FEDERATED BUT UNITED

Exploring user needs and community building in the environmental domain

Project team: Poppy Townsend, Ola Podgorska, Carl Watson, Maura Halstead, Monica Hanley, Matthew McCormack, Jennifer Bulpett, Louise Darroch

Friday 27th February 2025, NFCS Spring Conference, Bristol

eds.ukri.org/projects/united

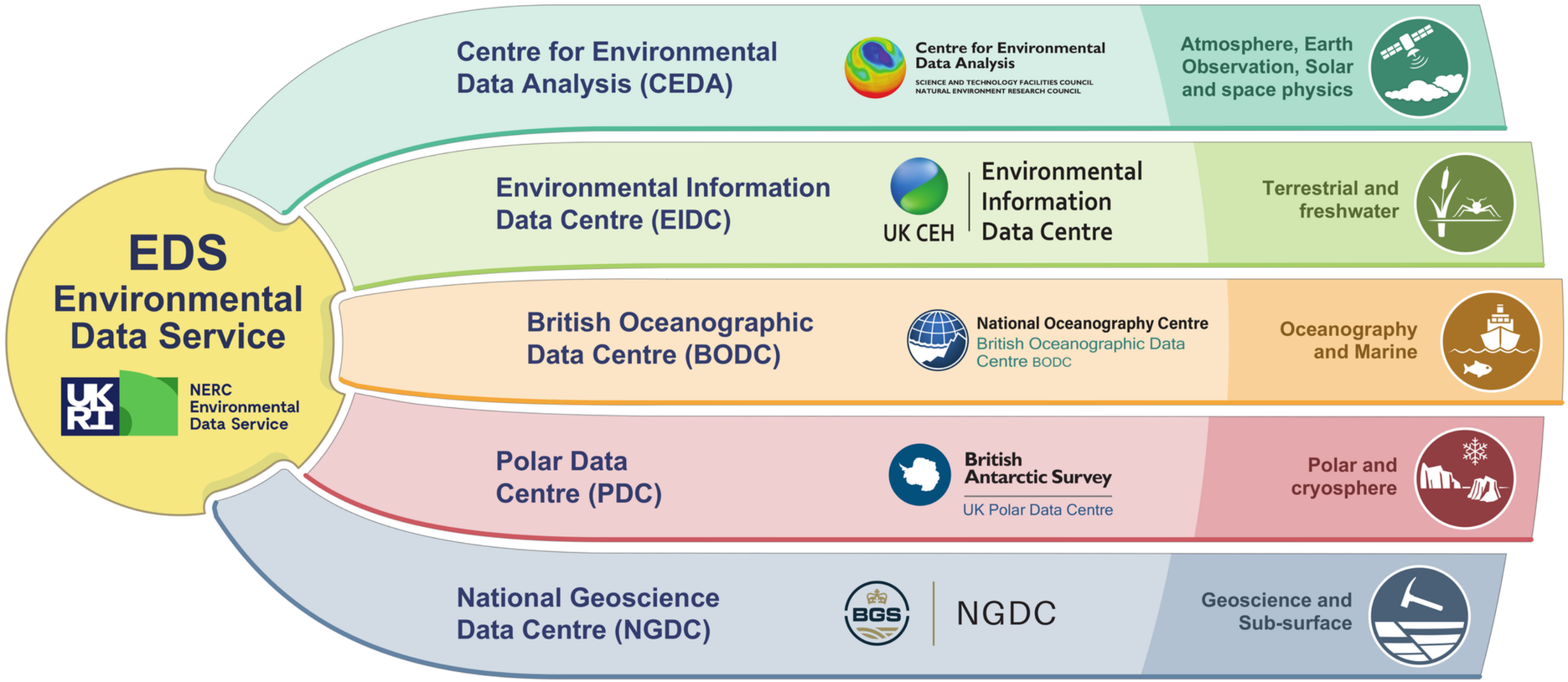
UNITED project

User **N**eeds **I**nformed **T**echnologies for **E**nvironmental **D**ata

A trusted UK facility providing data stewardship services ensuring environmental data of long-term value are findable, accessible, interoperable and reusable (FAIR)

NERC Environmental Data Service

Context setting: *our environmental expertise*



Types of expertise:

- data management and engineering
- software and development
- user experience and service design
- project management
- communications and engagement

eds.ukri.org/projects/united

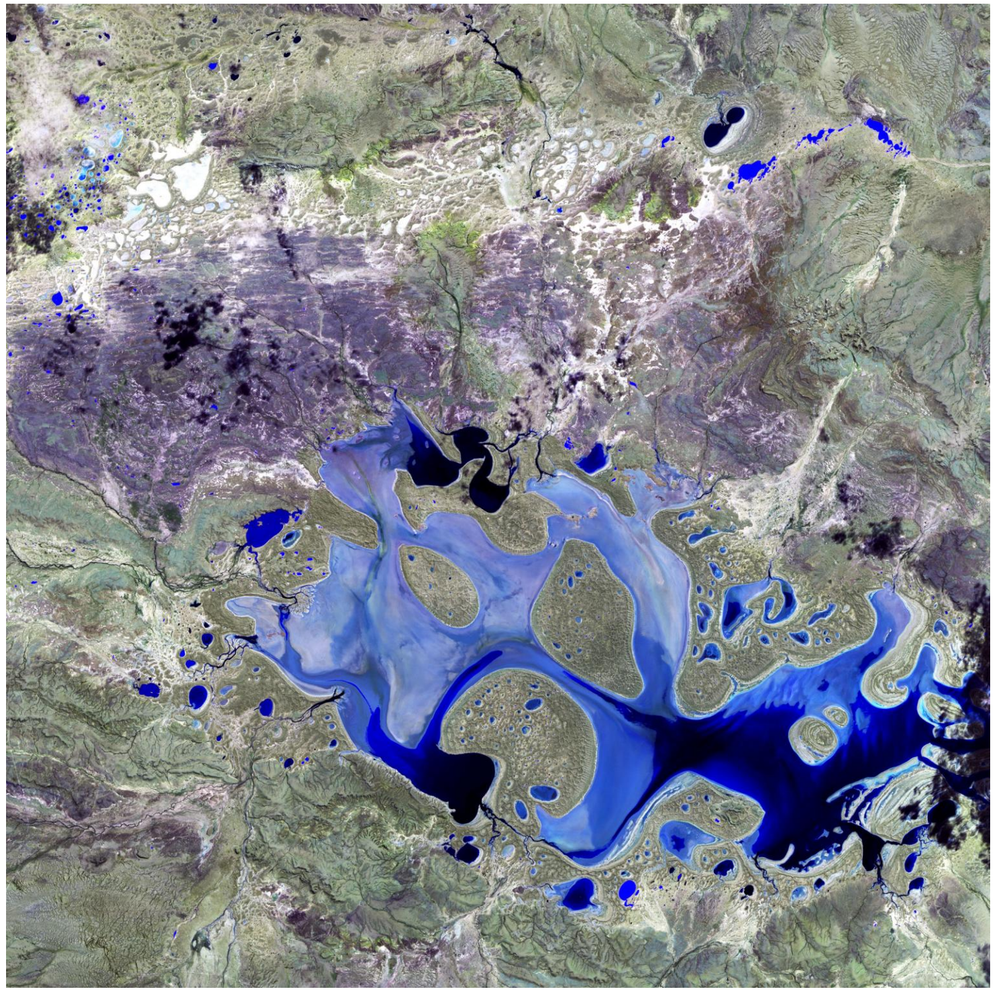
National Oceanography Centre | British Oceanographic Data Centre | British Geological Survey | Centre for Environmental Data Analysis | The University of Manchester

Contact: poppy.townsend@stfc.ac.uk

National Federated Compute Services NetworkPlus

Why focus on environmental science?

