

C3S Data Portal: Setting the scene

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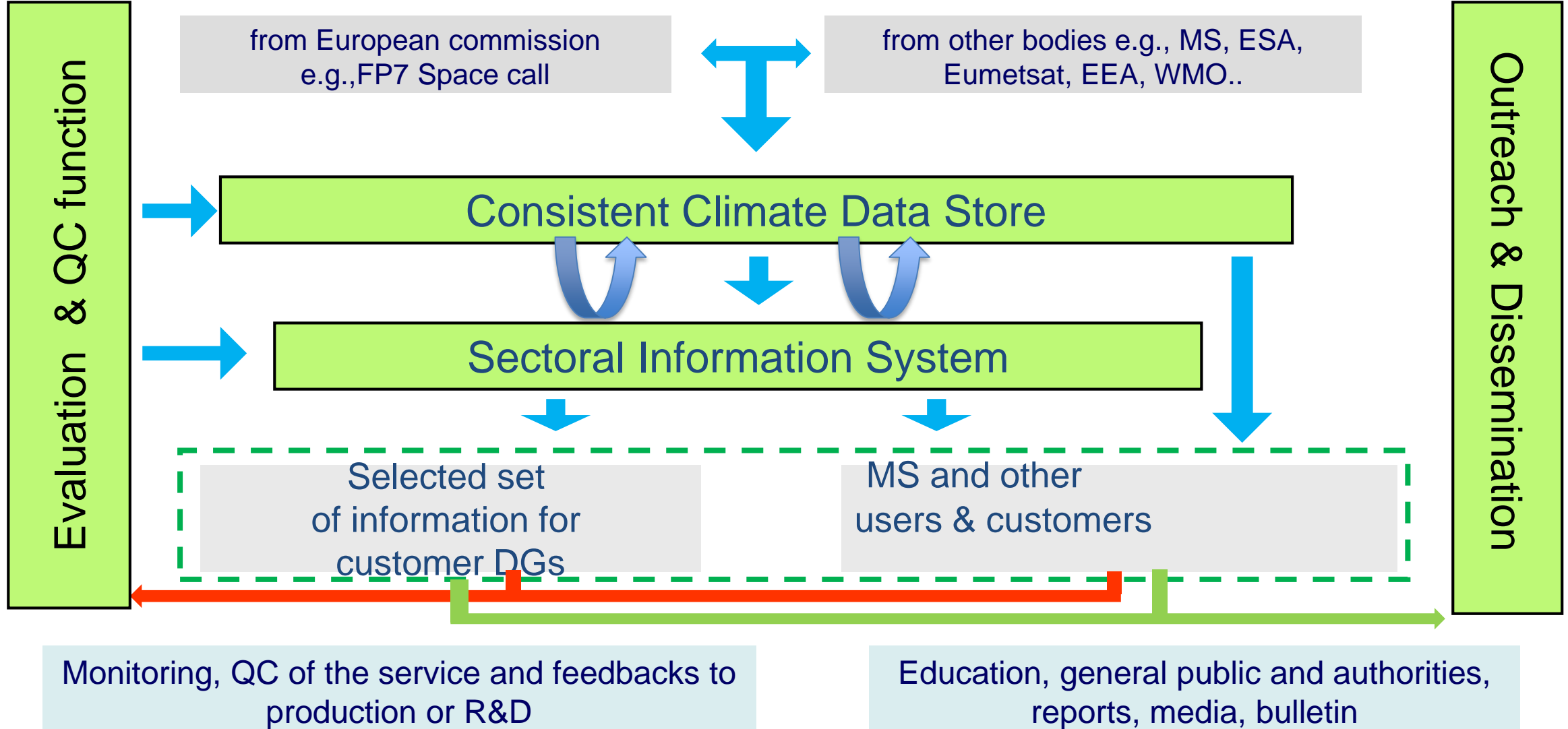
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Implemented by  **ECMWF**

C3S architecture



Sectorial Information System

- Agriculture and forestry
- Health
- Energy
- Infrastructure
- Coastal areas
- Water management
- Tourism
- Biodiversity
- Disaster risk reduction
- Marine and fisheries
- Transportation



Essential Climate Variables (ECVs)

Atmosphere

Surface Air Temperature
Surface Precipitation
Water Vapor
Surface Radiation Budget
Earth Radiation Budget
Carbon Dioxide &
Methane
Ozone & Aerosols
Cloud properties
Wind Speed & Direction
Upper Air Temperature
Other Long-Lived GHGs

Ocean

Ocean Color
Sea Ice
Sea Level
Sea Surface Temperature
Global Ocean Heat
Content
CO₂ partial pressure
Ocean Activity
Sea Surface Salinity
Current Salinity

Land

Snow Cover
Glaciers & Ice Caps
Albedo
FAPAR
Fire Disturbances
Ice Sheets
Lakes
Permafrost
Land Cover
Leaf Area Index
Soil Moisture



Climate Data Store: Content

- From suppliers
 - Reanalysis (Global and Regional)
 - Seasonal forecasts (+ re-forecasts)
 - Observations
 - ECVs from observations
 - Climate projections
- From Sectorial Information System
 - Sectorial specific climate indicators (e.g. hours of sunlight, for agriculture)
 - Charts, Graphs, Reports...



Climate Data Store: Actors/Stakeholders

- Users
 - EU DGs (e.g. DG CLIMAT, EEA CLIMAT ADAPT)
 - Policy makers
 - National Climate Service Providers
 - WMO Regional Climate Centers
- Suppliers
 - Provide data and products in CDS
 - Provide tools in toolbox



Climate Data Store: Actors/Stakeholders (cont.)

- Sectoral Information System
 - Also Users and Suppliers
 - Develop (sectoral) applications
 - Contribute products to CDS, contribute to the toolbox
- Evaluation and Quality Control (EQC)
 - Review quality of products, update metadata accordingly
 - Review standard compliance
- Interoperability
 - INSPIRE, WMO Information System, GEOSS, ...



There are many portals, serving different products to different communities

Drias les futurs du climat

ACCUEIL ACCOMPAGNEMENT DÉCOUVERTE DONNÉES ET PRODUITS

Découverte > Parcours initiation > Température

Cartes de simulation climatique pour plusieurs scénarios pour la métropole

Température moyenne quotidienne : référence et anomalie
Météo-France/CNRM2014 : modèle Aladin de Météo-France

Les cartes ci-dessous représentent la température à 2 mètres en moyenne annuelle, simulée par le modèle climatique régional de Météo-France, Aladin-Climat. Les résultats sont présentés pour plusieurs scénarios d'évolution socio-économique (les scénarios RCP - 'Région'), et plusieurs horizons temporels (horizons) : une période de référence sur le XXème siècle, ainsi que trois horizons moyens de projections sur le XXIème siècle.

En savoir plus ...

