



ICAO

International Civil Aviation Organization

**The Fourth Meeting of System Wide Information Management  
Task Force (SWIM TF/4)**

Web-conference, 3 – 6 November 2020

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**Agenda Item 5:** Updates on the assigned tasks by task leads/contributors including progress Report and issues

**d) Governance**

- Registry - implementation guidance for Interoperable Registry Model
  - Task 5 (Contains previous Task 1-4, Task 1-5, Task 2-1-2, Task 2-1-4)

**SWIM SERVICE CATEGORY TAXONOMY**

(Presented by Federal Aviation Administration (FAA), USA)

**SUMMARY**

This Working Paper presents a SWIM Service Category taxonomy. It elaborates briefly on the concepts of taxonomy, defines the SWIM Service Category taxonomy and describes its content and structure. It also discusses the usage of this taxonomy in a SWIM environment.

**1. INTRODUCTION**

1.1 Services are the principal ingredients in the SWIM universe. Every SWIM implementation encompasses a collection of services with varied architectural roles and business uses.

1.2 Identifying, specifying, and describing services and their relationships are essential functions of SOA Governance in general and SWIM Governance in particular.

1.3 To this end, SWIM Governance defines and deploys *taxonomies* as a mechanism for arranging services (and other entities of interest) in classes or categories based on specific criteria.

1.4 Taxonomies are most commonly used to support service discovery. They also help to determine guidelines or technologies that should be applied to specific groups of services.

1.5 In this paper, we describe a taxonomy designed to classify services developed or anticipated to be developed in a SWIM service-centric environment. We also discuss potential applications for this taxonomy in the context of SWIM implementations.

2. **DISCUSSION**

2.1 **Taxonomy**

2.1.1 A *taxonomy* is a controlled list of well-defined concepts organized into a hierarchical structure by which to categorize or classify objects.

2.1.2 *Categorization* is understood as a process of classifying or assigning items into categories or groups based on characteristics which the items have in common.

2.1.3 In a taxonomy, all *nodes* are linked through parent/child relationships with at most one parent node for each child node and with only one root node.

2.1.4 The *root node* represents the most general category, and each subordinate node represents a more specific concept or category than its respective parent node.

2.2 **SWIM Service Category Taxonomy**

2.2.1 The purpose of the SWIM Service Category taxonomy is to organize all kinds of services commonly deployed by SWIM implementations into categories by which they can be searched or managed by stakeholders.

2.2.2 The defining, root category in this taxonomy is the SWIM Service category, which encompasses all services deployed or intended to be deployed by a SWIM implementation.

2.2.3 The SWIM Service category is divided into two subcategories: Information Service (IS) and Core Service. These two categories reflect a commonly accepted SWIM architectural vision in which Information Services represent services whose main purpose is to provide air traffic management (ATM) information, while the role of Core Services is to support communications among interacting components.

2.2.4 The Information Service category is further organized into subcategories representing the type of ATM information provided by the service, e.g., aeronautical, flight, weather, etc.

2.2.5 The Core Service category is further organized into subcategories representing the type of support capabilities provided by services, e.g., initiating interaction between providers and consumers (discovery service), ensuring secure information exchange (security service), managing reliable transfers of messages (messaging service), etc.

2.2.6 Table 1 presents a hierarchical list of all concepts in the SWIM Service Category taxonomy, together with their definitions.

<i>Parents's Name</i>	<i>Name</i>	<i>Definition</i>
None	SWIM Service	An abstract class that represents any SWIM Service.
SWIM Service	Information Service	A service that offers capabilities for generating, making available, storing, managing, and analyzing information.
SWIM Service	Core Service	A service that offers capabilities by which to interconnect, adapt, and facilitate services provided by other parties.

Information Service	Aeronautical Service	A service that provides information used to describe, manage, and control aeronautical facts, concepts or instructions such as special use airspace restrictions, airport configuration, and Notices to Airmen (NOTAMS).
Information Service	Flight Service	A service that provides information used to describe, manage, and control the safe movement of aircraft in the airspace, including information such as flight itinerary, flight identification, flight planning, flight events and status, and air traffic management (ATM) control events associated with a single flight, where a flight normally includes one takeoff and one landing.
Information Service	Weather Service	A service that provides information used to describe current or predicted atmospheric conditions, including terminal and airborne weather observations, forecasts, and reports of weather phenomena.
Information Service	Infrastructure Service	A service that provides information used to describe the infrastructure and resources supporting a flight such as landing facilities, air space partitions, communications systems, navigation systems, surveillance systems, automation tools, etc.
Information Service	Surveillance Service	A service that provides information produced by technologies (e.g., radar, beacon interrogator, automatic dependent surveillance-broadcast) for detecting and locating airborne and taxiing aircraft and ground support vehicles.
Core Service	Discovery Service	A service that provides capabilities to a service consumer to obtain information about available services.
Core Service	Security Service	A service that provides capabilities for protecting systems from unauthorized access or interference with data transfers.
Core Service	Messaging Service	A service that provides capabilities for distributing messages exchanged by interacting components.
Core Service	Mediation Service	A service that provides capabilities for connecting systems that deploy different data representations, formats, or protocols.

