

Integrated Carbon Observing System (ICOS)

Briefing Note

- [1] The purpose of this briefing note is to provide information on the:
1. Concept of the Integrated Carbon Observing System (ICOS)
 2. Organisation and management of ICOS
 3. The current status of ICOS internationally and nationally
 4. Benefits of the UK becoming a part of ICOS
 5. Current activities of the UK ICOS community
- [2] For further information on ICOS please contact Jennifer Riley (Jennifer.Riley@noc.ac.uk) the UK-ICOS project support officer.

1. Concept of the Integrated Carbon Observing System (ICOS)

- [3] The Integrated Carbon Observing System (ICOS) is a **European Research Infrastructure (RI)**. A RI refers to facilities, resources and related services used by the scientific community to conduct top-level research. RIs may be 'single-sited' (a single resource at a single location), 'distributed' (a network of distributed resources), or 'virtual' (the service is provided electronically). CERN, the world's largest particle physics laboratory is an example of a well-established research infrastructure¹.
- [4] The mission of ICOS Research Infrastructure is to enable research to **understand the greenhouse gas budgets and perturbations**.
- [5] In particular ICOS RI will work to:
- **Track carbon fluxes** in Europe and adjacent regions by monitoring the ecosystems, the atmosphere and the oceans through integrated networks.
 - **Provide the long-term observations** required to understand the present state and predict future behaviour of the global carbon cycle and greenhouse gas emissions.
 - **Monitor and assess** the effectiveness of **carbon sequestration** and/or **greenhouse gases emission reduction activities** on global atmospheric composition levels, including attribution of sources and sinks by region and sector².

2. Benefits of the UK becoming a part of ICOS

- [6] By becoming a fully paid member of ICOS member states will benefit from:
- Being part in the developments and developing cutting-edge GHG measurement techniques and processes,
 - Access to up-to-date information on the activities in ICOS RI,
 - Support in station instrumentation, protocols and training, and

¹ www.ec.europa.eu/research/infrastructures

² www.icos-infrastructure.eu

- Get measurement data in a harmonized and processed pool of open world class GHG database.
- Access to EU capital funding available through the EU Infrastructure Roadmap³
- Access to national capital funding available through the UK RI roadmap⁴

More specifically the UK will benefit in two ways:

- 1) Individual sites will have access to the EU infrastructure on a site by site basis
- 2) The UK as a whole will play a part in the allocation of capital and GHG accounting at an EU level.

3. Organisation and management of ICOS

Organisation

[7] There are multiple organisational layers within ICOS to produce, manage, quality control and archive the scientific data produced (Figure 1).