- Multi-disciplinary - naturally requires federation and community building
- Large diversity of stakeholders - both internal and external
- We have existing federated teams, services, and communities – use as case studies

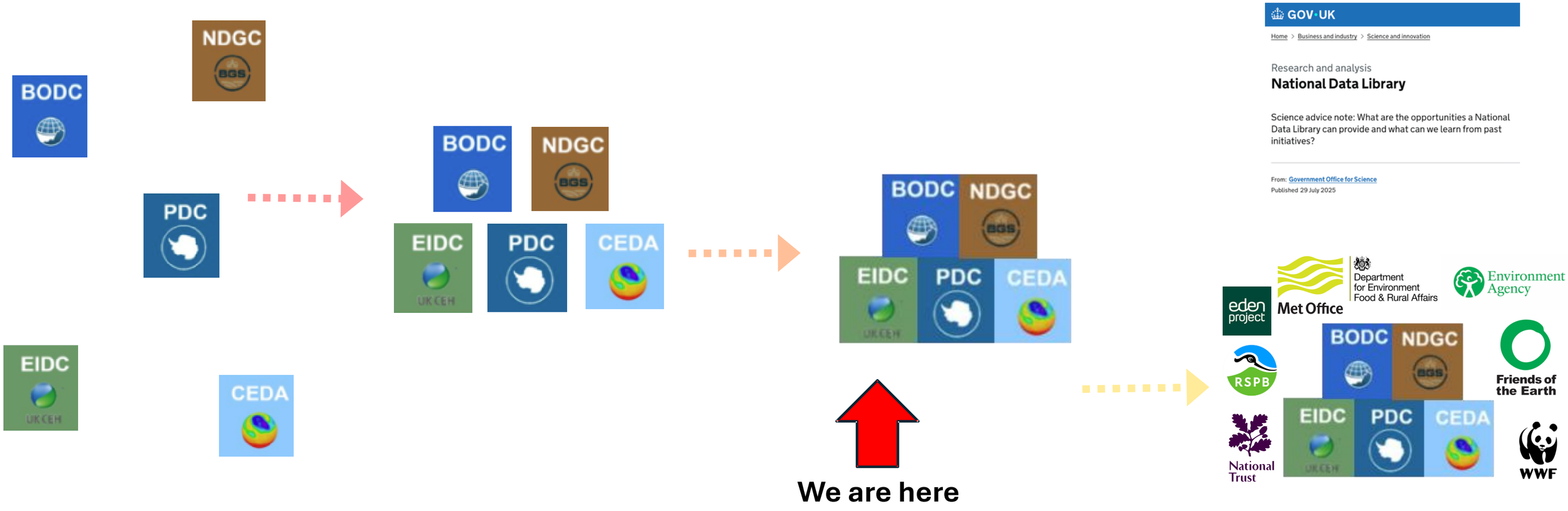


eds.ukri.org/projects/united

Contact: poppy.townsend@stfc.ac.uk

Evolution of the Environmental Data Service

Separate → Thin layer of integration → Integrated EDS service → Integrating beyond EDS



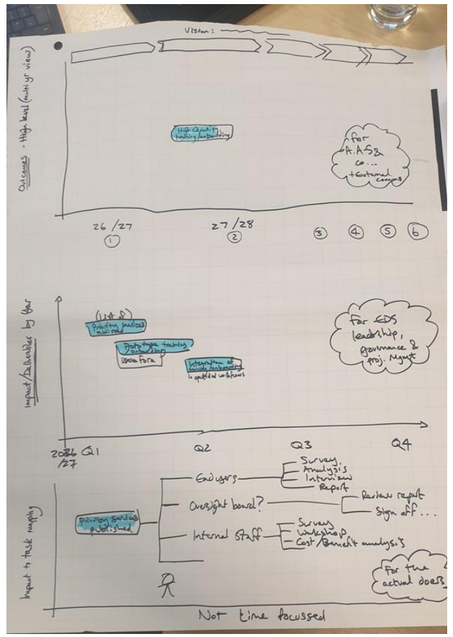
Contact: poppy.townsend@stfc.ac.uk

Our roadmap

Roadmap year 1 - milestones in black are funded by the commission, in blue by DRI Phase 1b, red signifies unfunded aspirations

