Brokering approach based implementation for the national hydrological and meteorological information system in Italy

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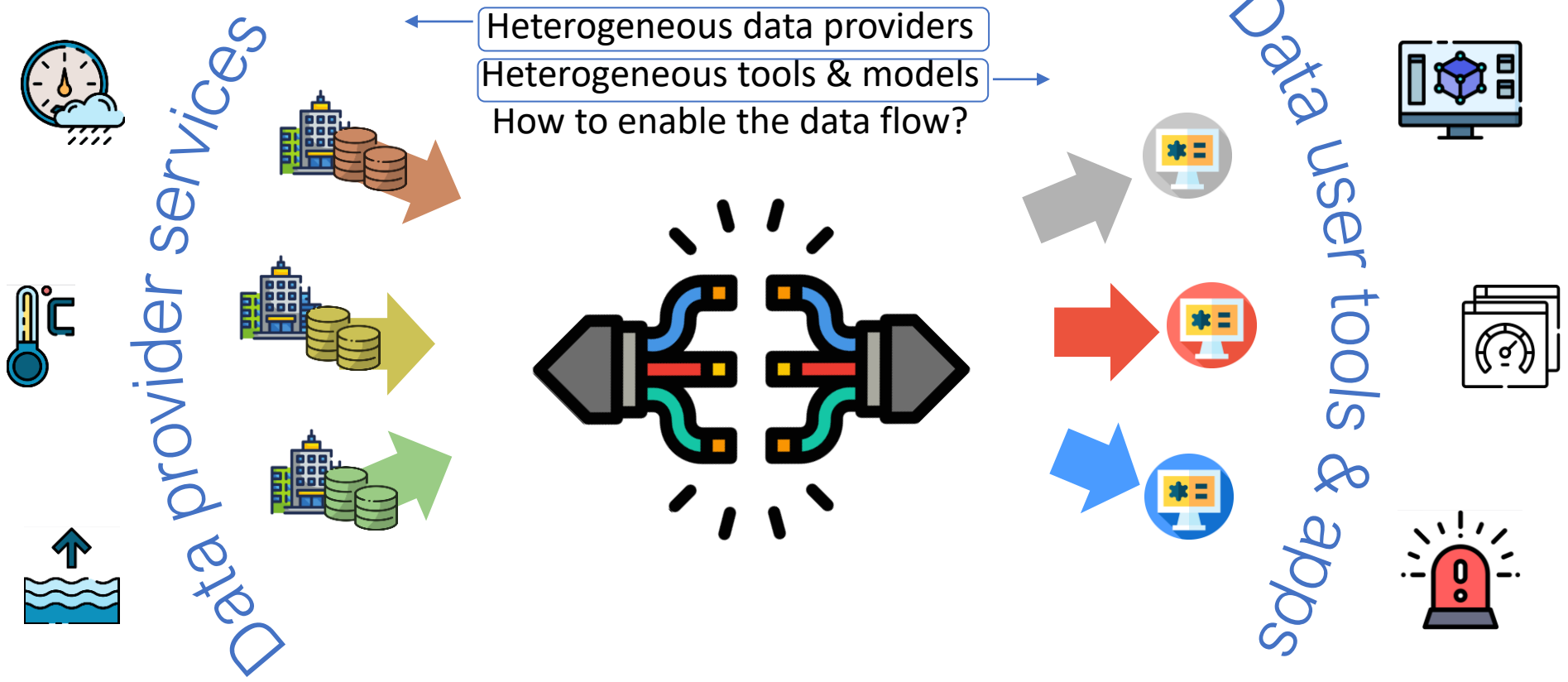
ESSI Lab