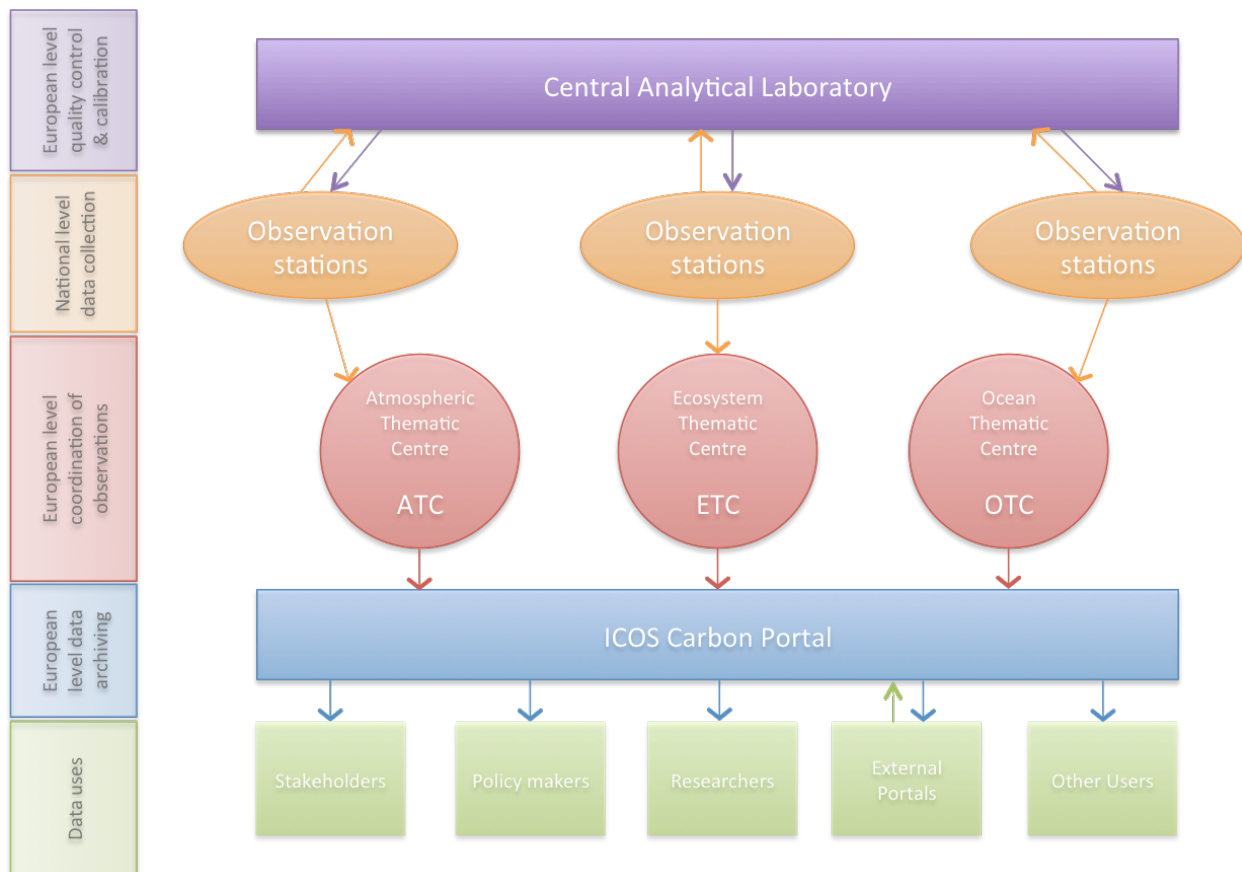


Figure 1 ICOS Organisational Structure

[8] The scientific data underpinning ICOS RI is *integrated across national networks* of:

³ www.ec.europa.eu/research/infrastructures/index_en.cfm?pg=esfri-roadmap

⁴ www.rcuk.ac.uk/RCUK-prod/assets/documents/publications/RCUKFrameworkforCapitalInvestment2012.pdf

- **Atmospheric stations:** established to continuously measure the variability in greenhouse gas (CO₂, CH₄, N₂O) concentration due to regional and global fluxes. The atmospheric network will have more than 30 sites, considered as the backbone of the infrastructure,
- **Ecosystem Stations:** built for monitoring the functioning of land ecosystems and the exchange of energy and greenhouse gases between the ecosystems and the atmosphere, The Ecosystem network will consist of 40-60 observation sites employing a standardized set of measurement techniques and instruments, and
- **Marine observations:** will provide the long-term oceanic measurements required to understand the present state and predict future behaviour of the global carbon cycle and climate-relevant gas emissions. A network of ships and fixed stations will be monitoring carbon exchange between the surface ocean and the atmosphere, acidification of oceans, surface temperature, salinity and other variables.

[9] The **Central Analytical Laboratory (CAL)** ensures the accuracy of observational data, thorough quality control and routine testing of air sampling material. It provides reference gases for calibration of in-situ measurements performed at the continuous monitoring stations. It also analyses air samples collected at the monitoring stations. CAL is hosted by Germany.

[10] The **Atmospheric, Ecosystem and Ocean Thematic Centres (ATC, ETC, OTC)** coordinate, standardise protocols, and **quality control** data produced from national observation stations submitted to the ICOS RI.

