the PENS network.
4. Customer Relationships	*How is the Common Service Provider interacting with the customers?* The Common Service Provider provides a technical service based on an SLA and a clearly defined interface. *What type of service level agreement is established between them? Which kind of information do they need to exchange? (We should expect to see an operational model of some nature that reflects the interaction between the Common Service provider and the consumer, and this may well introduce new information exchanges and thus services. This should also examine both the normal operations and the non-normal operations that the Common Service Provider needs to support).* The service level agreements between providers and consumers of the information will need to include: availability guarantees, response times, a reliable level of data quality. *Which kind of customer-provider relationship is established?* Standardisation (interfaces are standardised) and Outsourcing (customer capabilities are transferred) (for the aspects covered by COSER)

Business Model Building Blocks	
5. Revenue Streams	*How is the Common Service Provider paid? (Charging customers? Funding? Pricing mechanisms?)* *Is the payment direct from customer to provider or is it indirect?* Typically, the information handled in Aeronautical Information Management is part of the bundled charges. The revenue therefore typically is calculated on the basis of the crossed airspaces / sectors – basically the length of the flight through a controlled airspace. These charges are distributed to the different ATM disciplines by a specified factor to cover all of the bundled services of an ANSP. Alternative revenue streams were analysed but so far not realised by ICAO.
6. Key Resources	*What key resources does the Common Service Provider need? (incl. technical systems, human resources and their combinations in capability configurations)* *How are providers' resources intended to be deployed:* *a) at multiple locations (i.e.; distributed resources)* *b) at single location (i.e.; centralised resources)* The key resources needed by the common service provider are: - Technical: servers for gathering and storing data - Human: skilled resources in order to consolidate aeronautical data in a centralized way Common service to be deployed mostly in a centralized location or eventually duplicated in several locations but not in a distributed way. There could be one instance of the common service per country at the beginning in order to ease transition from a national process to a centralised one. A required key resource is also the SWIM Technical Infrastructure, which is the backbone for the data communication with PJ15.
7. Key Activities	*What are the key activities conducted by the Common Service Provider?* *What operational nodes (business functions) are used? Are any new ones introduced that may not exist in the current operational architecture? What activities do they undertake?* Flexible and dynamically symbolised visualisation and filtering of aeronautical information.
8. Key Partnerships	*Who are the key partners and suppliers of the Common Service Provider?* *Which resources would the provider need to acquire from them? What information flows would the provider need to receive from them?* The key partnerships of the common service are: - Data originators provide base data information - ANSPs provide processed information This information is required as basis for generating chart / GIS output. - Other ATC systems / units, aircraft operators are key partners on the output side. - National authorities for recovering aeronautical data: the data should have sufficient quality to cover the needs of various users (countries, systems) - Strengthened relationship with customers in order to be sure that provided data fit with the systems they are going to be integrated to

Business Model Building Blocks	
	- Strong link to the network operator to ensure availability and performance of the network
9. Cost Structure	*What are the most important costs?* Infrastructure costs for hosting the system and SWIM infrastructure, personnel costs for human interventions for validation and consolidation, Software licenses, maintenance, IT operations, training, data migration *Is the Common Service business model mainly cost-driven or value-driven?* The main costs for operating the service is the cost of acquiring the aeronautical data from each country. These acquisitions are done periodically. Other important costs are related to the first setup of the common service (infrastructure, network, agreements) and the periodic update of the digital data to be uploaded in the servers based on the latest aeronautical data changes. The business model is therefore mainly value-driven.

<table>
<tr>
<td rowspan="2">Key Partnerships

Data originator information and processed information from ANSPs is required as basis for generating chart / GIS output.</td>
<td>Key Resources

SWIM compliant system, SWIM infrastructure, IT systems to store and distribute information, Web Map server infrastructure; GIS web-viewer</td>
<td rowspan="2">Value Proposition

AIM units, data originators, procedure designers, airports: support to validation and editing

ATC / ATM, data integrators, aircraft operators: visualisation of complex data structures</td>
<td>Channels

SWIM Yellow Profile, web services</td>
<td rowspan="2">Customer Segments

AIM units, ATC / ATM units, data integrators, aircraft operators, airports, data originators, procedure designers</td>
</tr>
<tr>
<td>Key Activities

Rendering of aeronautical information for GIS data review</td>
<td>Customer Relationships

Service provider / service user relationship</td>
</tr>
<tr>
<td colspan="3">Cost Structure

Infrastructure costs for hosting the system and SWIM infrastructure, Software licenses, maintenance, IT operations, training, data migration</td>
<td colspan="2">Revenue Stream

Revenue via bundled AIM service charges</td>
</tr>
</table>

Figure 3: Canvas for the user story "Maps generation (digital or paper)"

6.2 User Story: [Production of other aeronautical data] - Aerodrome mapping information definition and distribution

6.2.1 User Story description

As a producer, originator or distributor of aeronautical information, I want to store and distribute aerodrome mapping information using a standardised interface and I want to offer standardised distribution channels compliant with SWIM principles.