Moyenne annuelle

Scénarios d'émissions Référence (1976-2005) Horizon proche (2021-2050) Horizon moyen (2041-2070) Horizon lointain (2071-2100)

Scénario RCP2.6

CLIMATE EXPLORER

Layers: HISTORICAL DATA

Coastal Flood Risk

Climate Stressors

- Inundation from Sea Level Rise (1ft)
- Inundation from Sea Level Rise (2ft)
- Inundation from Sea Level Rise (3ft)

People and Assets Impacted

- Population Density (2005)
- Coastal Vulnerability to Sea Level Rise
- Social Vulnerability Index

LAYER INFORMATION

ESGF Earth System Grid Federation

Home Search Tools Login Help

Current Selections

- Remove All
- Experiment: 20 Day Histograms
- UI: users/temperature

Search Categories

Project: Model-CMIP5_SPCAM3.0_Exp01

Institute: Data Node: esg-datanode.jpl.nasa.gov

Instrument: Version: v1

Experiment Family: No restriction available.

Experiment: Further options: Add To Cart

Time Frequency: Model-GISS_ModelE_Exp01

Product: Data Node: esg-datanode.jpl.nasa.gov

Realin: Version: v1

Variable: No restriction available.

Variable Long Name: Model-GISS_ModelE_Exp01

CMIP Table: Data Node: esg-datanode.jpl.nasa.gov

Version: v1

No restriction available.

NOAA NATIONAL CLIMATIC DATA CENTER

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Home Climate Information Data Access Customer Support Contact About NCDC

NOAA's National Climatic Data Center (NCDC) is responsible for preserving, monitoring, assessing, and providing public access to the Nation's treasure of climate and historical weather data and information.

Learn more about NCDC >

How may we assist you?

- I want to search for data at a particular location.
- I want quick access to your products.
- I want to see your monthly climate reports.
- I want to find a specific dataset.
- I want to know about climate change and variability.

NCDC Releases January 2015 U.S. Climate Report

During January, the average contiguous U.S. temperature was 33.9°F, 2.9°F above the 20th century average.

HIGHLIGHTS

Upcoming Events, Products, and Services

View a complete listing of the upcoming products and services.

State of the Climate in 2013 Report Release

NCDC is announcing the release of the State of the Climate in ...

NEWSROOM

Climate History: The Great Arctic Outbreak of February 1899

Over 115 years ago, a cold wave that would become known as the "Great Arctic Outbreak" took the United States by storm.

NCDC Insider: Meet Administrative Assistant, Julie Moore

As an administrative assistant, Julie Moore takes care of a wide variety of the needs of NCDC's management team.

NCDC PARTNERS

- Climate.gov
- weather.gov
- US drought.gov

Climate Change Knowledge Portal

For Development Practitioners and Policy Makers

CLIMATE IMPACTS VULNERABILITIES

HISTORICAL FUTURE GCM FUTURE DOWNSCALED COMPARISONS HISTORICAL VARIABILITY TOOL

Choose your variable: Temperature and Rainfall

Choose your time period: 1940-1990

AVERAGE MONTHLY TEMPERATURE AND RAINFALL FOR SWEDEN FROM 1940-1990

100 mm 75 mm 50 mm 25 mm 0 mm

20°C 10°C 0°C -10°C -20°C

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

It is important to evaluate how climate has varied and changed in the past. The monthly mean historical rainfall and temperature data can be inspected to show the baseline climate and seasonality by month, for specific years, and for rainfall and temperature. The chart above shows mean historical monthly temperature and rainfall for Sweden during the time period 1940-1990. The dataset was produced by the Climatic Research Unit (CRU) of the University of East Anglia (UEA).

KNMI Climate Explorer

Climate Explorer European Climate Assessment & Data KNMI

Select a time series

Historical observations

precipitation precipitation mean temperature mean temperature maximum temperature maximum temperature minimum temperature minimum temperature snow depth snow depth snow depth (full 1860) cloud cover cloud cover

Select a field

- Daily fields
- Monthly observations
- Monthly ensemble fields
- Monthly seasonal forecasts
- Monthly seasonal hindcasts
- Monthly ENSO runs
- Monthly CHPS+ scenario runs
- Annual CHPS+ ensemble
- Monthly and seasonal historical reconstructions
- External data (ensembles, axes, exact, solar, emef, ...)

Select a station

- stations with a name containing
- 10 stations near
- all stations in the region
- top stations with station numbers

Time display

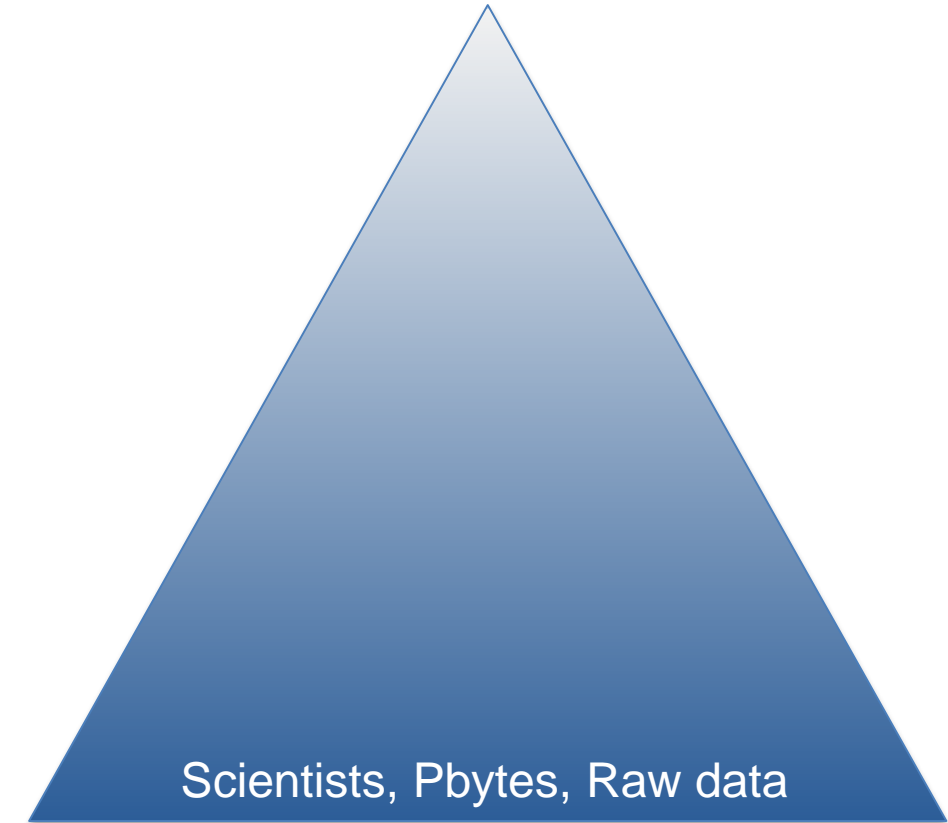
Get solutions Clear Form



Main challenges

- Diversity of users
 - Scientist to policy makers
- Diversity of volumes
 - PB to KB
- Diversity of products
 - Raw to elaborated

Policy maker, Mbytes, Simple plot



Data (PB) → Information (TB) → Knowledge (GB) → Wisdom (MB)



What is a PiB? *(Assuming reading from/writing to disk at 100 MiB/s)*

	Bytes	Seconds	Days	Months
MiB	1,048,576	0.01		
GiB	1,073,741,824	~10		
TiB	1,099,511,627,776	10,485	0.12	
PiB	1,125,899,906,842,624	10,737,418	124	> 4



C3S Data Store

- ... the service draws upon the outcome of the FP7 Copernicus **precursor projects** ...
- (products)... will have to be accessible in an **operational** way
- ...technical development, maintenance and **governance** efforts will be required from the **data providers** to ensure fully **compliance** with the C3S requirements.



