European Supplementary dataHub (E-SOH)

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Project objectives
User Requirements

User Requirements – Within the meteorological community – Improvements needed in forecasting of fog and convective events

Priority observation types for E-SOH

1. Sub-hourly resolution observations from stations operated by EUMETNET *Members* that are normally only made available hourly (or less frequently).
2. Sub-hourly resolution observations from stations operated by EUMETNET *Members* that are not normally made available
3. Rain-gauge observations, from gauges operated by EUMETNET Members
4. Rain-gauge observations, from gauges operationally operated by 3rd parties who currently make their data available to one or more EUMETNET Member, but aren't normally published
5. Real-time observations from personal weather stations (PWS) in a way that is consistent with other land surface observation
6. Single unified view of supplementary observations, that is easily accessible and findable, is easily integrated into downstream systems and can be re-used (i.e., following FAIR principles). Access to data across international borders is simplified.

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Project objective

Vision

With European co-operation and collaboration, E-SOH will deliver the first component of a Federated European Meteorological Data Infrastructure, that is sustainable and meets the technical requirements and standards of international bodies.

E-SOH in a wide Context

- E-SOH will develop World leading capability.

- First pilot project of **FDCM**

- Demonstration project of **WIS 2.0**.

- Will exploit **Cloud** and where appropriate EWC.

- Enabler for Members to meeting their open data obligations (e.g., **Resolution 42, HVD**)

Federation

- Mix of hosts to deliver the overall Service. Initially, mostly centralised

- Sub-hourly obs, eventually delivered by Members.

- 3rd party, PWS, etc. centralised more likely.

- Standards-based approach will allow a federated model

- Recognise Members will follow national IT strategies.

Approach

- Start small and build

- Open!

- Share and re-use

- Platform agnostic (within reason)

- Sustainable, continuous development and lifecycle managed

- Minimise Members duplication of effort

Project team – Work Package 0 - Vision

A Task Team established by EUMETNET to develop the vision of E-SOH, clarify the requirements and create the Invitation to Tender

Stuart Matthews (Met Office, EMN Obs-CA), Gé Verver (KNMI, HVD ET), Michael Schick (EUMETSAT, EWC), Rowan Smith (Met Office), Sarah O'Reilly (Met Éireann), Umberto Modigliani (ECMWF, EWC), Willie McCairns (ECOMET), Wim Som de Cerff (KNMI), Jacqueline Sugier (Met Office, EMN Obs-CA), Gérard Plangger (Meteo Swiss), Rémy Giraud and Frédéric Guillaud (Météo-France)

Task Team ended on 31 August 2021

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EWC: European Weather Cloud

Project team

Design, Development and Operations teams to be confirmed

- Invitation to Tender will be issued within the next 2 weeks
  - Approval given on 9 September 2021

- Open to All EUMETNET Members, plus ECMWF and EUMETSAT as hosts of EWC

- Initially Three Work Packages related to sub-hourly surface observations
  - WP1 – Design,
  - WP2 – Build,
  - WP3 – Operate

- Sub-hourly observations from EUMETNET Members networks only.
  - Other observation types will be considered later and under separate projects

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Project plan (WP1, 2 and 3)