ISPRA
Istituto Superiore per la Protezione e la Ricerca Ambientale

Autorità Distrettuale del Fiume Po

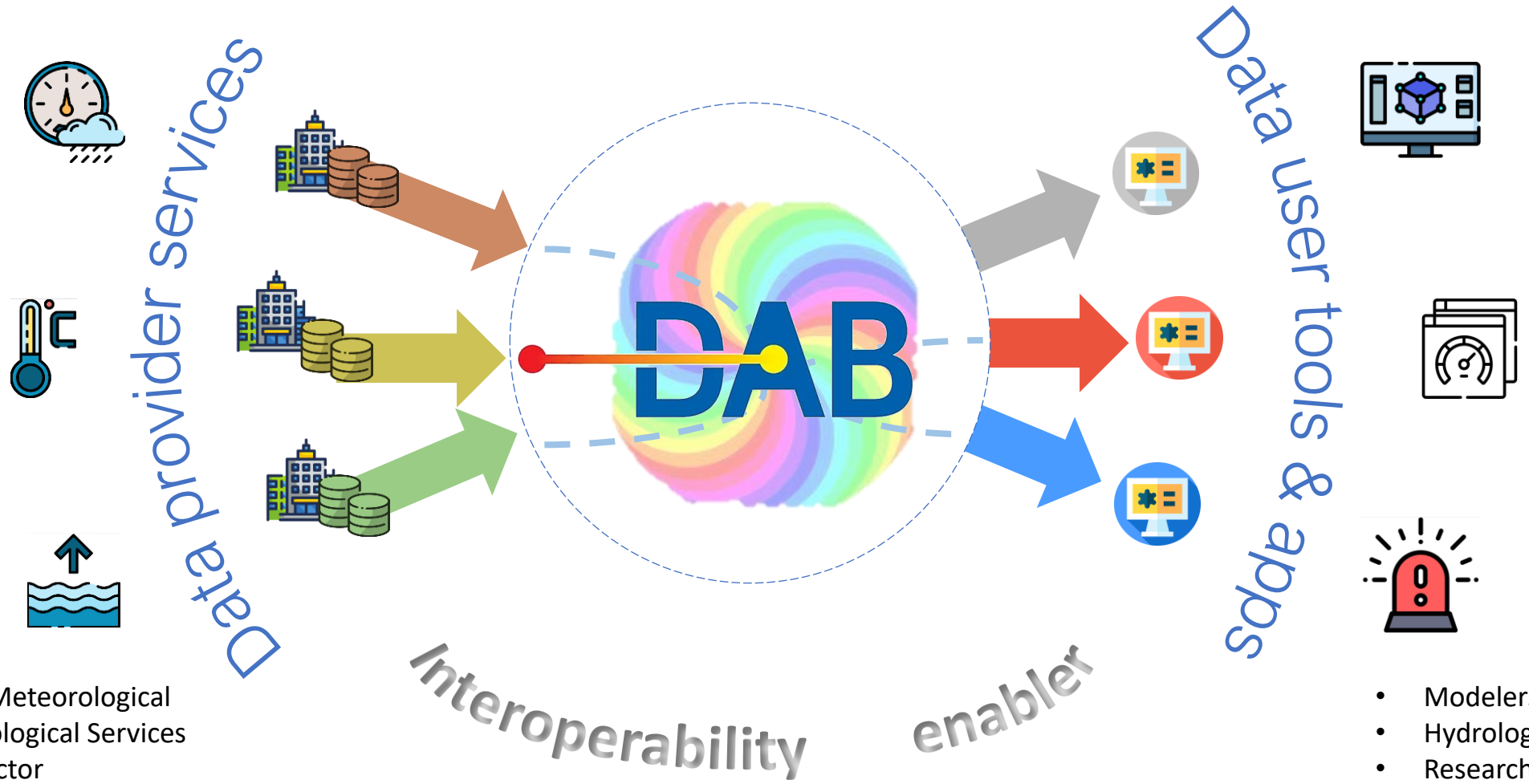
Data sharing in the hydro/meteorology context



- National Meteorological and Hydrological Services
- Private sector
- Research entities
- …

- Modelers
- Hydrologists
- Researchers
- Decision makers
- …

Discovery and Access Broker (DAB)



