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AMHS/SWIM Gateway - Building a Bridge

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AMHS/SWIM Gateway - Building a Bridge

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Member of AMHS to SWIM Gateway Study Group (SWAMWAY SG)

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ICAO Documentation

- ICAO Doc 9880, Part II

  Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using ISO/OSI Standards and Protocols, 3rd Edition, 2024
  Part II - Ground-Ground Applications - Air Traffic Services Message Handling Services (ATSMHS)

- ICAO Doc 10039

  Manual on the System-wide Information Management (SWIM) Concept, 1st Edition, 2024

- ICAO Doc 10203

  Manual on the System-Wide Information Management (SWIM) Implementation, 1st Edition, 2024

- ICAO EUR Doc 047

  AMHS/SWIM Gateway Specification, 2nd Edition, 2024

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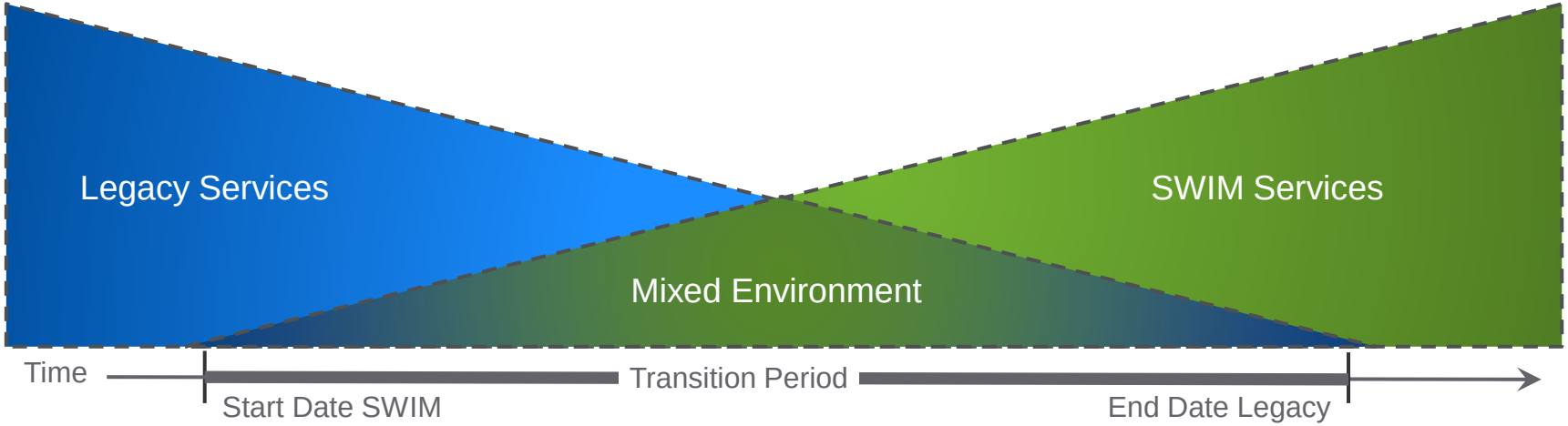
Mixed Environment

- Potential paths
  - Introduction of new services
  - Phase out of existing services
  - Transition of existing services
- Co-existence of legacy and SWIM services leads temporarily to a mixed environment



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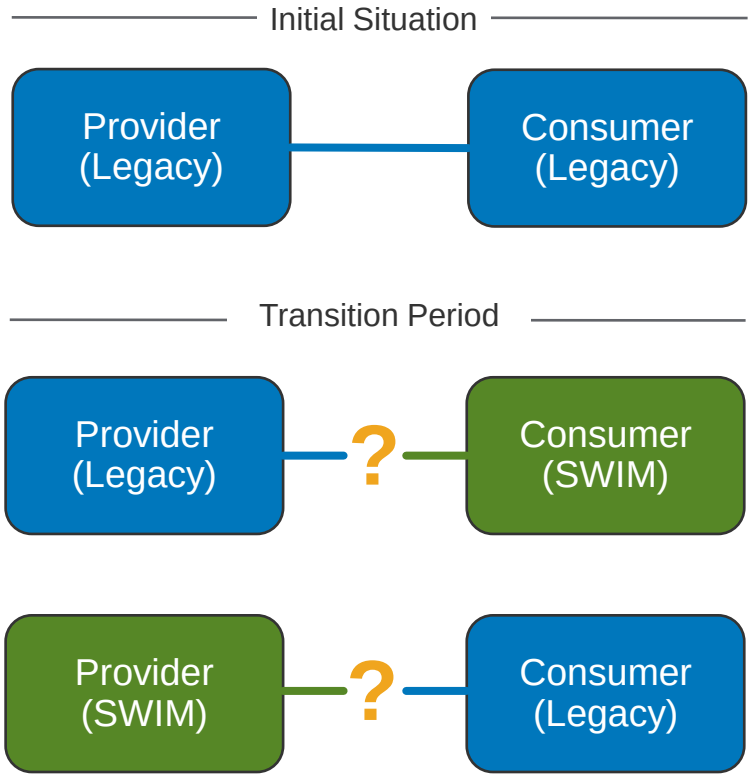
Transition Scenarios

