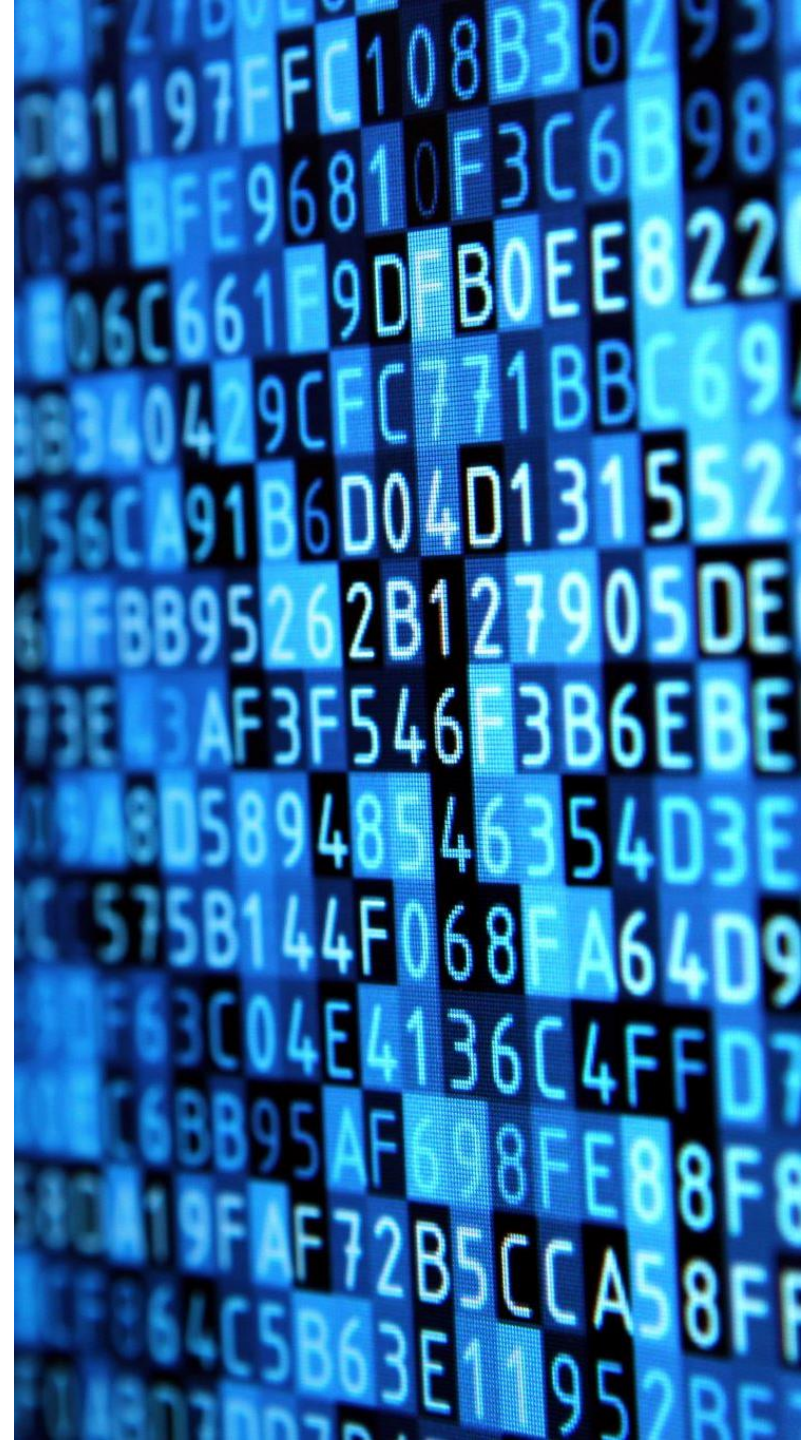


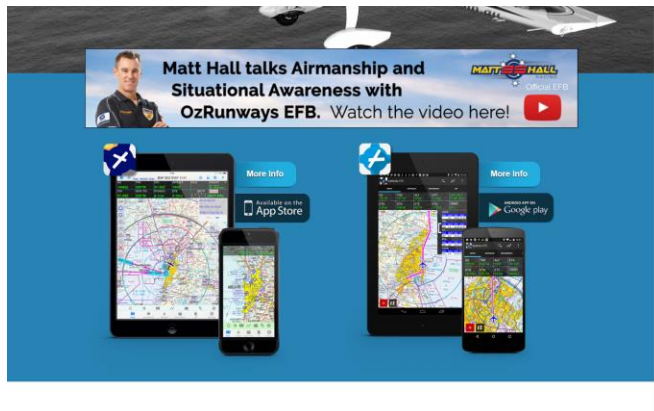
What is an Information Service?