6.2.2 Business Model Canvas

Business Model Building Blocks	
1. Customer Segments	*For which stakeholders is the Common Service Provider creating value? Are there different types of customer, with different needs?* AIM units, ATC / ATM units, data integrators, aircraft operators, airports, data originators *Are needs different depending on the operating environment?* The needs for procedure data does not significantly differ depending on the operating environment. *Is the market limited to a local area (e.g. within a country) or a sub-region or a region or can customers be anywhere in the world (global service)?* The market is not limited to a local area, but is global. The needs for aeronautical data are the same in the different types of operating environments that are the airports control tower or air traffic control centres. There could be however more specific detailed needs regarding geographical area requested, different types of objects requested, different types of filters needed. *What consumer activities are supported by the Common Service and what is the impact upon the Consumers own resource architecture?* Aerodrome mapping information for aircraft operators and data integrators for the production of aerodrome moving map displays that support the efficiency and safety of navigation while taxiing. Moreover, aerodrome mapping information is required for calculating taxi times and getting accurate gate-to-gate planning. For ANSP clients, the aerodrome mapping information is required for tower information systems for ATC purposes.
2. *Value Propositions*	*What is the Common Service Provider offering: Better performance? Cost reduction? New capability?* For AIM units, data originators, procedure designers and airports, the service provides standardised distribution and storage of aerodrome mapping data, which results in more efficiency / cost reduction due to the improved data exchange and interoperability with partner organisations.

Business Model Building Blocks	
	For ATC / ATM, data integrators, aircraft operators, the improved access to validated and consolidated aerodrome mapping information leads to reduced efforts for managing aerodrome mapping information manually and to a higher degree of safety and harmonisation. *What benefit do the consumers of the Common Services receive? (e.g. lower cost for the availability of a capability)? What value do the consumer's customers benefit from as a consequence of the Common Service? What is the benefit for airspace users?* ATC / ATM, data integrators, aircraft operators benefit from the access to validated and consolidated information, which allows better planning for taxi times. The usage in moving map displays ensures a higher degree of safety due to the avoidance of human errors while taxiing.
3. Channels	*How are customers accessed / reached by the Common Service Provider?* Customers are reached through a network infrastructure for exchanging digital data. *Which kind of infrastructure is required to reach customers? (Communication channels, SWIM infrastructure, R/T frequencies, etc.)* Customers are reached through SWIM infrastructure, using the yellow profile protocol on the PENS network.
4. Customer Relationships	*How is the Common Service Provider interacting with the customers?* The Common Service Provider provides a technical service based on an SLA and a clearly defined interface. *What type of service level agreement is established between them? Which kind of information do they need to exchange? (We should expect to see an operational model of some nature that reflects the interaction between the Common Service provider and the consumer, and this may well introduce new information exchanges and thus services. This should also examine both the normal operations and the non-normal operations that the Common Service Provider needs to support).* The service level agreements between providers and consumers of the information will need to include: availability guarantees, response times, a reliable level of data quality, the availability of meta information to prove the providence of the information and a proven safety case *Which kind of customer-provider relationship is established?* Standardisation (interfaces are standardised) and Outsourcing (customer capabilities are transferred) (for the aspects covered by COSER) The aeronautical information service provider may consolidate information coming from different countries and different providers in order to answer to various needs coming from various ATC systems. This is performed in the same manner as today except that the number of partnerships with countries may increase due to the nature of the service being common and accessed in a more flexible way by various customers.
5. Revenue Streams	*How is the Common Service Provider paid? (Charging customers? Funding? Pricing mechanisms?)* *Is the payment direct from customer to provider or is it indirect?* Typically, the information handled in Aeronautical Information Management is part of the bundled charges. The revenue therefore typically is calculated on the basis of the crossed airspaces / sectors – basically the length of the flight through a controlled airspace. These charges are distributed to the different ATM disciplines by a specified factor to cover all of the bundled services of an ANSP. Alternative revenue streams were analysed but so far not realised by ICAO.

Business Model Building Blocks	
6. Key Resources	*What key resources does the Common Service Provider need? (incl. technical systems, human resources and their combinations in capability configurations)* *How are providers' resources intended to be deployed:* *a) at multiple locations (i.e.; distributed resources)* *b) at single location (i.e.; centralised resources)* The key resources needed by the common service provider are: - Technical: servers for gathering and storing data - Human: skilled resources in order to consolidate aeronautical data in a centralized way Common service to be deployed mostly in a centralized location or eventually duplicated in several locations but not in a distributed way. There could be one instance of the common service per country at the beginning in order to ease transition from a national process to a centralised one. A required key resource is also the SWIM Technical Infrastructure, which is the backbone for the data communication with PJ.15.
7. Key Activities	*What are the key activities conducted by the Common Service Provider?* *What operational nodes (business functions) are used? Are any new ones introduced that may not exist in the current operational architecture? What activities do they undertake?* Aeronautical information management for aerodrome mapping information conducting aeronautical information collection, quality checking, consolidation, encoding and distribution activities.
8. Key Partnerships	*Who are the key partners and suppliers of the Common Service Provider?* *Which resources would the provider need to acquire from them? What information flows would the provider need to receive from them?* The key partnerships of the common service are: - Providers of aeronautical information or data originators are key partners on the input side, especially airports as data originators - Other ATC systems / units, aircraft operators are key partners on the output side. - National authorities for recovering aeronautical data: the data should have sufficient quality to cover the needs of various users (countries, systems) - Strengthened relationship with customers in order to be sure that provided data fit with the systems they are going to be integrated to - Strong link to the network operator to ensure availability and performance of the network
9. Cost Structure	*What are the most important costs?* Infrastructure costs for hosting the system and SWIM infrastructure, personnel costs for human interventions for validation and consolidation, Software licenses, maintenance, IT operations, training, data migration *Is the Common Service business model mainly cost-driven or value-driven?* The main costs for operating the service is the cost of acquiring the aeronautical data from each country. These acquisitions are done periodically. Other important costs are related to the first setup of the common service (infrastructure, network, agreements) and the periodic update of

Business Model Building Blocks	
	the digital data to be uploaded in the servers based on the latest aeronautical data changes. The business model is therefore mainly value-driven.

