

ICOS

Integrated Carbon Observation System

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Fate of Anthropogenic CO₂ Emissions (2002-2011 average)

8.3 ± 0.4 PgC/yr **90%**



1.0 ± 0.5 PgC/yr **10%**



+

46%

4.3 ± 0.1 PgC/yr



28%

2.6 ± 0.8 PgC/yr



Calculated as the residual
of all other flux components

26%

2.5 ± 0.5 PgC/yr



Source: [Le Quéré et al. 2012](#); [Global Carbon Project 2012](#)

Tools for monitoring Greenhouse Gases

- **Inventories** (accounting = “checkbook”)
 - Emission reporting
 - Reported and “verified” offsets
- **Earth system observation approach** (validation = “bank statement”)
 - Comprehensive atmospheric observation system
 - Ecosystem and ocean observations (sinks and sources)
- **Reanalysis** (compares checkbook with bank statement)
 - Transport models
 - Assimilation
 - Regional fluxes (emission and uptake)

Modified after James Butler,
WMO/NOAA ESRL

Societal impact

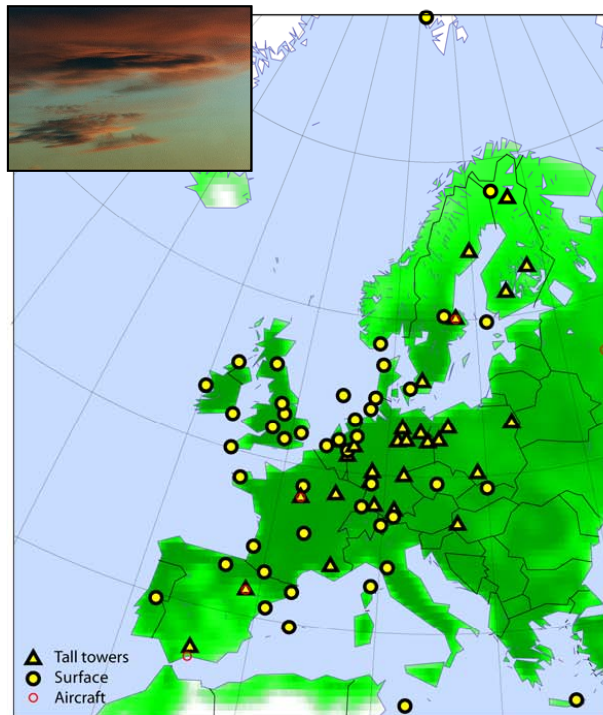
Climate negotiations at Copenhagen (COP 15)



Policy support for reducing the uncertainties on GHG inventories

ICOS – Distributed European research infrastructure

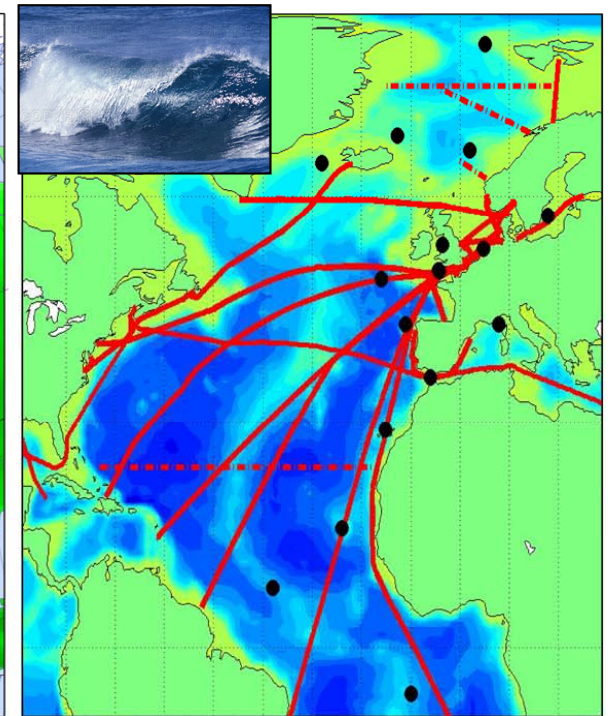
- ✓ A distributed network of stations, same sensors deployed at all stations
- ✓ Centralized data processing and distribution
- ✓ Standards compatible with international systems : GEOSS, WMO, GTOS
- ✓ Backbone data for operational flux modelling, aim to quantify regional greenhouse gas fluxes (up to 10km/daily scale)



Atmospheric network



Ecosystem network



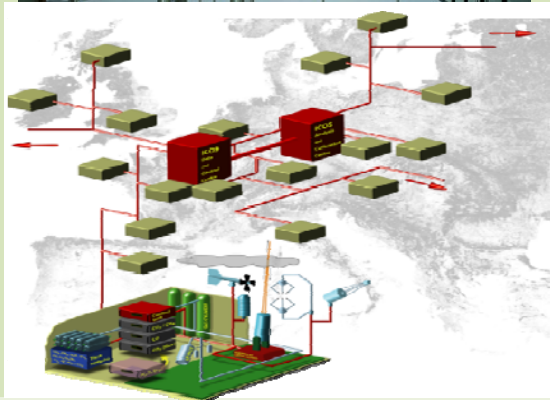
Marine network

ICOS RI Structure



ICOS ERIC

- Head Office and Carbon Portal
FI (FR) and SE (NL)