- Information services provide an ATM-related information-sharing capability
 - Example information services: Aeronautical Information Publication, Flight Data Information Publication, Observed Meteorological Information Publication, etc.
- Information Service Registries help publicize information about available services (discoverability)
 - Description of service (service overview): source, data available, exchange protocols, etc.



Information services outside ATM

- Internet technologies are already in use for other airline related information needs:
 - 1.Booking and passenger details (e-ticketing).
 - 2.Cargo planning and Flight information of interest to Airport and vendors
 - 3.Electronic Flight Bags with a multitude of services.



Potential Information Services

- Nav aids information service
 - Give in a single service all information on a nav aid and impacts of an outage.
- Trajectory information service
 - Provide trajectory awareness including for each waypoint flight levels, course, heading, speed and flight segment time and fuel burn.
- Airspace schedules and reservation service
 - Capacity/demand visibility.



Potential Information Services (2)

- Observer / Nowcast / Forecast
MET Information service
 - Provide Met information
according to selection
criteria.
- Air Traffic Flow Management
Information service
 - Provide flow restrictions
and updates.



Traps to avoid in creating information services

Change for the sake of change

- Replacing a message by a SWIM information service should only take place when it provides added value.
- E.g: Creating a METAR service just to provide the METAR information in a digital format may not provide sufficient benefit to justify the investment cost.

Only creates SWIM services when clear value can be demonstrated

- E.g: Increasing ability to share for mutual benefit across multiple users.

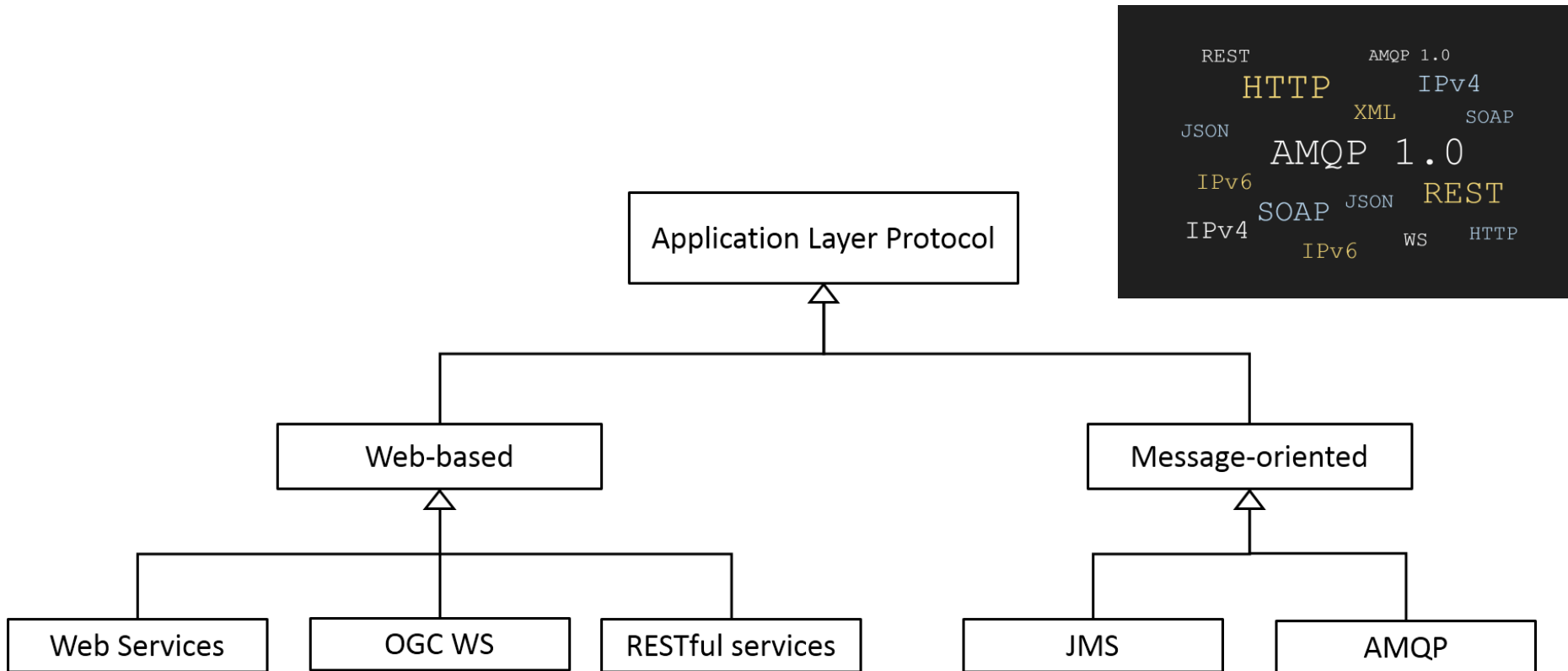
Duplication of information and services

- Avoid overloading information models with information not core to the domain.
- E.g: SAR related information in Flight Object and airport-airline specific information in the flight object.