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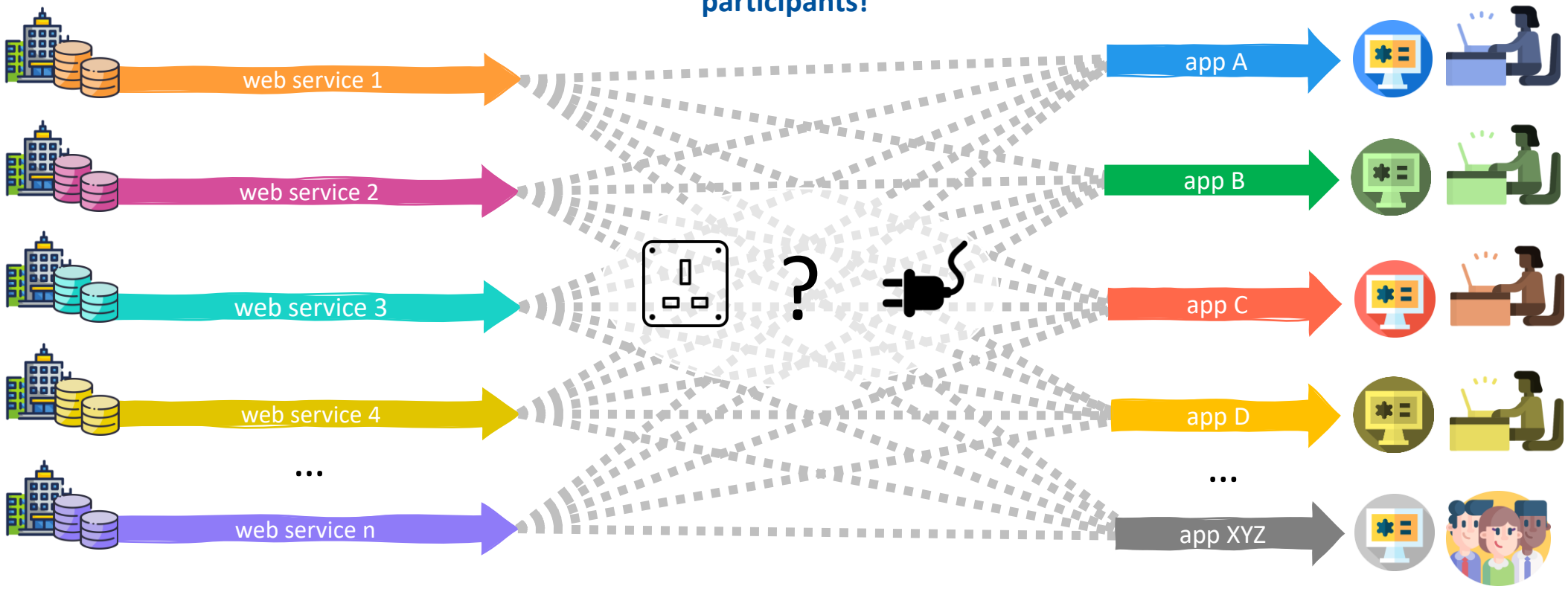
Without a broker…

