

Developing a Digital Hub and set of Toolkits that exploits environmental and other data (social, economic & health) to create innovative digital services that deliver economic, societal and environmental benefits across the UK

Dispersion Modelling User Group (DMUG) conference
25th April 2024, London

*Richard Kingston
Prof of Urban Planning & Geographic Information Science,
The University of Manchester*

DSH

Digital Solutions Hub

Bringing **40** Petabytes of Environmental Data + To your doorstep

NERC DIGITAL SOLUTIONS PROGRAMME

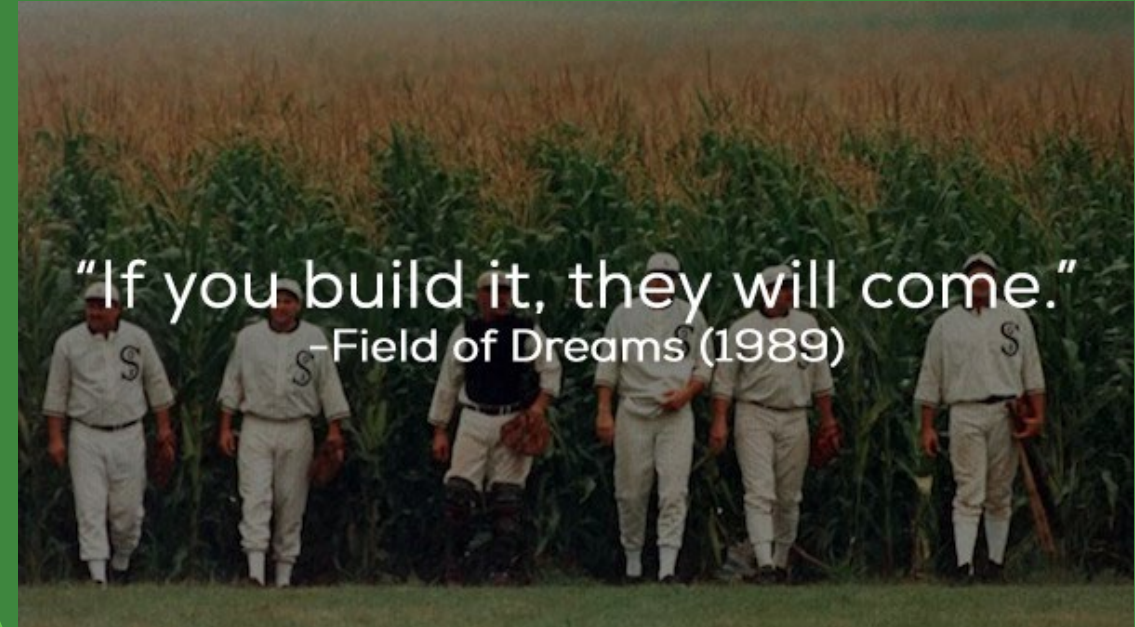
- ▶ 5 year £8m investment to build a UKRI 'national facility' – the Digital Solutions Hub – during phase 1
- ▶ NERC's core focus is to work closely with stakeholders across the public / third sector and industry
 - ▷ plus those of you who are not environmental scientists in academia
- ▶ making NERC's 40+ PBs data more discoverable to non-academic users
- ▶ to make better use of their data from the 5 data centres
- ▶ connecting with **social, economic, health** and other **environmental** data across the **whole of the UK**
- ▶ integrated with **JASMIN / STFC** for analytics and modelling
- ▶ Post 2025 – phase 2 funding



Dataset name	Purpose	Total depth (meters)
CCAM	Chlorophyll a, total suspended matter	41
UL702	Chlorophyll a, total suspended matter	14
POC04	Particulate organic carbon	43
OSAP	Optical sensors	11
CC06	Chlorophyll a, total suspended matter	11
UL06	Chlorophyll a, total suspended matter	14
UL701	Chlorophyll a, total suspended matter	7