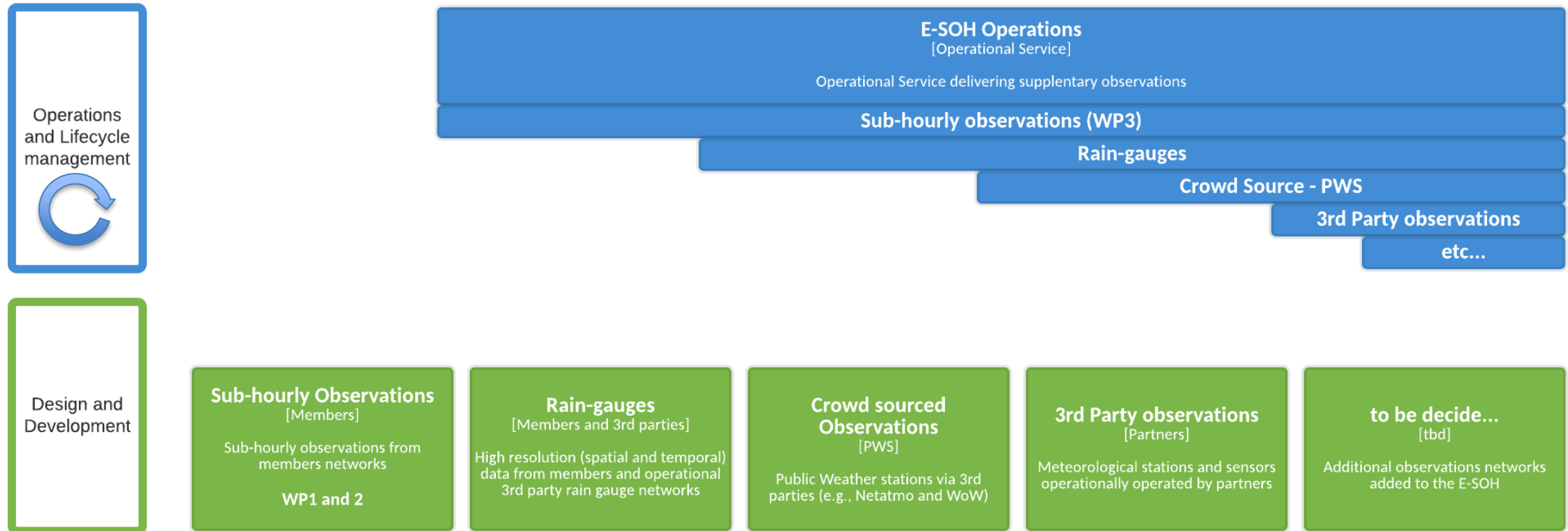|	2021 Q4			2022 Q1			2022 Q2			2022 Q3			2022 Q4			2023 Q1			2023 Q2			2023 Q3			2023 Q4			2024	2025	2026...
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ITT and Business Case				1																										
Establish Development Team								2																						
Design (WP1)															3															
Build (WP2)																									4					
Operate (WP3)																													5	
Operational																														