C3S Data Store

- The **EQC** will ... monitor ... using standard **key performance indicators**
 - ... technical **quality of service** as measured by timeliness, number of interruptions, response time for troubleshooting...
 - ...**quality of products** through statistical comparison with observed quantities;
 - ...**quality of information** made publicly available ...
 - ...**uptake** of services and products **by users**: ...unique visitors on the web portal, downloads, data volumes...



C3S Data Store

- ...access to the products for **authenticated users**
 - ... single logon across the Copernicus programme (mid-term)
- ...identification of **backup solutions** regarding the provision of information populating the CDS and the SIS.
- ... the provision of a technical user **support** and **help desk** facility...



C3S Data Store

- Timely acquisition of state-of-the-art climate information from various data providers, and the development and maintenance of the **C3S catalogue** content
- The information delivered to the end-user is **fully traceable, quality controlled** and **disseminated** within the most appropriate time
- To ensure uptake of climate information by downstream users, **climate toolboxes** will be developed and maintained.



Requirements for the Climate Data Store

- Be **distributed**
- **Reuse** existing systems when possible
- ... But **should not** be a mere collection of heterogeneous systems:
 - The user should have a **consistent** view of all data and services available through the CDS



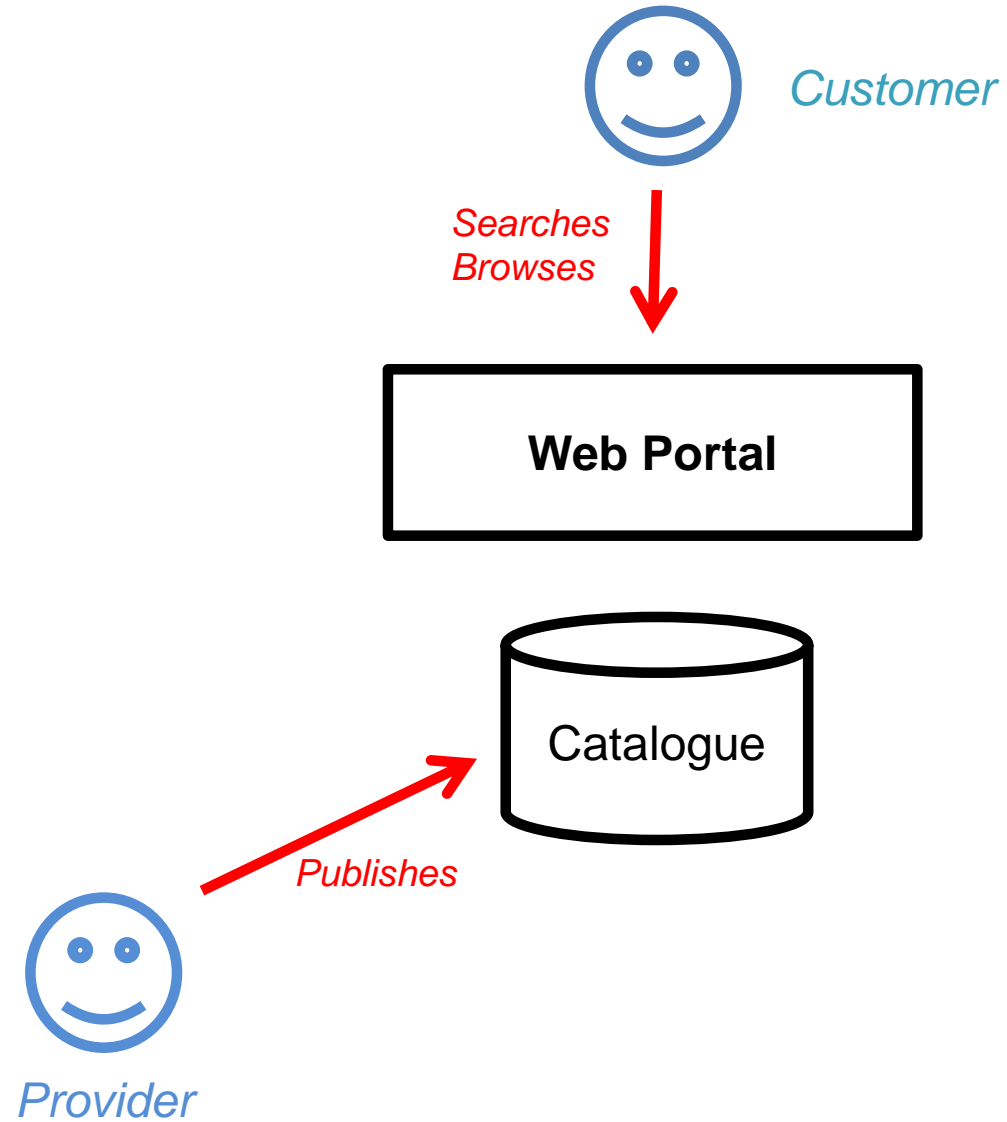
Example: Amazon marketplace

The screenshot shows the Amazon.co.uk website with search results for 'hdmi'. The search bar at the top contains 'hdmi' and a 'Go' button. The navigation bar includes 'Your Amazon.co.uk', 'Today's Deals', 'Gift Cards', 'Sell', and 'Help'. The left sidebar lists various departments like 'Electronics & Photo', 'Computers & Accessories', and 'PC & Video Games'. The main content area displays several product listings for HDMI cables. Red circles highlight the following items:

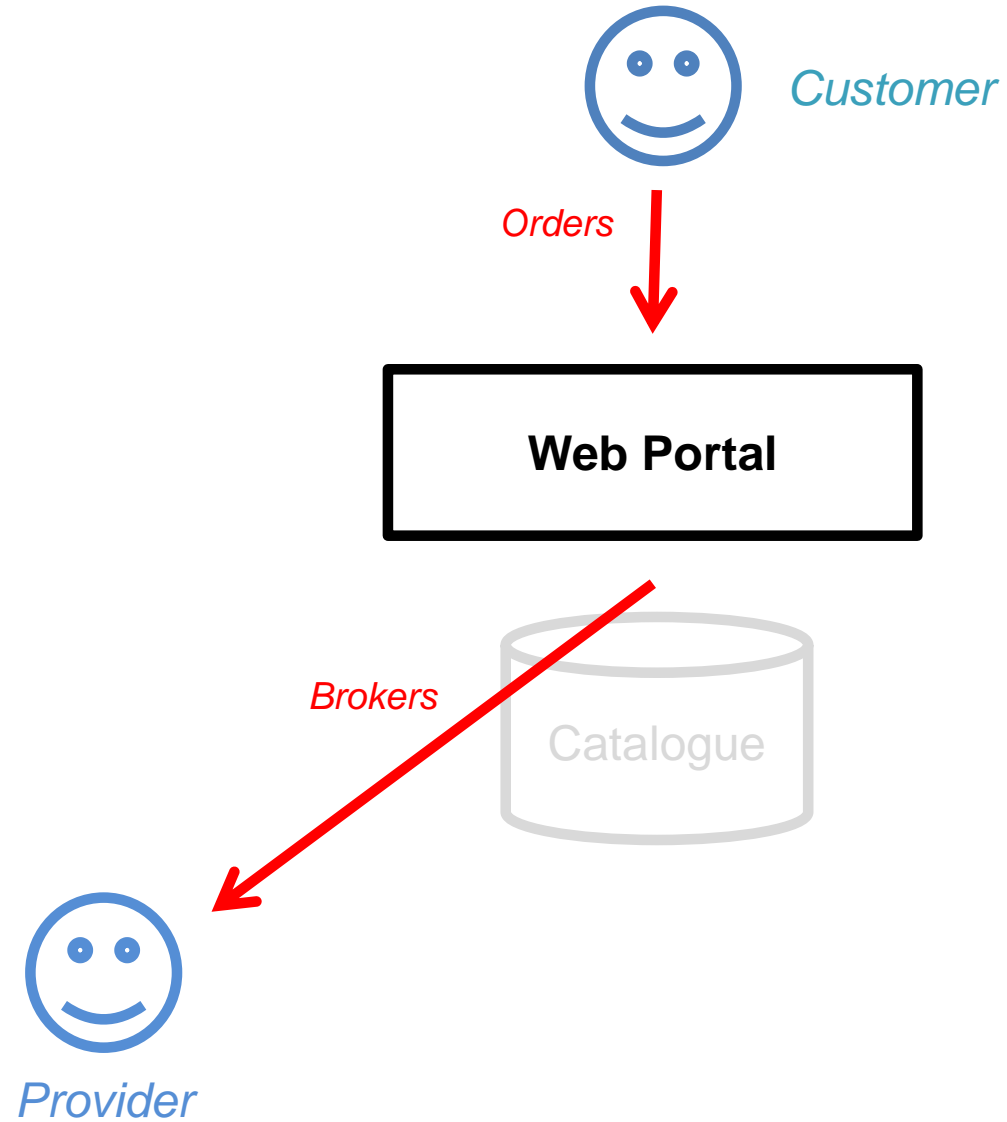
- Wired-up HDMI to HDMI Gold Plated Connectors 1.8m Cable** (11 Apr 2010) priced at **£1.28** (new) and **£0.10** (used).
- AmazonBasics High-Speed HDMI Cable 6.5 Feet / 2.0 m Supports Ethernet / 3D / Audio Return (Newest Standard)** by AmazonBasics (15 Oct 2010) priced at **£3.49** (new).
- AmazonBasics High-Speed HDMI Cable 3 Feet / 0.9 m Supports Ethernet / 3D / Audio Return (Newest Standard)** by AmazonBasics (11 Aug 2012) priced at **£3.49** (new).
- CablesionBasics 3M (3 Meter) High Speed HDMI Cable with Ethernet - (Latest 1.4a Version, 15.2Gbps) Gold HDMI to...** by Cablesion priced at **£4.45** (new).
- High Speed (Category 2) 1.2 Meter Gold Plated HDMI to HDMI cable with 3D, Ethernet and Audio Return Channel** by Betron® priced at **£3.45** (new) and **£5.00** (used).



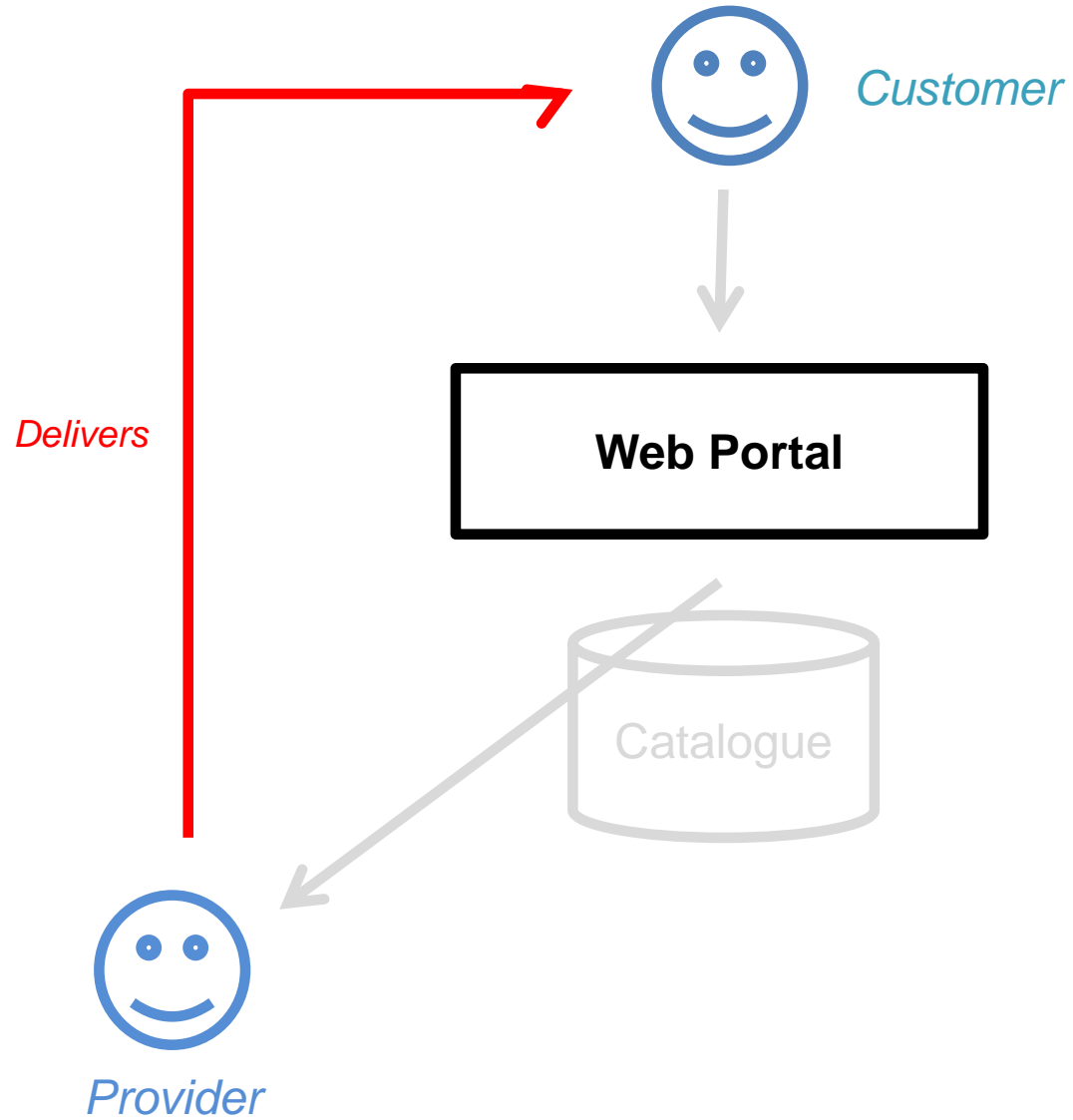
A "Marketplace"