OVERALL APPROACH

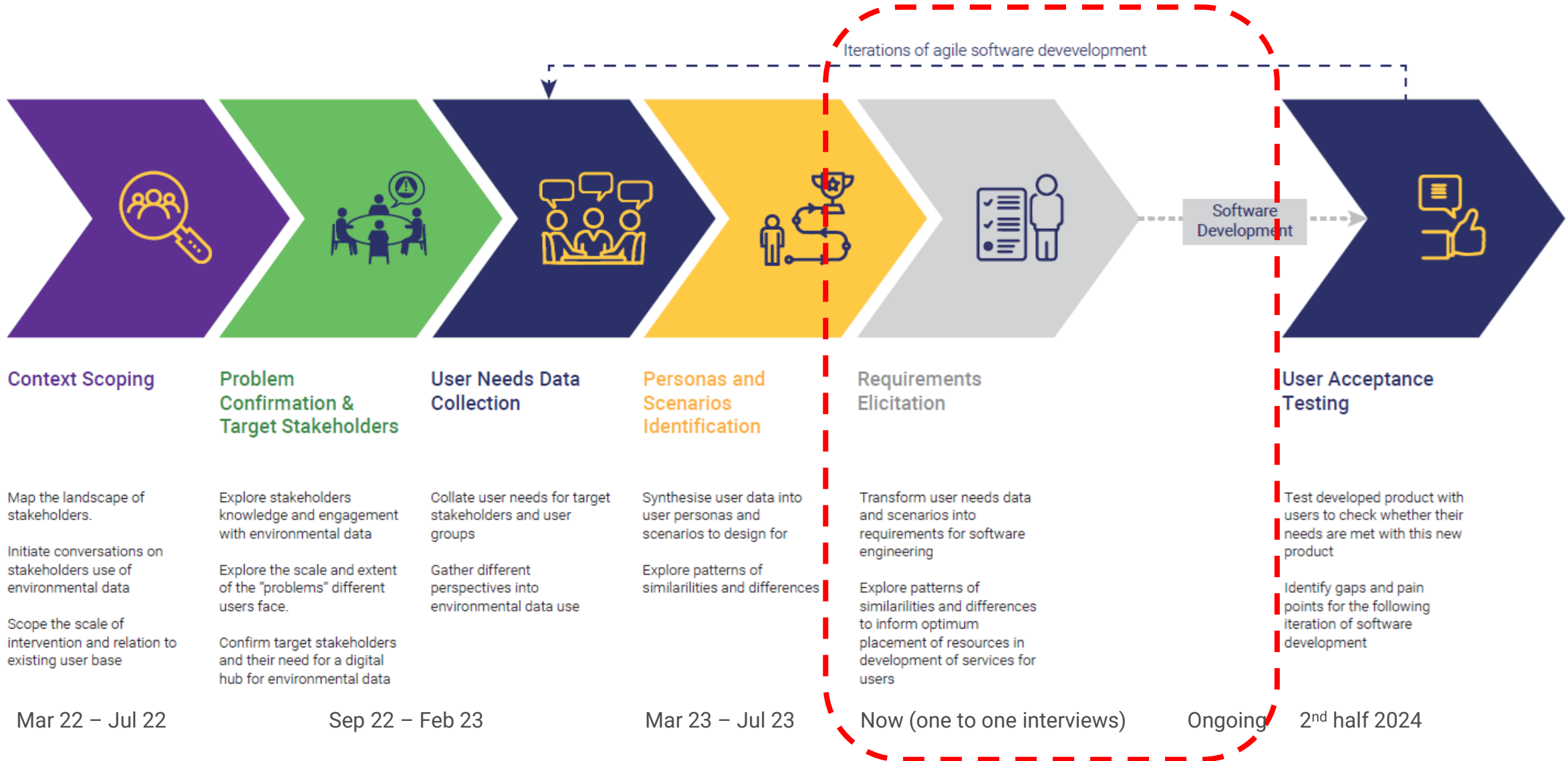
- ▶ Build it and they will come.
- ▶ No, no, no.
- ▶ So, you spent 4 years building this thing, it's great it can do A, B and C but we also want it to do X, Y and Z !





