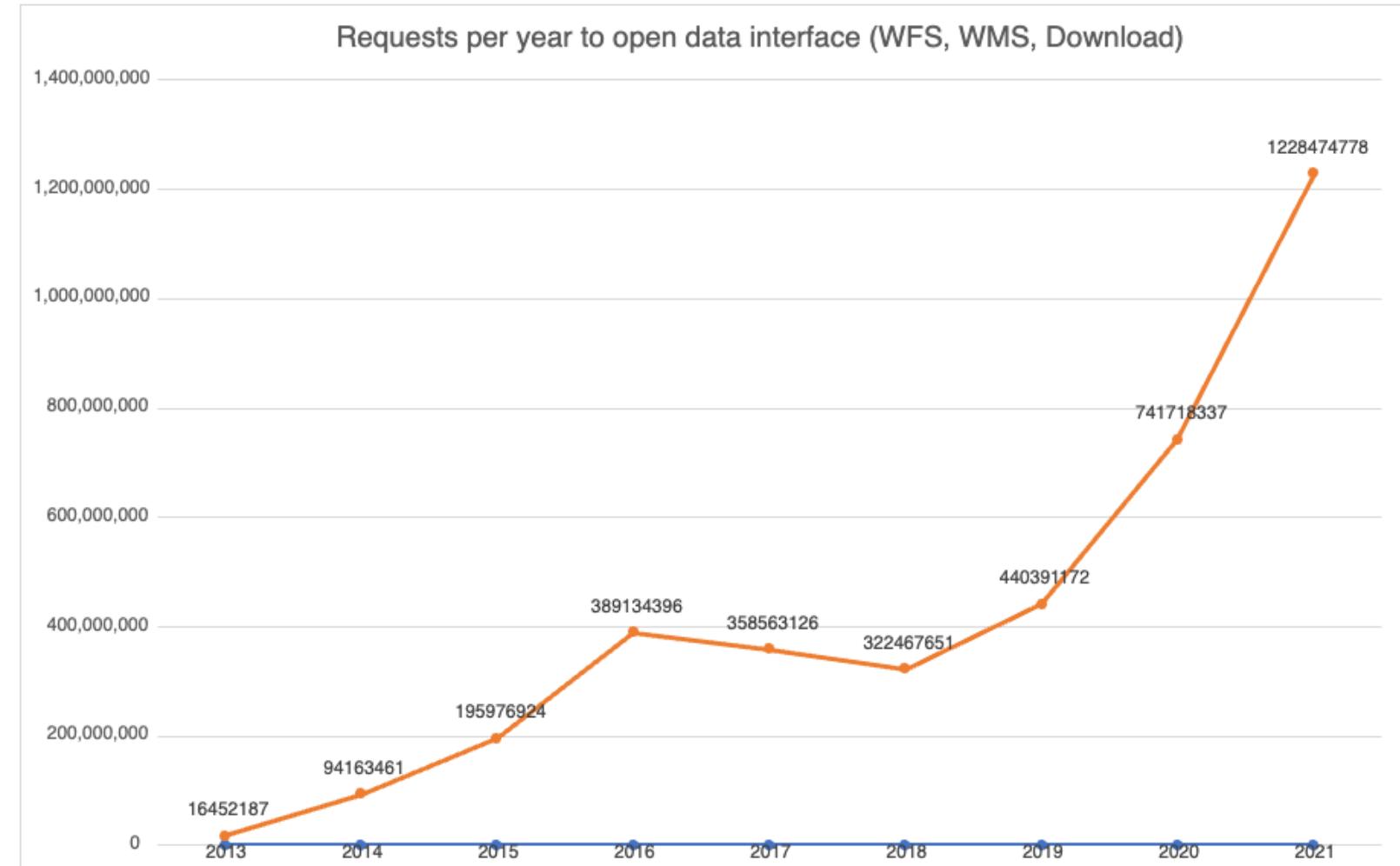


FMI Open data

- Most data open and free of charge since 2013 following INSPIRE requirements
- WFS 2.0, WMS, Binary download, AWS Public Data Sets, OGC API Features (BETA), Common Alerting Protocol (CAP), OGC API EDR (BETA)
- Impact study done with 2018 data
 - How: Most users want timeseries data via WFS while large datasets are typically disseminated via AWS
 - 25% of respondents use FMI open data with other open data
- Who: Companies 55% of all requests, 81% of identified reqs
- What: Station observations 34%, HIRLAM forecast model 26%, Lightning strikes 15%
- Impacts: 14% of private companies said: “open data has generated new business during last 3 years”
(N = 389; 14 % of 389 = 54 companies)
- Actions based on study results:
 - Develop new more easy-to-use interfaces and improve documentation
 - Open even more new data sets according to survey results
 - Create a continuously updating dashboard to monitor impacts