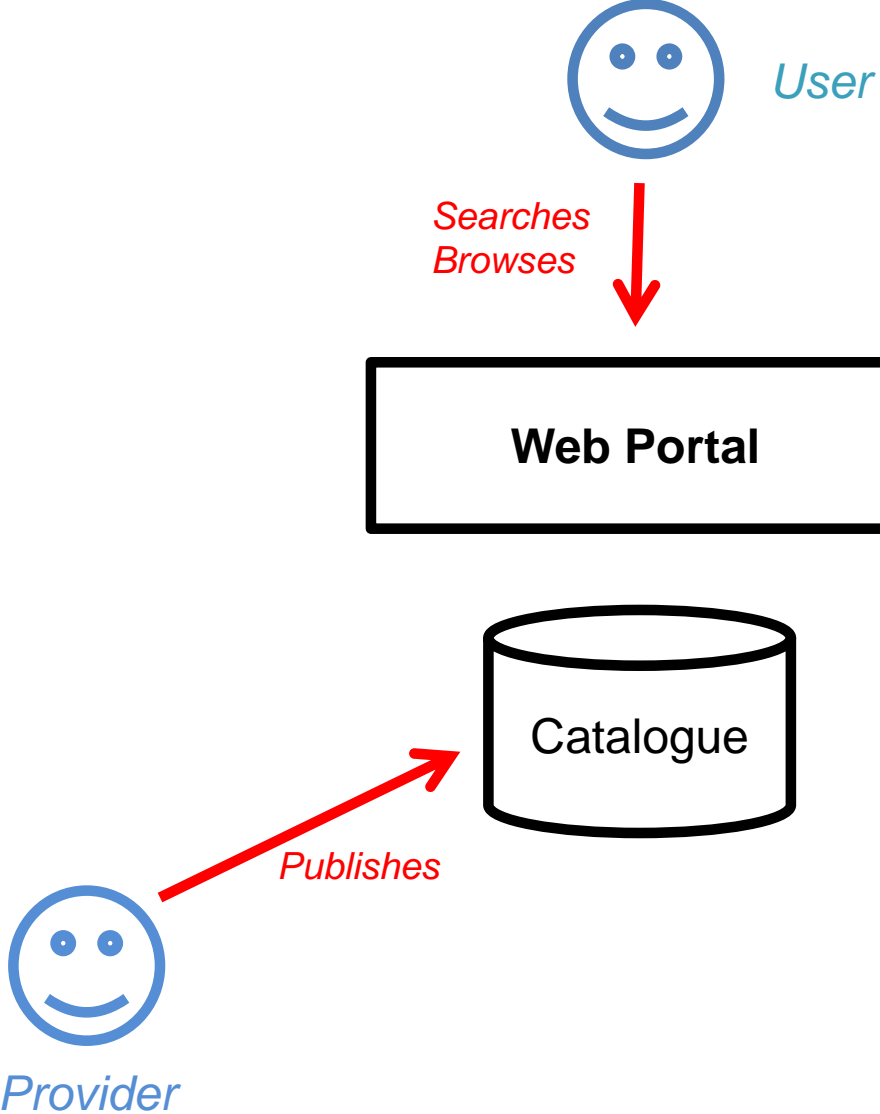
A "Marketplace"



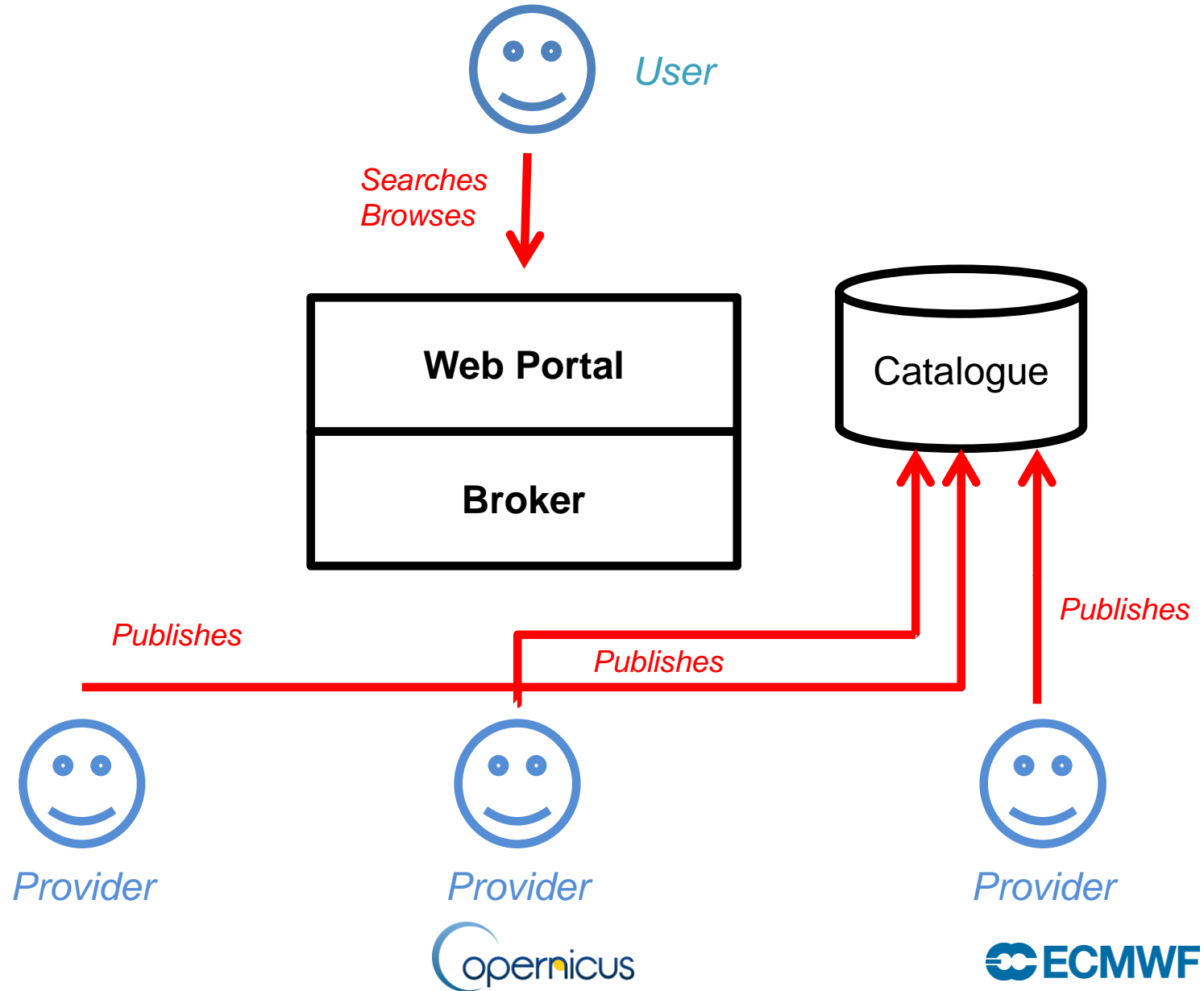
A "Marketplace"