- Straight forward / out of scope
  - Introduction of new services
  - Phase out of existing services

- Transition challenges
  - Change in data representation
    - ➢ New XML-based formats replace existing formats
  - Transition not synchronised
    - ➢ Information provider and consumer migrate at different points in time
  - Prevent disruption of services
    - ➢ Continuity of information flows at any time during the transition



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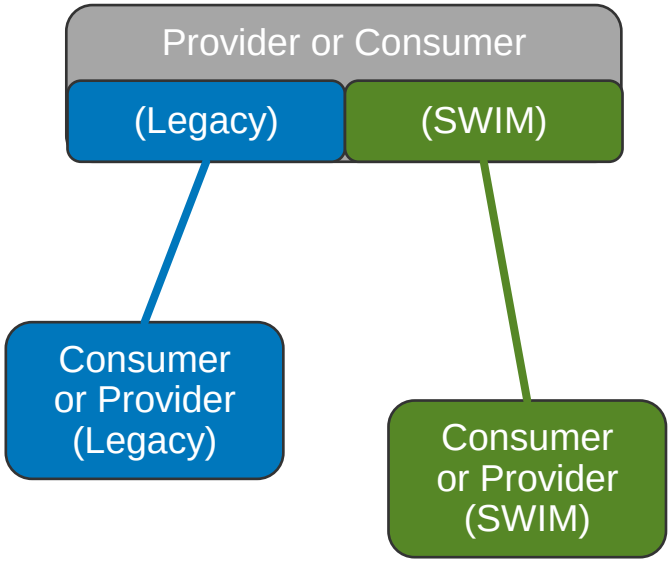
“Dual-track” Application

- Application
  - Is provider or consumer of information
  - Generates legacy and SWIM data formats
    - Legacy: ATS message carrying FPL, TAC, etc.
    - SWIM: FIXM, IWXXM, etc.
  - Implements legacy and SWIM interfaces
    - Legacy: AFTN, AMHS, etc.
    - SWIM: AMQP, SOAP, etc.

- Upgrade of legacy application
- Life cycle of applications
- Implementation costs for both legs



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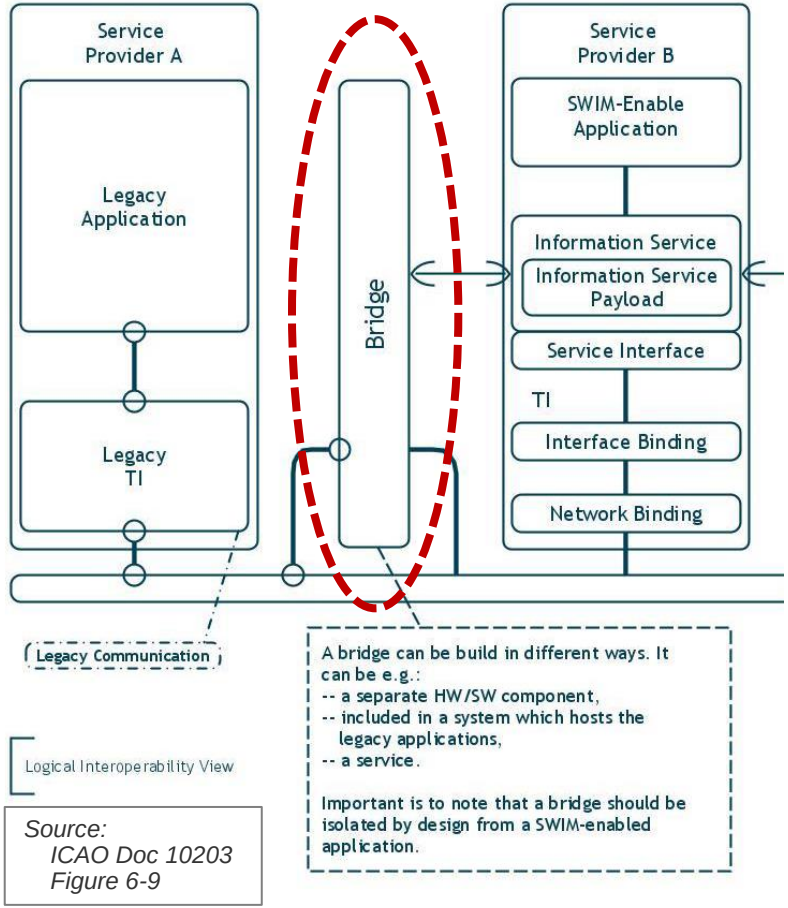
Bridge