[11] The **ICOS Carbon Portal⁵ is a central data archive** for all ICOS quality controlled data coordinated through the Thematic Centres. The ICOS Carbon Portal offers **easy access to research data** from ICOS scientists all over Europe, as well **science and education products**, including visualizations of and flux maps in time and space, and material for policy makers, educators and outreach.

[12] The CAL, ATC, ETC, OTC and the Carbon Portal are central ICOS facilities, available to all paying ICOS members.

Management

[13] ICOS is managed on a tiered basis by various different nations (Figure 2). The ICOS RI is managed centrally from the head office in Helsinki, Finland. Each Thematic Centre also has its own leadership, ensuring that all observations are coordinated at a European Level. The thematic centres are hosted by groups of nations/institutions:

- **Atmospheric Thematic Centre:**
France: Laboratory of Climate Sciences and the Environment

⁵ www.icos-cp.eu

- **Ecosystem Thematic Centre**
Italy: University of Tuscia, euro-Mediterranean Centre on Climate Change
Belgium: University of Antwerp
France: French National Institute for Agricultural Research
- **Ocean Thematic Centre**
Norway: University of Bergen, Uni Research
UK: National Oceanography Centre, Uni. of Exeter, Plymouth Marine Laboratory
Germany: GEOMAR Helmholtz Centre for Ocean Research