Objective	EDS governance & management	Service delivery and data governance	User engagement	Training	Innovation
Milestones	New effective Governance and management structure in place (DCM1, IM1) To include: • EDS Management Board • Recruitment of EDS Integration and Engagement Lead • Mechanism for seconding staff to EDS hub activities • Agreement of annual reporting structure and content • Review of appropriate accreditation schemes • EDS-AG established	Deliver excellent core services that meet user needs (essential underpinning activity) Move towards use of common standards, practices (P&SM1) and tools (A&I1) where possible To include: • Review, harmonisation and publication of polices, procedures and guidance documents • Use of the Digital Stewardship Wizard for data management planning • Update DOI policy	Mechanism put in place to ensure user views are integral in the design of new systems and processes (SEE1) To include: • Set up EDS advisory group • Set up user fora for each data centre Engagement with users emphasising the importance of contributor credit and data citation (SEE2) To include: • Publication of updated DOI policy and guidance • Communication about this and associated UKRI Open Research policy to users • EDS stakeholder engagement strategy and plan	Harmonisation of user support and training (SEE3) To include: • Review of training needs and provision that is common across the EDS • Further development of the EDS website as a single point of entry for users Begin planning of career development pathways and training for EDS staff to ensure they have skills needed to support long term ambitions of EDS	Evolution of the EDS to utilise and meet demands of new technologies and techniques (A&I2, A&D1, A&D2) To include: • Review of existing standards for sensor Networks and recommend those to be adopted by EDS • Initial roadmap for an EDS data commons • Trials of technologies, standards and architectures needed for an EDS data commons • Prototype design for environmental TRE on JASMIN
Outcomes towards the five objectives	Clear governance and management structure in place, understood and supported by all	Increase in common policies and procedures across EDS, so that it is increasingly seen as a single federated service	Better understanding across EDS of wide variety of user needs	EDS has knowledge required to develop an EDS training package for users	EDS is beginning to respond proactively to new technologies
Factors that may influence the roadmap	• Outcomes of DRI 1b WP 1 - the roadmap for an EDS Data Commons (Oct 23)	• Outcomes of DRI 1b WP 1 and WP 2 • Digital Solutions metadata review	• Outcomes of DRI 1b WP4 use cases • Reports from Digital Solutions user engagement events	• DM Training programmes run by others • RDA interest group on professionalising data stewardship	• Reports from other relevant NERC groups e.g. digital twins, net zero, RDA groups, NZARC (Net zero airborne capability)

- Single internal document
- Varying granularity
- Top down - created by management
- Driven by technical and funding requirements



- Open access
- Different levels of detail for different audiences
- **Co-created** with key stakeholders following best practice
- Regularly updated
- Driven by **user needs**, technical and funding requirements

eds.ukri.org/projects/united

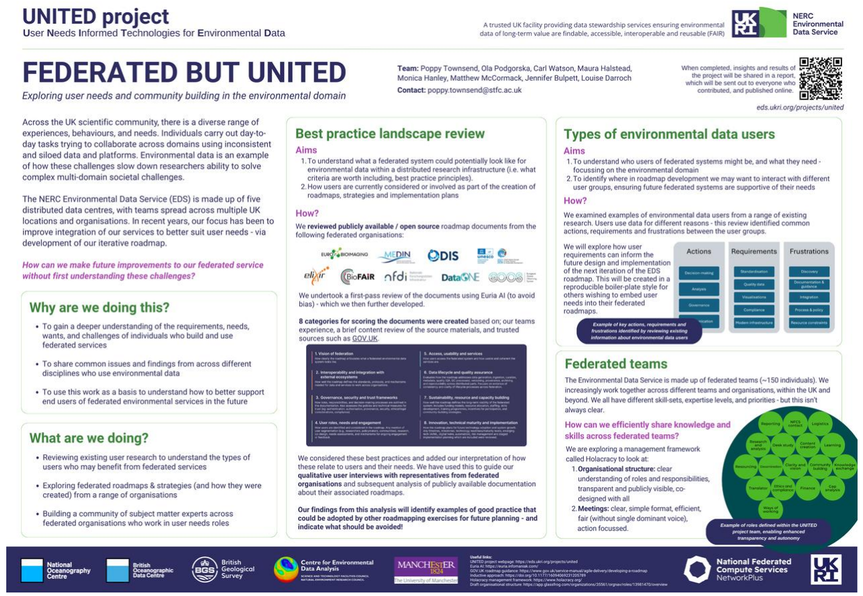
Contact: poppy.townsend@stfc.ac.uk

Three key areas explored in the UNITED project:

- best practice landscape review of federated roadmaps - specifically how users are considered
- community building and federated teams
- types of users of federated environmental services

We will apply the findings by creating a new version of the EDS roadmap.