DATA PROVIDERS and WEB SERVICES

Interoperability burden is **a huge effort for all the participants!**

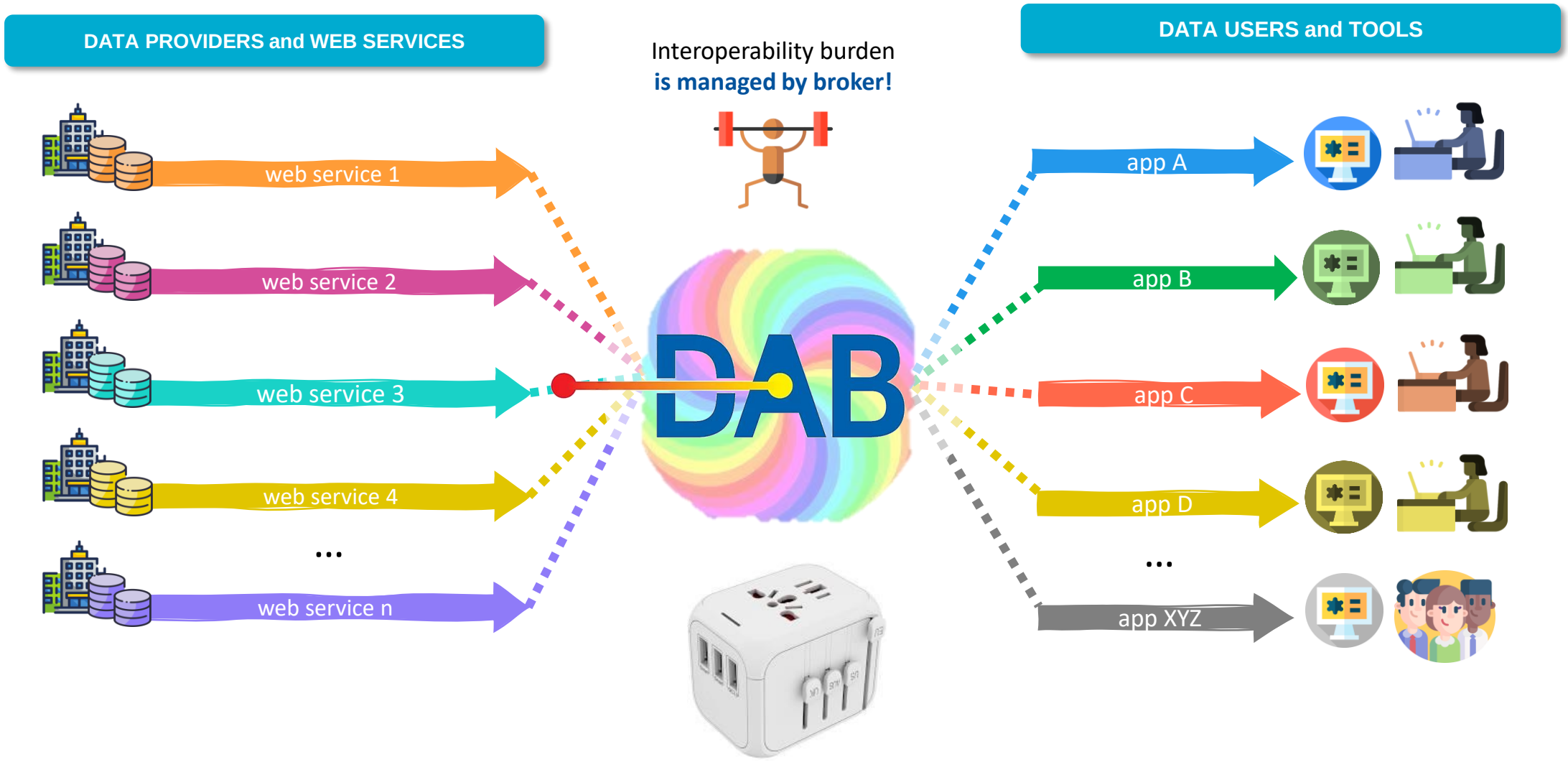
DATA USERS and TOOLS



…**huge effort for data providers**, needing to publish their data according to different standards required by the different applications

…**huge effort for data users,** needing to access data published according to different standards by the different data providers

With broker

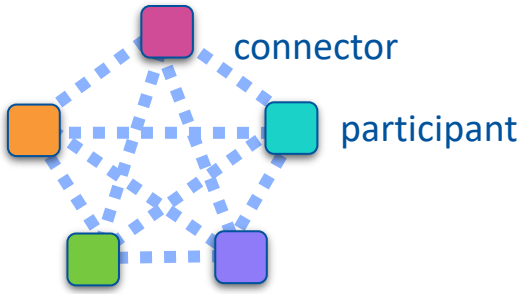


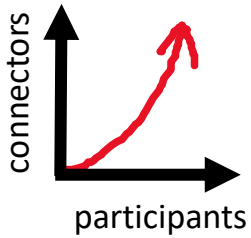
it works like a power adapter …for hydrology!

Connecting data providers & data users regardless of the specific standards available

Brokering approach benefits

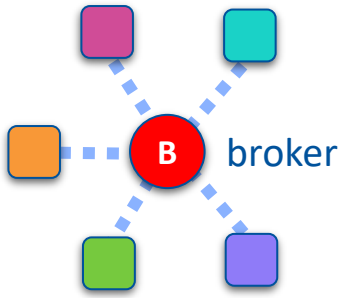
Without broker

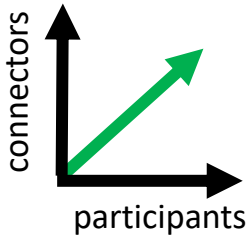




Number of connectors grows **very rapidly** with the number of participants!

With broker





Number of connectors grows **linear** with the number of participants.

