PML | Plymouth Marine Laboratory

Research excellence supporting a sustainable ocean

D1 – Demonstration of the developed functionalities

From photons to fish, from seconds to centuries; Generating FAIR data from high resolution sensors in the Western Channel Observatory

Tom Mansfield, Ben O'Driscoll, Matthew Palmer and Tim Smyth

Digital Gathering '23, British Antarctic Survey
11th July 2023
10.5281/zenodo.8114483

Constructing Digital Environments

Scope

Coming up over the next 20 minutes…

"From photons to fish, from seconds to centuries;
Generating FAIR data from high resolution sensors in the Western Channel Observatory (WCO)"

- Motivation
- Method
- Key Outputs

Motivation

The Western Channel Observatory

- The Western Channel Observatory (WCO) is an oceanographic time-series and marine biodiversity reference site in the Western English Channel.
- In situ measurements are undertaken from a range of costal stations in addition to research vessels from Plymouth Marine Laboratory and the Marine Biological Association.
- A UN Ocean Decade-recognized observation site, the WCO has data series dating from 1903.

Motivation

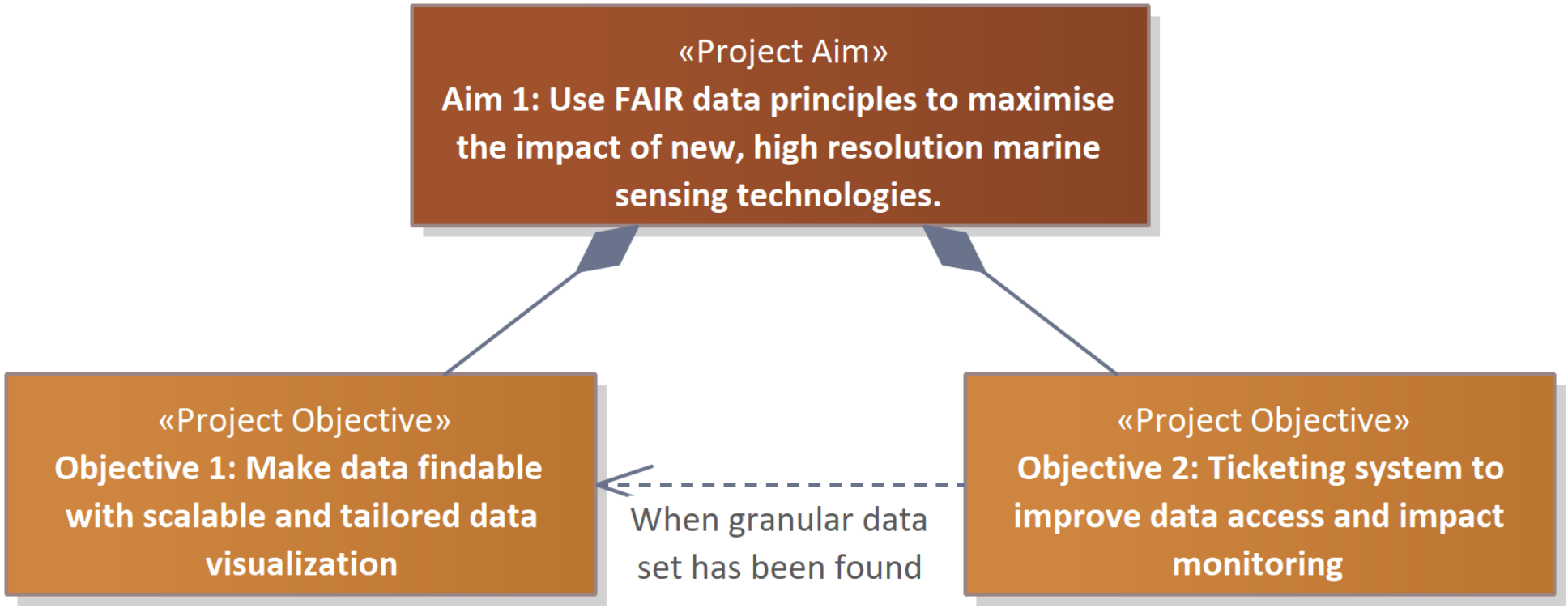
Increasing the resolution of WCO data

- The majority WCO's long time-series of data have been sampled at a weekly resolution at fixed locations.
- While this approach has been successful in developing the current set of impactful WCO data, emerging sensor and platform technologies promise to increase both spatial and time resolution of these data.
- This high-resolution data provides a foundation to the development of digital twins and improved modelling capabilities as well as providing a valuable resource that can accelerate the development, test and training of artificial intelligence (AI) and machine learning (ML) applications.
- These higher-level capabilities are of significant value to scientific, policy making and business communities by supporting responses to acute events while better informing our understanding of long-term environmental change.

The challenge: making data findable, accessible, interoperable and reusable (FAIR) as the size, frequency and complexity of these data series increases.

Motivation

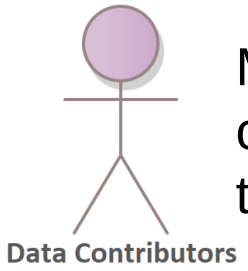
The aims and objectives of this work



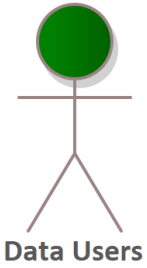
Method

Identify the key stakeholders and data interactions

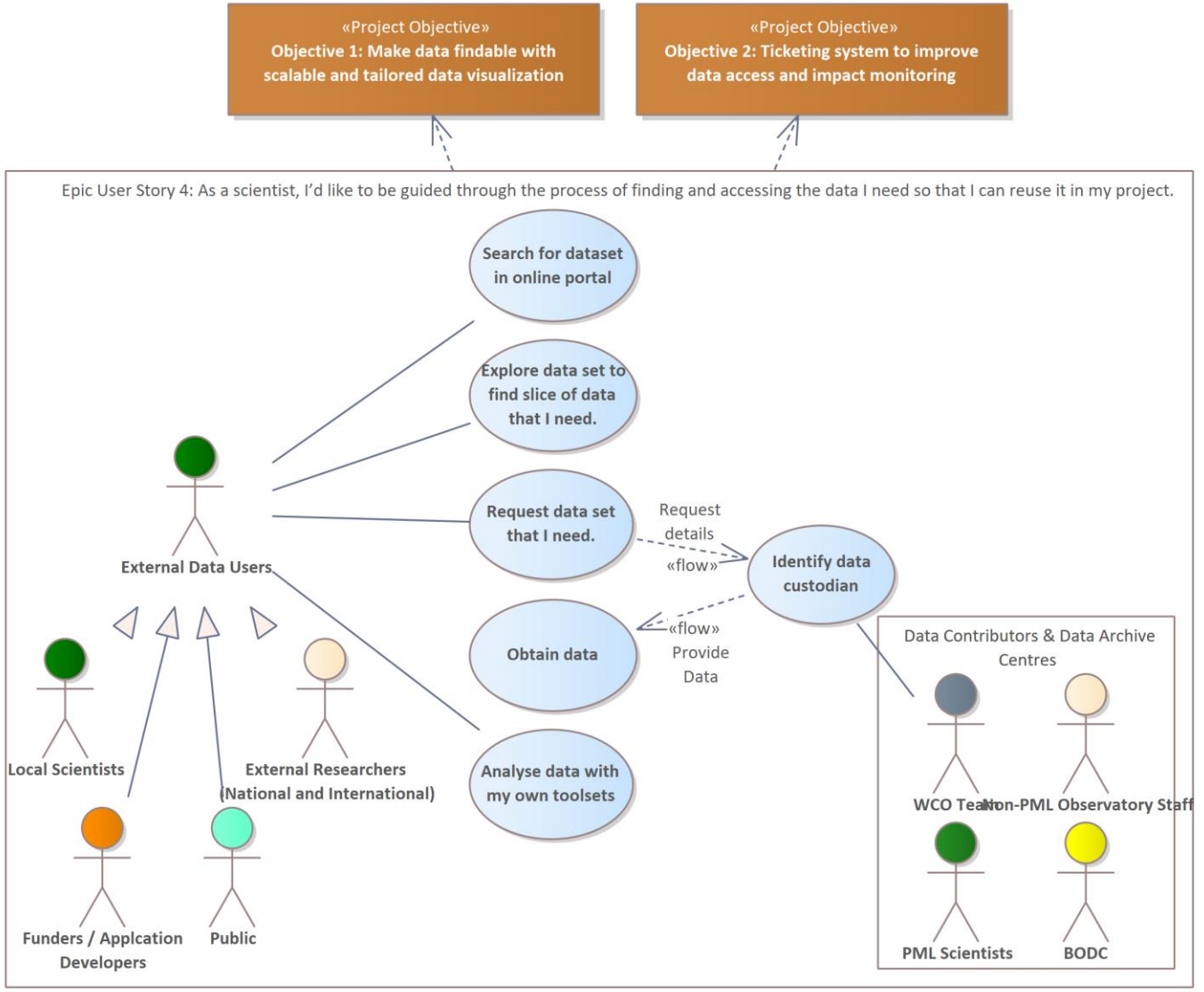
To meet the project's objectives, developed functionalities focus on:



Mitigating barriers to the use of community standard metadata throughout the data pipeline.



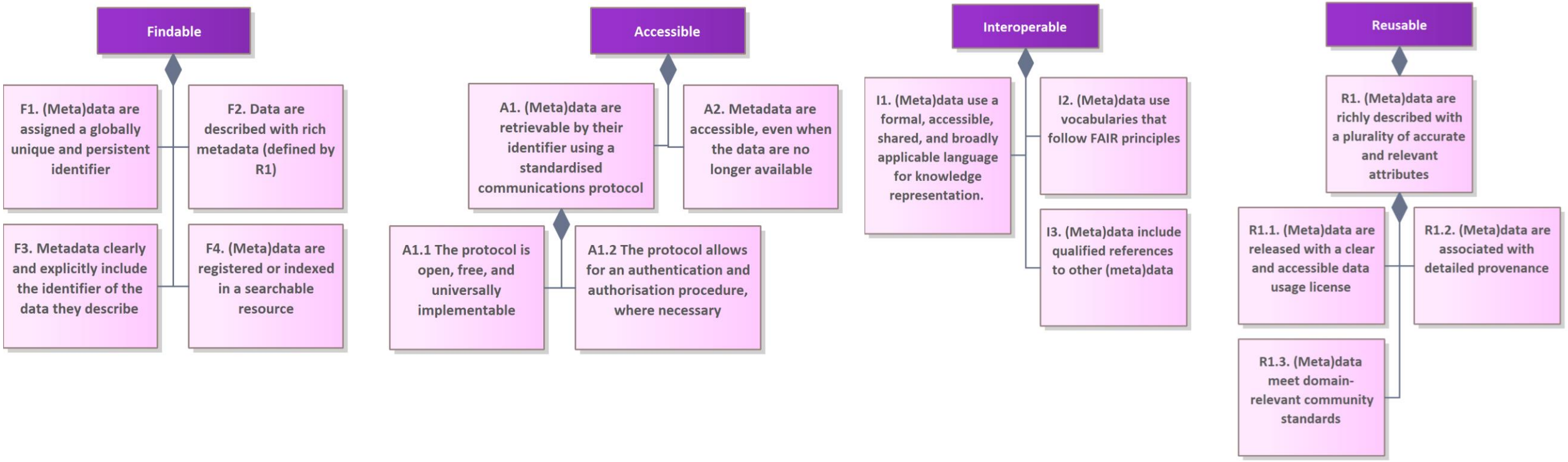
Encouraging the appropriate access and correct citation of data.



Example model-based use case diagram

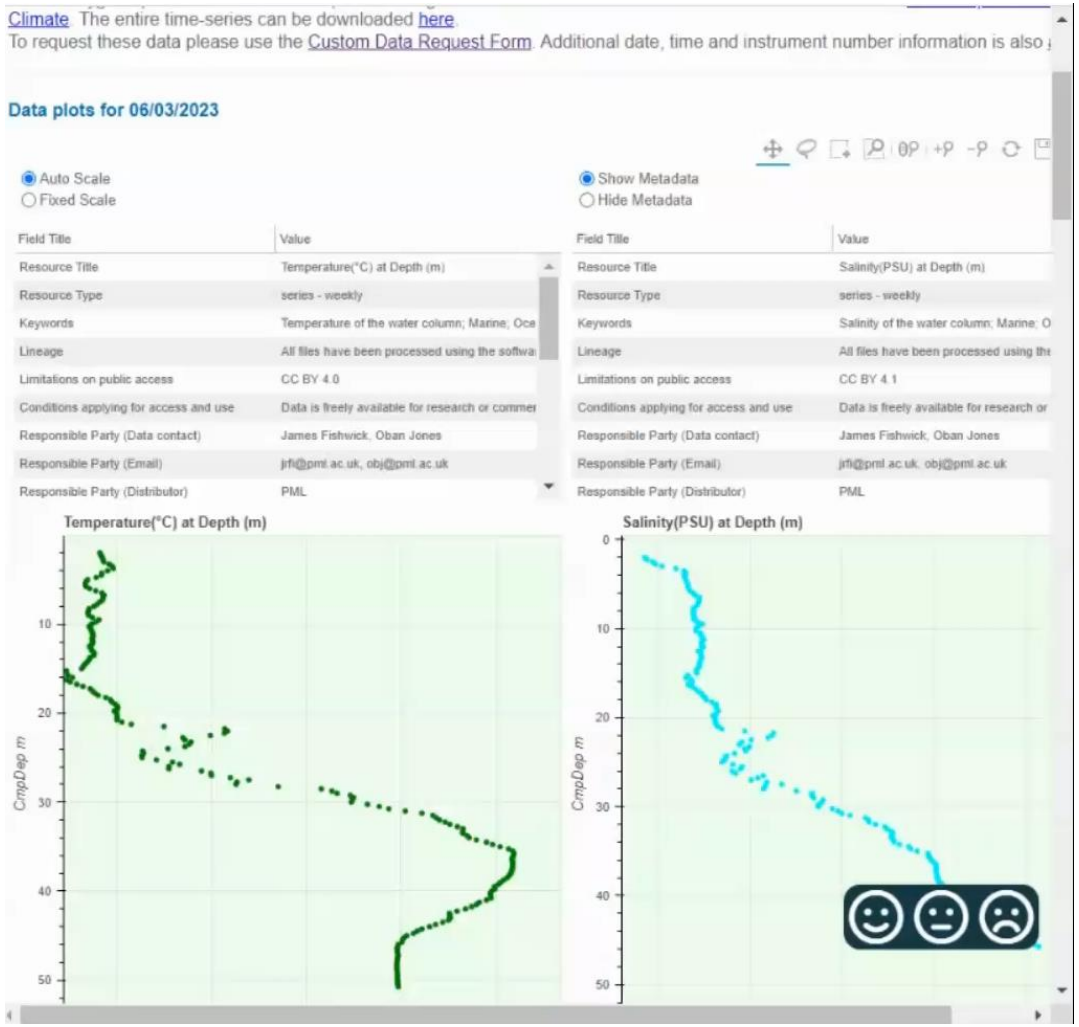
Method

A recap of the FAIR principles*



*M. Wilkinson, et. Al, “The FAIR Guiding Principles for scientific data management and stewardship”, Nature, 15th March 2016.