England





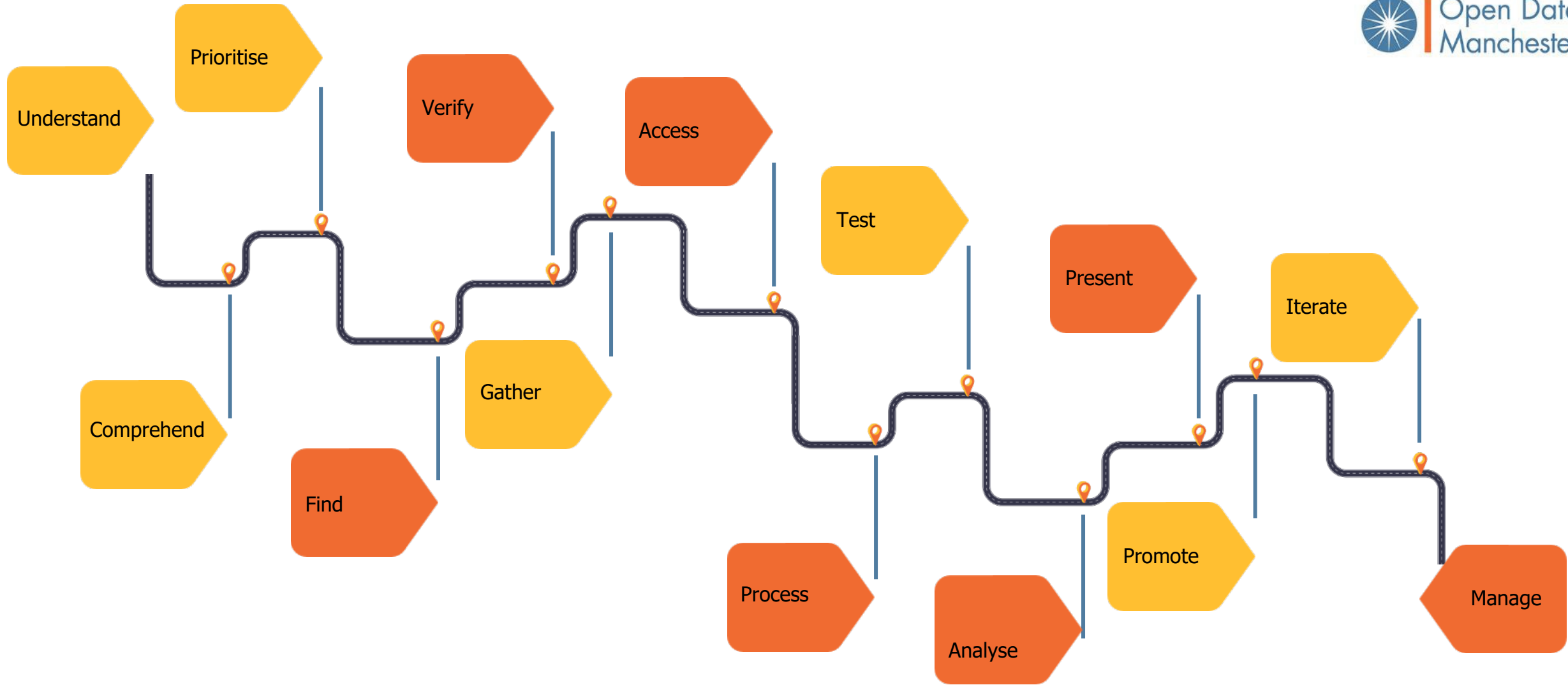
THE LANDSCAPE USERS OPERATE IN

- ▶ Data is held in lots of places.
- ▶ Data is not always held in formats, or on systems, that make it easy to search for.
- ▶ It's not always obvious what the purpose of different platforms is, and the variety of data they contain.
- ▶ It is hard to keep up with the 'sheer range' of these.
- ▶ Some platforms are 'clunky' to learn and use with multiple clicks needed to get at data, or arduous registration processes.

KEY REQUIREMENTS

- ▶ Users need sufficient **access to the data** to quality assure it, clean it and transform it into suitable format.
- ▶ **Reviewing a sample of a dataset** may help determine its suitability in an easier way.
- ▶ Users need to be able to **keep track of work and resources** they have done on datasets.
- ▶ Users are keen to **avoid duplication of effort** – through sharing work they've done on datasets and accessing the work others have done.
- ▶ A way of applying **suitable analysis** software to data.
- ▶ Allow users to **combine/link their own data with other data** they access from DSH as part of analysis.

