"Get into SWIM" session

Design TOBT Setting service
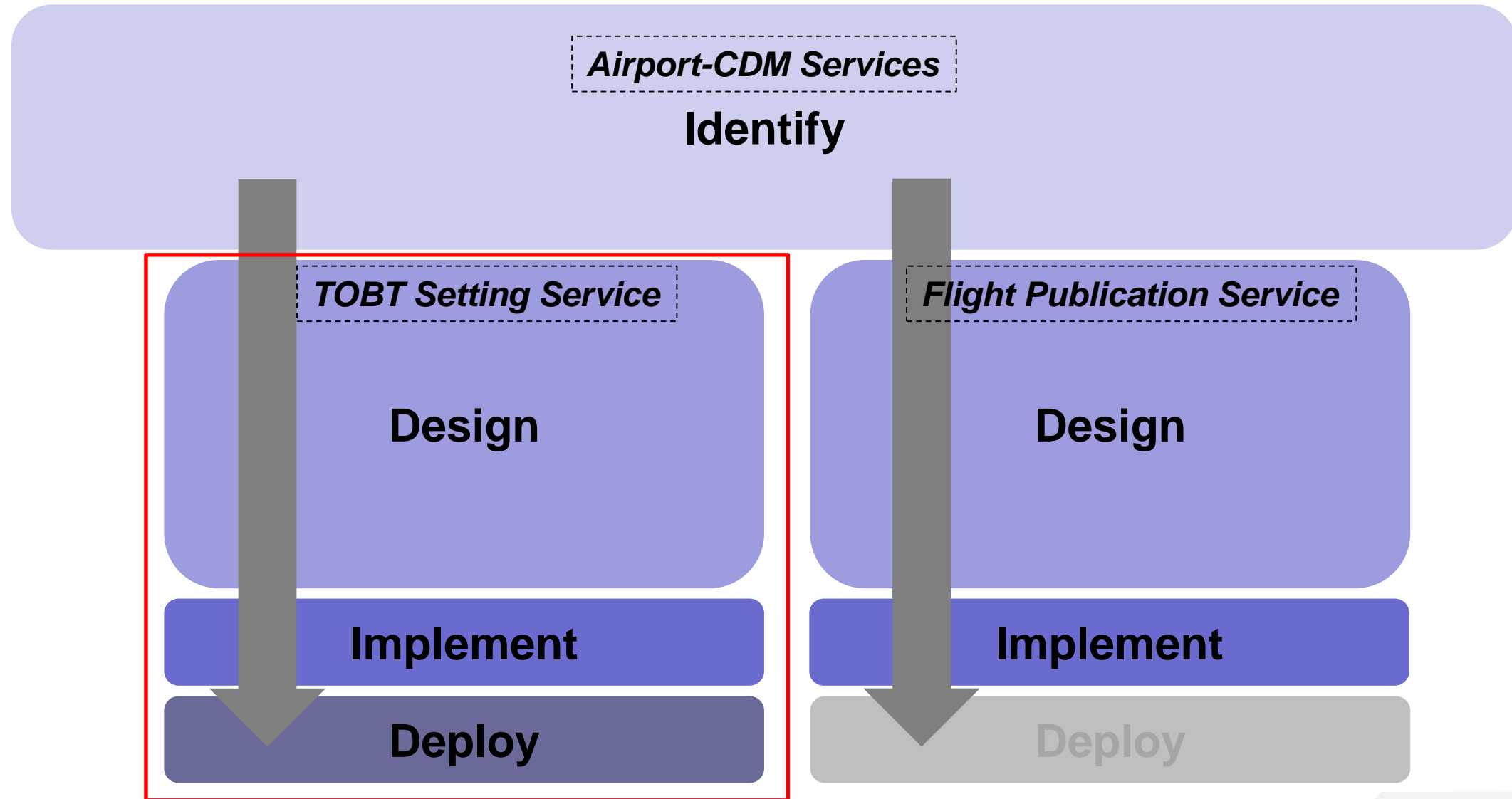
Walter / Scott / Pedro