Thematic Centres

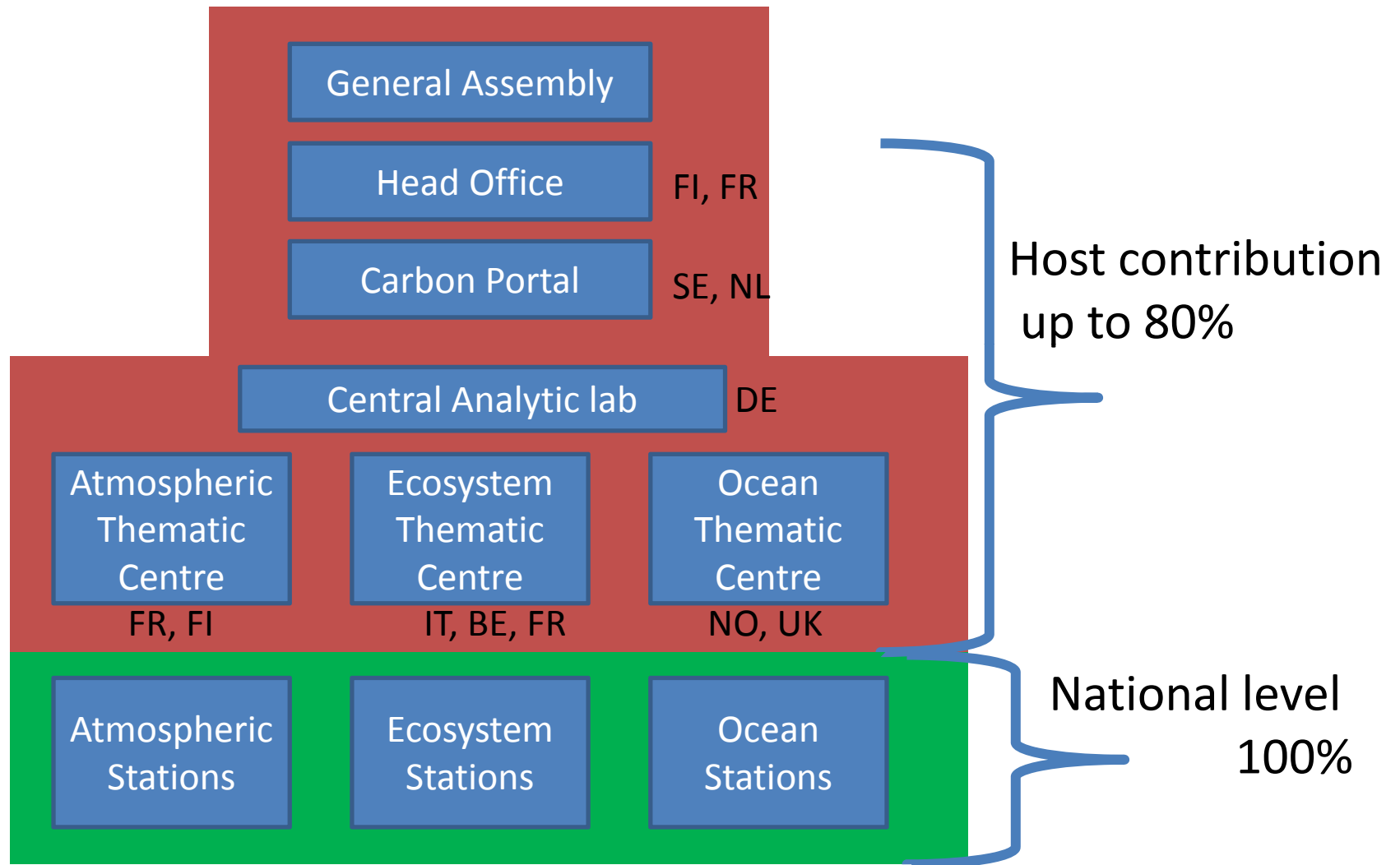
- ATC, ETC, OTC, CAL
- European level, host contributions
FR (FI), IT (BE,FR), UK,NO, DE