USER JOURNEY



DEFINE

GET

ANALYSE

SHOWCASE

MANAGE

ARCHETYPES (PERSONAS)



The Analyst

Analysts monitoring the environment

The Author

Authors of monitoring frameworks

The Data Leader

Data leaders in organisations

The Investigator

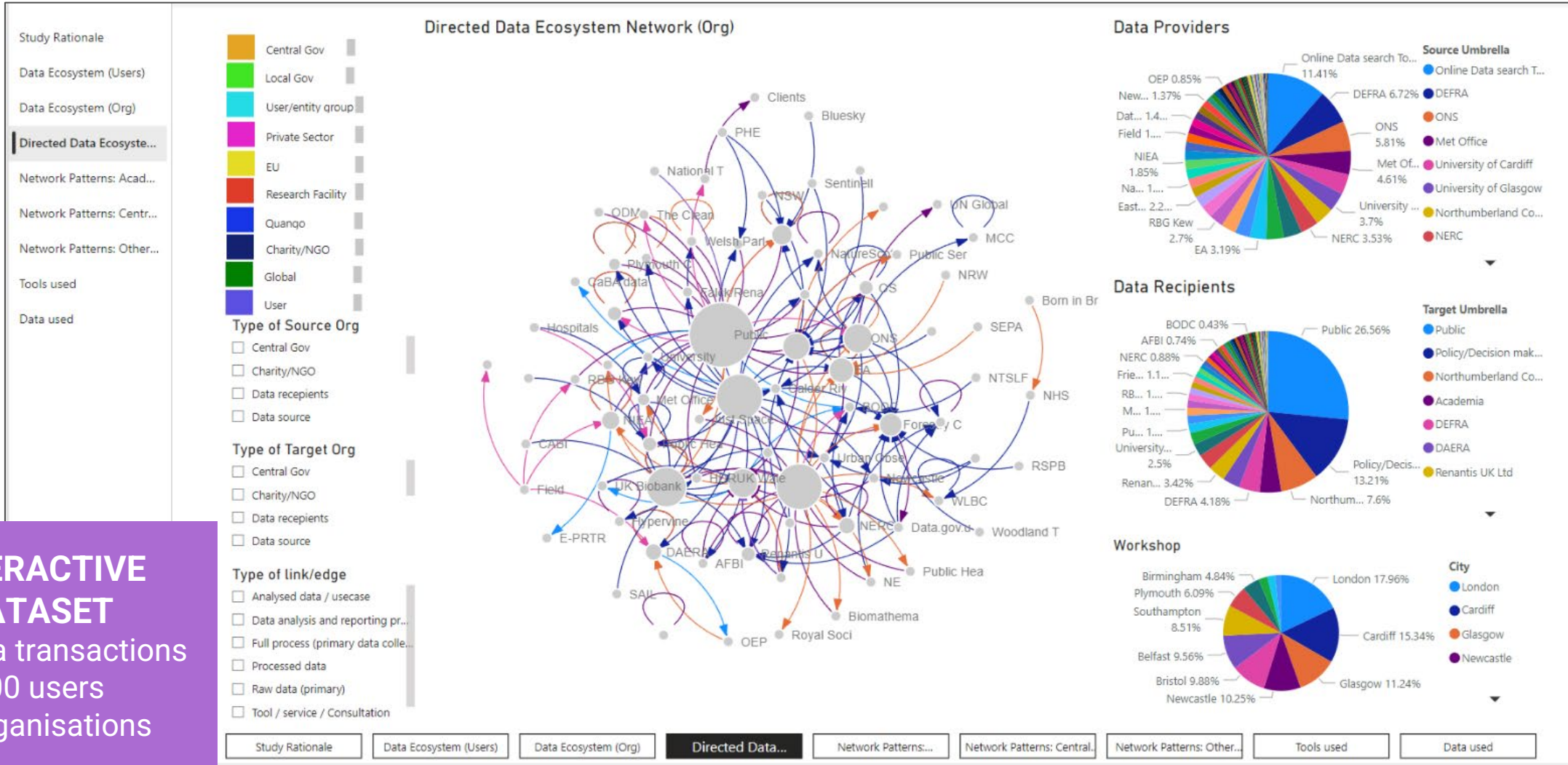
Analysts answering questions with data