DECMA / RTD / DAI - Digitalisation and Information unit

22nd May 2019
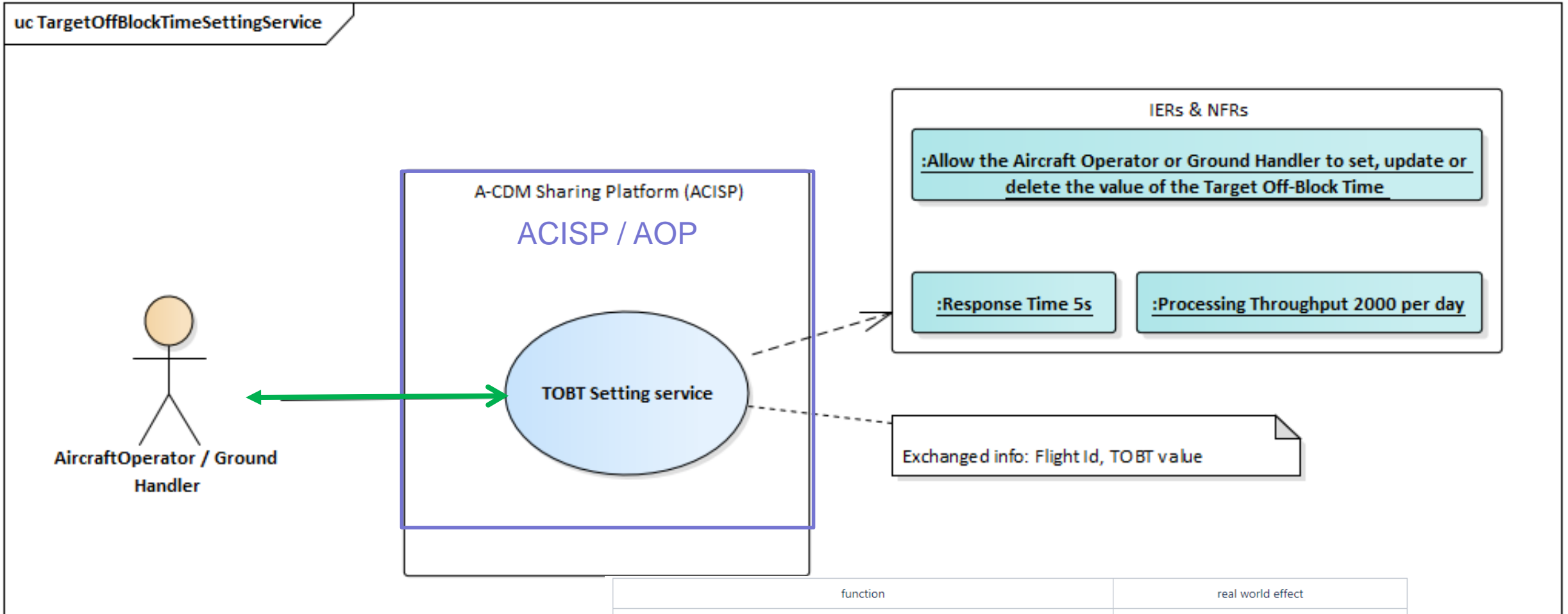
Approach for today

Airport-CDM Services

Identify

TOBT Setting Service

Design

Implement

Deploy

Flight Publication Service

Design

Implement

Deploy

Starting point

- Input = One service from the set of identified services
  for which we would know:
  - Name & Abstract
  - Intended provider & Intended consumer
  - IERs & NFRs
  - Exchanged information
  - Functions
  - Architectural considerations

- Note: Input can be refined or refactored during design if needed.
  - eg merging several atomic services into one service

Starting point
TOBT Setting Example

Design

service design is the set of activities involved in expressing what the service does and how it works. … typically use a modelling language notation (e.g. UML) to represent the blueprint of the information service as a service model (e.g. including service interfaces, service operations, and service payload).

- Selection of the message exchange pattern (MEP)
- Definition of the service (interface, service operations and information service payload)
- Sharing of service description information (e.g. using a SWIM Service Registry)

- Chosen MEP.
- Service model (service interface(s), service operation(s), service behaviour)
- Service payload (the logical). representation of the information exchanged by the service interface operations
- Service design information expressing what the service does and how it works

Process Step: Design service

Service design is the set of activities involved in expressing what the service does and how it works. Service design practitioners typically use a modelling language notation (e.g. UML) to represent the blueprint of the information service as a service model (e.g. including service interfaces, service operations, and service payload).

Identify

Design

Message exchange pattern

Interface, operations and payload

Share service design

Implement

Deploy

EUROCONTROL
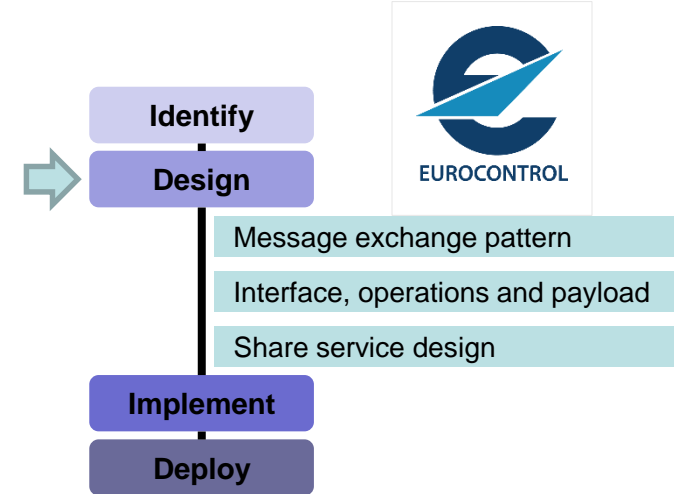
- This step is executed for each service selected.
  - Tip: Concentrate on a few services with clear benefits (avoid Analysis-Paralysis).
- This is about logical design
  - in this process, the technical design is part of Implementation step
- The activities are examples
  - they not necessarily sequential (parallelism, iteration, etc)
- Concerns worth managing:
  - re-usable design
    - re-usable across technologies: technology-agnostic design
    - re-usable across providers: leading to interoperable implementations
    - re-usable across time: simple, that can evolve

Activity: Select message exchange pattern (MEP)

Activity

Selection of the message exchange pattern (MEP).

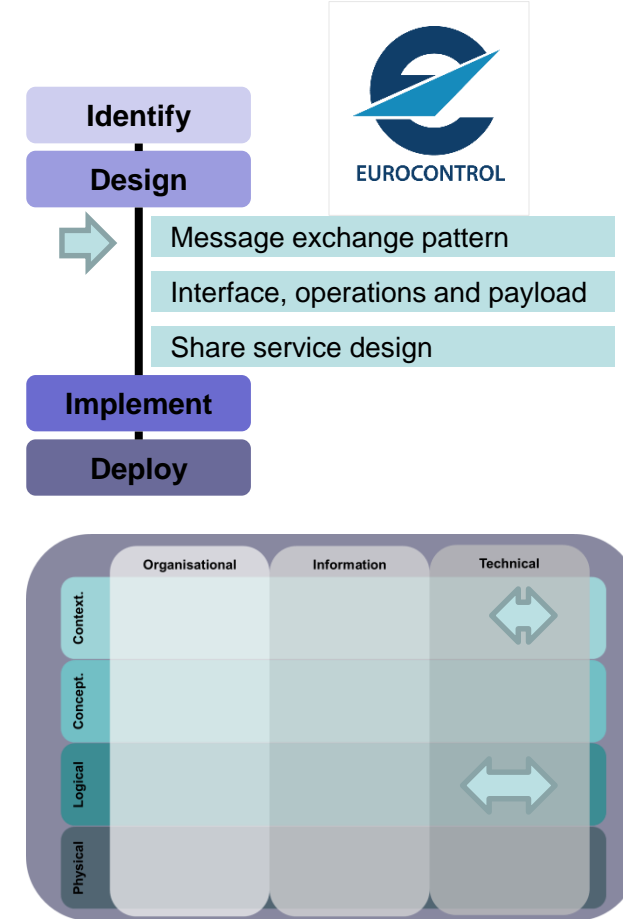- The MEP is chosen from the list of application MEPs (a building block).