- ICAO Doc 10203
  Manual on the SWIM Implementation
  - “Aeronautical Fixed Service (AFS) Transition” (section 6.5)
  - Bridge for interacting with legacy applications

- ICAO EUR Doc 047
  AMHS/SWIM Gateway Specification
  - Bridge between AMHS and SWIM using AMQP
  - Excludes conversion

- For further consideration
  - Mapping and translation of service elements
  - Stateless and stateful information exchanges
  - Conversion of payload and context demands



Source:
ICAO Doc 10203
Figure 6-9

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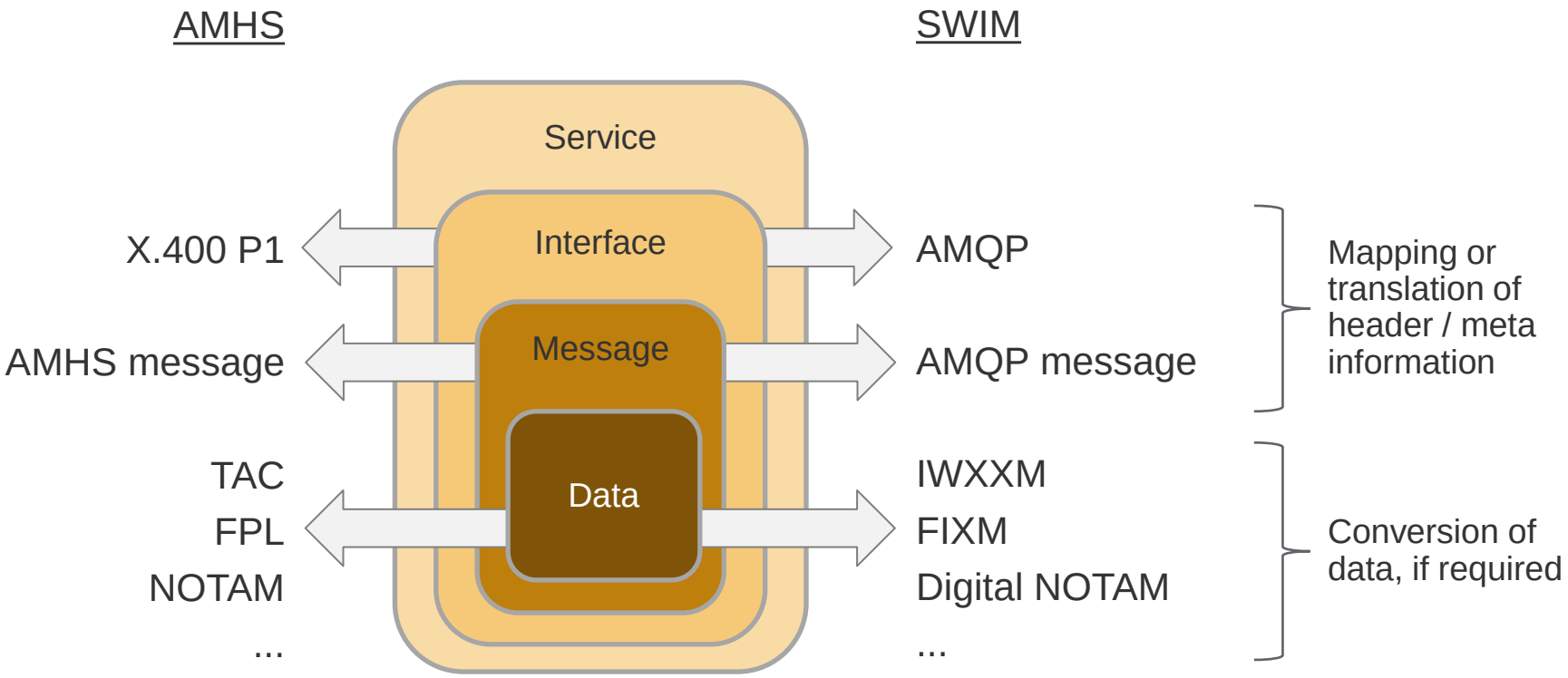
Service Elements