The Data Specialist

GIS specialists and data support

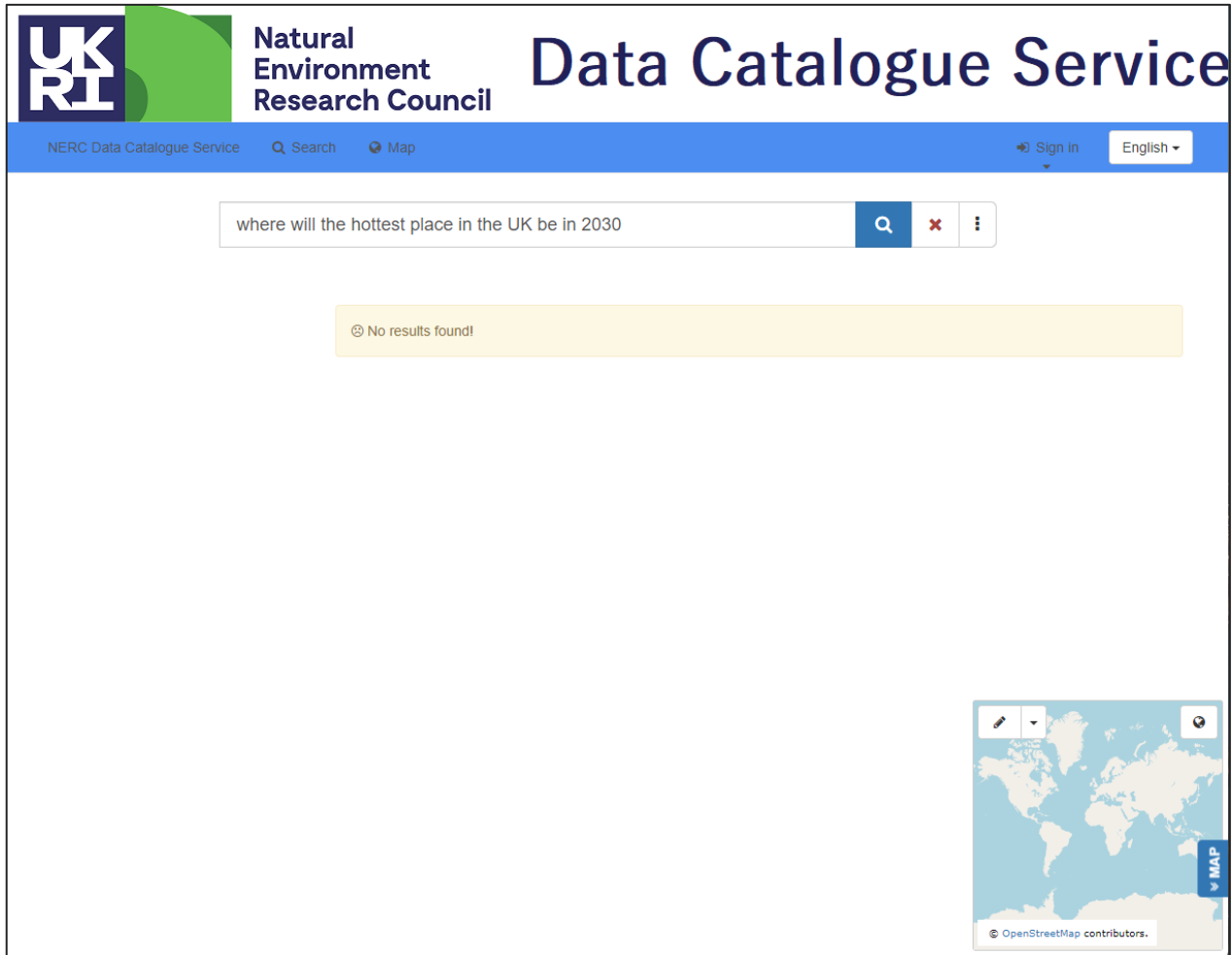
The Data Steward

Focusing on data quality and sharing



INTERACTIVE DATASET
273 data transactions
100 users
84 organisations

A CHALLENGE IS KNOWING WHAT DATA NERC HAS



Where will be the
hottest place in
the UK in 2030?