An analysis and demonstration of the toolsets developed as part of this project **Interactive Data Exploration**



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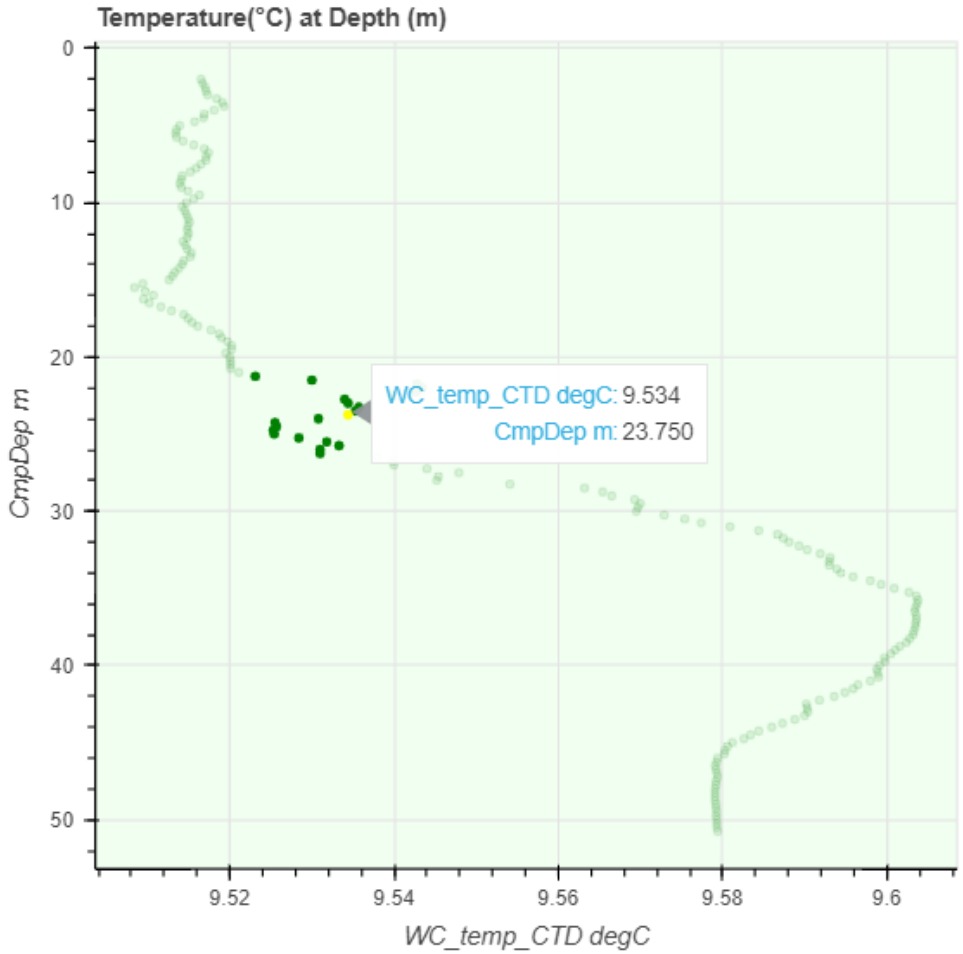
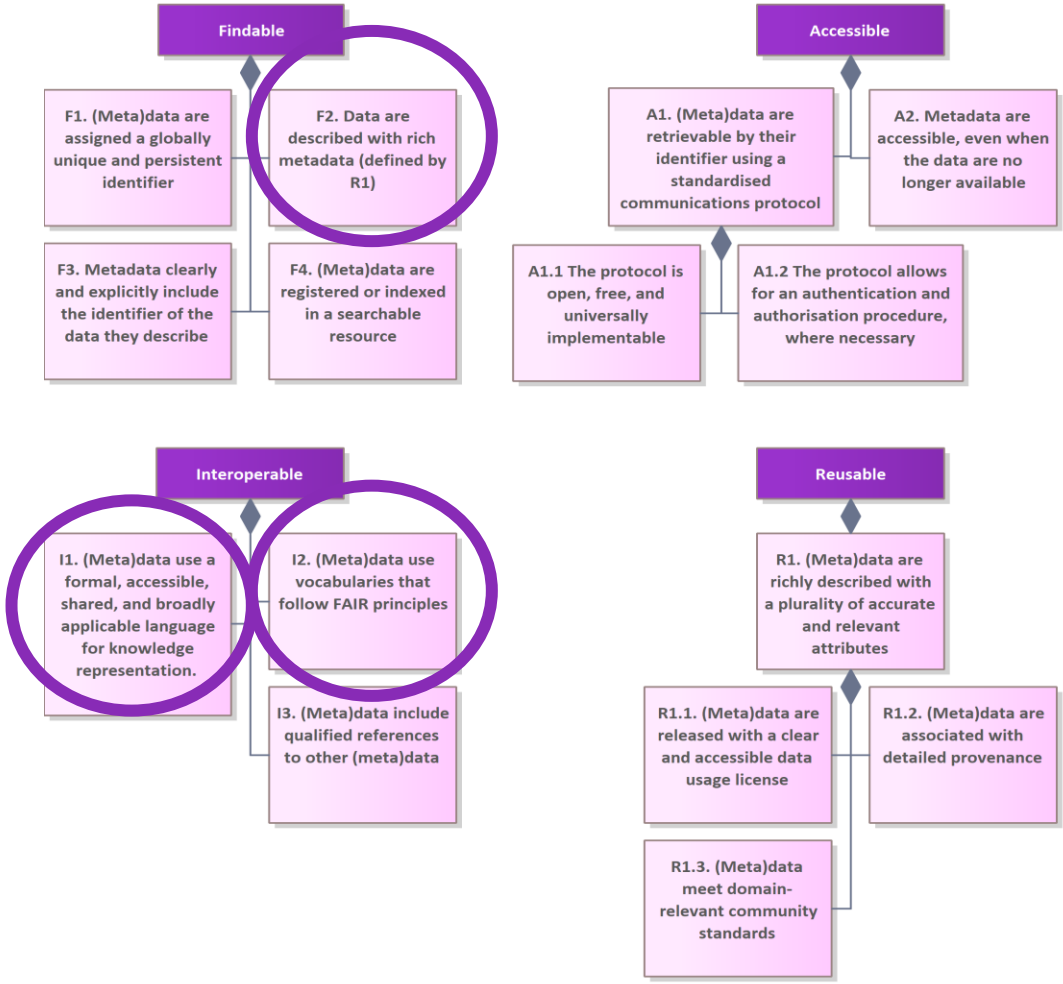
Enriched Usage Metadata