We hope others can learn and use the processes of developing our roadmap/ways of working as examples for other federated communities (like NFCS)



More details in our poster!

eds.ukri.org/projects/united

UNITED project

User **N**eeds **I**nformed **T**echnologies for **E**nvironmental **D**ata

A trusted UK facility providing data stewardship services ensuring environmental data of long-term value are findable, accessible, interoperable and reusable (FAIR)

NERC Environmental Data Service

Best practice landscape review: *consideration of users*

Identified 8 categories that make up a successful federated roadmap

1. Vision of federation
How clearly the roadmap articulates what a federated environmental data system looks like.

2. Interoperability and integration with external ecosystems
How well the roadmap defines the standards, protocols, and mechanisms needed for data and services to work across organisations.

3. Governance, security and trust frameworks
How roles, responsibilities, and decision-making processes are outlined in the documentation. Also assesses the policies and technical measures for trust (eg: authentication, authorisation, provenance, security, ethical/legal considerations, compliance).

4. User roles, needs and engagement
How users are identified and considered in the roadmap. Any mention of user segmentation (e.g., researchers, policymakers, communities), research, co-design, needs assessments, and mechanisms for ongoing engagement or feedback.

5. Access, usability and services
How users access the federated system and how usable and coherent the services are.

6. Data lifecycle and quality assurance
Evaluates how the roadmap addresses data generation, ingestion, curation, metadata, quality (QA, QC processes), versioning, provenance, archiving, and reproducibility across distributed parts. Focuses on evidence of consistency and clarity of lifecycle processes across federation.

7. Sustainability, resource and capacity building
How well the roadmap defines the long-term viability of the federated system. Includes funding models, resource allocation, staffing, skills development, training programmes, incentives for participation, and community-building strategies.

8. Innovation, technical maturity and implementation
How the roadmap plans for future technology adoption and system growth. Any timelines, milestones, technology readiness/maturity levels, emerging tech (AI/ML, digital twins, automation), risk management and staged implementation planning which are included were reviewed.

Conversations with representatives from federated organisations, reviewing their open source roadmap documents

We will identify examples of good practice that could be adopted by other roadmapping exercises (and what to avoid!)

eds.ukri.org/projects/united

National Oceanography Centre
British Oceanographic Data Centre
British Geological Survey
Centre for Environmental Data Analysis
The University of Manchester
Contact: poppy.townsend@stfc.ac.uk
National Federated Compute Services NetworkPlus

Community building: *federated teams*

Example of roles defined within the UNITED project team, enabling enhanced transparency and autonomy

The EDS is made up of federated teams (~150 individuals)

- work together across teams and organisations, within UK and beyond
- different skill-sets, expertise levels, and priorities - but this isn't always clear.

Experimenting with ways to:

- clarify roles and responsibilities
- enhance transparency and autonomy

tinyurl.com/eds-roles

eds.ukri.org/projects/united

Community building: *international*

Is there international interest in building a community of subject matter experts in user needs?

Join the discussion at the Research Data Alliance online plenary

tinyurl.com/rda-eds

Thu 19 March 2026 13:30-15:00

Understanding User Needs: How Can Research Data Experts Learn From Each Other?

Plenary: RDA's 26th Plenary

Session Abstract

Meeting objectives

- To explore user-centred approaches used by the RDA community to enhance research data services
- To introduce recent work undertaken in this area by the five data centres in the UK's Environmental Data Service
- To understand any skills gaps in this area (including frustrations and challenges)
- To decide if there is the desire for any continued discussions (and how)
- To indicate preferred scope of future discussions