- ▶ Our approach searches the meta-data records and now provides a list of relevant datasets to help answer the question.
- ▶ Next step is to allow user to visualise the data.

Search for NERC data

Where will be the hottest place in the UK in 2030?

Results

UKCP Local Projections at 2.2km Resolution for 1980-2080

Convection permitting climate model projections produced as part of the UK Climate Projection 2018 (

UKCP18 Convection-Permitting Model Projections for the UK at 2.2km resolution

Climate model runs at convection-permitting scale for the UK for three time slices (1981-2000, 2021-

UKCP18 Regional Projections for UK Countries for 1980-2080

Regional climate model projections produced as part of the UK Climate Projection 2018 (UKCP18) proje

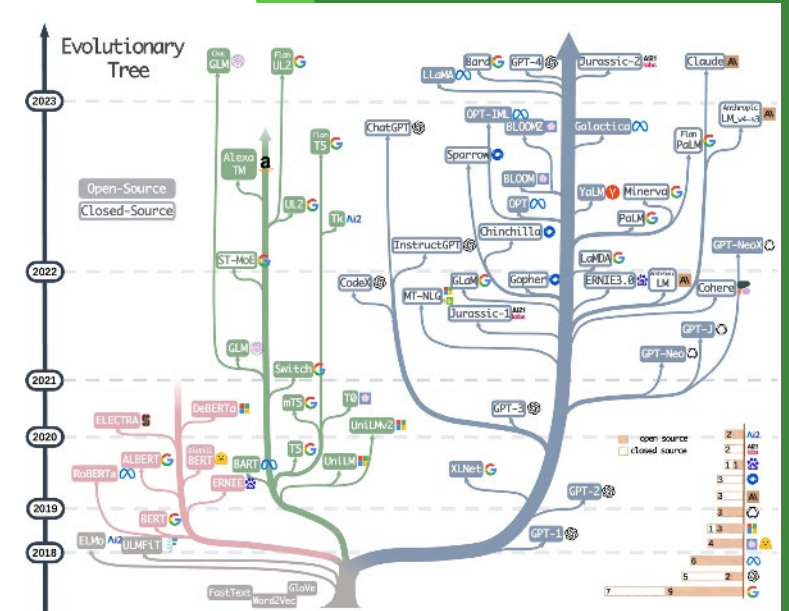
UKCP18 Regional Projections by Administrative Regions over the UK for 1980-2080

Regional climate model projections produced as part of the UK Climate Projection 2018 (UKCP18) proje

Thermal imagery of England

Thermal imagery for selected areas of England was taken by a FLIR SC 6000 HS thermal camera mounted

Using a Large Language Model (LLM) we have trained it on all the NERC meta-data records. When we ask the same question