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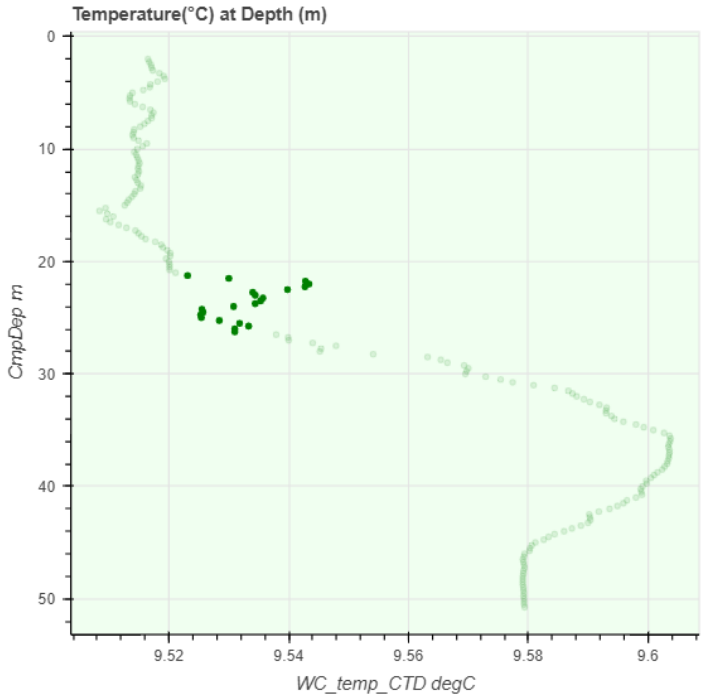
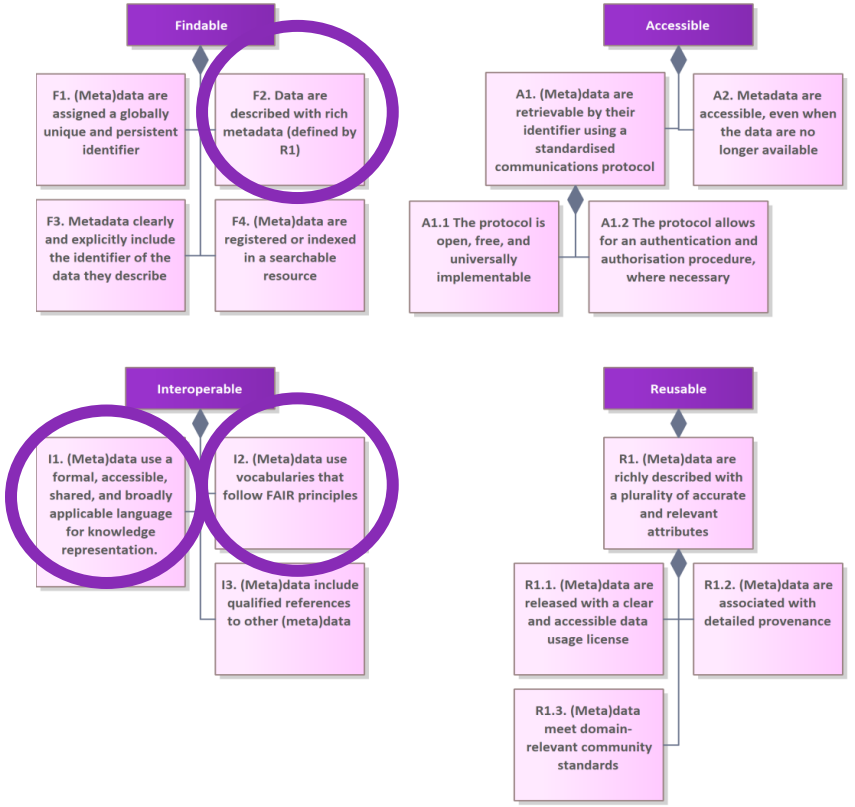
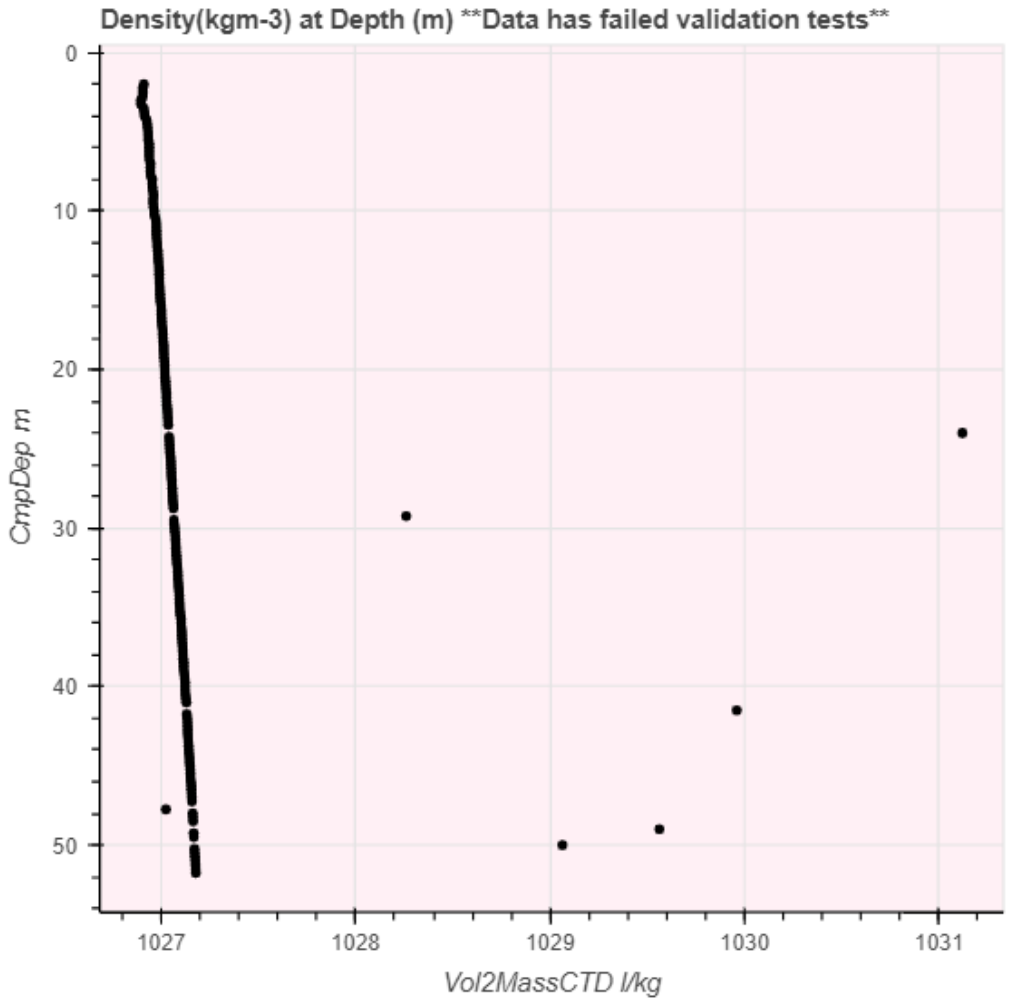
Enriched Discovery Metadata