<table>
<tr>
<td rowspan="2">Key Partnerships

Airport Operators as data originators; AIM units as data processing validation units.

Other ATC systems / units, aircraft operators are key partners on the output side.</td>
<td>Key Resources

SWIM compliant system, SWIM infrastructure, IT systems to store and distribute information</td>
<td rowspan="2">Value Proposition

AIM units, data originators, procedure designers, airports: standardised distribution and storage

ATC / ATM, data integrators, aircraft operators: access to validated and consolidated information</td>
<td>Channels

SWIM Yellow Profile, web services</td>
<td rowspan="2">Customer Segments

AIM units, ATC / ATM units, data integrators, aircraft operators, airports, data originators, procedure designers</td>
</tr>
<tr>
<td>Key Activities

Storage, validation and distribution of aeronautical information</td>
<td>Customer Relationships

Service provider / service user relationship</td>
</tr>
<tr>
<td colspan="3">Cost Structure

Infrastructure costs for hosting the system and SWIM infrastructure, personnel costs for human interventions for validation and consolidation, Software licenses, maintenance, IT operations, training, data migration</td>
<td colspan="2">Revenue Stream

Revenue via bundled AIM service charges</td>
</tr>
</table>

Figure 4: Canvas for the user story "Aerodrome mapping information definition and distribution"

6.3 User Story: [Production of other aeronautical data] - Meta-information allowing offline capabilities, dynamic scalability and safe filtering

6.3.1 User Story description

As a producer or originator of aeronautical information, I want to store meta-information for aeronautical data, which allows dynamic scalability and safe filtering of information based on this meta information. Meta information includes e.g.: precision, error rate, origin of the data, confidence interval, tools used for measurement etc. Meta information is based on the ISO 19100 meta information standard.

6.3.2 Business Model Canvas

Business Model Building Blocks	
1. Customer Segments	*For which stakeholders is the Common Service Provider creating value? Are there different types of customer, with different needs?* AIM units, ATC / ATM units, data integrators, aircraft operators, airports, data originators. *Are needs different depending on the operating environment?* The needs for meta data does not significantly differ depending on the operating environment. *Is the market limited to a local area (e.g. within a country) or a sub-region or a region or can customers be anywhere in the world (global service)?* The market is not limited to a local area, but is global. The needs for aeronautical data are the same in the different types of operating environments that are the airports control tower or air traffic control centres. There could be however more specific detailed needs regarding geographical area requested, different types of objects requested, different types of filters needed. The meta information is also used for appropriate filtering. *What consumer activities are supported by the Common Service and what is the impact upon the Consumers own resource architecture?* Meta information is used by all users of the common service to determine if the information is fit for purpose. For providers of information, meta information is used to describe the origin of the data and to record the meta information required by the users.

Business Model Building Blocks	
2. *Value Propositions*	*What is the Common Service Provider offering: Better performance? Cost reduction? New capability?* For AIM units, data originators, procedure designers and airports, the service provides standardised distribution and storage aeronautical information including the necessary meta data results in more efficiency / cost reduction due to the improved data exchange and interoperability with partner organisations. For ATC / ATM, data integrators, aircraft operators, the improved access to validated and consolidated aeronautical information including the necessary meta information leads to reduced efforts for managing aerodrome mapping information manually and to a higher degree of safety and harmonisation. *What benefit do the consumers of the Common Services receive? (e.g. lower cost for the availability of a capability)? What value do the consumer's customers benefit from as a consequence of the Common Service? What is the benefit for airspace users?* ATC / ATM, data integrators, aircraft operators benefit from the access to validated and consolidated information and meta information. The result is a higher degree of efficiency and safety and a lower effort for managing and validating the necessary data.
3. Channels	*How are customers accessed / reached by the Common Service Provider?* Customers are reached through a network infrastructure for exchanging digital data. *Which kind of infrastructure is required to reach customers? (Communication channels, SWIM infrastructure, R/T frequencies, etc.)* Customers are reached through SWIM infrastructure, using the yellow profile protocol on the PENS network.
4. Customer Relationships	*How is the Common Service Provider interacting with the customers?* The Common Service Provider provides a technical service based on an SLA and a clearly defined interface. *What type of service level agreement is established between them? Which kind of information do they need to exchange? (We should expect to see an operational model of some nature that reflects the interaction between the Common Service provider and the consumer, and this may well introduce new information exchanges and thus services. This should also examine both the normal operations and the non-normal operations that the Common Service Provider needs to support).* The service level agreements between providers and consumers of the information will need to include: availability guarantees, response times, a reliable level of data quality, the availability of meta information to prove the providence of the information and a proven safety case. *Which kind of customer-provider relationship is established?* Standardisation (interfaces are standardised) and Outsourcing (customer capabilities are transferred) (for the aspects covered by COSER)