TABLE 1 SWIM Service Category taxonomy

2.2.7 Figure 1 depicts the SWIM Service Category taxonomy as a UML class diagram.

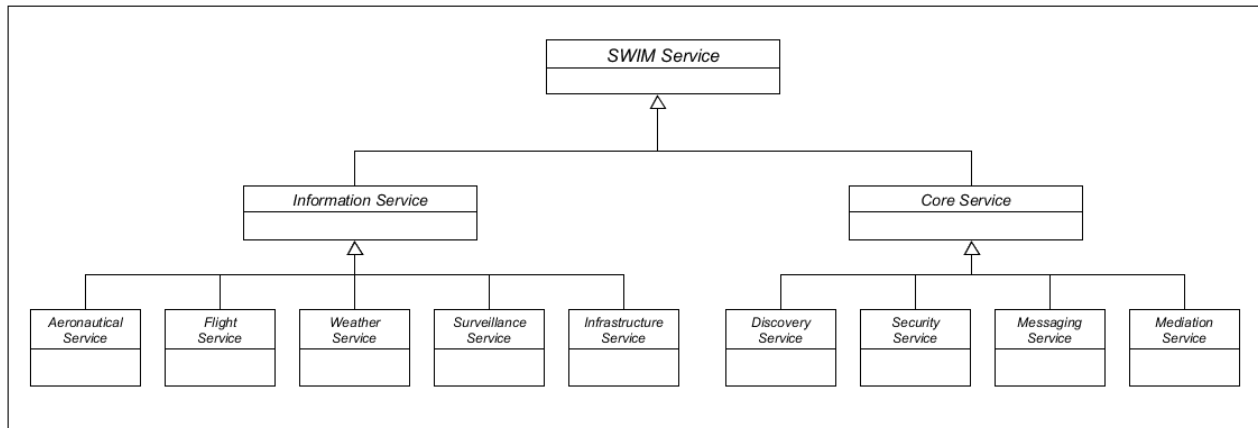


FIGURE 1 SWIM Service Category taxonomy class diagram

2.2.8 The SWIM Service Category taxonomy is designed in a manner that promotes extensibility and scalability; it may be modified to meet business requirements that may emerge in the future. It can be extended both *vertically* and *horizontally*.

2.2.8.1 *Vertically* in this context means that existing service categories can be specialized further. For example, the Mediation Service category can be organized into subcategories like "Data Mediation Service," "Protocol Mediation Service," etc.

2.2.8.2 *Horizontally* means that new service categories can be added to any level of the taxonomy's hierarchy (except the topmost one). For example, in some SWIM settings, an "Airport Service" category can be considered for adding to the set of Information Services.

## 2.3 Usage

2.3.1 The SWIM Service Category taxonomy provides an intuitive and effective way to manage the complexity and diversity of services in a SWIM implementation context. For example:

2.3.1.1 It may support a query mechanism in a SWIM service discovery application;

2.3.1.2 It may be applied to prescribe governance policies and solutions relevant to a specific category of services;

2.3.1.3 It may be rendered as a machine-interpretable definition to be processed by software (see for example <https://semantics.aero/service-category>) and human users (as shown in Table 1 and Figure 1).

## 2.4 Conclusion

2.4.1 The Service Category taxonomy facilitates service discovery and governance processing in a SWIM service-centric environment.

2.4.2 The taxonomy helps implementers determine which guidelines, best practices, and technologies to apply to specific categories of services.

2.4.3 The taxonomy is implementation-neutral, i.e., it can be described in natural human languages and in formal languages such as XML or RDF.

2.4.4 More taxonomies are expected to be developed and deployed in the future to support the implementation of a SWIM Governance framework

### 3. ACTION BY THE MEETING

3.1 The meeting is invited to consider the following actions:

- a) Review the contents of this Working Paper;
- b) Adopt the taxonomy defined in this Paper as a standard approach for classifying SWIM services, and
- c) Advise on the way forward.

### 4. REFERENCES

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