Legend: No started | Development | Operations

1. **Tender response – 14th January 2022**
2. Business case presented to EUMETNET Assembly 28 – May 2022
3. Design phase complete and approved by the Project Board - January 2023.
4. Development of first release of E-SOH complete and operational service starts - December 2023.
5. Report on Lessons Learnt and operational costs of maintaining E-SOH in the long term (at least next 5 years) - Spring 2025.
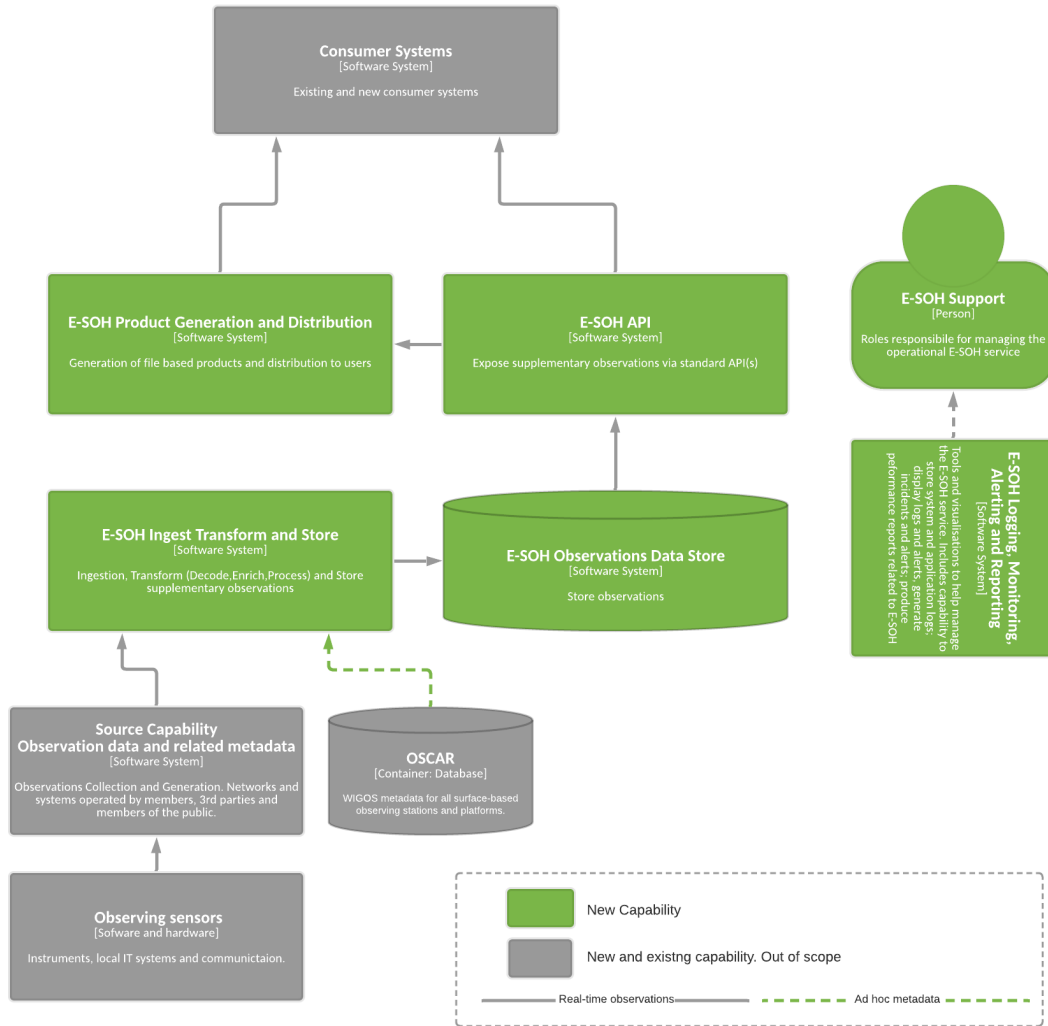
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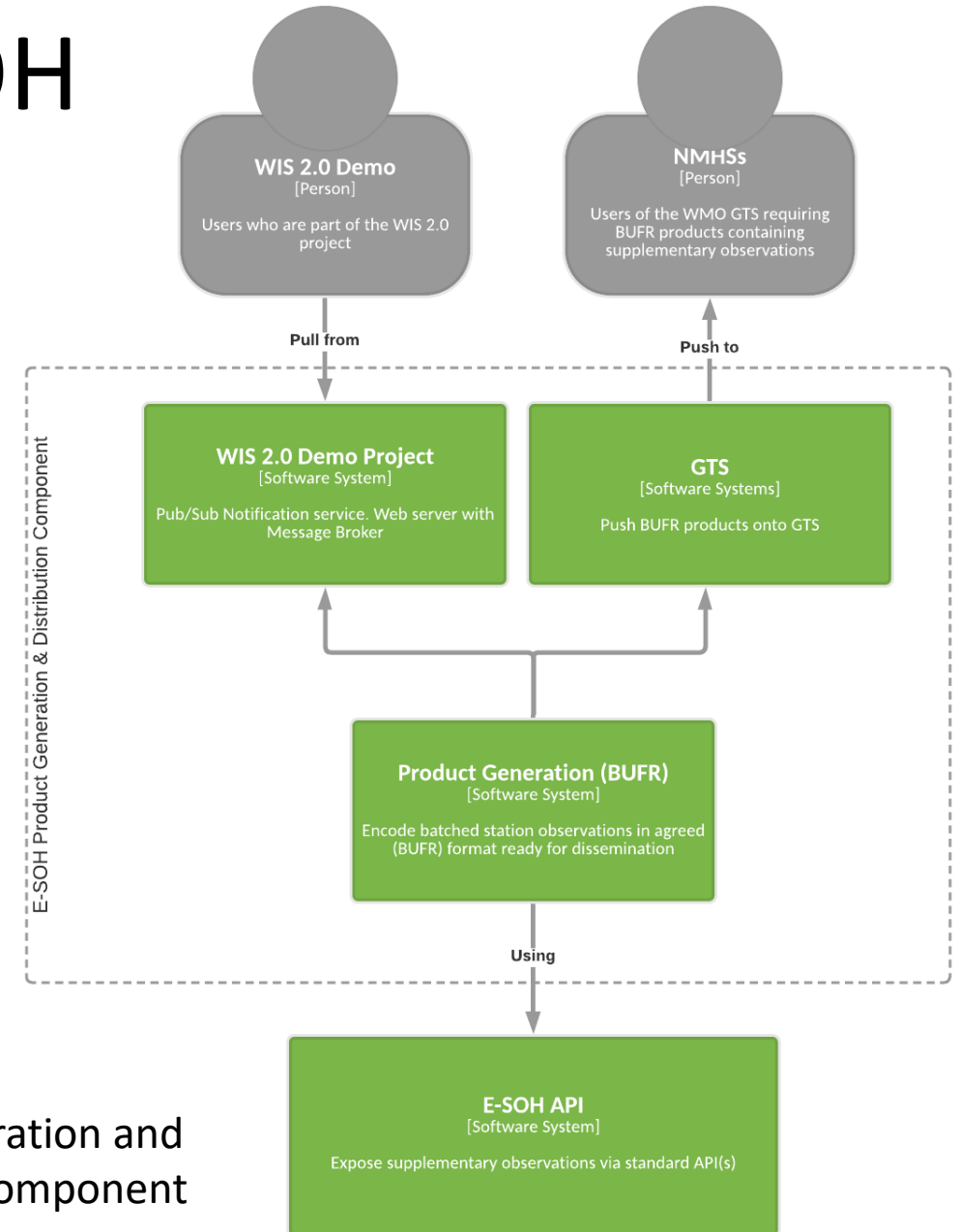# E-SOH Ambition
No time timeframe yet and priority may change