Business Model Building Blocks	
	The aeronautical information service provider may consolidate information coming from different countries and different providers in order to answer to various needs coming from various ATC systems. This is performed in the same manner as today except that the number of partnerships with countries may increase due to the nature of the service being common and accessed in a more flexible way by various customers.
5. Revenue Streams	*How is the Common Service Provider paid? (Charging customers? Funding? Pricing mechanisms?)* *Is the payment direct from customer to provider or is it indirect?* Typically, the information handled in Aeronautical Information Management is part of the bundled charges. The revenue therefore typically is calculated on the basis of the crossed airspaces / sectors – basically the length of the flight through a controlled airspace. These charges are distributed to the different ATM disciplines by a specified factor to cover all of the bundled services of an ANSP. Alternative revenue streams were analysed but so far not realised by ICAO.
6. Key Resources	*What key resources does the Common Service Provider need? (incl. technical systems, human resources and their combinations in capability configurations)* *How are providers' resources intended to be deployed:* *a) at multiple locations (i.e.; distributed resources)* *b) at single location (i.e.; centralised resources)* The key resources needed by the common service provider are: - Technical: servers for gathering and storing data - Human: skilled resources in order to consolidate aeronautical data in a centralized way Common service to be deployed mostly in a centralized location or eventually duplicated in several locations but not in a distributed way. There could be one instance of the common service per country at the beginning in order to ease transition from a national process to a centralised one. A required key resource is also the SWIM Technical Infrastructure, which is the backbone for the data communication with PJ15.
7. Key Activities	*What are the key activities conducted by the Common Service Provider?* *What operational nodes (business functions) are used? Are any new ones introduced that may not exist in the current operational architecture? What activities do they undertake?* Aeronautical information management specifically for meta information conducting aeronautical information collection, quality checking, consolidation, encoding and distribution activities.
8. Key Partnerships	*Who are the key partners and suppliers of the Common Service Provider?* *Which resources would the provider need to acquire from them? What information flows would the provider need to receive from them?* The key partnerships of the common service are: - Providers of aeronautical information or data originators are key partners on the input side, especially airports as data originators - Other ATC systems / units, aircraft operators are key partners on the output side.

Business Model Building Blocks	
	- National authorities for recovering aeronautical data: the data should have sufficient quality to cover the needs of various users (countries, systems) - Strengthened relationship with customers in order to be sure that provided data fit with the systems they are going to be integrated to - Strong link to the network operator to ensure availability and performance of the network
9. Cost Structure	*What are the most important costs?* Infrastructure costs for hosting the system and SWIM infrastructure, personnel costs for human interventions for validation and consolidation, Software licenses, maintenance, IT operations, training, data migration *Is the Common Service business model mainly cost-driven or value-driven?* The main costs for operating the service is the cost of acquiring the aeronautical data from each country. These acquisitions are done periodically. Other important costs are related to the first setup of the common service (infrastructure, network, agreements) and the periodic update of the digital data to be uploaded in the servers based on the latest aeronautical data changes. The business model is therefore mainly value-driven.

Key Partnerships	Key Resources	Value Proposition	Channels	Customer Segments
Data Originators, e.g.: procedure design, surveyors, mobile phone tower builders, building companies etc. AIM unit for validating and approving the metadata.	SWIM compliant system, SWIM infrastructure, IT systems to store and distribute information **Key Activities** Storage, validation and distribution of aeronautical meta information	By providing the meta information it becomes possible to improve the degree of automation for safe filtering, offline capabilities, dynamic scalability.	SWIM Yellow Profile, web services **Customer Relationships** Service provider / service user relationship	AIM units, ATC / ATM units, data integrators, aircraft operators, airports, data originators, procedure designers

Cost Structure	Revenue Stream
Infrastructure costs for hosting the system and SWIM infrastructure, personnel costs for human interventions for validation and consolidation, Software licenses, maintenance, IT operations, training, data migration	Revenue via bundled AIM service charges

Figure 5: Canvas for the user story "Meta-information allowing offline capabilities, dynamic scalability and safe filtering"

6.4 User Story: [Services for ATC systems] - ATC dataset preparation

6.4.1 User Story description

A new ATC dataset is prepared each AIRAC cycle. We study the usage of the common service.

6.4.2 Business Model Canvas

Business Model Building Blocks	
1. Customer Segments	*For which stakeholders is the Common Service Provider creating value? Are there different types of customer, with different needs?* The typical customers of the common service in this user story are the ANSPs which are exploiting the ATC systems. *Are needs different depending on the operating environment?* The needs for aeronautical data are the same in the different types of operating environments that are the airports control tower or air traffic control centres. There could be however more specific detailed needs regarding geographical area requested, different types of objects requested, different types of filters needed. *Is the market limited to a local area (e.g. within a country) or a sub-region or a region or can customers be anywhere in the world (global service)?* Customers can be anywhere in the world. However, we focus the first usage of the common service in the ECAC area. There could be one instance of common service available for one geographical area that could be local or sub-regional. This could be done anywhere in the world. The service could even be regional considering that several providers could operate in it. *What consumer activities are supported by the Common Service and what is the impact upon the Consumers own resource architecture?* Activities are related to the improvement of the elaboration of the aeronautical dataset embedded in the ATC systems and updated at each AIRAC cycle. Due to the fact that the provided data would be performed in a standardised way, impact would be a more fluent elaboration of this dataset, therefore optimising the number of resources needed for this activity. Automating the elaboration of the dataset based on the information available from the common service may even be envisaged but is subject to each customer capability since it may be very dependent on each system and on its internal design.