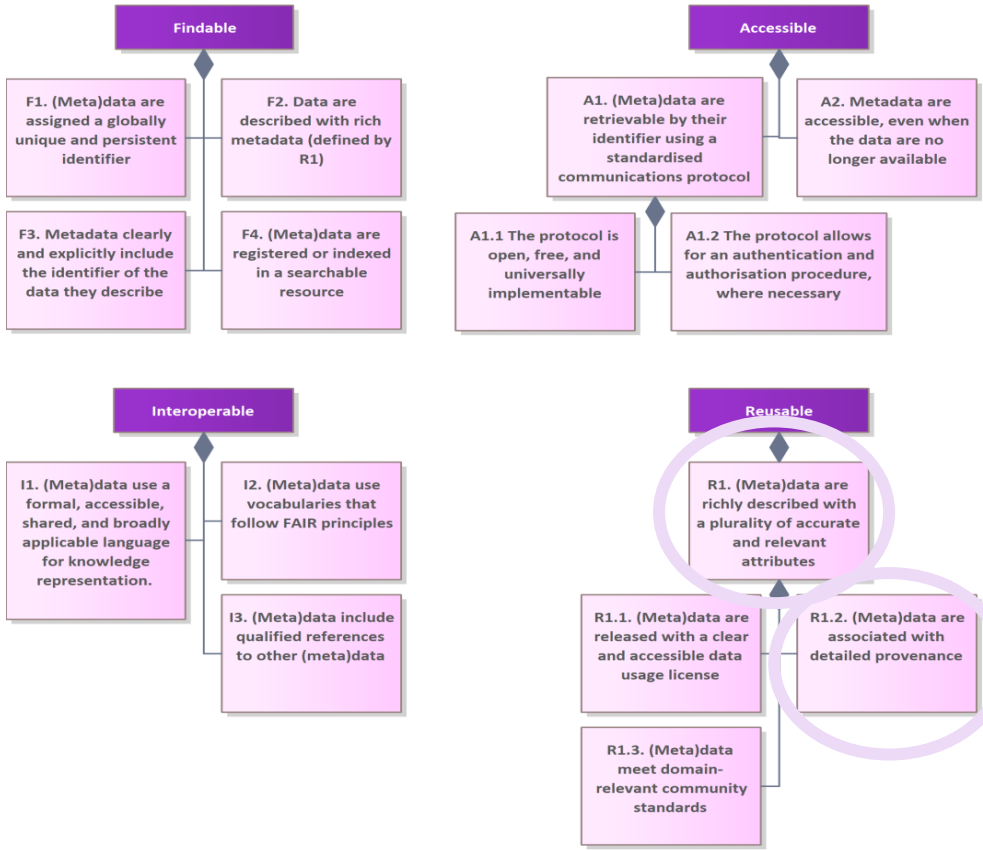
Field Title	Value
Resource Title	Temperature(°C) at Depth (m)
Resource Type	series - weekly
Keywords	Temperature of the water column; Marine; Oce
Lineage	All files have been processed using the softwar
Limitations on public access	CC BY 4.0
Conditions applying for access and use	Data is freely available for research or commer
Responsible Party (Data contact)	James Fishwick, Oban Jones
Responsible Party (Email)	jrfi@pml.ac.uk, obj@pml.ac.uk
Responsible Party (Distributor)	PML





An analysis and demonstration of the toolsets developed as part of this project **Automated Quality Checking**





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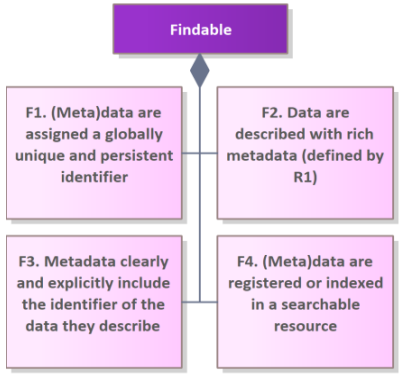
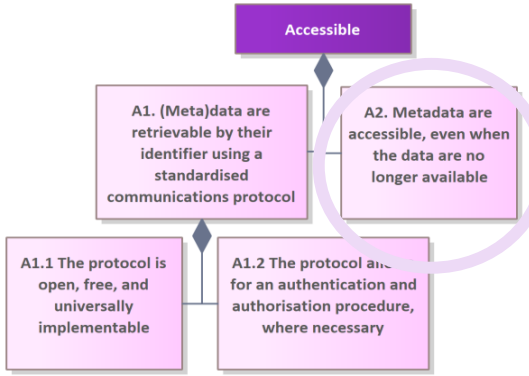
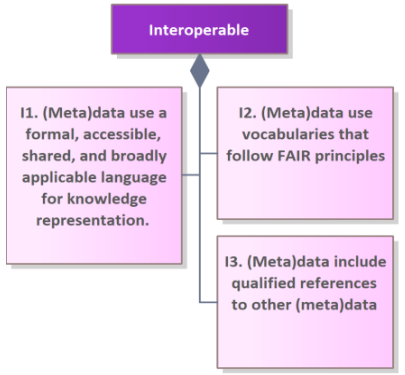
Missing data is handled

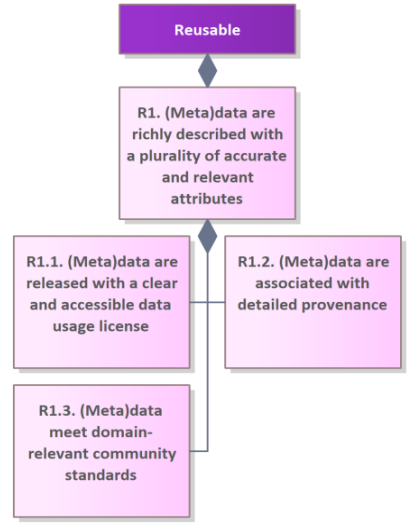
Field Title	Value
Resource Title	Transmission at Depth (m)
Resource Type	series - weekly
Keywords	Marine; Oceanographic features; UK project.
Lineage	All files have been processed using the softwar
Limitations on public access	CC BY 4.3
Conditions applying for access and use	Data is freely available for research or commer
Responsible Party (Data contact)	James Fishwick, Oban Jones
Responsible Party (Email)	jrfi@pml.ac.uk, obj@pml.ac.uk
Responsible Party (Distributor)	PML