High level components of E-SOH

Consumer Systems
[Software System]

Existing and new consumer systems

E-SOH Product Generation and Distribution
[Software System]

Generation of file based products and distribution to users

E-SOH API
[Software System]

Expose supplementary observations via standard API(s)

E-SOH Support
[Person]

Roles responsible for managing the operational E-SOH service

E-SOH Ingest Transform and Store
[Software System]

Ingestion, Transform (Decode,Enrich,Process) and Store supplementary observations

E-SOH Observations Data Store
[Software System]

Store observations

E-SOH Logging, Monitoring, Alerting and Reporting
[Software System]

Tools and visualisations to help manage the E-SOH service. Includes capability to store system and application logs; display logs and alerts; generate incidents and alerts; produce peformance reports related to E-SOH

Source Capability
Observation data and related metadata
[Software System]

Observations Collection and Generation. Networks and systems operated by members, 3rd parties and members of the public.

OSCAR
[Container: Database]

WIGOS metadata for all surface-based observing stations and platforms.

Observing sensors
[Sofware and hardware]

Instruments, local IT systems and communictaion.

New Capability

New and existng capability. Out of scope

Real-time observations — — — Ad hoc metadata

E-SOH: Component diagram, Stuart Matthews 08-09-2021

WIS 2.0 Demo
[Person]

Users who are part of the WIS 2.0 project

NMHSs
[Person]

Users of the WMO GTS requiring BUFR products containing supplementary observations

Pull from

Push to

E-SOH Product Generation & Distribution Component

WIS 2.0 Demo Project
[Software System]

Pub/Sub Notification service. Web server with Message Broker

GTS
[Software Systems]

Push BUFR products onto GTS

Product Generation (BUFR)
[Software System]