Business Model Building Blocks	
2. *Value Propositions*	*What is the Common Service Provider offering: Better performance? Cost reduction? New capability?* The common service provider will help cost reduction within the ANSPs which are taking in charge the elaboration of datasets for their systems due to the more automated approach, time gained in the elaboration of the dataset but also due to the potential mutualisation of the service within one provider for several consumers. It may also improve cost of safety due to more fluent access to the latest aeronautical data in a more effective way. Consistency with the neighbouring systems if they are using the same service may improve safety at the cross-border of areas of responsibilities. Reduction of errors in the manual use of data compared to the more automated approach of using a common service could also slightly improve safety. *What benefit do the consumers of the Common Services receive? (e.g. lower cost for the availability of a capability)* Customer should experience a lower cost for introduction of a new dataset in an ATC system. Reduction of cost of safety is foreseen since it is expected that the integration process can be automated whenever needed on a periodic manor so having the latest changes in the aeronautical data available to the ATC system. Within collocated areas, the exactly same aeronautical data are shared. The benefit may be little for a local area where only one ANSP operates and higher where several ANSPs operate co-located areas. One limitation could occur on the sharing of military data: some nations may put some restrictions in the publications of military data in a centralised database. As an example, today the EAD (European Aeronautical Database) does not contain all information. *What value do the consumer's customers benefit from as a consequence of the Common Service? What is the benefit for airspace users?* For the consumer's customer, the benefits are quicker reaction when an update of the dataset Is required, cheaper costs and better safety. The airspace users will benefit from having consistent data shared with the ATCOs, thus reducing potential misunderstanding between the flight crew and controllers, or minimising errors when interpreting the aeronautical data.
3. Channels	*How are customers accessed / reached by the Common Service Provider?* Customers are reached through a network infrastructure for exchanging digital data. *Which kind of infrastructure is required to reach customers? (communication channels, SWIM infrastructure, R/T frequencies, etc.)* Customers are reached through SWIM infrastructure, using the yellow profile protocol on the PENS network.
4. Customer Relationships	*How is the Common Service Provider interacting with the customers? What type of service level agreement is established between them? Which kind of information do they need to exchange? (We should expect to see an operational*

Business Model Building Blocks	
	model of some nature that reflects the interaction between the Common Service provider and the consumer, and this may well introduce new information exchanges and thus services. This should also examine both the normal operations and the non-normal operations that the Common Service Provider needs to support). *Which kind of customer-provider relationship is established?* *a) Standardisation? (interfaces are standardised)* *b) Outsourcing? (customer capabilities are transferred)* *c) Consolidation? (providers' capabilities are consolidated)* d) *Partnerships? (providers' capabilities are aggregated).* The relationships between the customer and the common service provider are mainly industrial relationship: one industry is offering a data service a customer. The provider if offering standardised data to it customer. There could however be different standards but the usage of one common service for different ANSPs could help the convergence between these standards. The aeronautical information service provider may consolidate information coming from different countries and different providers in order to answer to various needs coming from various ATC systems. This is performed in the same manner as today except that the number of partnerships with countries may increase due to the nature of the service being common and accessed in a more flexible way by various customers.
5. Revenue Streams	*How is the Common Service Provider paid? (Charging customers? Funding? Pricing mechanisms?)* *Is the payment direct from customer to provider or is it indirect?* Payment is quite direct between customer and provider expect the fact that the payment may not be one shot but could be a subscription for periodic access to the service in order to have access to the more updated information when ever needed by a customer for its ATC system design, evolution or maintenance. Payment could be done on the basis of volume of data transferred, thus fostering lower costs for larger ANSPs that require big amount of data and optimising the cost for smaller ANSPs. One particularity of the business model is due to the fat that the source of the aeronautical data sometimes comes from the ANSP themselves. ANSPs would sell this information to the common service provider and then buying a related service to the provider. Added value of this process is that the data and addition process needed to consolidate the data are shared by several customer ANSPs and performed by only one provider.
6. Key Resources	*What key resources does the Common Service Provider need? (incl. technical systems, human resources and their combinations in capability configurations)* *How are providers' resources intended to be deployed:* *a) at multiple locations (i.e.; distributed resources)* *b) at single location (i.e.; centralised resources)* The key resources needed by the common service provider are: - Technical: servers for gathering and storing data

Business Model Building Blocks	
	- Human: skilled resources in order to consolidate aeronautical data in a centralized way Common service to be deployed mostly in a centralized location or eventually duplicated in several locations but not in a distributed way. There could be one instance of the common service per country at the beginning in order to ease transition from a national process to a centralised one.
7. Key Activities	*What are the key activities conducted by the Common Service Provider?* *What operational nodes (business functions) are used? Are any new ones introduced that may not exist in the current operational architecture? What activities do they undertake?* Aeronautical information management conducting aeronautical information collection, quality checking, consolidation, encoding and distribution activities.
8. Key Partnerships	*Who are the key partners and suppliers of the Common Service Provider?* *Which resources would the provider need to acquire from them? What information flows would the provider need to receive from them?* The key partnerships of the common service are: - National authorities for recovering aeronautical data: the data should have sufficient quality to cover the needs of various users (countries, systems) - Strengthened relationship with customers in order to be sure that provided data fit with the systems they are going to be integrated to - Strong link to the network operator to ensure availability and performance of the network
9. Cost Structure	*What are the most important costs?* *Is the Common Service business model mainly cost-driven or value-driven?* The main costs for operating the service is the cost of acquiring the aeronautical data from each country. These acquisitions are done periodically. Other important costs are related to the first setup of the common service (infrastructure, network, agreements) and the periodic update of the digital data to be uploaded in the servers based on the latest aeronautical data changes. The business model is therefore mainly value-driven.