Transmission at Depth (m) **No data was found for this variable**









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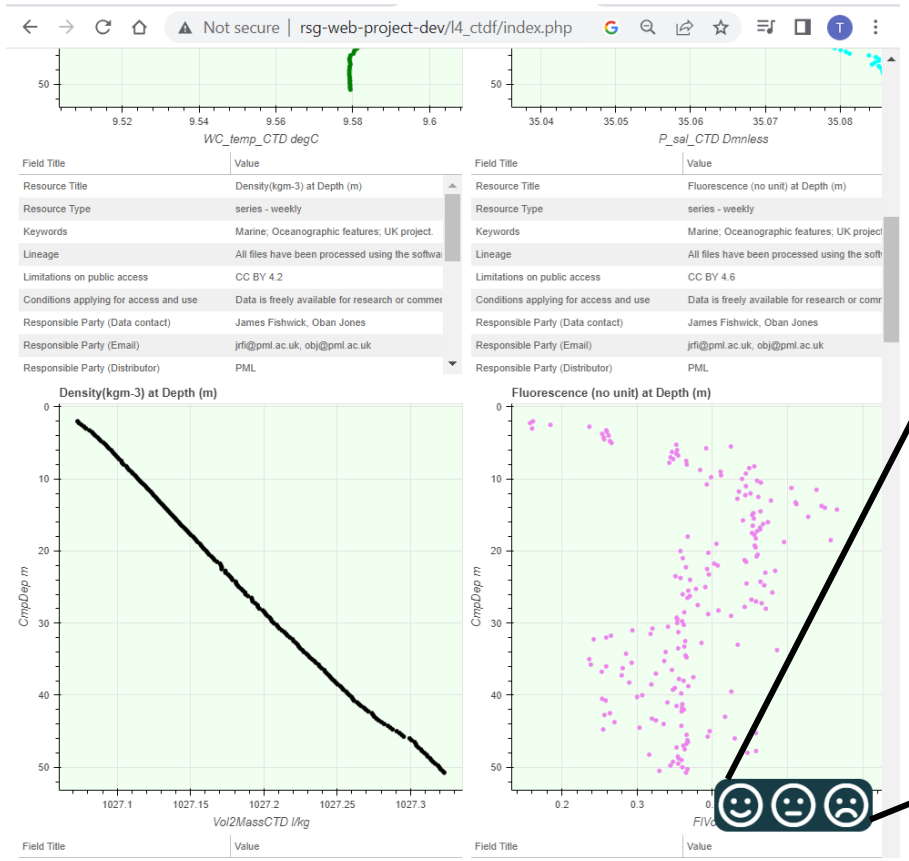
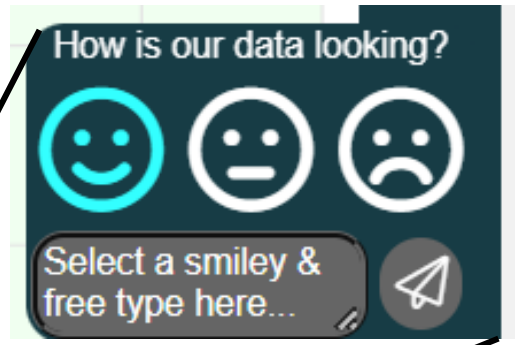
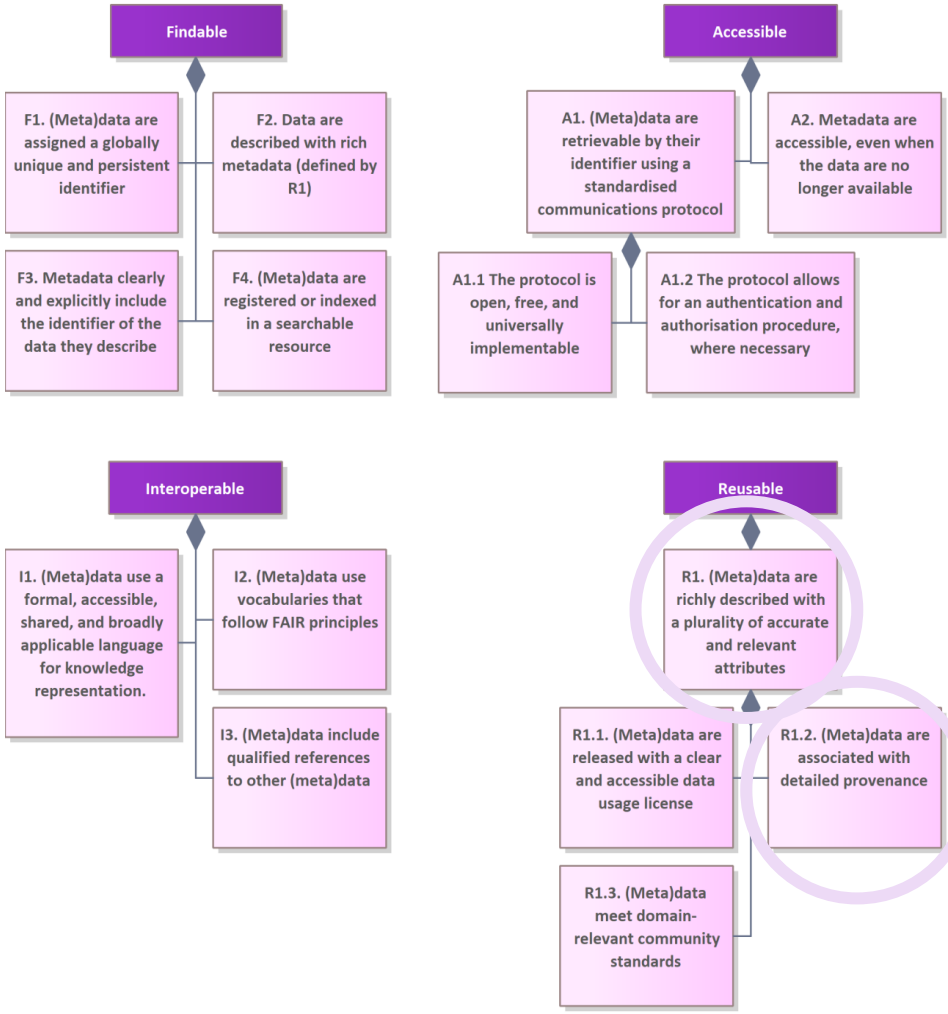
Data User Feedback