Identify

Design

Message exchange pattern

Interface, operations and payload

Share service design

Implement

Deploy

SWIM-SERV-017 Message exchange pattern

Application MEP
TOBT Setting Example

Activity: Interface, operations, payload

Activity

Definition of how the service works (interface, service operations and service payload).

- Logical interface design
  - agnostic from technology choices.

- Covers
  - Design style
  - Interface, Operations , Messages
  - Payload

- Concern worth managing
  - iterations, refinement, refactoring (eg grouping, splitting, merging)
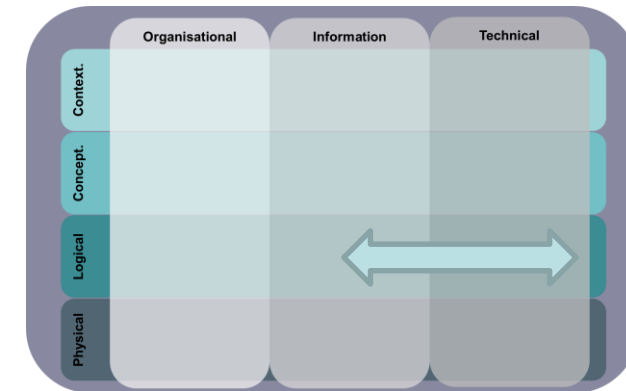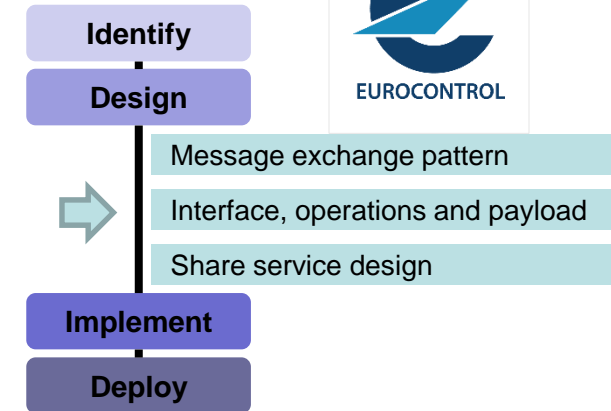
SWIM-SERV-016 Service interfaces

SWIM-SERV-021 Service operations

SWIM-SERV-022 Information definition

SWIM-SERV-023 AIRM conformance

Activity: Define service interface
Design style

Various design styles exist

- Recurring terms
  - Method-oriented, Resource-oriented, Message-oriented
  - RPC-like, RESTful, …
- Characteristics
  - operations close to information exchanges (requirements)
  - operations close to transport protocol (eg http)
  - …
- Expected benefits
  - easy to do (straightforward)
  - close link with business requirements (business - IT alignment)
  - high degree of re-usability
  - …

Activity: Define service interface
Interface(s) & operation(s) design

- Define interfaces
    - number
    - role
    - interaction pattern (related to MEP)
    - naming

- Define operations
    - intent
    - expected result
    - parameters
    - naming (name reflects user intention)

- Refactoring
    - refining, merging, splitting, …
    - scope management: possibly revisit the name and scope of the service

(candidate) Resources

Guidance on naming
interface naming ; operation naming ; parameter and message naming

Activity: Define service interface
TOBT Setting example

RPC-like design-style

- direct links to the business

Single interface

- often the case with Request/Reply
- TOBTSettingReceiver

Operations

- aligned with info exchanges & user intent
- setTOBT, deleteTOBT

Messages

- systematic naming (according to name of operation)
- input: TOBTDeleteRequest, output: TOBTDeleteResponse

class TargetOffBlockTimeSetting Interface Definition

«interface»
TOBTSettingReceiver

+ deleteTOBT(TOBTDeleteRequest): TOBTDeleteResponse
+ setTOBT(TOBTSettingRequest): TOBTSettingResponse

«provide»