<table>
<tr>
<td rowspan="2">Key Partnerships

National authorities for recovering aeronautical data

ANSPs customer of dataset

Network operators</td>
<td>Key Resources

Technical: servers for gathering and storing data

Human: skilled resources in order to consolidate aeronautical data in a centralized way</td>
<td rowspan="2">Value Proposition

Cost reduction of ANSPs

Improvement of safety</td>
<td>Channels

SWIM Yellow Profile interface on the PENS network to exchange data

Dedicated interface to the countries national authorities for retrieving source data needed to build aeronautical information</td>
<td rowspan="2">Customer Segments

ANSPs for Enroute control centres and Control Tower systems</td>
</tr>
<tr>
<td>Key Activities

Aeronautical information management conducting aeronautical information collection, quality checking, consolidation, encoding and distribution activities</td>
<td>Customer Relationships

Provider to customer industrial relationship

Exchange of standardized data in a point to multipoint way

Providers aggregate the aeronautical data from different countries in order to simplify customer interfaces</td>
</tr>
<tr>
<td colspan="3">Cost Structure

Periodic acquisition of aeronautical data from the different countries national authorities

Costs related to the setup of the common service structure

Periodic update of the ATC systems</td>
<td colspan="2">Revenue Stream

Subscription by customers for unlimited access to the Common Service based on the volume of data retrieved</td>
</tr>
</table>

Figure 6: Canvas for the user story "Dataset preparation"

7 Business Model Validation

The following table describes the outcome of the validation of the business model described in the previous chapters.

Business Model Building Blocks	Validation Objectives	Outcomes
1. Customer Segments	*With both provider and consumer representatives, confirm that the segment identified shares the need for the capability being offered and that there is sufficient cohesive need justifying a common solution.* *Test the boundaries of the segment to see if there is flexibility to enlarge the number or types of consumers involved.* *Confirm that the Consumers activities could be supported by the services and separation of the capability form the consumers operation is feasible.*	*Common capability need is confirmed*
2. Value Propositions	*Confirm that the value could be realised through the adoption of the Common Services for normal and non-normal operations.* *Confirm that transition to the use of the Common Service Provider can be achieved at the lowest practical risk to the consumer's operations.*	*The main benefit is related to the possibility to have several providers and different geographical areas (local, sub-regional, regional, whole world) addressing the common service in a standardized way*
3. Channels	*Confirm that the channel to the consumer is practicable, and that the service can be secured at a reasonable cost.* *Confirm that the coverage of service provision and market approach supports the proposed Common Service*	*Cost is related to the common service infrastructure which would not be a blocking issue.* *The main difficulties are related to the purchase of the source data to the different national authorities but this issue is already dealt by some existing providers*

Business Model Building Blocks	Validation Objectives	Outcomes
4. Customer Relationships	*Confirm that the process model covers the management of the relationship between the Common Service Provider and consumer during normal and non-normal operations.* *Confirm Service provision pattern would support the provision and that a price could be fixed for the service.*	*No particular issue identified on the provider to customer relationship except on the fact that one customer could be also providing source data to the provider (example of an ANSP responsible in its country for providing aeronautical data and using the common service provider to recover complete set of aeronautical data for other purposes)*
5. Revenue Streams	*Confirm funding stream would be available as described.*	*Revenue streams to periodic subscription or on-demand purchase seem to be feasible*
6. Key Resources	*Confirm that the system functionality required is feasible, the human role and competence are defined.*	*Confirmed since the mechanism already exists within some providers*
7. Key Activities	*Confirm the operational processes necessary to support capability being provided through the provision of the service.* *Confirm that all the necessary information is available.*	*Main operational process to be put in place is related to the availability of the source data coming from the countries and reconciled within the common service.* *Operational usage of the data offered by the common service is less complex.*
8. Key Partnerships	*Confirm that any key partners can be described such that they can be practically engaged with the Common Service Provider.*	*The main key partners are the national authorities of each country responsible for providing the source data to the common service provider. Specific framework agreements need to be put in place to make the data available to the common service provider.*
9. Cost Structure	*Confirm that the asset structure is fundable and that the provision of the resource is practicable.*	*The same type of cost structure already exists so should be extendable to a common service concept.*

Table 5: Validation Assessment

8 Reference and Applicable Documents

9.1 Applicable Documents

[1] SESAR B4.5, D04 Common Services Foundation Method

[2] EU IR 716/2014: Pilot Common Project

[3] Final SESAR 1 Maturity Assessment Report Executive Summary, 01.00.00

[4] PCG32 Action Paper Cybersecurity in SESAR 2020

[5] SESAR2020 CBA Template for Enabler projects

[6] SESAR2020 Project Handbook

[7] Grant Agreement GA-734160 – PJ15 COSER, edition 01.00.00, 27/10/2016

[8] SESAR 16.06.06-D26_04, Guidelines for Producing Benefit and Impact Mechanisms, Edition 03.00.01

[9] SESAR 16.06.06-D26_03, Methods to Assess Costs and Monetise Benefits for CBAs, Edition 00.02.02

[10] SESAR 2020 Multi Annual Work Programme, edition V1.0, 08/07/2015

[11] Foundation Method on Common Services

[12] PJ19.2.1 Business Model of the Aeronautical Information Common Service TRL6

[13]

9.2 Reference Documents

[14] Business Model Generation. A. Osterwalder and Y. Pigneur. Wiley, 2010.