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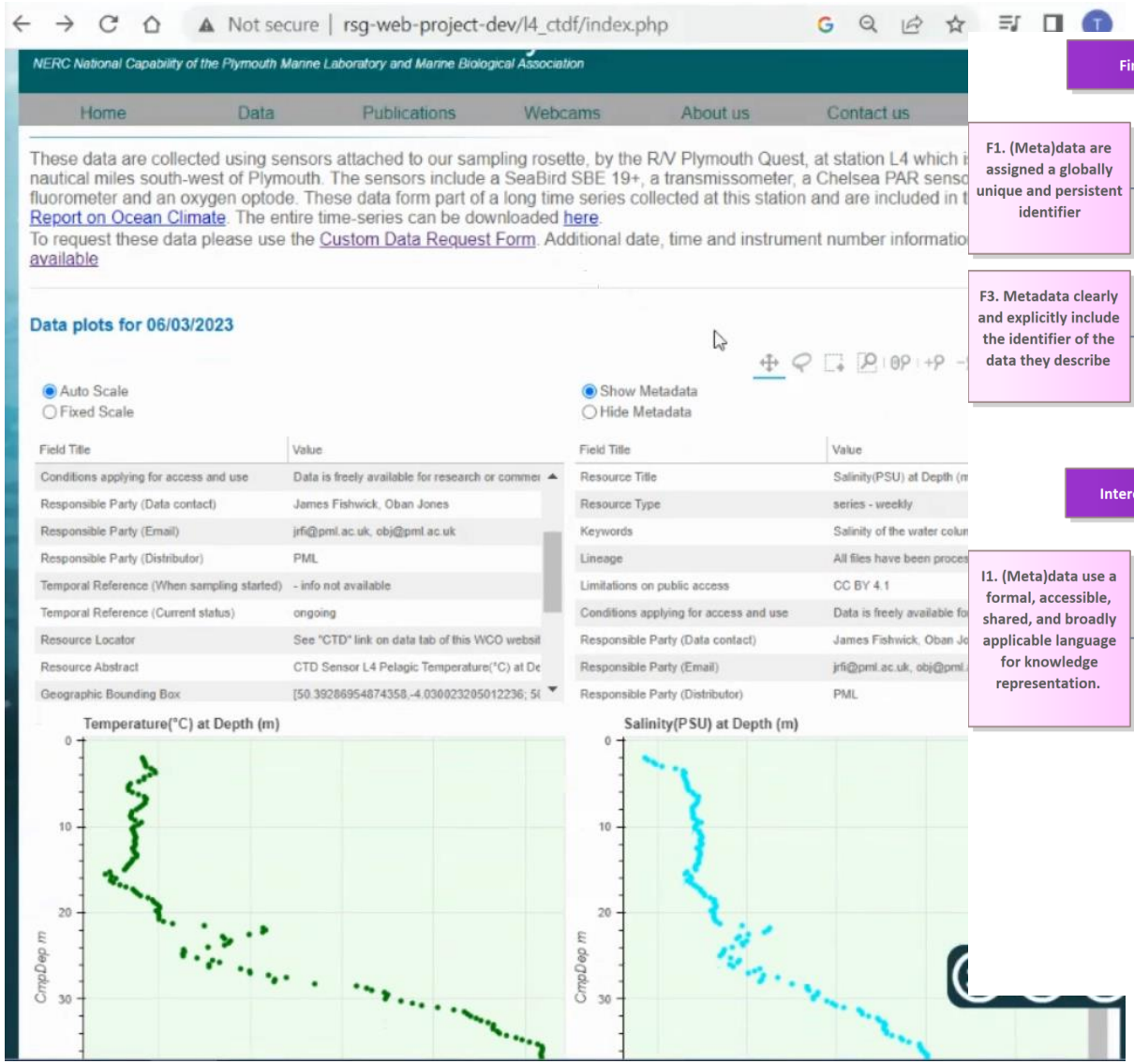
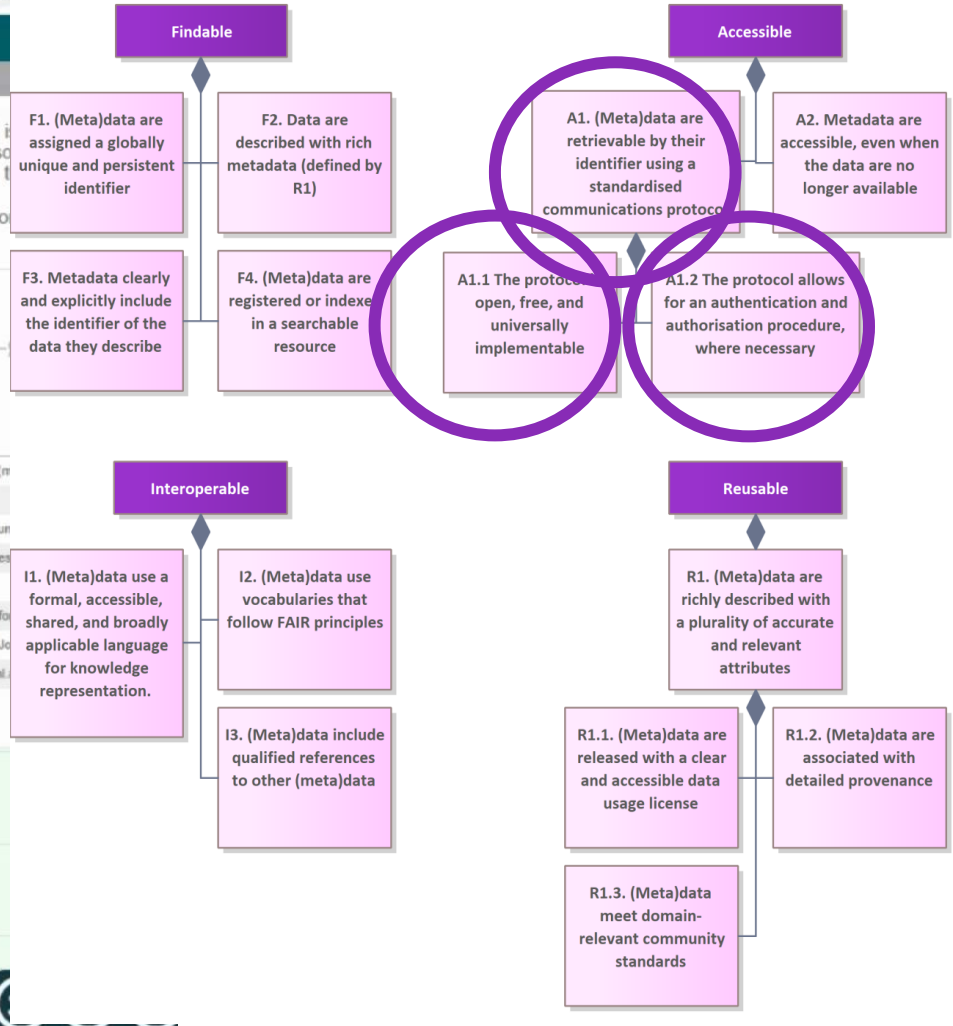
Accessing the correct data





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Collection of data for impact monitoring

Custom Data Request Form

User Details

*Name:
Ben O'Driscoll

*Email:
bod@wco.ac.uk

*Organisation:
PML

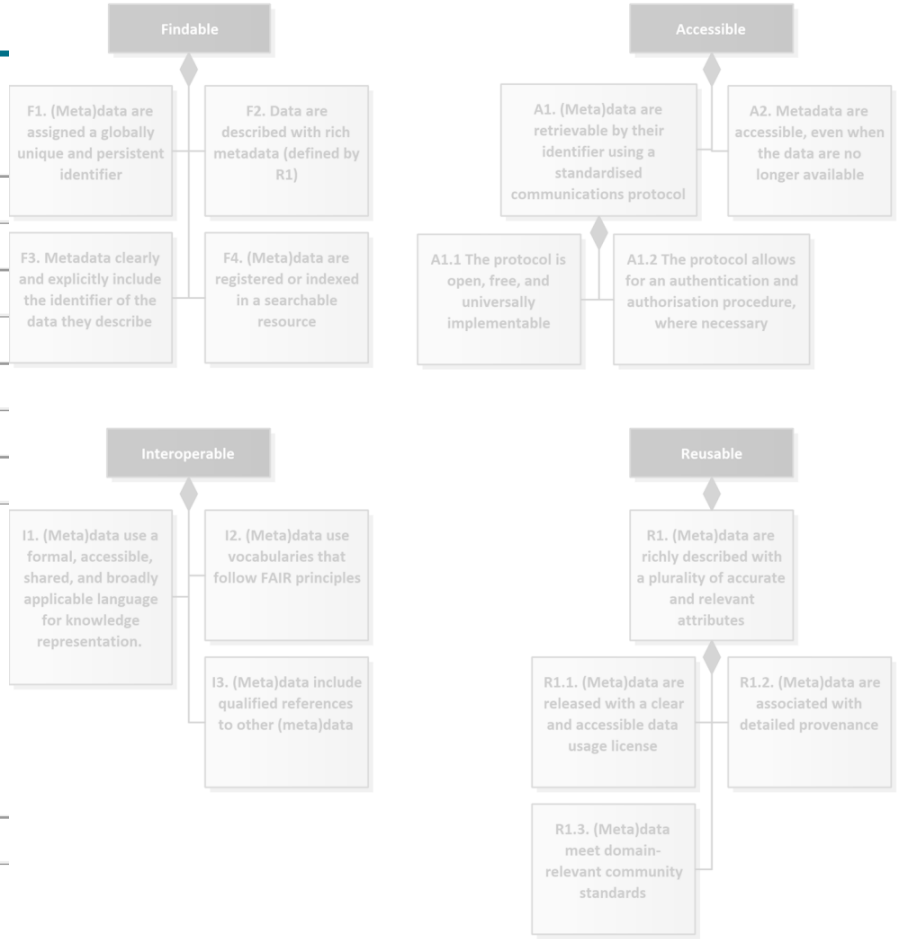
Department:
EOSA

Sector:
- [ ] Academia
- [ ] Industry
- [ ] Government
- [ ] NGO
- [ ] Media
- [ ] Other

Project Details

*Project Title:
Temperature Variation in Plymouth Sound

Project Type:
- [ ] Undergraduate
- [ ] Masters
- [ ] PhD
- [ ] Industry
- [ ] Commissioned Project
- [ ] Scientific Paper
- [ ] Policy Relevant Report
- [ ] Other