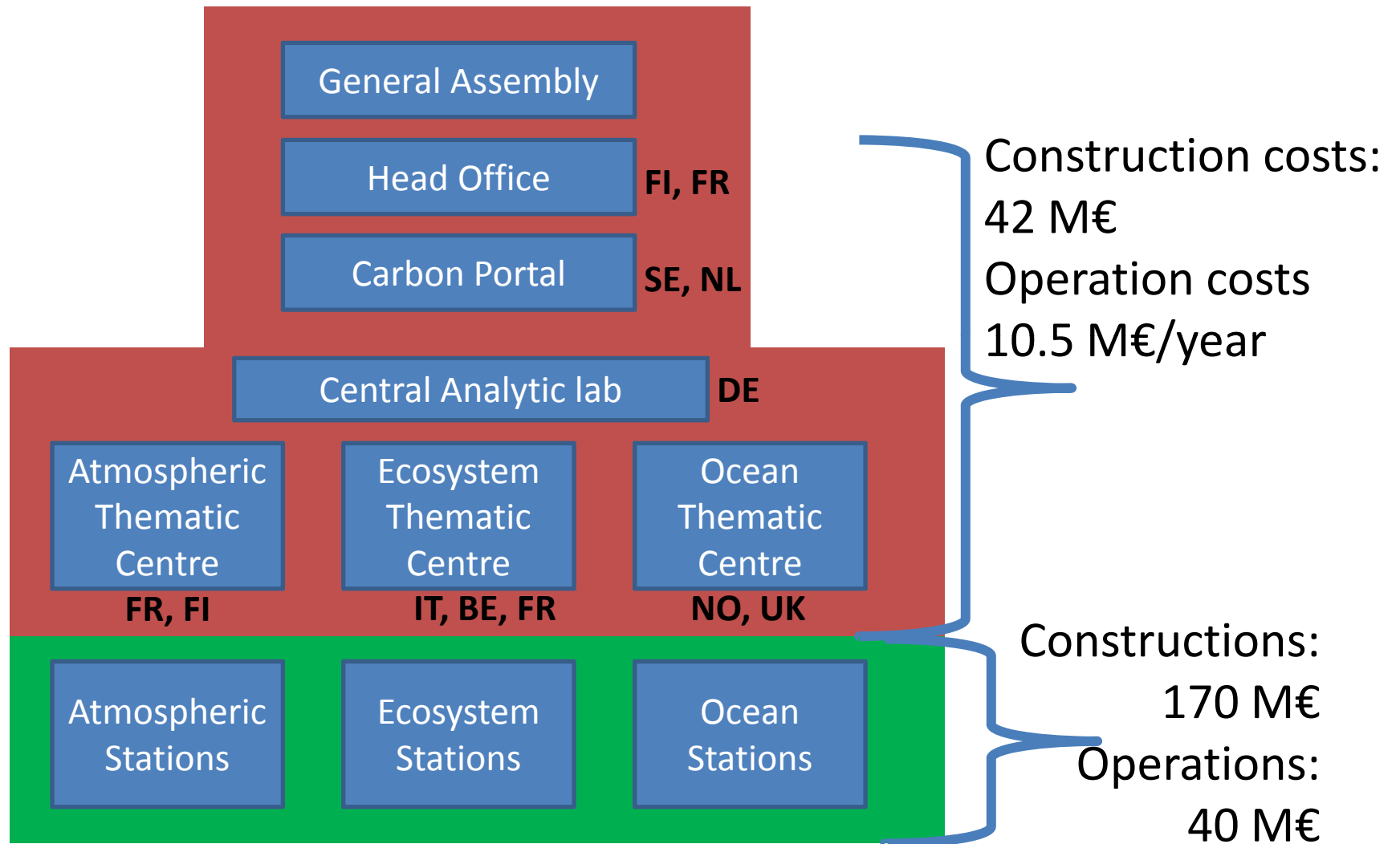
ICOS Station Network

National owned and operated
ICOS stations

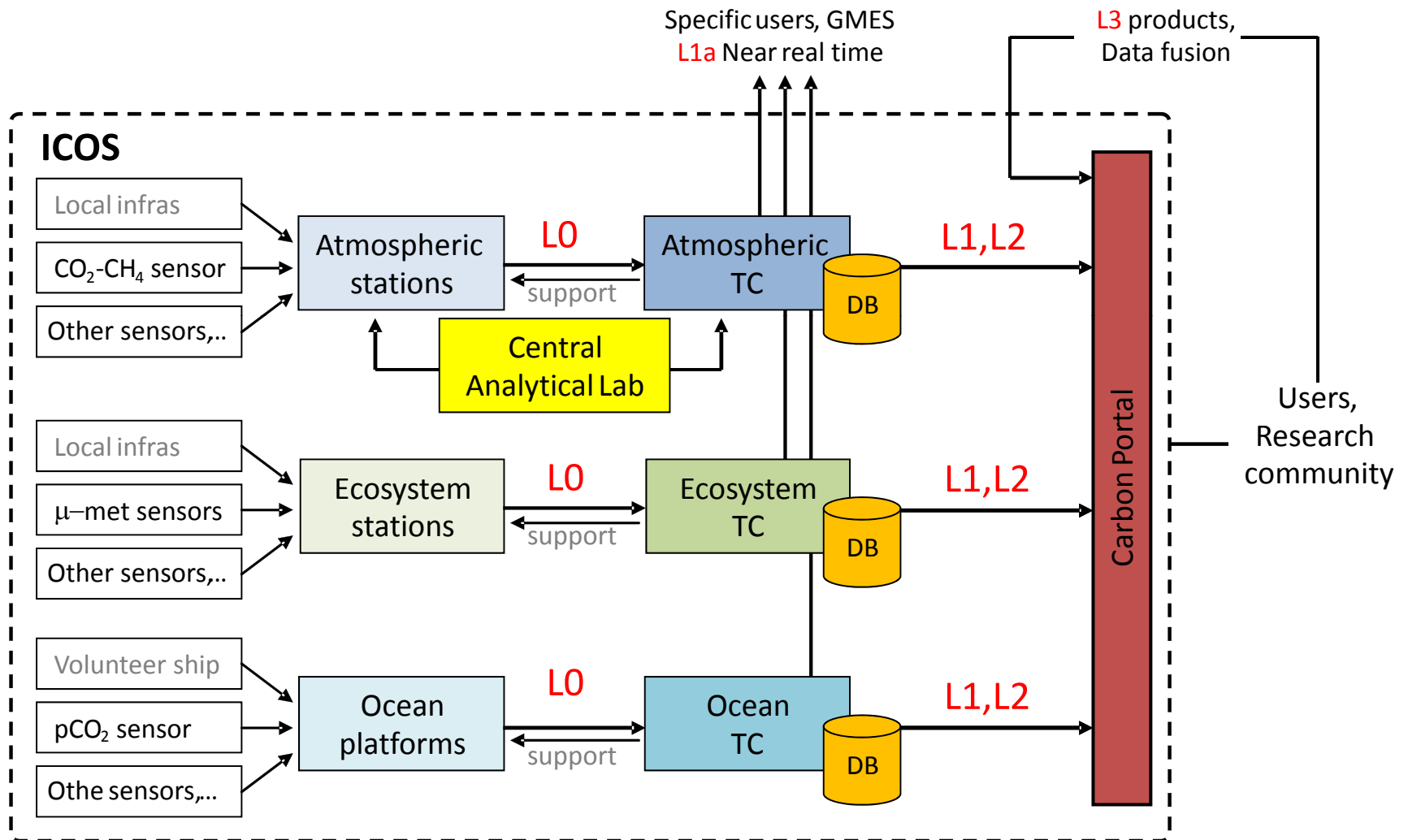