eds.ukri.org/projects/united

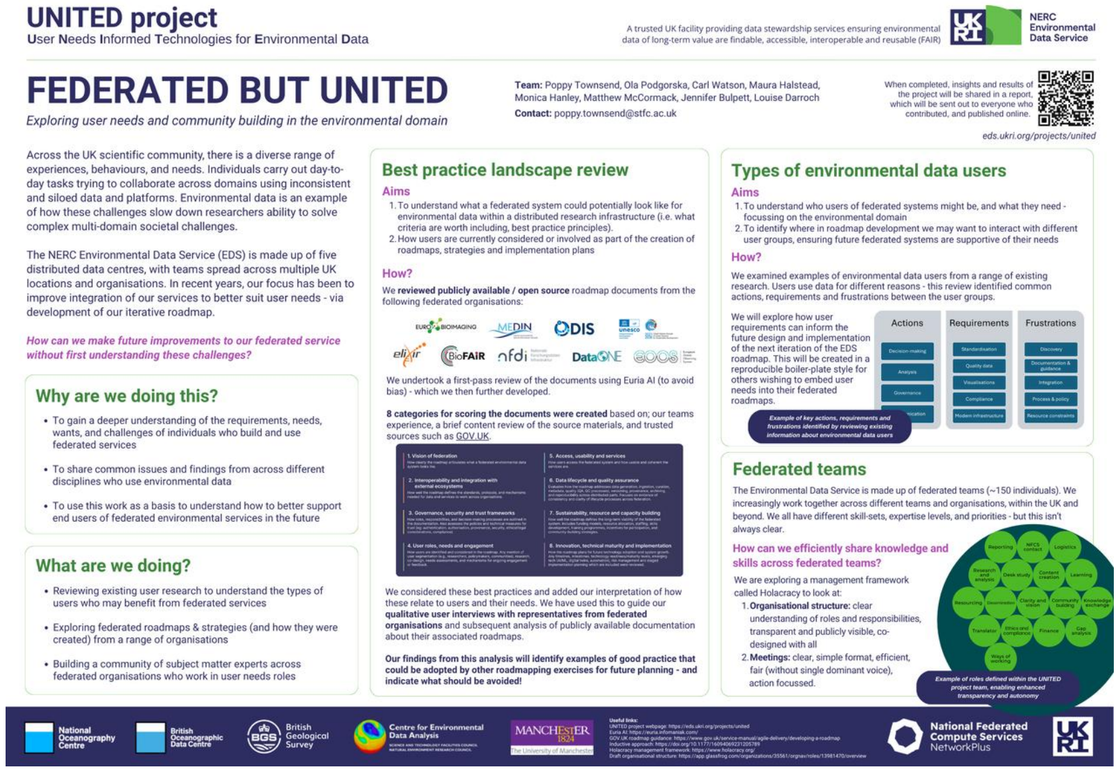
Contact: poppy.townsend@stfc.ac.uk

UNITED project

User **N**eeds **I**nformed **T**echnologies for **E**nvironmental **D**ata

A trusted UK facility providing data stewardship services ensuring environmental data of long-term value are findable, accessible, interoperable and reusable (FAIR)

NERC Environmental Data Service



UNITED project

User Needs Informed Technologies for Environmental Data

A trusted UK facility providing data stewardship services ensuring environmental data of long-term value are findable, accessible, interoperable and reusable (FAIR)

NERC Environmental Data Service

FEDERATED BUT UNITED

Exploring user needs and community building in the environmental domain

Team: Poppy Townsend, Ola Podgorska, Carl Watson, Maura Halstead, Monica Hanley, Matthew McCormack, Jennifer Bulpett, Louise Darroch

Contact: poppy.townsend@stfc.ac.uk

When completed, insights and results of the project will be shared in a report, which will be sent out to everyone who contributed, and published online.

eds.ukri.org/projects/united

Across the UK scientific community, there is a diverse range of experiences, behaviours, and needs. Individuals carry out day-to-day tasks trying to collaborate across domains using inconsistent and siloed data and platforms. Environmental data is an example of how these challenges slow down researchers ability to solve complex multi-domain societal challenges.

The NERC Environmental Data Service (EDS) is made up of five distributed data centres, with teams spread across multiple UK locations and organisations. In recent years, our focus has been to improve integration of our services to better suit user needs - via development of our iterative roadmap.

How can we make future improvements to our federated service without first understanding these challenges?

Why are we doing this?

- To gain a deeper understanding of the requirements, needs, wants, and challenges of individuals who build and use federated services
- To share common issues and findings from across different disciplines who use environmental data
- To use this work as a basis to understand how to better support end users of federated environmental services in the future

What are we doing?