[15] Common assumptions for CBAs as maintained by PJ19 (provisionally the ones included in the 16.06.06- D68 – New CBA Model and Methods 2015 – Part 1 of 2, Edition 00.01.01 can be used)

[16] SESAR 2020 Common assumptions, Edition 01.00.00 (17 May 2018)

[17] EUROCONTROL: Challenges of Growth 2013, Task 4: European Air Traffic in 2035. Edition June 2013.

[18] SESAR B.04.05-D02, Options on Common Services, Edition 00.01.00

[19] SESAR B.04.05-D03, Service Identification, Edition 00.01.04

[20]EUROCONTROL – Standard Inputs 2018

[21]EAIM.GEN. Business Plan 2017 2021

[22]SESAR proposal on the content of a pilot common project. Accessed on 17/01/2019 via: https://ec.europa.eu/transport/sites/transport/files/modes/air/consultations/doc/2014-01-31-sesar/sju1.pdf

[23]PRB RP2 Annual Monitoring Report 2015. Volume 3 – CAPEX. Version 2.2 from 20/12/2016. Accessed on 11/04/2017 via: https://ec.europa.eu/transport/sites/transport/files/prb_annual_monitoring_report_2015_vol_3_capital_expenditures.pdf

[24][24]European ATM Portal – Working view. Accessed on 11/04/2017 via: https://www.eatmportal.eu/working/depl/essip_objectives/map

[25]European ATM Portal – Working view. Draft Dataset 17, issued 22 June 2017. Accessed on 04/07/2017 via: https://www.eatmportal.eu/working/rnd/rd-dashboard

[26]European ATM Portal – Deployment view. European ATM Master Plan Level 3 - Implementation Plan (ESSIP Plan). Accessed on 05/07/2017 via: https://www.eatmportal.eu/working/depl/essip_objectives/1000085

[27]ESSIP European ATM Master Plan Level 3 - Implementation Plan.

[28]LSSIP European ATM Master Plan Level 3 – Local Implementation Plan Tool.

[29]SESAR DEPLOYMENT MANAGER. Deployment Programme 2017. Deliverable D1.1. Ed. May 2017. Accessed on 06/07/2017. Available for download via: http://www.sesardeploymentmanager.eu/publications/deployment-programme/

[30]EU Commission Regulation (EU) No 73/2010 of 26 January 2010 laying down requirements on the quality of aeronautical data and aeronautical information for the Single European Sky.

[31]EU Commission Implementing Regulation (EU) No 1029/2014 of 26 September 2014 amending Regulation (EU) No 73/2010 laying down requirements on the quality of aeronautical data and aeronautical information for the single European Sky.

[32]European ATM Master Plan Level 3 – Implementation View (LSSIP). Plan 2016. Pages 13, 85 and 103.

[33]EUROCONTROL: Challenges of Growth 2013, Task 4: European Air Traffic in 2035. Edition June 2013.

[34]EUROCONTROL: SEVEN-YEAR FORECAST February 2017, Flight Movements and Service Units 2017-2023.

[35]EAD – European AIS Database. Accessed on 17/07/2017 via: http://www.eurocontrol.int/articles/european-ais-database-ead

[36]EAD Data. Accessed on 17/07/2017 via: http://www.eurocontrol.int/articles/ead-data

[37]PJ15-10 COSER High-Level Architecture for Aeronautical Information Service

[38]PJ.15-10 – Initial Performance Estimations Questionnaire. Edition V1.0 of 14 August 2017.

- OSED - 13.02.02-D118 Edition 01.01.01 (30/06/2016)
- TS: 13.02.02-D120 Edition 00.01.02 (06/07/2016)
- ISRM: 08.03.10-D65 00.01.01 (25/07/2016)
- 14.01.04-D44-004 00.01.00 (04/07/2016): SWIM Yellow Profile
- SWIM Compliance Report for EXE-13.02.02-VP-461
- SWIM Compliance Report for EXE-13.02.02-VP-462

[39] SESAR Solution #46 Initial system-wide information management (SWIM) technology solution

- 08.01.01-D55 SWIM Registry design-time requirements
- 08.01.03-D47 AIRM v4.1.0 (for global reference)
- 08.03.10-D65 ISRM v2.0 (for global reference)
- 14.01.03-D30 SWIM (GG AG) Architectural Definition - Final
- 14.01.03-D39 SWIM Profiles - Final
- 14.01.04-D44-001 SWIM-TI Technical Specifications Catalogue
- 14.01.04-D44-002 SWIM-TI Identity Management Technical Specification
- 14.01.04-D44-004 SWIM-TI Yellow Profile Technical Specification

Appendix A ATSUs falling under the PCP IR

The Appendix of the IR 716/2014 (PCP) [2] lists the ATSUs that are required to "implement services which support the exchange of the following aeronautical information using the yellow SWIM TI Profile".