ICOS Research Infrastructure



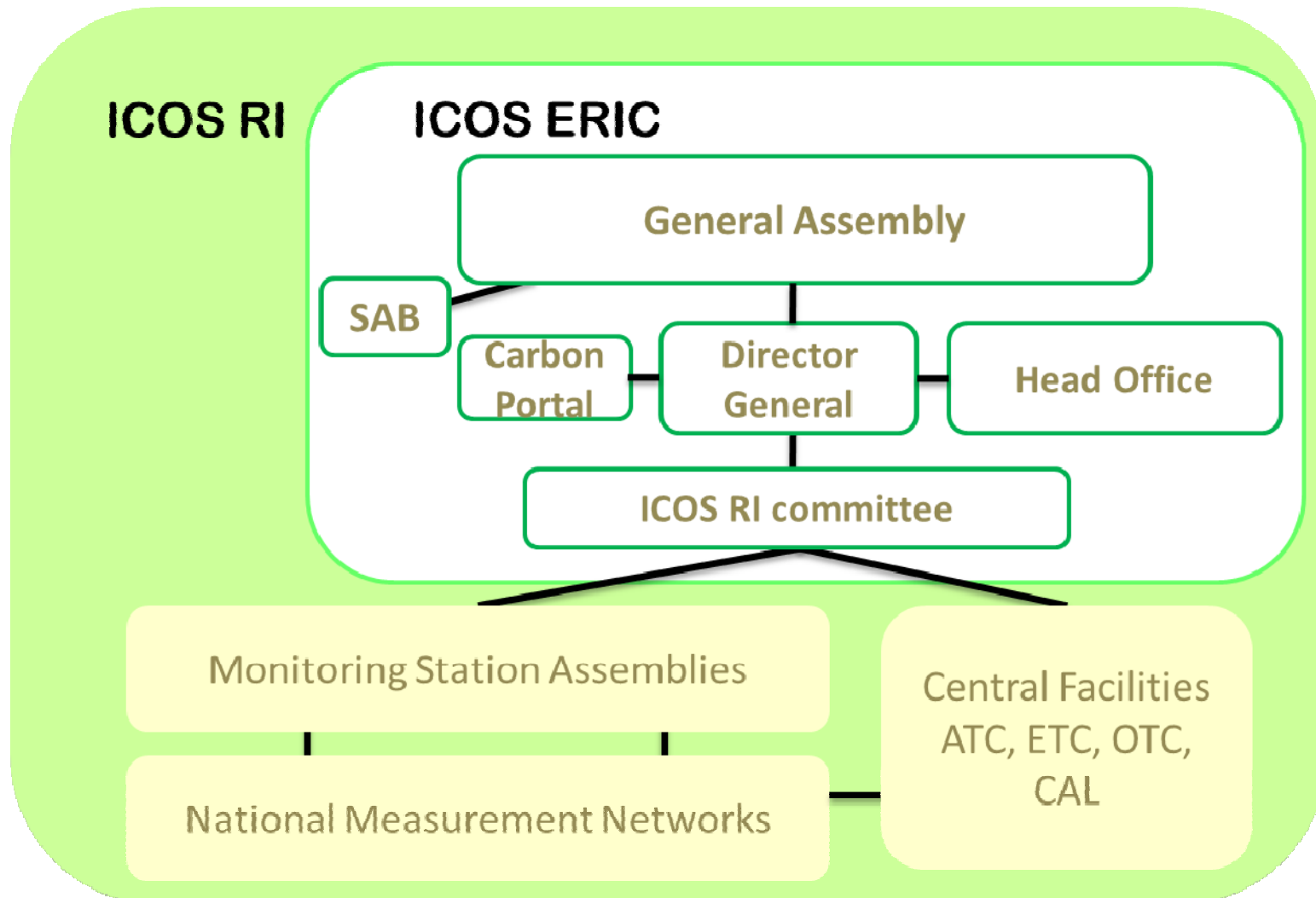
ICOS Research Infrastructure



ICOS data architecture

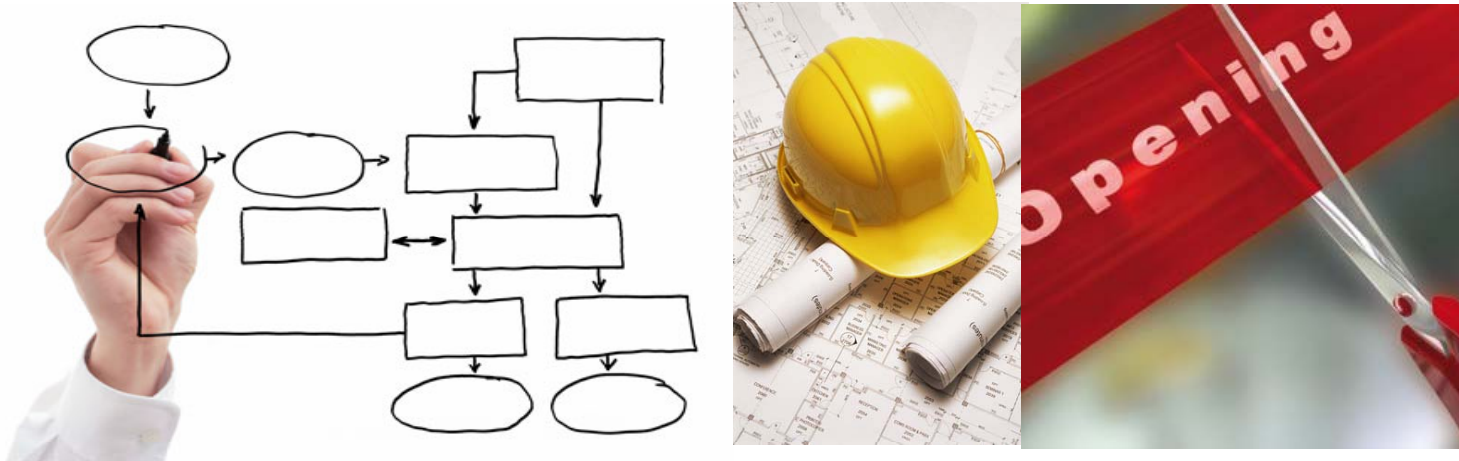