«Service»
TargetOffBlockTimeSetting
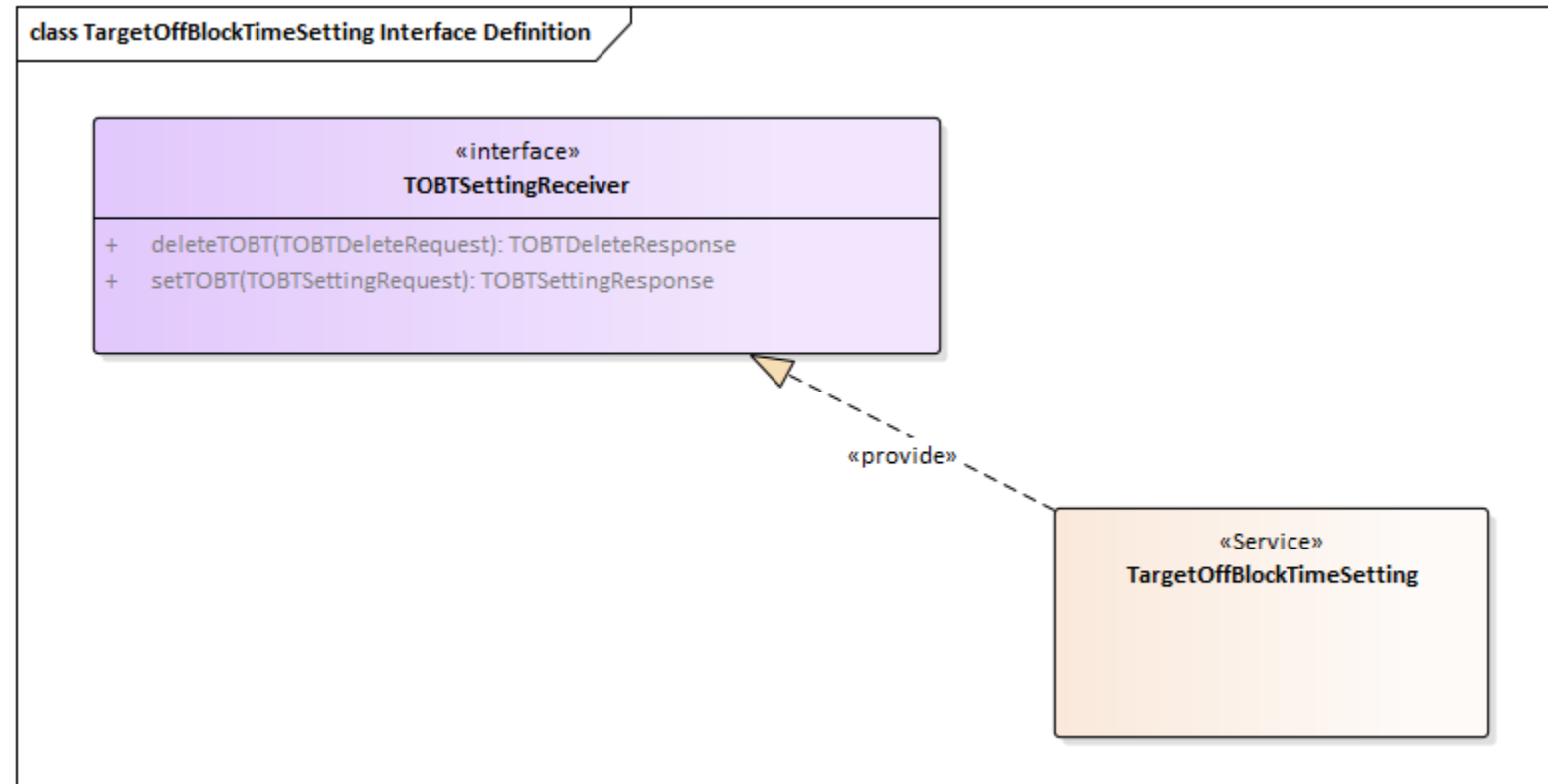
Activity: Define service interface
Payload design

"Get into SWIM" session

Design service payload

Scott Wilson
DECMA / RTD / DAI – Digitalisation and Information unit
23rd May 2019

activity: share the service design

Identify

Design
- Message exchange pattern
- Interface, operations and payload
- Share service design

Implement

Deploy

Activity

Sharing of service description information (e.g. using a SWIM Service Registry).

Good SWIM practice

Making service design information available before the service instance is actually implemented (e.g. as a standard) is a good SWIM practice that can lead to harmonisation of implementation (e.g. when multiple providers provide the same service).

- Service design is typically used when multiple service providers run the same service and collaboratively define it (i.e. service blueprints are the same but instances are different).

Resources

Describing non implemented services
Using the specification for describing non-implemented service
- either provider-independent service or prospective service
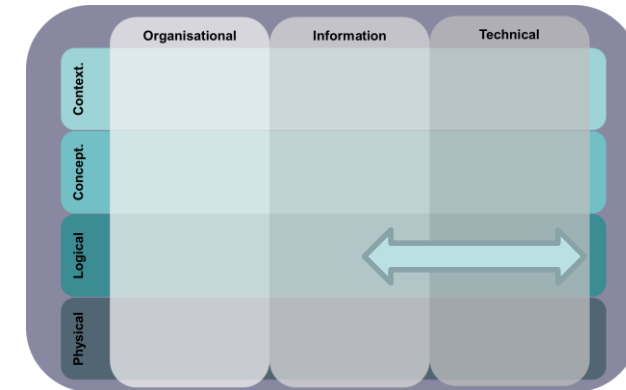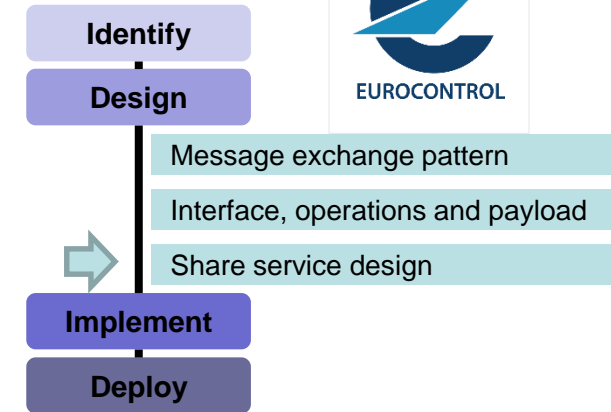
outcomes

Outcome

Service Model. A (UML) model expressing the service interface(s), service operation(s), service behaviour, etc

Outcome

Service Design doc. textual representation of the service design expressing what the service does and how it works (i.e. the blueprint of the service).

Outcome

Service payload. The logical representation of the information exchanged by the service interface operations.

Outcome

Service Overview. A summary of the service, with prospective status to announce future availability of a service.

Service Overview.
A set of information service metadata intended to promote service discovery and an initial evaluation of the information service characteristics.