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Conversion – General

- No Conversion of data
  - AMHS conveys XML-based data by File Transfer Boy Parts (FTBP)
  - AMHS User Agent must support respective XML-based data formats
  - Example: IWXXM
    - ICAO Guidelines for the Implementation of OPMET Data Exchange using IWXXM
    - Potential blueprint for further XML-based data formats

- Conversion of data depends on characteristics
  - Stateless or stateful message exchanges
  - References pointing to context external to the message
- Conversion can imply loss of information or accuracy
  - Some XML-based data formats include the equivalent legacy data formats

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Conversion – Stateless versus Stateful

- Stateless
  - Each message is independent from any other message
  - Example: FPL, NOTAM, IWXXM, ...

- Stateful
  - Message depends on previous message(s)
  - Example: Update messages

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Conversion – Context

- Self-contained messages
  - All information is available within a given message
  - Example: ATS messages

- References in data
  - Data makes reference to external, static data
  - Example: Digital NOTAM
  - Conversion potentially requires context

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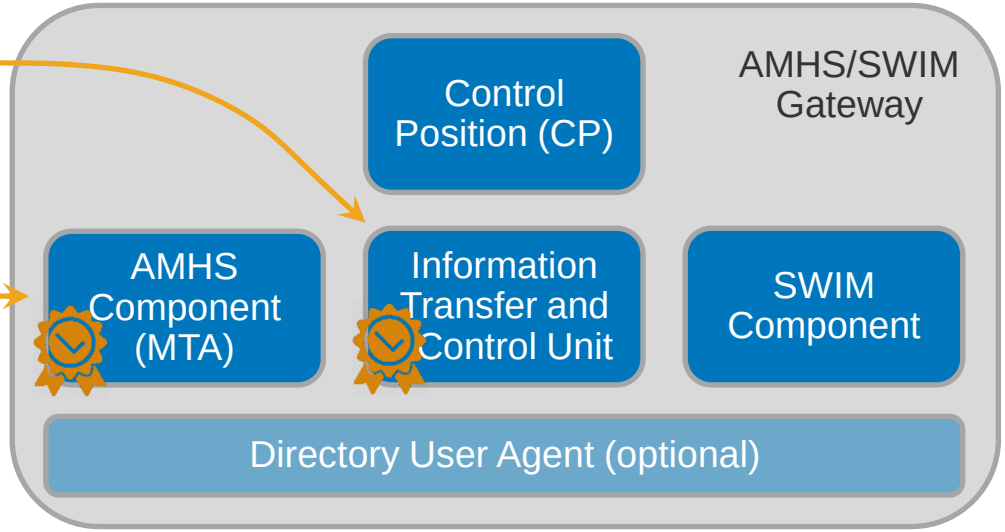
AMHS Security

- Improved AMHS security features at the AFTN/AMHS Gateway
  - ICAO Doc 9880 Part II, 3rd Edition
  - AMHS message signature generation
  - Strong bind operations
- Adoption possible for AMHS/SWIM Gateway



Building Blocks as per ICAO EUR Doc 047

- Prerequisite
  - Availability of certificates (Public Key Infrastructure, PKI)
  - Support of strong bind operations by peer MTAs
  - Support of message signature checking by receiving User Agents and Gateways

Key Take-aways

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- Mixed environment during transition from AMHS to SWIM
  - Requires measure to prevent from disruption of services
- AMHS/SWIM Gateway can support the transition
  - Consider need for stateless/-ful operation, conversion and context
  - No universal gateway implementation (one fits all)
- Latest AMHS Security improvements can also leverage security at AMHS/SWIM Gateway
  - Strong bind operations
  - Message signature generation


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