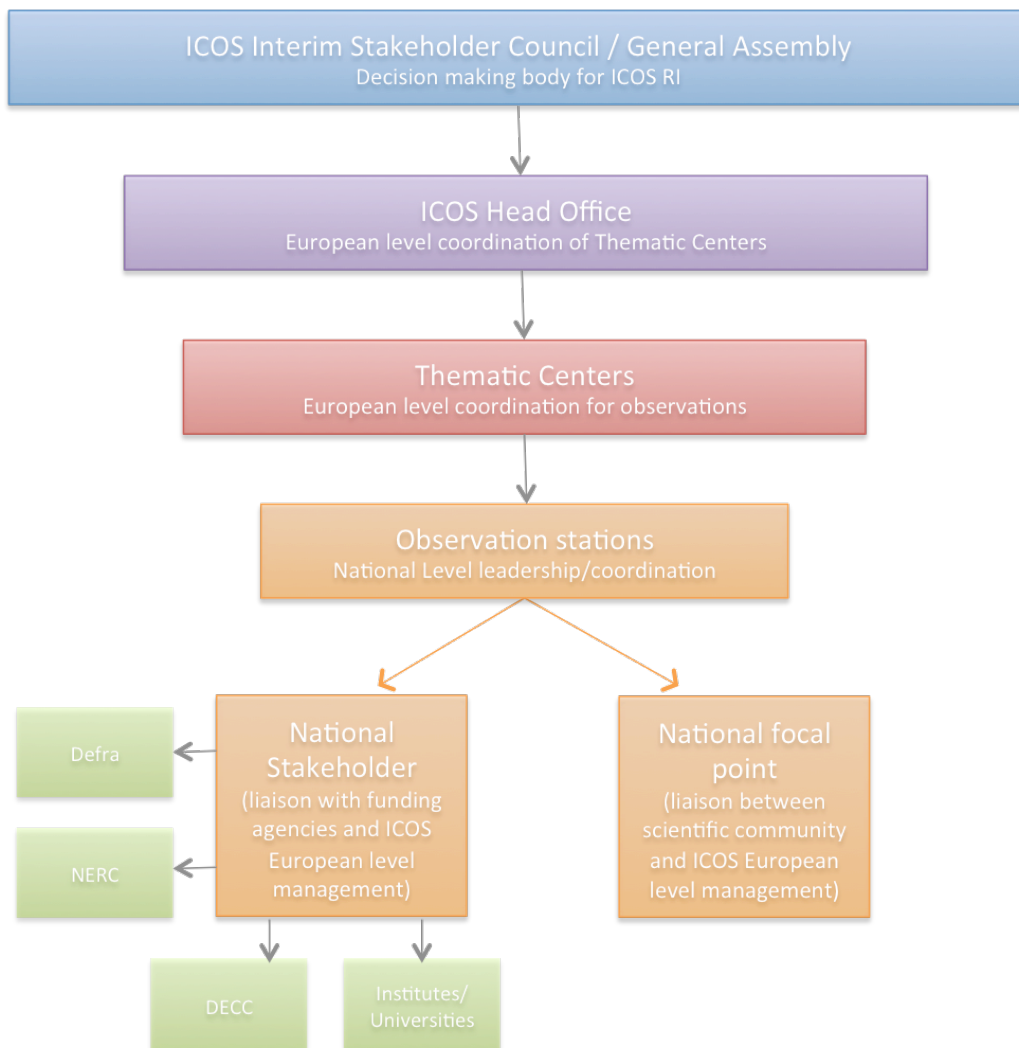


Figure 2 ICOS Management

[14] **Nationally there are two management positions, the Focal Point and the Stakeholder.** The National Focal Point is an individual recognised by the community to be the main communication point between the ICOS Thematic Centre and Head Office. Specifically the National Focal Point:

- Coordinates the ICOS activities in the country,
- Relays information about ICOS RI activities to the researchers and station operators,
- Should be able to find the right funding agencies, and
- Should be willing and capable of negotiating with the stakeholders to find resources for sustainable ICOS activities in the country.

The **UK National Focal Point is Professor Andrew Watson** (University of Exeter).

- [15] The National Stakeholder is a representative of the country who can liaise between the national funding agencies (NERC, Defra, DECC), the ICOS Thematic Centres and Head Office. The National Stakeholder is also eligible to attend the ICOS Stakeholders Interim Council/General Assembly (the decision making body of ICOS). The **UK National Stakeholder is Professor Richard Sanders** (National Oceanography Centre).

4. The current status of ICOS internationally and nationally in the UK

- [16] **Internationally ICOS is in the process of gaining status as a European legal entity** (an ERIC; European Research Infrastructure Consortium)⁶, as set by the European Commission 2009 (Council Regulation n° 723/2009). ERIC is a specific legal form designed to facilitate the joint establishment and operation of research infrastructures of European interest. The ICOS ERIC has been negotiated among the European countries and submitted to the European Commission for considerations.
- [17] **Membership of ICOS is based on member state subscriptions.** National subscriptions help to pay for the central ICOS facilities including the CAL, and the Carbon Portal (Figure 1, section 2) as well as the ICOS head office (Figure 2, section 3).
- [18] As a nation committed to the management of the OTC (section 3), **the UK is committed to paying membership to ICOS for the first 5 years (2015-2019).**
- [19] In January 2015 the ocean, atmosphere and ecosystem scientific communities came together at a Greenhouse Gas Townhall meeting held at the National Oceanography Centre. The aim of this workshop was to look for priority research questions, overlapping the three fields, which could act as coordination points for future scientific programmes (see appendix 1 for Greenhouse Gas Townhall Meeting agenda).
- [20] This workshop facilitated the **formation of a UK-ICOS committee**, a group of individuals from across the three disciplines interested in better coordinating both GHG observations and ICOS in the UK. The first meeting of this committee immediately followed the workshop and allowed a first discussion of how the UK should interact with ICOS.
- [21] The **second UK-ICOS meeting** will be held on 31st March and will discuss **which atmospheric, ecosystem and oceanic stations should be submitted to ICOS by the UK.** (See appendix 2 for the 2nd UK-ICOS meeting agenda)

⁶ www.ec.europa.eu/research/infrastructures/index_en.cfm?pg=eric1

- [22] In order to ensure longer-term coordination of ICOS in the UK, it is anticipated that the following actions will be undertaken/achieved:
- Establishment of a dedicated funding stream for coordination of UK-ICOS activities (via National Capability bid)
 - Establishing a funding stream from DECC, Defra, NERC for funding the UK-ICOS station submissions,
 - Updating of a UK-ICOS database,
 - Update of the current UK-ICOS web pages⁷,
 - Regular meetings of the UK-ICOS committee.

⁷ www.icos-infrastructure.co.uk/