As defined in draft ICAO SWIM Manual

- "The Service Overview is produced by the information service provider and consists of a set of mandatory and optional fields. "
- "This information allows information service consumers to discover information services which may meet their need."

Usage
- to publicise an operational service
- to publicise a prospective service, announcing its future availability

(candidate) Resources

Service Overview
ICAO Service Overview ; Service Overview mapping to the spec ; Donlon TOBT Setting Service Overview

Mandatory fields

- Service Name & Service Version
- Provider Organization & Provider Point of Contact
- Brief Description of the Service
- Lifecycle Information
- Geographical Extent of Information
- Quality of Service
- Access Restrictions
- Message Exchange Pattern
- Exchange Models
- Service Validation

Optional fields
- Service Functions
- Filtering Available
- Sources of Information
- Support Availability

outcomes
TOBT Setting example

Outcome

Service Model. A (UML) model expressing the service interface(s), service operation(s), service behaviour, etc

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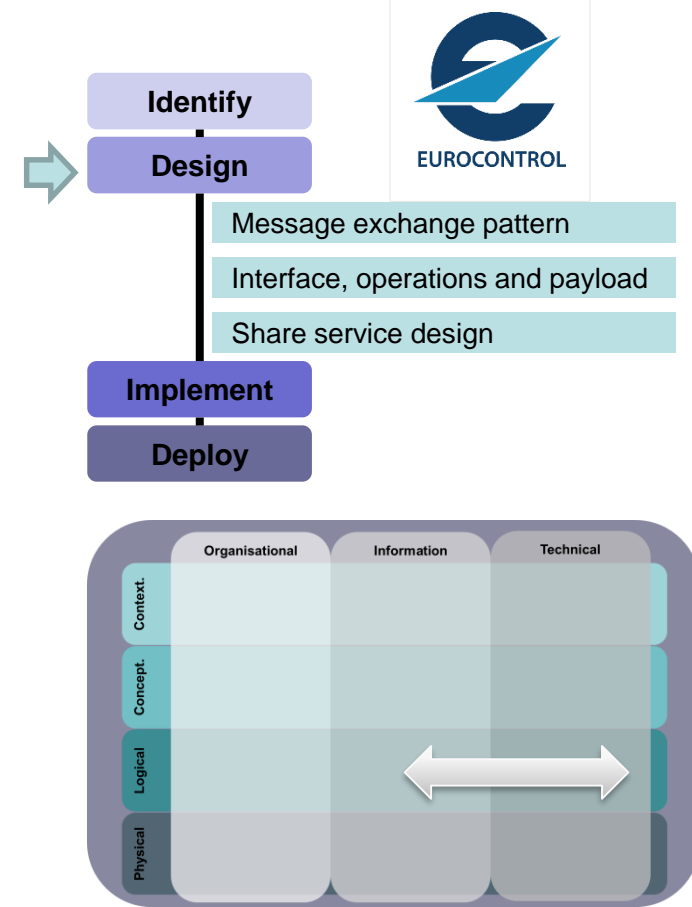
Design

service design is the set of activities involved in expressing what the service does and how it works. … typically use a modelling language notation (e.g. UML) to represent the blueprint of the information service as a service model (e.g. including service interfaces, service operations, and service payload).

- Selection of the message exchange pattern (MEP)
- Definition of the service (interface, service operations and information service payload)
- Sharing of service description information (e.g. using a SWIM Service Registry)

➡

- Chosen MEP.
- Service model (service interface(s), service operation(s), service behaviour)
- Service payload (the logical). representation of the information exchanged by the service interface operations
- Service design information expressing what the service does and how it works

Identify
Design
- Message exchange pattern
- Interface, operations and payload
- Share service design
Implement
Deploy

SWIM-SERV-016 Service interfaces
SWIM-SERV-017 Message exchange pattern
SWIM-SERV-021 Service operations
SWIM-SERV-022 Information definition
SWIM-SERV-023 AIRM conformance
SWIM-SERV-025 Service behaviour
SWIM-SERV-026 Model view

Identify

service identification is the set of activities involved in docu... context of the service in relation to the business need, i... requirements (IER), non-functional requirements (NFR), a...

- Description of operational environment
- Determination of operational process leading to the identification of information exchanges assigned to information service(s)
- Determination of IER and NFR
- Investigation of reuse of services
- Characterization of the identified information service in terms of functionality

- Docume... process... flows
- Identific... informa... determi... context... and func...
- Service... informa... operatio... NFRs ar...