Encode batched station observations in agreed (BUFR) format ready for dissemination

Using

E-SOH API
[Software System]

Expose supplementary observations via standard API(s)

Product Generation and Distribution Component

Input patterns to E-SOH

Centralised Ingestion Container

Ingest - Push
[Container: E.g. FTP server]

Ingestion of data from sources who push data, for example files over (s)FTP

Ingest - Pub/Sub
[Container: E.g. Web server]

Ingestion of data from sources who provide, for example, pub/sub broker services

Ingest - Pull API
[Container: E.g. Web server]

Ingestion of data from sources who only provide a Pull API

Push to   Pull from   Pull from

Source Capability
[Push Service]

Source Capability
[pub/sub message service]

Source Capability
[Pull API]

Not directly from the instrument, but via a 'central' capability (e.g., NC or a 3rd party centralised capability)

Expectations on data producers…

- Consistent delivery format and protocol, but not necessarily following any official standards.
- Minimal latency ~1 minute
- If possible… automated quality controlled, with quality indicator

Ingestion Patterns into E-SOH

1. Traditional FTP server with the capability of receiving files **pushed** by the source.
2. Consume from Sources that provide data through a publish-subscribe (**pub/sub**) message pattern
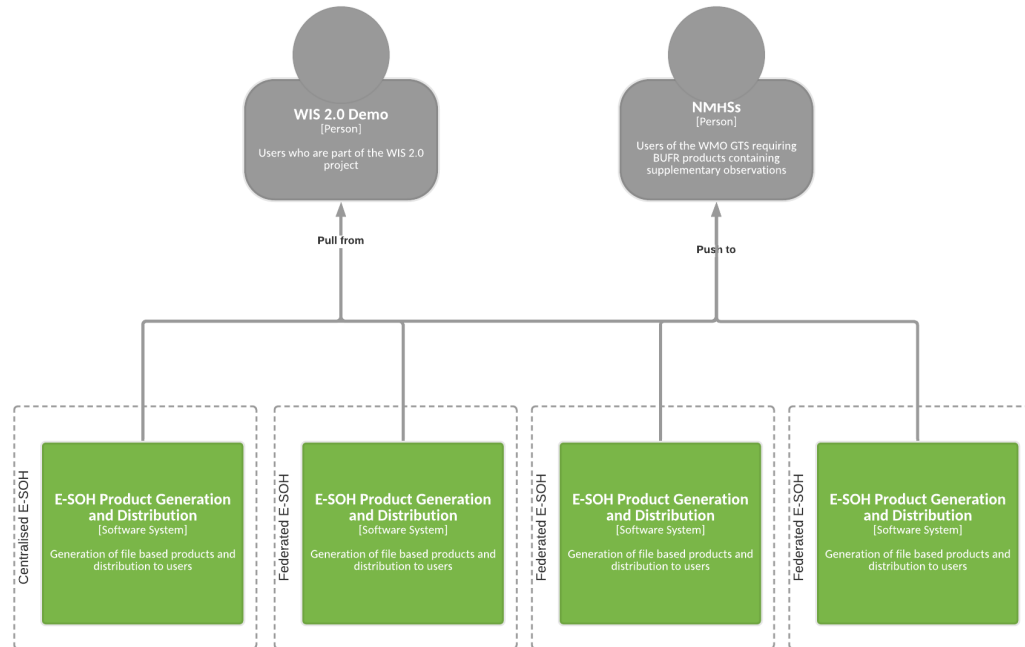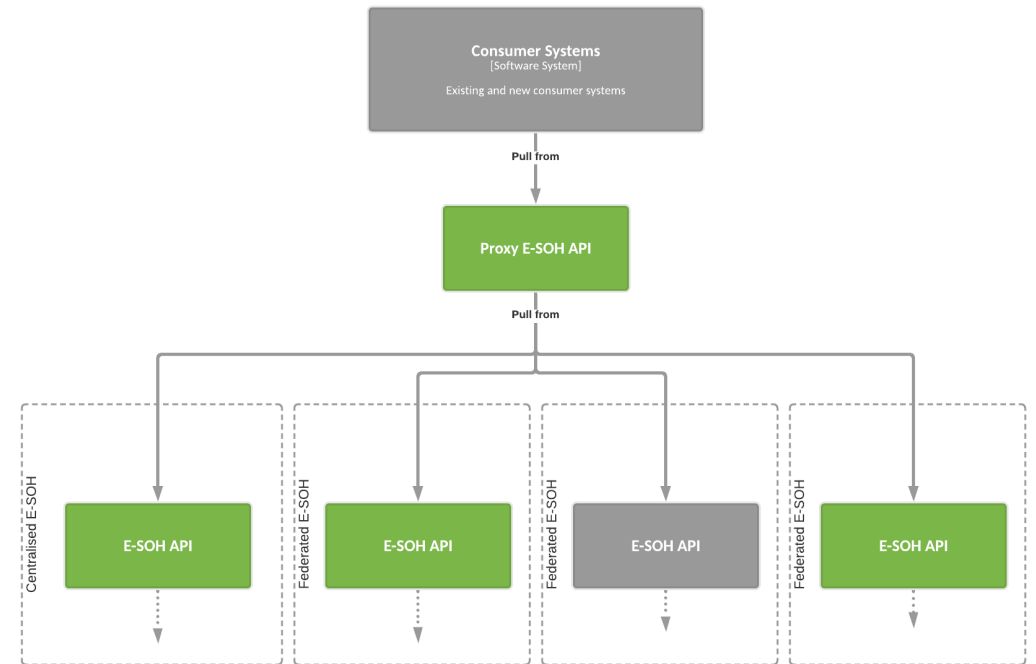3. Consume from an API that only offers a 'Pull' service.