ICOS governance

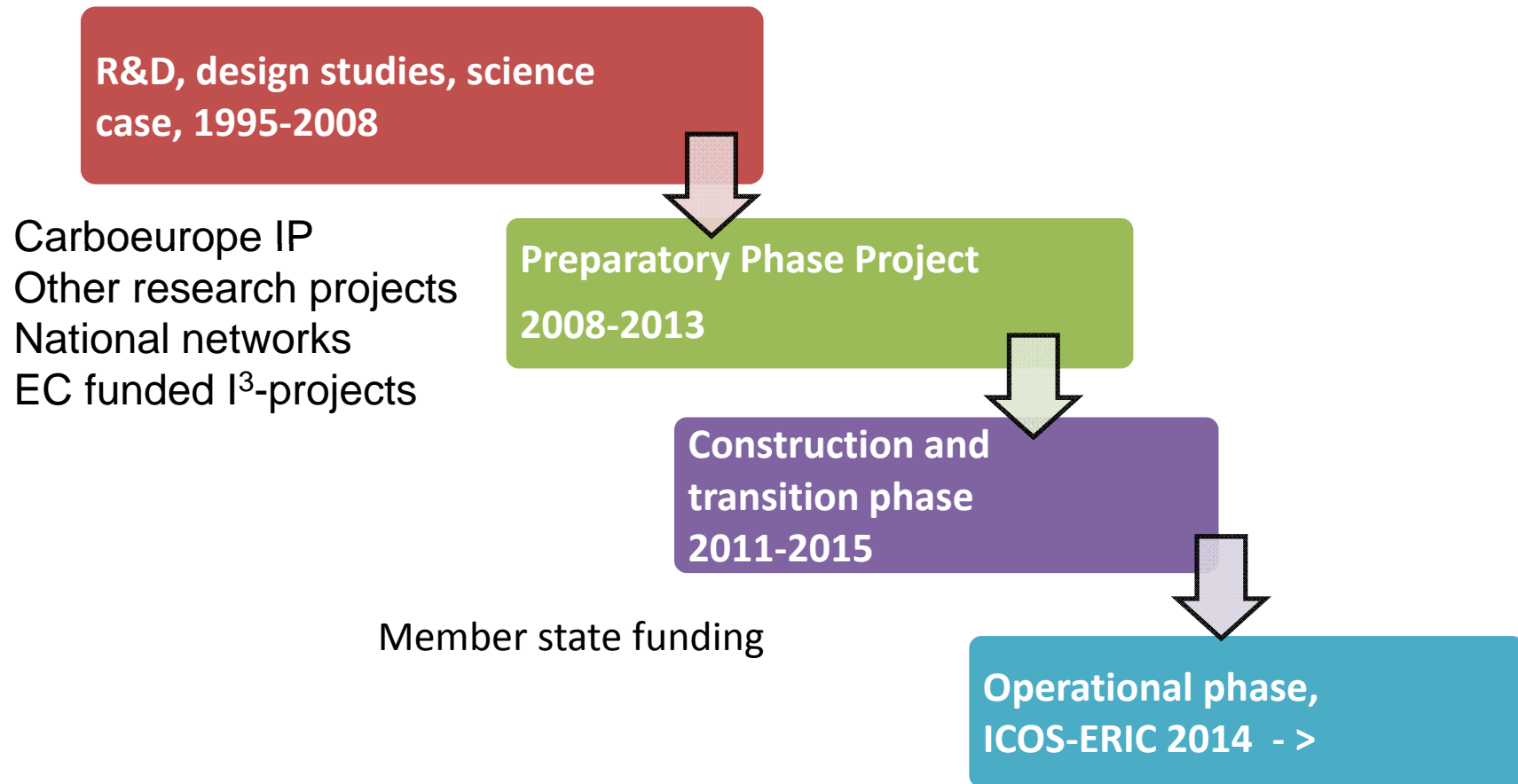


ICOS RI

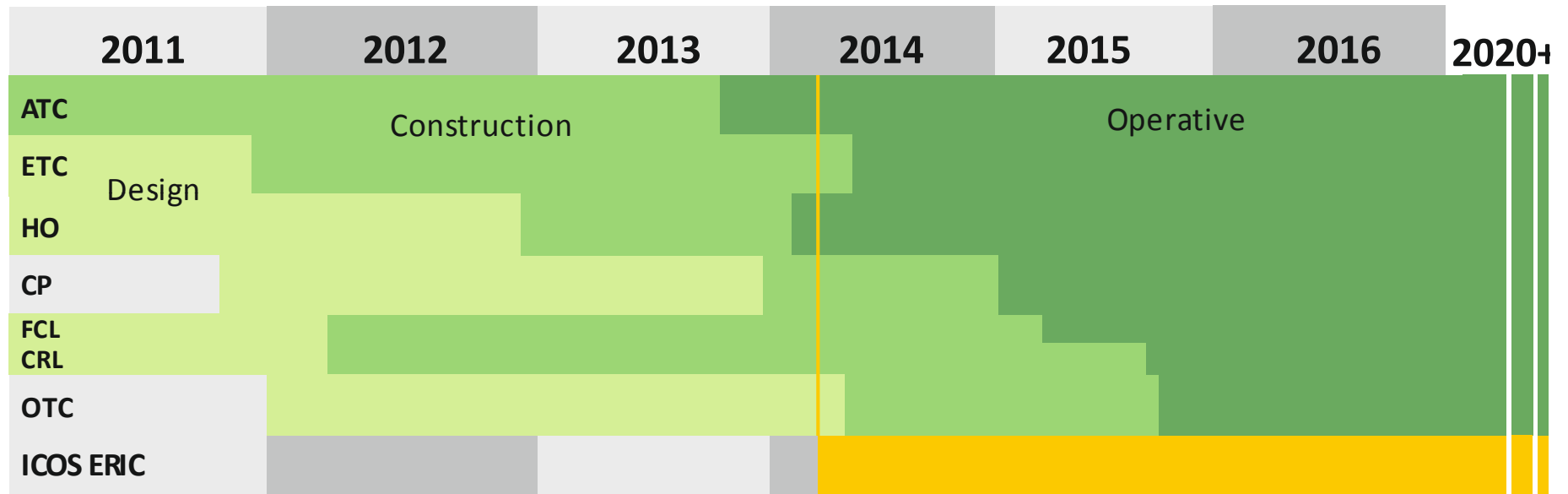
from construction to operations