Design

service design is the set of activities involved in expressing what the service does and how it works. … typically use a modelling language notation (e.g. UML) to represent the blueprint of the information service as a service model (e.g. including service interfaces, service operations, and service payload).
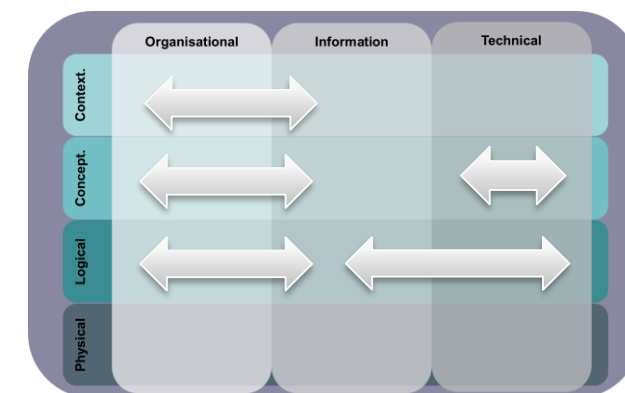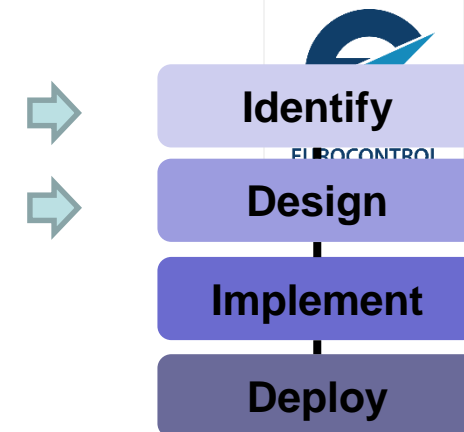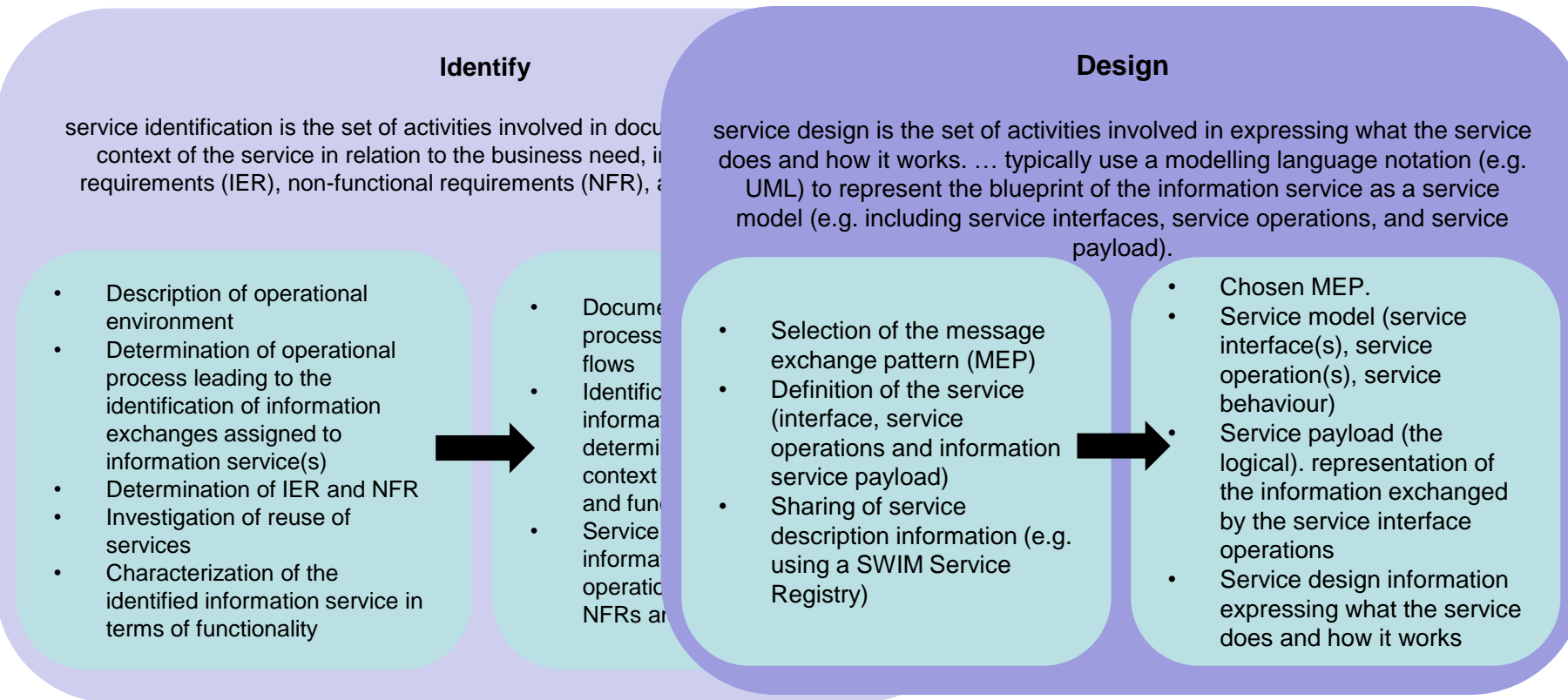
- Selection of the message exchange pattern (MEP)
- Definition of the service (interface, service operations and information service payload)
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- Chosen MEP.
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- Service payload (the logical). representation of the information exchanged by the service interface operations
- Service design information expressing what the service does and how it works

Identify
Design
Implement
Deploy

SWIM-SERV-006 Service identification
SWIM-SERV-007 Service abstract
SWIM-SERV-009 Service categories
SWIM-SERV-011 Operational needs
SWIM-SERV-012 Service functionality
SWIM-SERV-014 Quality of service

SWIM-SERV-016 Service interfaces
SWIM-SERV-017 Message exchange pattern
SWIM-SERV-021 Service operations
SWIM-SERV-022 Information definition
SWIM-SERV-023 AIRM conformance
SWIM-SERV-025 Service behaviour
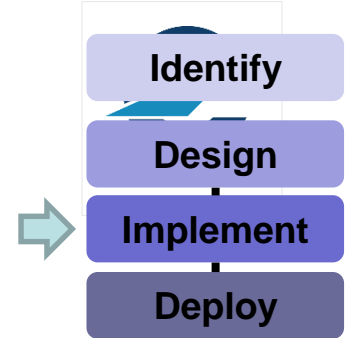SWIM-SERV-026 Model view

Implement

Implement

service implementation is the set of activities where the information service is implemented in a target environment and technology context.