Number of requests to FMI Open Data Interface – current rate about 40-50 requests / second



Current operational interface

- OGC WFS 2.0 with stored queries, returns GML/XML (INSPIRE compliant)
 - Example:
https://opendata.fmi.fi/wfs?service=WFS&version=2.0.0&request=getFeature&storedquery_id=fmi::observations::mareograph::monthly::30year::multipointcoverage&starttime=1991-01-01T00:00:00Z&endtime=1991-01-01T23:00:00Z
- OGC WMS 1.3
 - Mainly for radar images
 - Example:
http://openwms.fmi.fi/geoserver/wms?service=WMS&version=1.3.0&request=GetMap&layers=Radar:suomi_rr12h_eureffin&styles=&bbox=59.7,19.1,70.1,31.7&width=512&height=422&crs=EPSG:4326&format=image/png&

Future work development drivers

- World Meteorological Organization
 - WMO Information System version 2 (WIS2)
- European Meteorological Network (EUMETNET)
 - Federated Meteorological Data Infrastructure (FEMDI) concept
- EU
 - Open Data Directive specifies Meteorological data as a High Value Dataset
- ICAO (International Civil Aviation Organization)
 - New data sharing requirements by end of 2025
- Both WIS2 and FEMDI (and ICAO reqs) feature a federated data sharing approach with similar technology including
 - Data catalog
 - API and bulk download service
 - PubSub notification service

EUMETNET FEMDI

- Agreed in 2020 EUMETNET assembly to develop a federated approach to share European meteorological data
 - Increased exploitation and value to the wider community
 - Agility, responsiveness and collaboration through adoption of effective standards
 - Increased recognition of NMHSs as an authoritative provider
 - Less duplications of effort and expenditure
 - More affordable and competitive product generation
 - Improved decision making

WMO WIS2

- WMO data sharing for all WMO members and general public, in short:
 - Search catalog
 - Subscribe topic and get notifications of new data
 - E.g. “all SYNOP observations from Italy”
 - Download data from Global 24h cache
- Replace legacy systems built in 1970's..
- Build on OGC and W3C standards

WMO data sharing:

WMO Information System



WIS 2.0

“ WIS 2.0 is a collaborative system of systems using Web-architecture and open standards to provide simple, timely and seamless sharing of trusted weather, water and climate data and information through services.”

open
standards

Web
technology

cloud
ready

replace
GTS

EUMETNET data sharing:

Federated European Meteorological Data Infrastructure

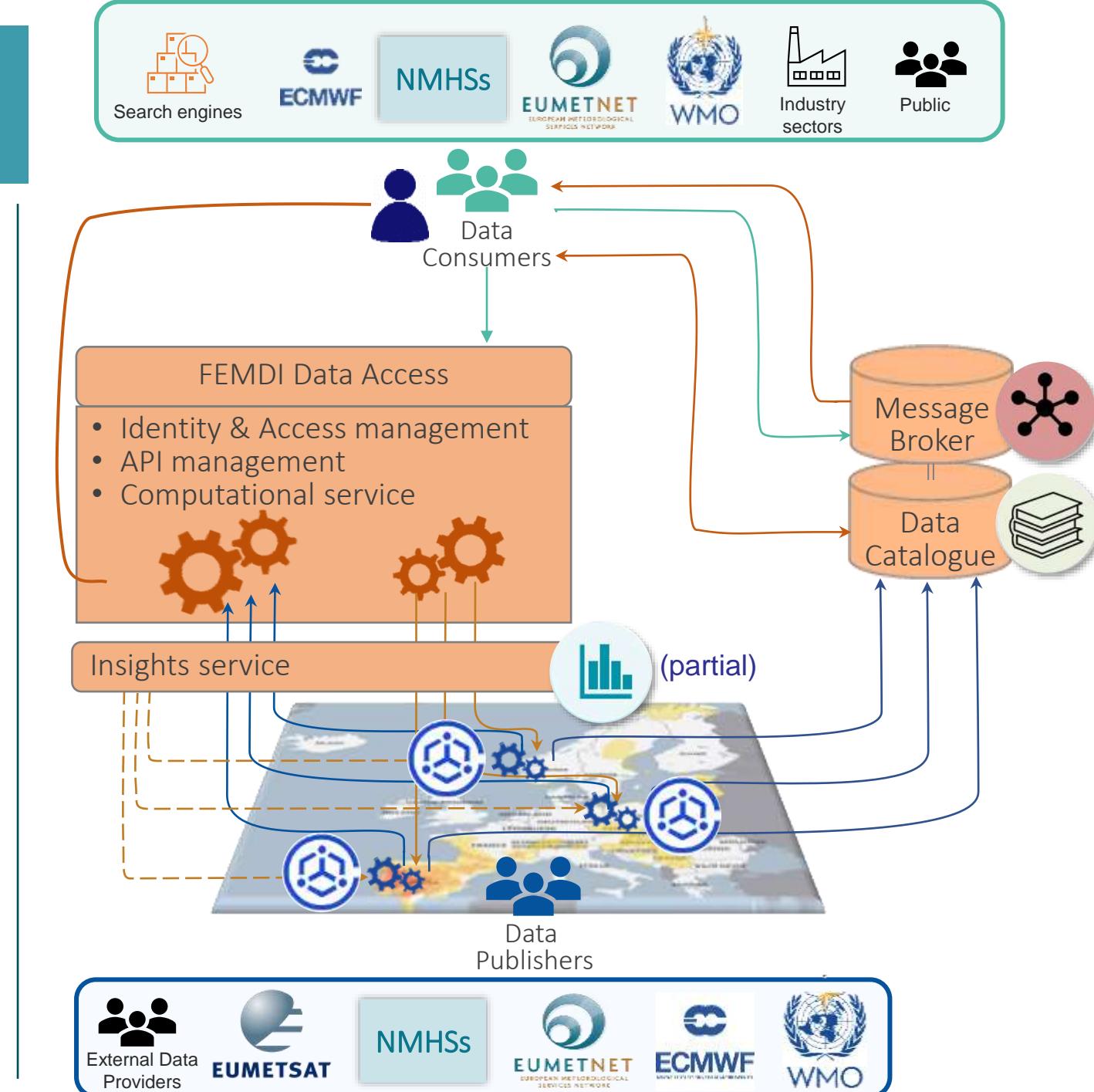
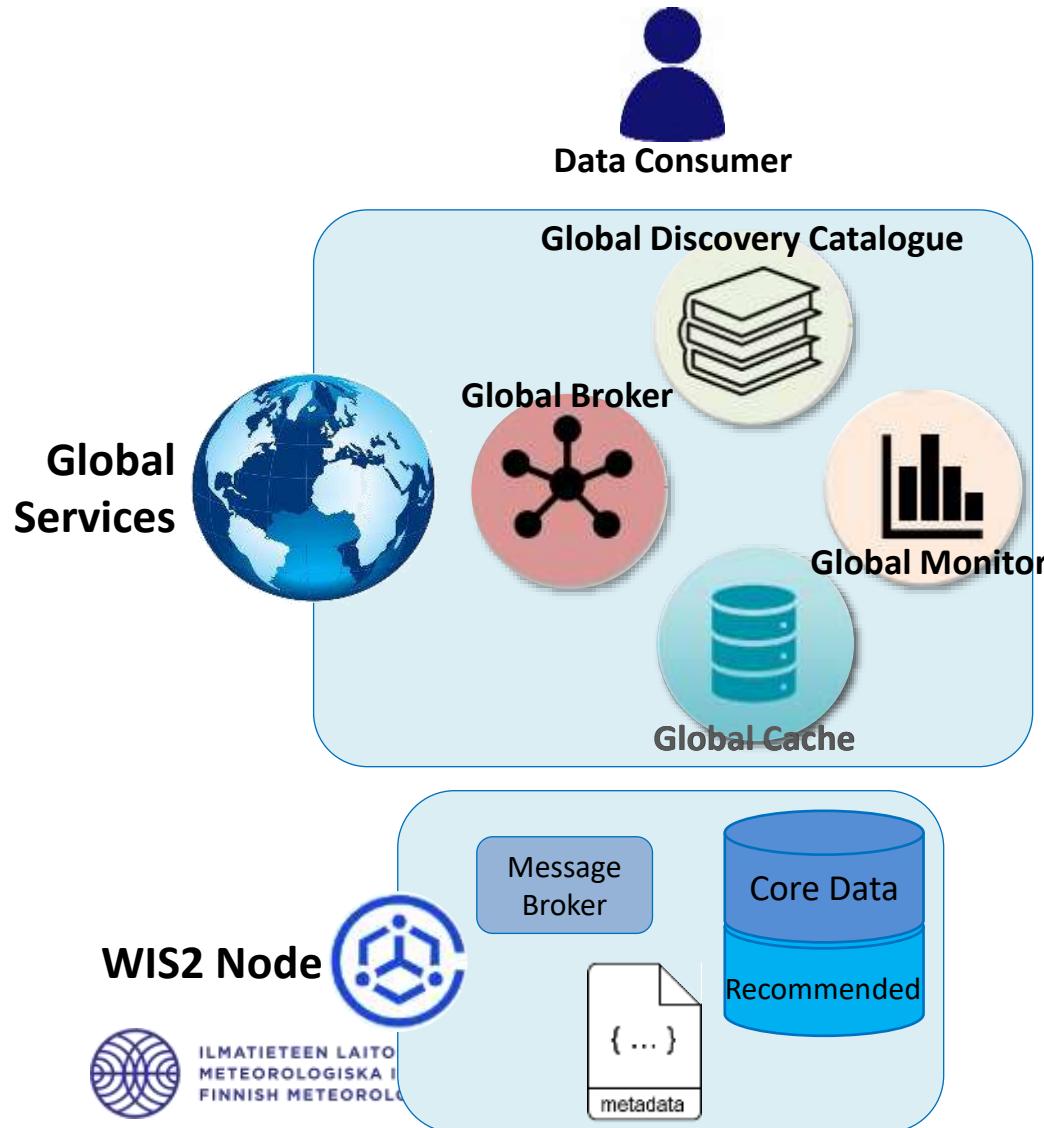