✗ Burden of creating new connectors on participants

✗ New requirements (e.g. new standard) require new implementations by each participant

✓ Burden of creating new connectors on broker

✓ Able to cope with new requirements & change of standards: more sustainable

Three brokers compose the DAB framework

Discovery Broker

Obtain **metadata**

Discovery:
To **search** for the datasets that match a set of user query terms

Semantic Broker

Augment **query**

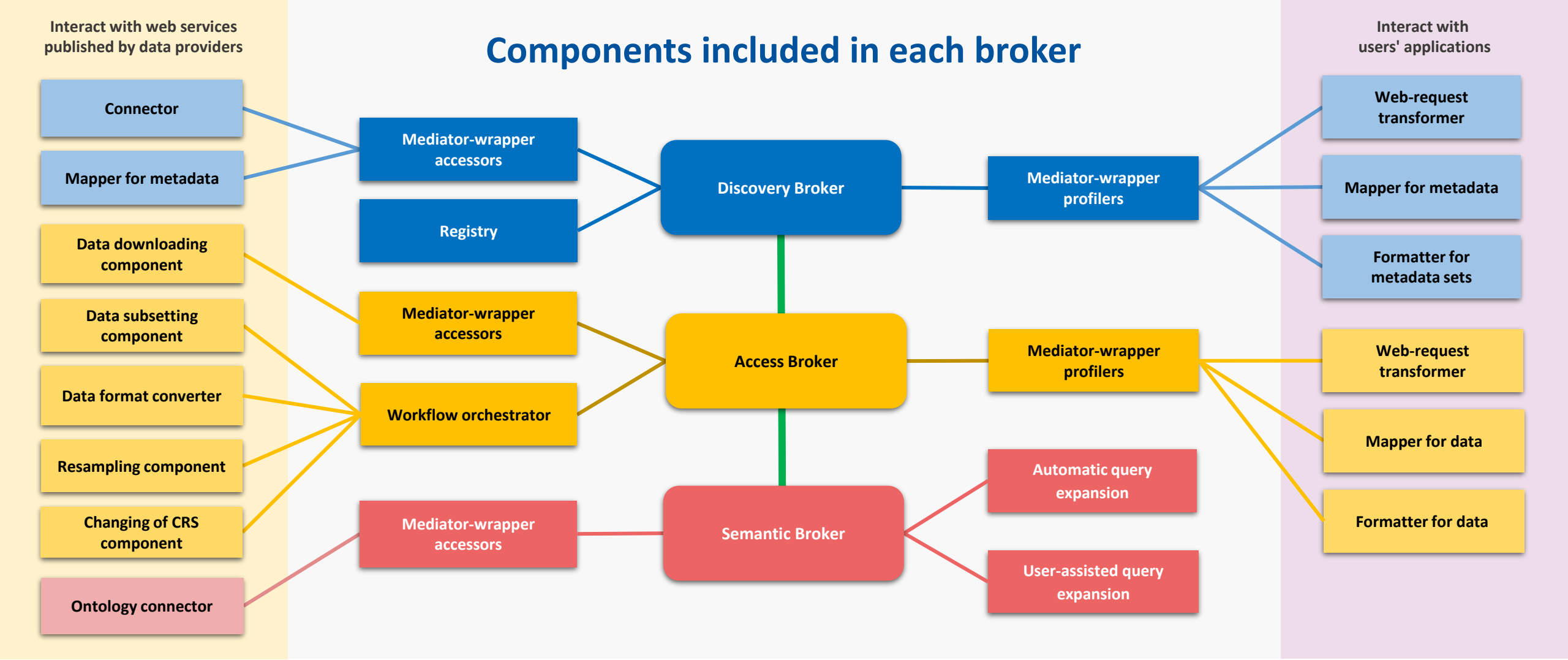
Semantic:
To **augment** user queries with additional search terms from various ontologies
To semantically **harmonize** metadata elements (e.g. metadata translation in different languages)

Access Broker

Obtain **data**

Access:
To **download** and **transform** the datasets that are the result of the discovery step

Components included in each broker



✓ Modular, flexible framework, new components can be plugged in. E.g.:

- One new **accessor** component is added to support a new **data provider** type
- One new **profiler** component is added to support a new **user application** type

DAB

cloud based
containerized and orchestrated
middleware service

kubernetes

docker

Managed and advanced by ESSI-Lab at CNR-IIA

DAB has been developed in the context of:

GENESI-DR

HMA HeterogeneousMissionsAccessibility

CEOS Water Portal

PANGAEA

TREES 4 FUTURE

GMOS Global Mercury Observation System

EMODnet European Marine Observation and Data Network

WORLD METEOROLOGICAL ORGANIZATION

ODIP

EU BON

AFRIMAISON

GEOSS EuroGEOSS A EUROPEAN APPROACH TO GEOSS

SeaDataNet

ISPRA

Blue-Cloud Piloting innovative services for Marine Research & the Blue Economy

Gestione Integrata e Interoperativa dei Dati Ambientali

NSIDC National Snow and Ice Data Center

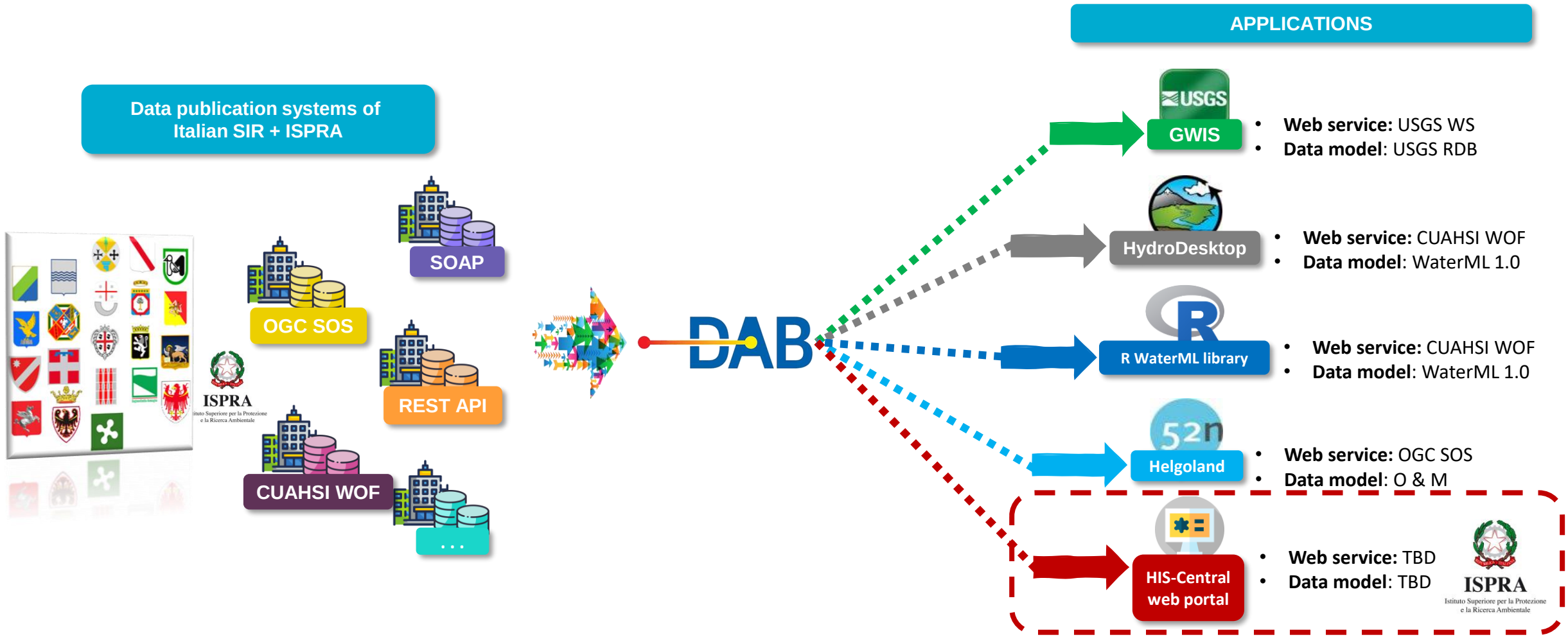
ISPRA HIS-Central

- Multi-scale hydrological data sharing (local, national, regional) **system of systems**
- Enables data sharing between:
  - Italian Regional Informative Systems (SIR) **data publication services**
  - **End user tools and applications** (in particular the HIS-Central web portal)

HIS-Central system of systems
Target for full operativity on target cloud infrastructure: 2025

ISPRA coordinates the implementation
CNR-IIA develops the brokering software framework and the user web portal
INFN develops and provides cloud services and hosts the system on its cloud
Regional Informative Systems (SIR) implement regional data publication systems

HIS-Central data flow



Provides a user-friendly entry point to discover and access HIS-Central data

Different HIS-Central user views

River discharge stations from the Po river basin

Discharge and precipitation parameters

All the stations

Custom view

HIS-Central-Po

HIS-Central-discharge-precipitation

HIS-Central-global

...

HIS-Central-XYZ

DAB

SIR 1

SIR 2

SIR 3

...

SIR 21

ISPRA

Thank you!

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