- Selection/definition of the data format
- Definition of the message(s) used to interact with the service interface
- Selection of the service interface protocols
- Implementation of service(s) using technology and based on implementation choices made
- Integration of the service(s) into the target environment
- Verification and testing of the service(s)
- Validation of the service(s)

- Chosen XM or other data format.
- Chosen service interface protocol.
- Message definition
- Implemented service(s) (interfaces and operations)
- Machine readable service definition
- Verification report, validation report
- Service Overview (update)
- Verification report
- Validation report
- Service implementation information (e.g. service interface protocols and QoS characteristics)
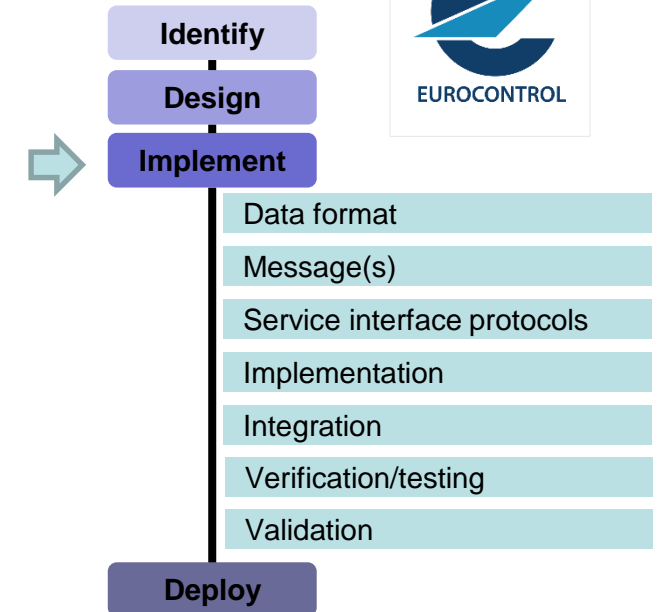
Process Step: Implement service
service implementation is the set of activities where the information service is implemented in a target environment and technology context.

- Today we'll not focus on the Implementation step
- Except to cover the activity related to technical design

Identify

Design

Implement

Data format

Message(s)

Service interface protocols

Implementation

Integration

Verification/testing

Validation

Deploy

EUROCONTROL

Activity: Service interface protocols

> **Activity** 🏃
>
> Selection of the service interface protocols.

- Note: technology details may already be available from the design step.
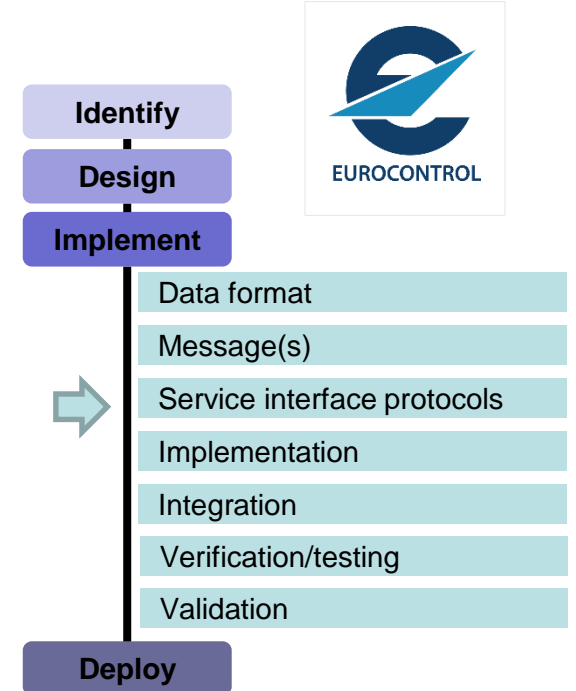
"Get into SWIM" session

Interface Binding

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22nd May 2019

Identify
Design
Implement
Data format
Message(s)
Service interface protocols
Implementation
Integration
Verification/testing
Validation
Deploy

SWIM-SERV-018 TI Profile and bindings
SWIM-SERV-019 Protocols and data format

Outcomes

- Chosen XM or other data format.

- Chosen service interface protocol.

- Message definition.

- Implemented service(s) (interfaces and operations).

- Machine readable service definition.

- Service Overview (update).

- Verification report.

- Validation report.

- Service implementation information (e.g. service interface protocols and QoS characteristics).

Deploy

Deploy

service deployment is the set of activities where the information service instance is made available for use in operation.

- Deployment of the information service instance with an addressable end-point used in operations
- Completion of the description of the service for service consumers
- Registration of the information service instance to enable discovery of the service (e.g. using a SWIM Service Registry to publicize the service overview)

➡️

- A configured information service running and available for operational use by service consumers
- Completed Service Overview publicized with "operational status", to announce operational availability of the service
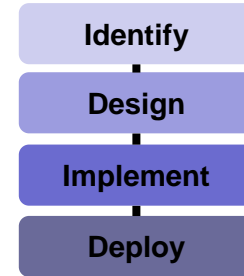
Process Step: Deploy service

service deployment is the set of activities where the information service instance is made available for use in operation.

Identify

Design

Implement

Deploy

Deployment

Completion of the description
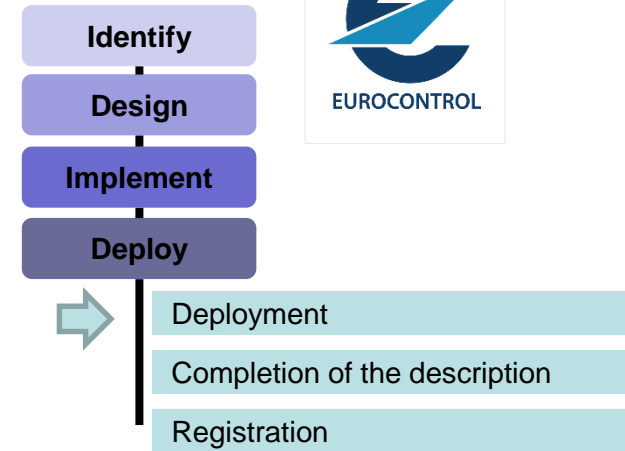
Registration

EUROCONTROL

Activity: Deploy the service instance in operations

> **Activity**
>
> Deployment of the information service instance with an addressable end-point used in operations.