- FEMDI is a **federated approach** to sharing European meteorological data
- FEMDI will provide a **unified view of all data** available from EUMETNET Members
- The shared parts of FEMDI will be operated by Members on behalf of the community
- FEMDI enables **WIS 2.0 implementation in Europe**
- FEMDI **extends WIS 2.0**
- *FEMDI is not a centralised, singularly managed data store*
- *And it is not a single centrally managed IT solution for data sharing*



WMO OMM

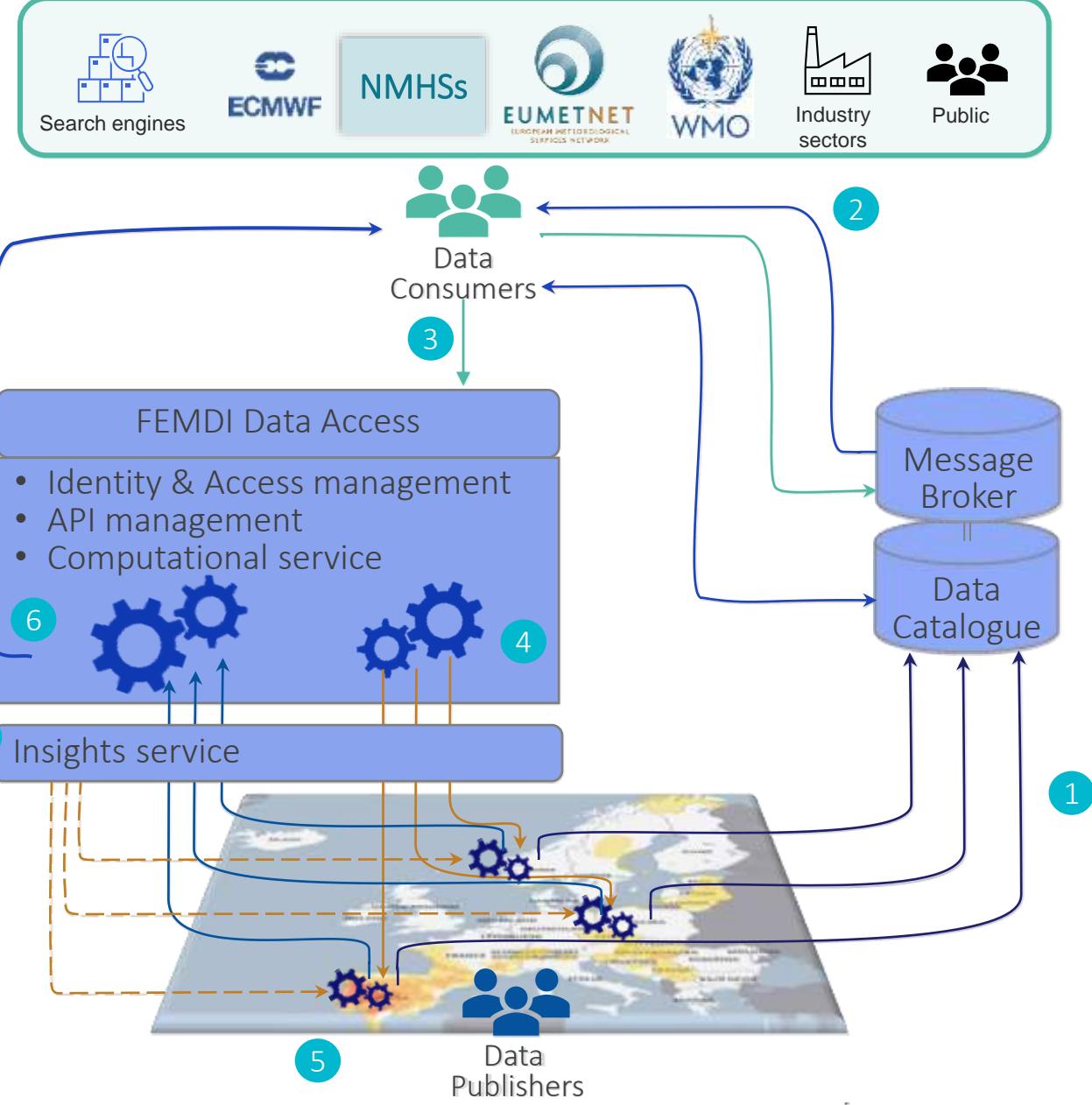
Mapping between WIS 2.0 and FEMDI



FEMDI 'One-Stop Shop'

ROLES There will be Data Publishers, such as NMHSSs, and Data Consumers, including other NMHSSs, industry, search engines and the public.

1. Data Publishers publish their data and metadata to the FEMDI community Data Catalogue.
2. Data Consumers see what data is available, search the metadata, and subscribe to receive updates when new data becomes available.
3. Data Consumers submit a request for data, or a computation workflow for bespoke data processing.
4. FEMDI triage process determines what resources are needed and orchestrates onward request(s).
5. Local data or computation service components process their request, and return data or workflow output.
6. FEMDI packages the responses from the local components into a data product and returns that to the Data Consumer.
7. Data Publishers receive data and service usage metrics.



OGC API EDR & GeoE3

- OGC API EDR (Environmental Data Retrieval) compliant implementation developed in GeoE3 project
- First implementation already up and running at
 - <https://opendata.fmi.fi/edr/>
 - HTML encoding not yet implemented
 - Output as CoverageJSON format
- GeoE3 use case: Intelligent Traffic
 - Trajectory query is used to get temperatures along a road
- GeoE3 use case: Energy efficiency
 - Outside temperature for a location (related to building heating)
- GeoE3 uses FMI's EDR service for these use cases, more at
- <https://geoe3platform.eu/geoe3/> and <https://geoe3.eu/>

OGC API EDR

- Based on and compatible with OGC API Features Part 1: Core
- Support for multidimensional and time-sensitive data
- Supported query types
 - Position – single point or multipoint, z ("height")
 - Location – named location identifiers for predefined coordinates
 - Area – polygon or multipolygon
 - Radius – from certain point
 - Cube
 - Trajectory
 - Corridor ("fat trajectory")
 - Item – pre-existing, pre-defined objects by id