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Centralised and Federated

(Data distribution)

GTS and WIS 2.0

Proxy E-SOH API

Some uncertainty about the technical solution for the 'Proxy' API

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WIS 2 Principles in the project

Principle 1. Web technologies and leverages industry best practices and open standards.	Open standards are a key part of the of the E-SOH principles.
Principle 2. Uniform Resource Locators (URL) to identify resources.	URL Access to data mandatory requirement
Principle 3. use of public telecommunications networks (i.e., the Internet) when publishing digital resources.	Mandatory requirement
Principle 6. will add open standard messaging protocols that use the publish-subscribe message pattern to the list of data exchange mechanisms approved for use within WIS and GTS.	Open standards and alignment with WIS are a mandatory requirement

WIS 2 Principles in the project

Principle 7. all services that provide real-time distribution of messages (containing data or notifications about data availability) to cache/store the messages for a minimum of 24-hours, and allow users to request cached messages for download.	Real-time, with absolute minimum delay, is a key mandatory requirement. A minimum 24 hours cache is also a mandatory requirement.
Principle 8. adopt direct data-exchange between provider and consumer.	Users will be access data directly either through pub/sub capability or API.
Principle 9. phase out use of routing tables and bulletin headers.	We do not intend to use routing tables and bulletin headers beyond the first E-SOH data type (sub-hourly surface observations).

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Project data standards

- BUFR to be exchanged on GTS and WIS 2.0

- Conversion to BUFR using ecCodes

- Format for API access to be decided, GeoJSON currently proposed.
  - Standards need to be developed

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Project metadata standards

To be confirmed

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Data discovery

Yes, but detailed design not developed yet

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Data exchange

- Exchange through GTS and WIS 2.0 protocols
- API query access
  - Suggested OGC EDR API developed but there might be requirements from European Union for a different approach.

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Input to WIS2

- Ongoing discussion about 'openness' of the solution
  - Strong preference for Open Source, but this might limit potential to re-use existing capability
- Platform agnostic (within reason) solution proposed.
- Cloud first principle with EWC considered as a host for centralised capability
  - NMHSs free to follow national strategy including public cloud (e.g. AWS)

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