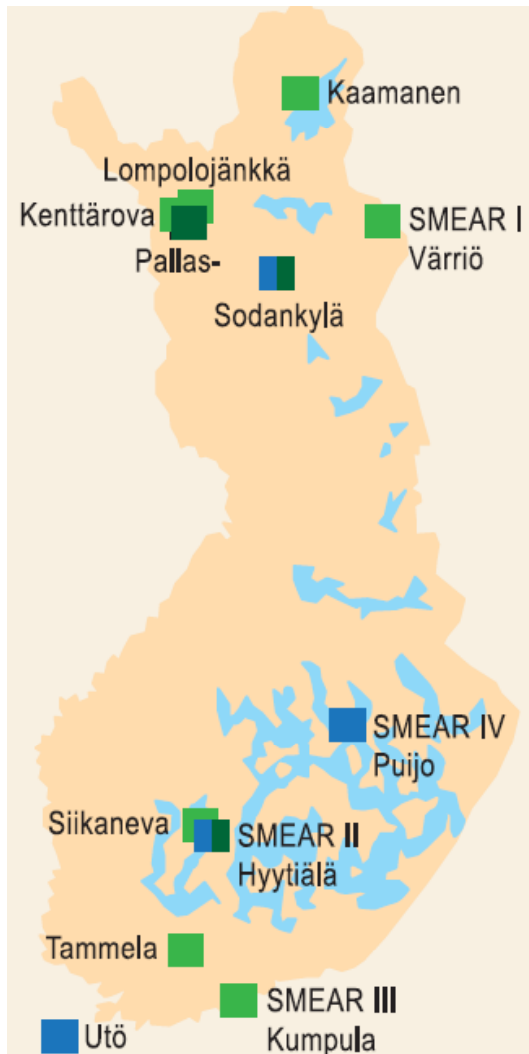
ICOS is a result of 20+ years of work



ICOS RI European implementation



ICOS in Finland



Actors:

Finnish Meteorological Institute, Univ.
Helsinki, Univ. Eastern Finland

Ministries:

Min. Education and Culture

Min. Transport and Communication

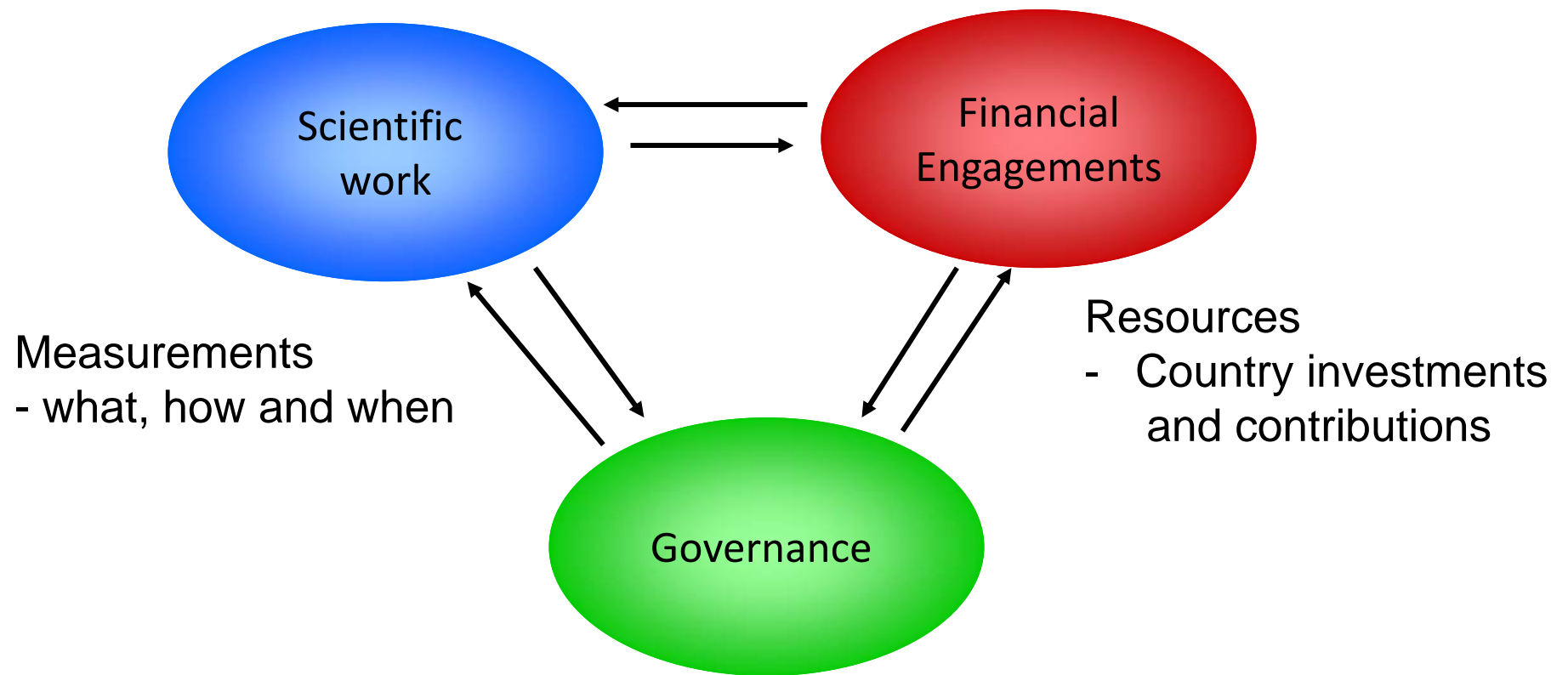
National station network

ATC Boreal node

ICOS ERIC Head Office

Experiences

Research infrastructure planning and establishment



How to organise the operations at national and European level

Big Science requires organised RIs

| Attribute | Network | Research Infrastructure |
|-----------------------|---|---|
| Science | Decisions made by scientists, creators, inventors | managers, directors, delegated |
| Design flexibility | flexible, creative | fixed, baselined |
| Fabricated by | in-house craftwork, "make" | industrial approach, "buy" |
| Team | composition predominantly scientists | scientists, engineers, accountants, project managers |
| Visibility of project | private | public |
| Project process | opaque | transparent |
| Success defined by | scientists, creators, inventors, peers | managers, reviewers, sponsors, peers |

Understanding the diversity of RIs

- Single site, distributed, virtual (usually combination)
 - Data or RI access in the center of the activities?
 - Phases of the RIs (planning, construction, initiation, full operations, upgrades,...)
- > No fixed, one-size fit for all –type of decisions/principles to be created, e.g. that 50% of operational costs need to be instruments/hardware ?!