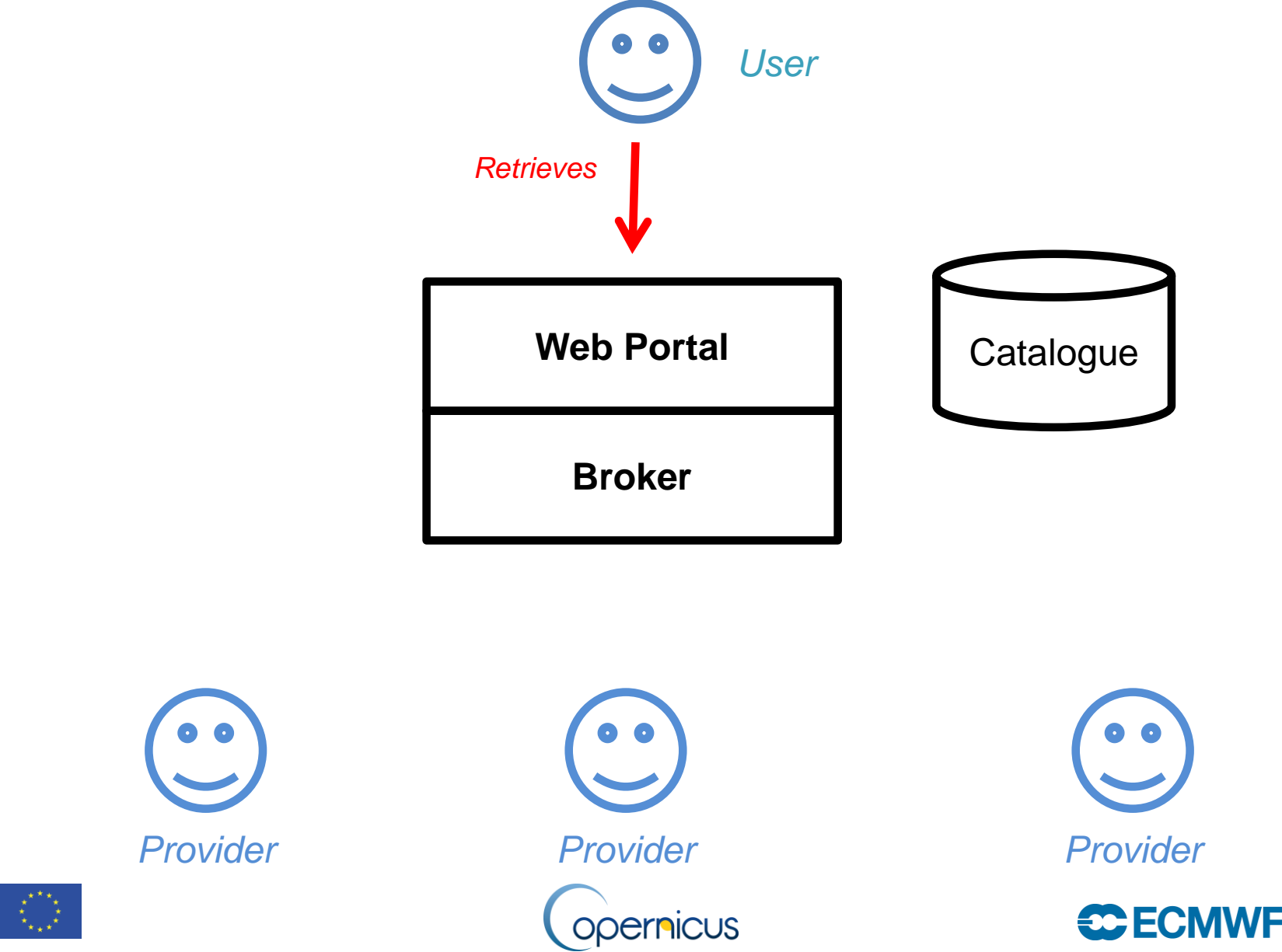
Climate Data Store: Architecture



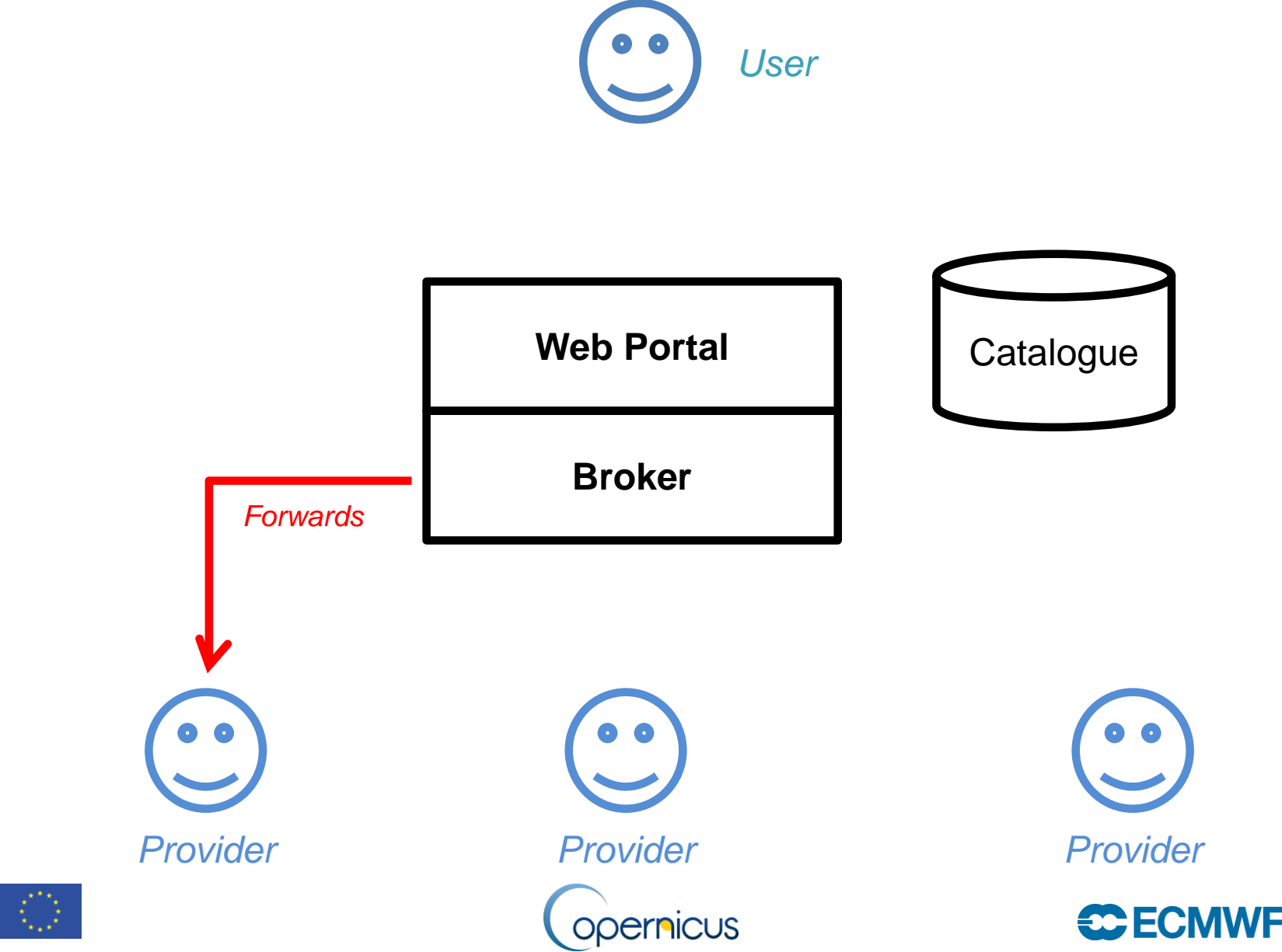
Climate Data Store: Architecture



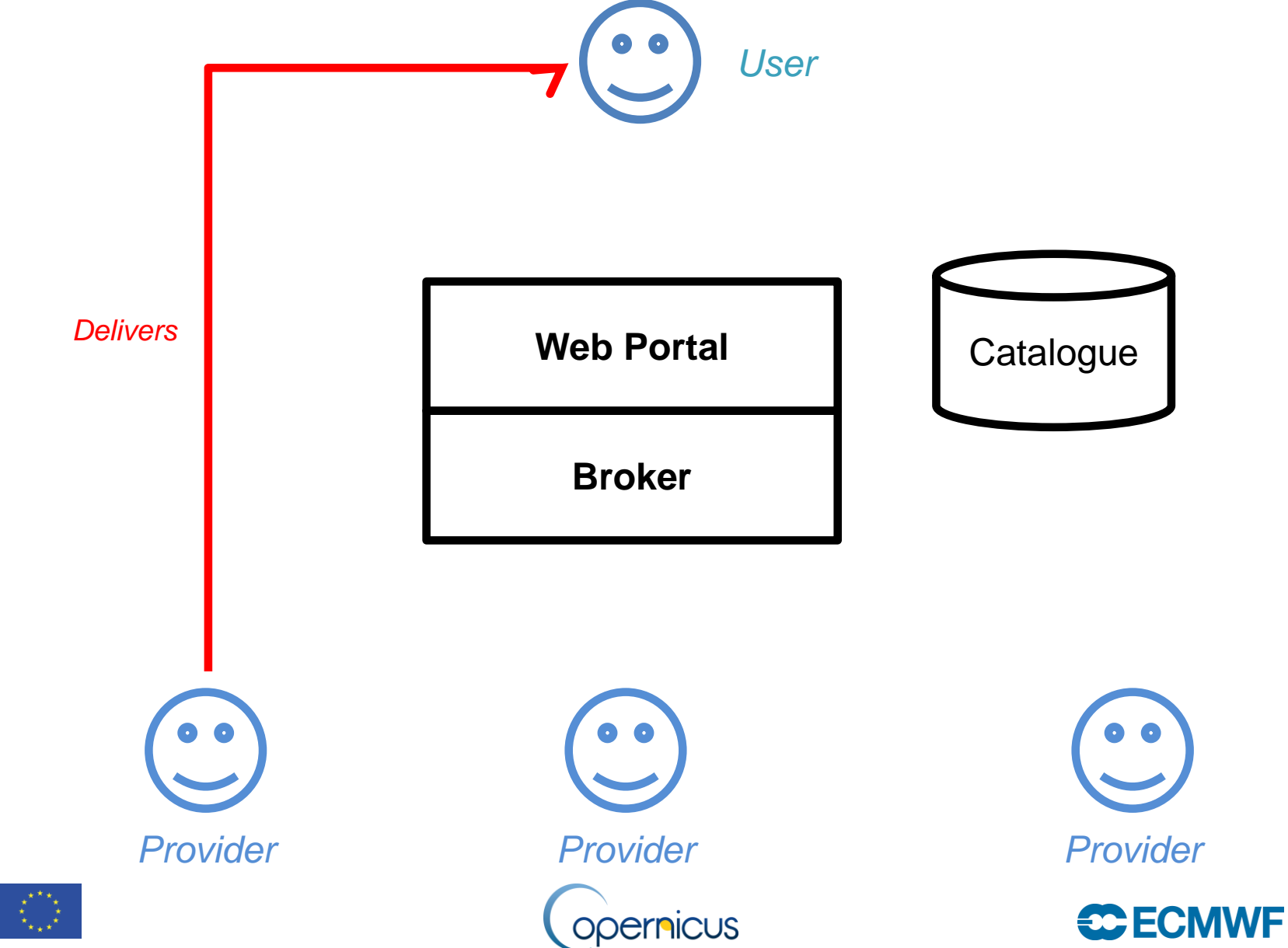
Climate Data Store: Architecture



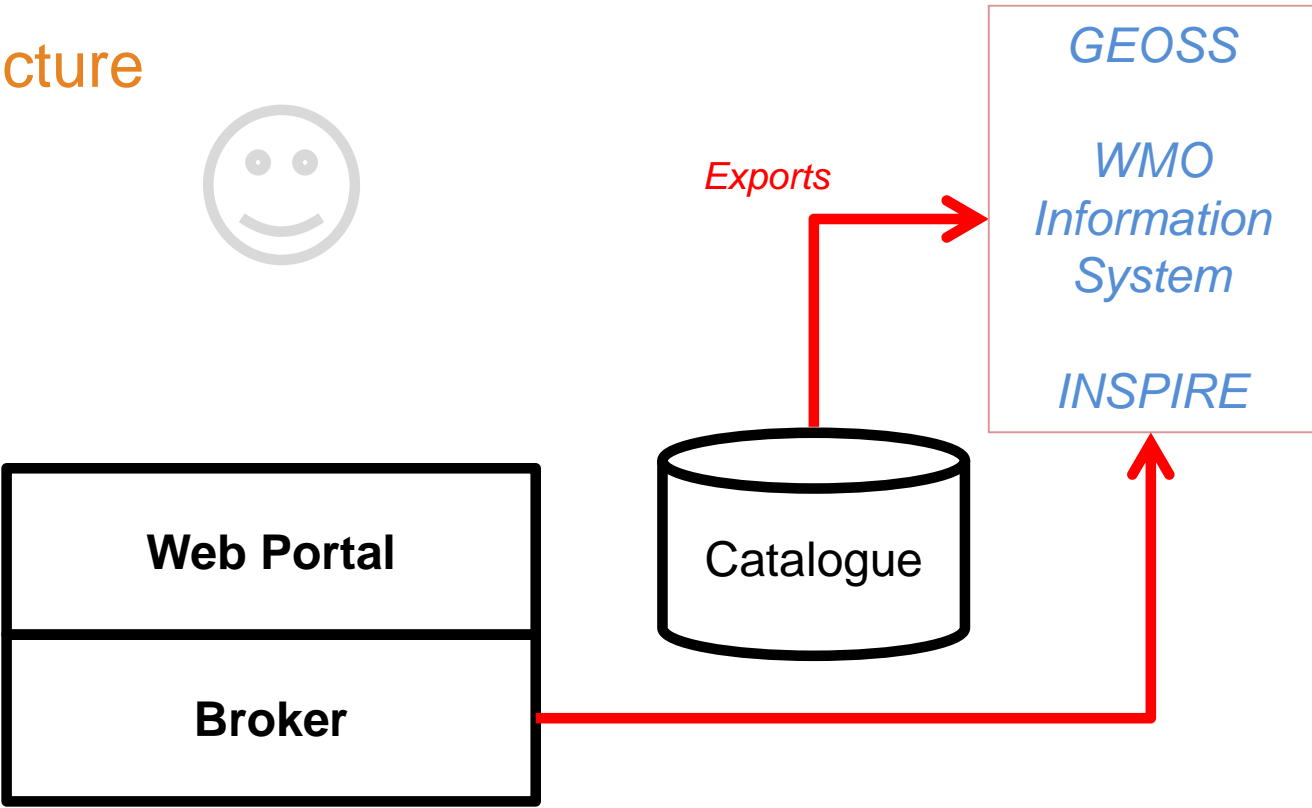
Climate Data Store: Architecture



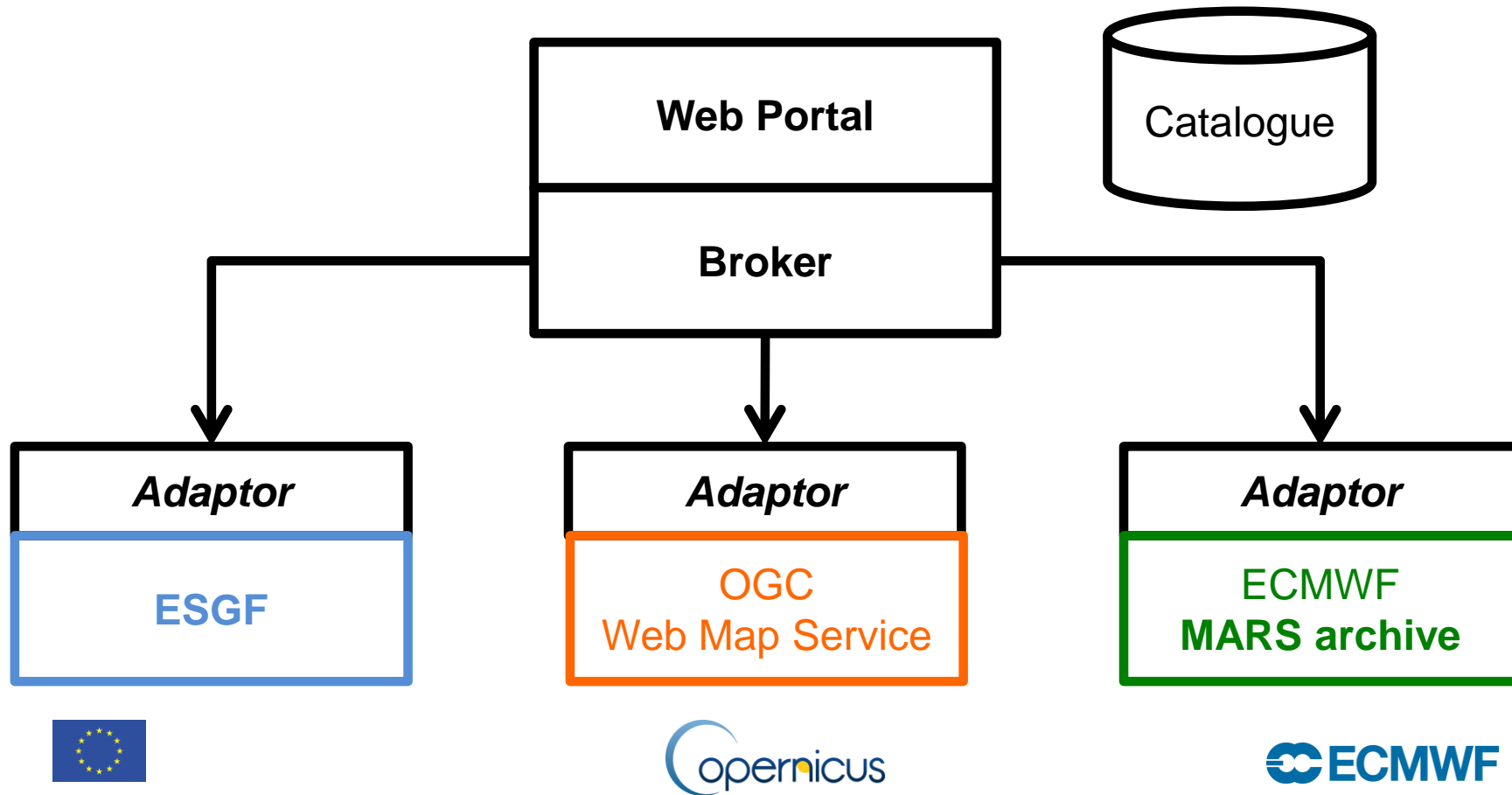
Climate Data Store: Architecture



Climate Data Store: Architecture



Climate Data Store: Architecture



Climate Data Store: Architecture

- ECMWF could host new services when no infrastructure exists
- Adaptors are not limited to data provision
 - They will contribute to the “C3S toolbox”
 - As for data, services are invoked by the broker



Operational?

- Monitoring
- Reporting
 - Capacity planning
 - Usage statistics
- Service level agreement
- On-call and support
- Help desk
- High-availability
- Backup



Standards are the key

- INSPIRE, OGC