Underlying technical considerations

SWIM Interacting Models and Protocols



SWIM Interacting Models and Protocols

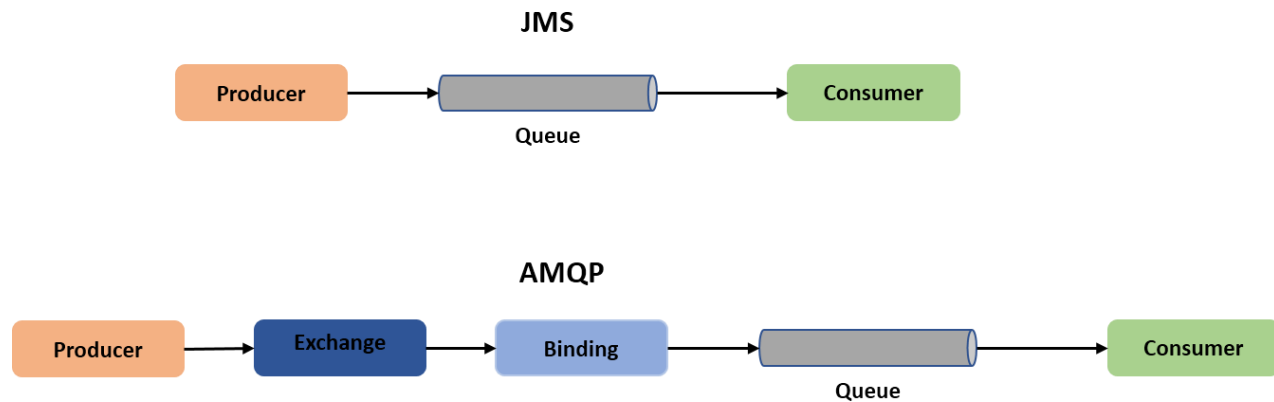
Model/Protocol	Pros	Cons
<i>Web-based</i>	<p>Relies on a set of well-defined, ubiquitous Web standards.</p> <p>Uses HTTP protocol which is the most scalable and widely-used.</p>	<p>Provides a limited support for asynchronous communications.</p> <p>Limited (but possible) support for guaranteed delivery.</p>
<i>Message-oriented</i>	<p>High level of decoupling.</p> <p>Reliable asynchronous message handling (capable of supporting guaranteed delivery).</p> <p>Designed to support publish/subscribe interaction model.</p>	<p>Required Message-Oriented Middleware (MOM).</p>

JMS and AMQP Comparison

Java Message Service (JMS)	Advanced Message Queuing Protocol (AMQP)
Application program interface (API) for a Java message-oriented middleware (MOM).	An open standard application layer protocol for MOM.
Not technology agnostic. Supports only Java platform.	Is cross-platform and supports multiple languages, e.g. JMS, as well as C, C++, Python, C#.
All messages are sent in well-defined message types, (Text, Stream, Map, Object, Byte).	Requires all messages to be sent in binary (bytes) format.

JMS and AMQP Comparison (cont.)

Java Message Service (JMS)	Advanced Message Queuing Protocol (AMQP)
Supports 2 message models : <ul style="list-style-type: none">▪ Point to Point (P2P)▪ Publish/Subscribe (Pub/Sub)	Supports 4 <i>exchange types</i> : <ul style="list-style-type: none">▪ Direct Exchange▪ Fan-out▪ Topic▪ Header





Considerations for SWIM Architecture and Interoperability

- Web-based and message-oriented technologies should architecturally complement each other, e.g., HTTP for request-response and AMQP for publish-subscribe.
- JMS is the de facto API standard for exchanging messages between Java clients. It is very mature and has a broad vendor support.
- AMQP is a better candidate for exchanging information between enterprises, that is, “local” instances of SWIM.

SWIM service registry

- The SWIM service registry: directory of information that supports the discovery of SWIM services.
- The SWIM service registry stores metadata that describes **SWIM service overviews** : information needed in order to use, or consider using, a service
- **Main functionality**
 - Discovery & Registration