#	FAB		ANSP/State	ACCs	TMAs and TWRs	APTs	ATSUs	
1	DE-SE	1	Denmark		APP Copenhagen	CPH	2	4
		2	Sweden		APP Arlanda	ARN	2	
2	NEFAB	3	Finland		APP Helsinki		1	3
		4	Norway		TMA Oslo	OSL	2	
3	FABEC	5	Belgium	-	APP Brussels	BRU	2	28
		6	France	ACC Marseille, Paris, Bordeaux, Brest and Reims	TMA Paris	CDG, ORY, NCE	9	
		7	Germany	UAC Karlsruhe, ACC Langen and Munich	ACC Langen, ACC Munich, ACC Bremen	FRA, MUC, DUS, BER	10	
		8	MUAC	ACC MUAC			1	
		9	Netherlands	ACC Amsterdam	TMA Amsterdam	AMS	3	
		10	Switzerland	ACC Zurich	APP Zurich	ZRH	3	
4	FABCE	11	Austria	ACC Wien	APP Wien	VIE	3	4
		12	Hungary	ACC Budapest			1	
5	DANUBE	13	Romania	ACC Bucharest			1	1
6	BLUEMED	14	Italy	ACC Padua and Rome	TMA Roma, TMA Milano, TMA Padua	MXP, FCO	7	7
7	UK-Ireland	15	Ireland		TMA Dublin	DUB	2	10
		16	United Kingdom	ACC London and Prestwick	TMA London, APP Manchester	LHR, LGW, STN, MAN	8	
8	SW FAB	17	Spain	ACC Madrid and Barcelona	TMA Madrid, TMA Barcelona, TMA Palma, TMA Canarias	MAD, BCN, PMI	9	9

-	Outside FABs	18	Serbia & Montenegro	ACC Belgrade			1	1
		19	Turkey	ACC Ankara			1	1
Total			**19**	**22**	**22**	**24**	**68**	

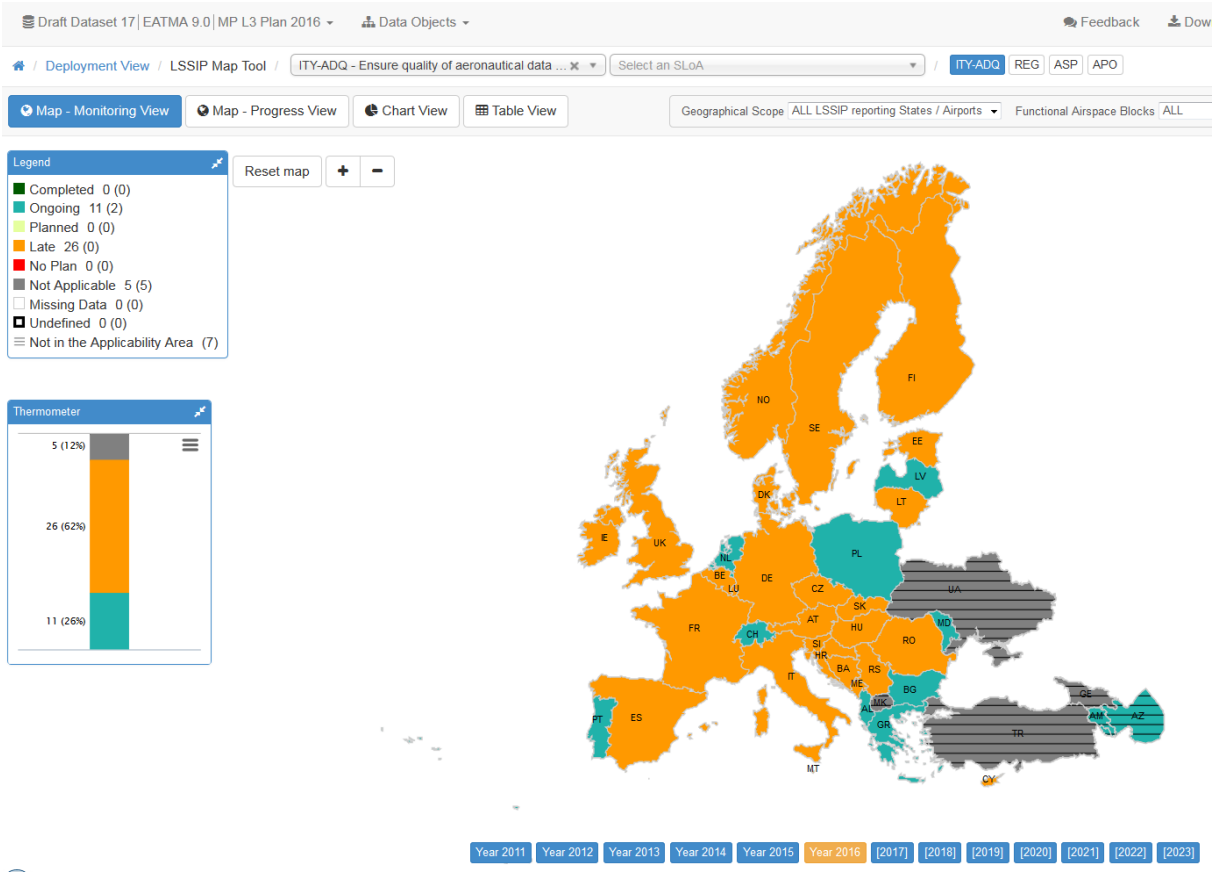
Appendix B FABs outside PCP IR

The following FABs have ANSPs/States that are outside the scope of applicability of the PCP IR 716/2014 [2].

#	FAB	ANSP/State
1	NEFAB	Estonia and Latvia
2	Baltic	Poland and Lithuania
3	FABEC	Luxembourg
4	FABCE	Czech Republic, Slovak Republic, Croatia, Slovenia, Bosnia and Herzegovina
5	DANUBE	Bulgaria
6	BLUEMED	Malta, Greece, Cyprus
7	SW FAB	Portugal

Appendix C LSSIP reporting for IO ITY-ADQ – Ensure quality of aeronautical data

But ITY-ADQ is reported in the LSSIP to be in 2016 (6 months before deadline recommended) only fulfilled at 11%. https://www.eatmportal.eu/working/depl/essip_objectives/map



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