 - WMS, WMTS, WPS, CWS,...
 - ISO 19xxx series
- Data formats
 - NetCDF, GRIB
 - Time series? Images?
 - Sector specific formats?



What is in the toolbox

- Tools and libraries
 - Source code repository, bug tracking, ...
 - Support, documentation, forums...
- Analysis services
 - Lightweight processing can be done on the content of the Data Store
 - Heavy processing (large amount of data, high CPU requirement), will need infrastructure support:
 - How to bring the computations to the data?



About this workshop

- User expectations
- Existing data portals
- Solutions from industry



About this workshop: User expectations

- Content
 - What do you expect to find in the Climate Data Store (maps, graphs, raw data, ...)
 - How about quality information? Support? Documentation?
- Data portal:
 - How do you want to interact with the portal (search, browse, view, download?)
- Toolbox
 - What tools should be in it?
 - What hosted analysis services do you expect to find?
- Standards
 - What tools are you using?
 - In what format do you want to download data?
 - What other systems should the C3S be interoperable with?



About this workshop: existing data portals

- Share your experience with us
 - What are you most proud of?
 - What would you do differently?
- What feed back do you get from your users?
 - What do they like?
 - What do they say is missing?



About this workshop: solutions from industry

- What is the current state of the art?
- Are there any off-the-shelf solutions?



Workshop: working groups

- Three topics
 - Tuesday: The Catalogue and Portal
 - Wednesday: The Toolbox
 - Thursday: Content, Standards and Interoperability
- Four working groups
 - Members are randomly selected every day
 - All discussing the same topic
- Outcome will be presented at the plenary