ICOS Data policy

- more than just open and free data

- Definitions for: ICOS Data, ICOS Synthesis Data Products (internal and external), ICOS Data Related Tools, ICOS Metadata, IPR, Background IPR, Sideground IPR
- ICOS data attribution and citation (PIDs for dynamic datasets and versioning)
- ICOS Data is public data open to all Data Users, available for the Data Users via Carbon Portal
- Limitations on open ICOS data (commercial use of ICOS Data)
- ICOS Data user license
- Registry for monitoring the data downloads (reporting)
- Liability: ICOS ERIC to protect Data Providers/authors' right to the proper acknowledgement and citation, and relieve Data Providers/authors from any legal responsibilities on their behalf

Data policy - Discussion topics

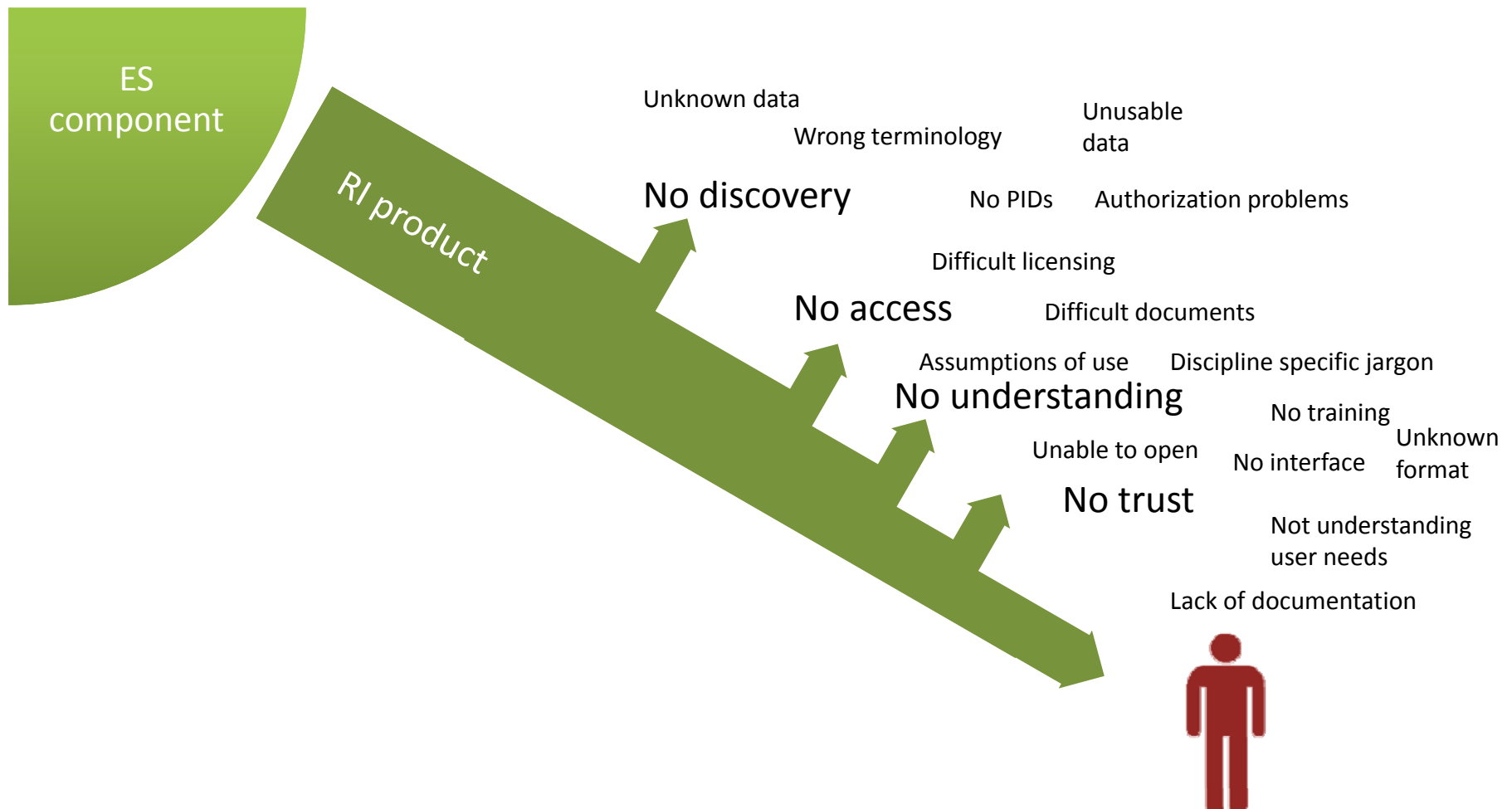
- ICOS role in providing data products?
 - How to pass/transfer the rights from Central Facilities to ERIC? (multitude countries and organisations)
 - Free data also for private sector?
 - Liability: to avoid new Climategate
-
- User perspective: multitude licenses to agree
 - Who actually have the rights on the data?
(licensing/sub-licensing - reseachers, organisations)

Technicalities

- Interoperability with other env RIs and observation systems
- PIDs and data citation
- Good license for datasets
- Common user identification



Barriers of information





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Welcome to ICOS!

Welcome to the ICOS (Integrated Carbon Observation System) website. This site provides the latest news and how to join the ICOS activities. ICOS is a European Research Infrastructure Consortium. As soon as ICOS ERIC is established, the website will be updated.

The ICOS Preparatory Phase Project web site can be accessed at [http://www.icos-eu.org](#)

More information:
<http://icos-infrastructure-transition.eu/>

Contact:
icos-admin@helsinki.fi