- Reviewing existing user research to understand the types of users who may benefit from federated services
- Exploring federated roadmaps & strategies (and how they were created) from a range of organisations
- Building a community of subject matter experts across federated organisations who work in user needs roles

Best practice landscape review

Aims

1. To understand what a federated system could potentially look like for environmental data within a distributed research infrastructure (i.e. what criteria are worth including, best practice principles).
2. How users are currently considered or involved as part of the creation of roadmaps, strategies and implementation plans

How?

We **reviewed publicly available / open source** roadmap documents from the following federated organisations:

EUROBIOIMAGING, MEDIN, IODIS, UNESCO, eLTER, BiCFAIR, nfdi, DataONE, GOOS

We undertook a first-pass review of the documents using Euria AI (to avoid bias) - which we then further developed.

8 categories for scoring the documents were created based on; our teams experience, a brief content review of the source materials, and trusted sources such as GOV.UK.

1. Vision of federation
2. Interoperability and integration with external ecosystems
3. Governance, security and trust frameworks
4. User roles, needs and engagement
5. Access, usability and services
6. Data lifecycle and quality assurance
7. Sustainability, resource and capacity building
8. Innovation, technical maturity and implementation

We considered these best practices and added our interpretation of how these relate to users and their needs. We have used this to guide our **qualitative user interviews with representatives from federated organisations** and subsequent analysis of publicly available documentation about their associated roadmaps.

Our findings from this analysis will identify examples of good practice that could be adopted by other roadmapping exercises for future planning - and indicate what should be avoided!

Types of environmental data users

Aims

1. To understand who users of federated systems might be, and what they need - focussing on the environmental domain
2. To identify where in roadmap development we may want to interact with different user groups, ensuring future federated systems are supportive of their needs

How?

We examined examples of environmental data users from a range of existing research. Users use data for different reasons - this review identified common actions, requirements and frustrations between the user groups.

We will explore how user requirements can inform the future design and implementation of the next iteration of the EDS roadmap. This will be created in a reproducible boiler-plate style for others wishing to embed user needs into their federated roadmaps.

Actions: Decision-making, Analysis, Governance, Education

Requirements: Standardisation, Quality data, Visualisations, Compliance, Modern infrastructure

Frustrations: Discovery, Documentation & guidance, Integration, Process & policy, Resource constraints

Example of key actions, requirements and frustrations identified by reviewing existing information about environmental data users

Federated teams

The Environmental Data Service is made up of federated teams (~150 individuals). We increasingly work together across different teams and organisations, within the UK and beyond. We all have different skill-sets, expertise levels, and priorities - but this isn't always clear.

How can we efficiently share knowledge and skills across federated teams?

We are exploring a management framework called Holacracy to look at:

1. **Organisational structure:** clear understanding of roles and responsibilities, transparent and publicly visible, co-designed with all
2. **Meetings:** clear, simple format, efficient, fair (without single dominant voice), action focussed.

Reporting, NPCS contact, Logistics, Research and analysis, Desk study, Content creation, Learning, Resourcing, Assessment, Clarity and vision, Community building, Knowledge exchange, Translation, Ethics and compliance, Finance, Gap analysis, Ways of working

Example of roles defined within the UNITED project team, enabling enhanced transparency and autonomy

National Oceanography Centre, British Oceanographic Data Centre, British Geological Survey, Centre for Environmental Data Analysis, The University of Manchester, National Federated Compute Services NetworkPlus

Useful links:
UNITED project webpage: https://eds.ukri.org/projects/united
Euria AI: https://euria.infomaniak.com/
GOV.UK roadmap guidance: https://www.gov.uk/service-manual/agile-delivery/developing-a-roadmap
Inductive approach: https://doi.org/10.1177/1609406921105789
Holacracy management framework: https://www.holacracy.org/
Draft organisational structure: https://app.glassfrog.com/organizations/35561/orgmaxroles/13981470/overview

More details in our poster!

Any questions?

poppy.townsend@stfc.ac.uk

eds.ukri.org/projects/united

National Oceanography Centre | British Oceanographic Data Centre | British Geological Survey | Centre for Environmental Data Analysis, Science and Technology Facilities Council, Natural Environment Research Council | The University of Manchester | National Federated Compute Services NetworkPlus