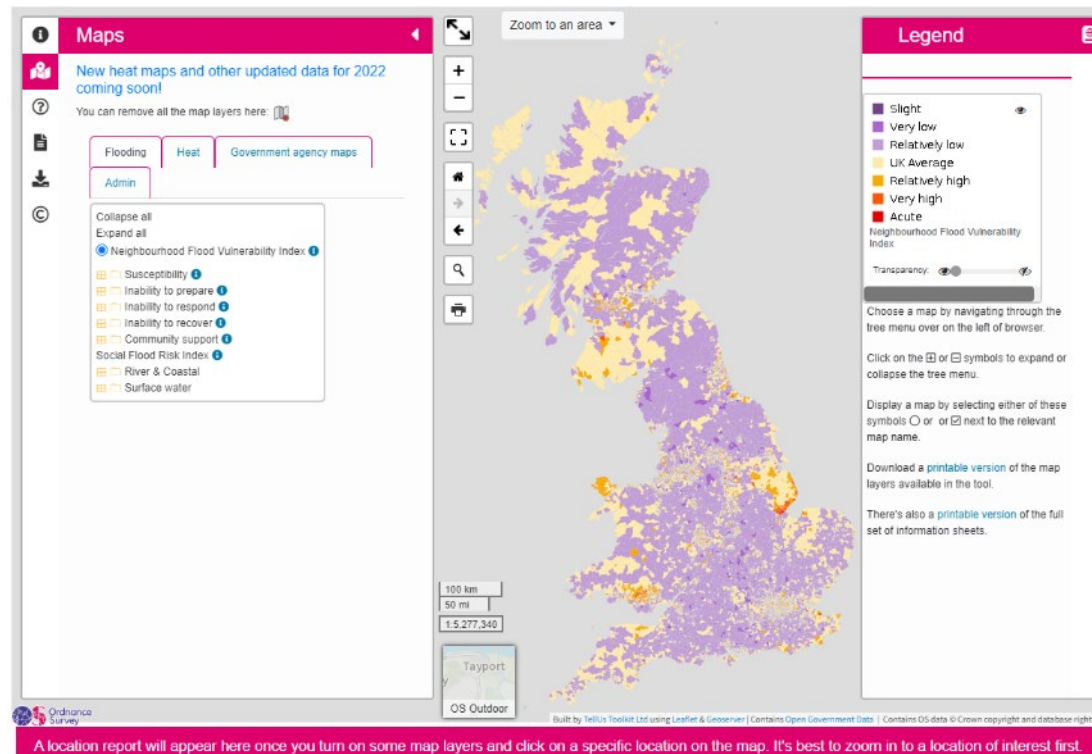


Genealogy of LLMs (Harnessing the Power of LLMs in Practice: A Survey on ChatGPT and Beyond)

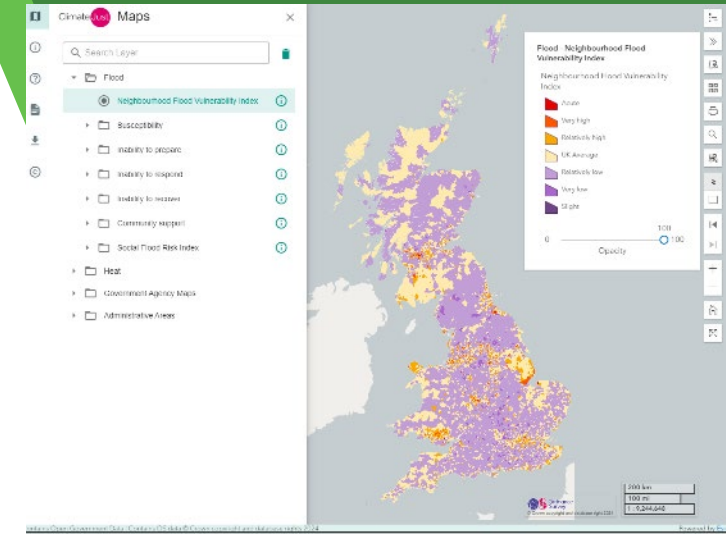


THE DSH IS NOT JUST A DATA PORTAL

- ▶ It will run on JASMIN – NERC’s supercomputer in Harwell.
- ▶ Also building on previous research using NERC data e.g., www.climatejust.org.uk using UKCP18 climate projections
- ▶ Vast majority of the data is spatial.
- ▶ As well as the NERC data we are integrating other environmental, social, economic and health data.
- ▶ Allow users to find and explore data



- ▶ Deliberately using a wide range of data sources and types
 - ▷ Air pollution and health (NHS, Met Office and Defra)
 - along with a Trusted Research Environment
 - ▷ Housing and environmental constraints (DLUHC and Geospatial Commission)
 - flood risk over next 5, 10, 20 years
 - modelling net zero implications, biodiversity net gain etc.
 - ▷ Flooding from rivers, tidal surges, sea level rise etc. (Defra, EA, SEPA, NRW, GAD, LAs)
 - impacts on coastal communities
 - ▷ ...



FURTHER DETAILS

- ▶ Report from our user engagement workshops is now available from our website.
- ▶ Webinar recordings etc.
- ▶ Get in touch
 - ▷ sign-up for our newsletter @
 - ▷ <http://www.digital-solutions.uk/>
 - ▷ early access to user testing
 - ▷ richard.kingston@manchester.ac.uk

@NERCdsh @gisplanner



The Pankhurst Institute

Come and spend time working with us directly in our new home on Oxford Rd.



Natural Environment Research Council