- Life-cycle: prospective → operational

Activity: Completion of the service description

Identify
Design
Implement
Deploy

Deployment
Completion of the description
Registration

Activity

Completion of the description of the service for service consumers.

Outcome

service description. The information needed in order to use, or consider using, a service.

Resources

Fulfilling the requirements
Guidance on individual requirements
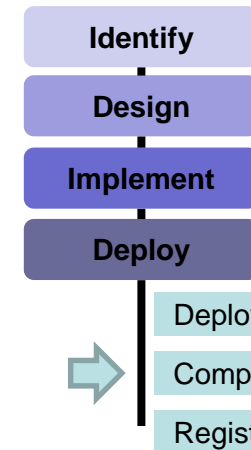Example service descriptions
Templates

(Candidate) Resources

Conformance assessment
Conformance matrix
Verification checklist for serv desc (on going work)

Activity: Completion of the service description
TOBT Setting example

Resources

TOBT Setting example

Donlon TOBT Setting example
- Donlon TOBT Setting Service Description
- Donlon TOBT Setting Service Overview

- Conformance assessment - Donlon example

Activity: Register the service instance

Identify
Design
Implement
Deploy

Deployment
Completion of the description
Registration

Activity

Registration of the information service instance to enable discovery of the service (e.g. using a SWIM Service Registry to publicize the service overview).
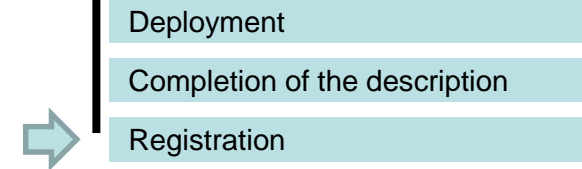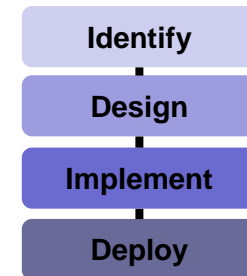
Supporting
European
Aviation

"Get into SWIM" session

Service Registration

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22nd May 2019

Outcomes

Outcome

running service.
A configured information service running and available for operational use by service consumers.

Outcome

REGISTERED

service overview.
Completed Service Overview, publicized with "operational status", to announce operational availability of the service.

subset of →

Outcome

REGISTERED

service description.
The information needed in order to use, or consider using, a service.

Outcomes
TOBT Setting Example

Outcome

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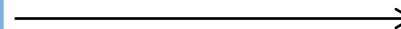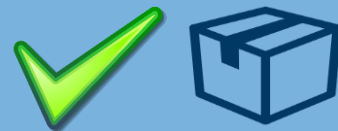
Outcome

service overview.
Completed Service Overview, publicized with "operational status", to announce operational availability of the service.

subset of →

Outcome

service description.
The information needed in order to use, or consider using, a service.

Identify

Design

Implement

Deploy

service identification... context of th... requirements...

- Description... environmen...
- Determinat... process lea... identificatio... exchanges... information...
- Determinat...
- Investigatio... services
- Characteriz... identified i... terms of fun...

service design is... does and how it... UML) to repre... model (e.g. inc...

- Selection o... exchange p...
- Definition o... (interface, s... operations... service pay...
- Sharing of... description... using a SW... Registry)

Implement

service implementation is the set of activities where the information service is... implemented in a target environment and technology context...

- Selection/definition of the data format
- Definition of the r... used to interact... service interface...
- Selection of the interface protoc...
- Implementation... service(s) using... and based on... implementation... made
- Integration of the... into the target en...
- Verification and t... the service(s)
- Validation of the service(s)

Deploy

service deployment is the set of activities where the information service instance is made available for use in operation.

- Chosen XM or other data format.
- ... interfa...
- ... ce...
- ... era...
- ... se...

- Deployment of the information service instance with an addressable end-point used in operations
- Completion of the description of the service for service consumers
- Registration of the information service instance to enable discovery of the service (e.g. using a SWIM Service Registry to publicize the service overview)

... (u...

... tati... ... servic... interface protocols and QoS characteristics)

- A configured information service running and available for operational use by service consumers
- Completed Service Overview publicized with "operational status", to announce operational availability of the service

- **General Requirements**
- SWIM-SERV-001 Description coverage
- SWIM-SERV-002 Description language
- SWIM-SERV-003 Define abbreviations
- SWIM-SERV-004 Use standard abbreviations
- SWIM-SERV-005 Description identification
- SWIM-SERV-006 Service identification
- SWIM-SERV-007 Service abstract
- SWIM-SERV-008 Service provider
- SWIM-SERV-009 Service categories
- SWIM-SERV-010 Service standard reference

- SWIM-SERV-011 Operational needs
- SWIM-SERV-012 Service functionality
- SWIM-SERV-013 Access and use conditions
- SWIM-SERV-014 Quality of service
- SWIM-SERV-015 Technical constraint
- **Service Interface Requirements**
- SWIM-SERV-016 Service interfaces
- SWIM-SERV-017 Message exchange pattern
- SWIM-SERV-018 TI Profile and bindings
- SWIM-SERV-019 Protocols and data format

- SWIM-SERV-020 Machine-readable interface
- SWIM-SERV-021 Service operations
- SWIM-SERV-022 Information definition
- -SWIM-SERV-023 AIRM conformance
- SWIM-SERV-024 Filter capabilities
- SWIM-SERV-025 Service behaviour
- SWIM-SERV-026 Model view
- **Other Requirements**
- SWIM-SERV-027 Service validation
- SWIM-SERV-028 Service monitoring
- SWIM-SERV-029 Examples of code