An analysis and demonstration of the toolsets developed as part of this project

Clarifying licence restrictions and limitations on use

Field Title	Value
Resource Title	Temperature(°C) at Depth (m)
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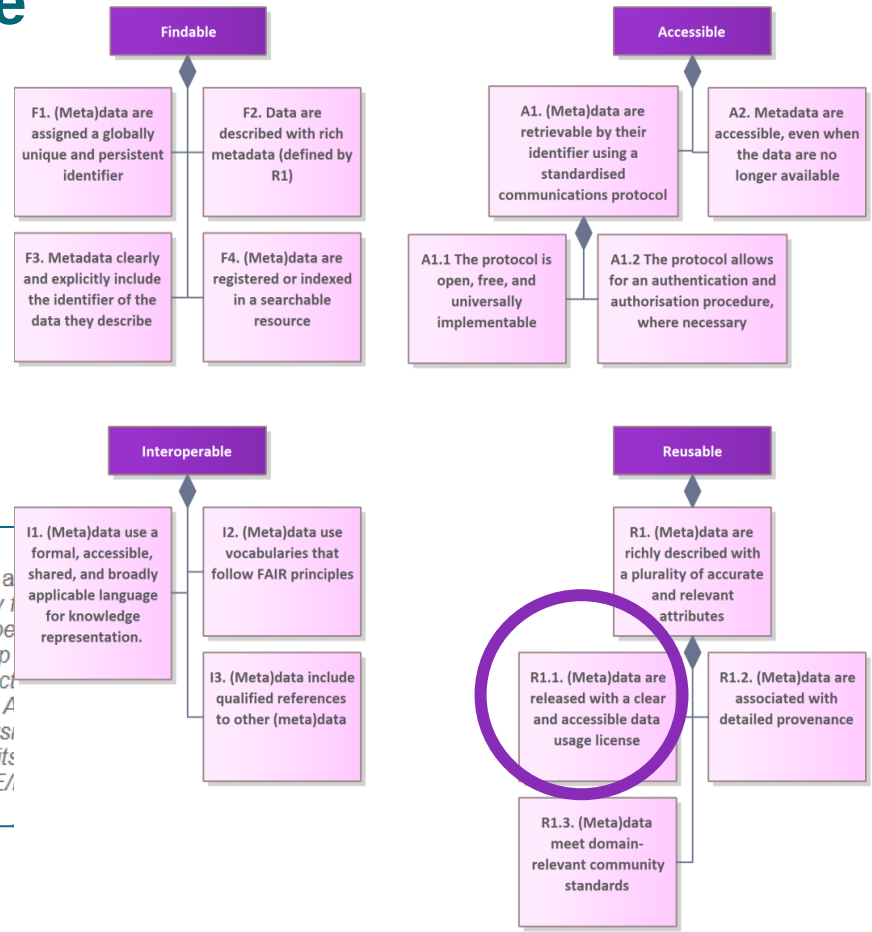
Responsible Party (Email)	jrfi@pml.ac.uk, obj@pml.ac.uk

Temperature(°C) at Depth (m)

User Notices

- We kindly request that all data uptake is appropriately a
  - *The Data Policy of the NERC National Capability i point of delivery. However, we request that prospe data. They will provide the metadata, the most up expertise in how the data can be used. We expect active collaboration in projects using these data. A provided by the Western Channel Observatory us Natural Environment Research Council through its Linked Atlantic Sector Science, grant number NE/*

*I have read and agree to The Data Policy ☑



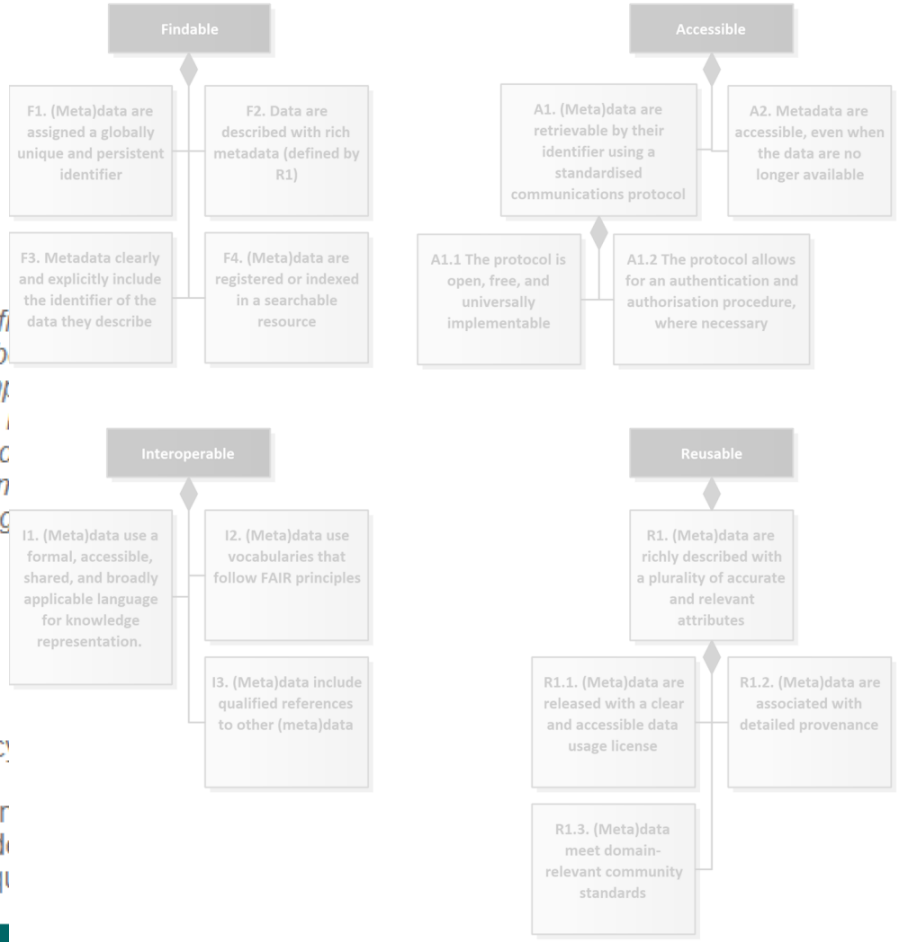
An analysis and demonstration of the toolsets developed as part of this project

A note on GDPR…

User Notices

- We kindly request that all data uptake is appropriately acknowledged as detailed below:
  - *The Data Policy of the NERC National Capability funded Western Channel Observatory is to make the data fi point of delivery. However, we request that prospective data users first contact the points of contact at PML b data. They will provide the metadata, the most up to date versions of the data (where available) and most imp expertise in how the data can be used. We expect that co-authorship will be offered to relevant PML experts active collaboration in projects using these data. Any publication or report using these data should acknowlec provided by the Western Channel Observatory using the following: "The Western Channel Observatory is fun Natural Environment Research Council through its National Capability Long-term Single Centre Science Prog Linked Atlantic Sector Science, grant number NE/R015953/1"*
    *I have read and agree to The Data Policy ☑
- We would like to contact you in the future to understand how you have used this data.
  Please tick the box to opt-in ☐
- We would like to include details of your research in some of PML's output such as Reports and Newsletters.
  Please tick the box to opt-in ☐
- For more information on our privacy practices, and how we are committed to protecting and respecting your privacy Privacy Policy
- By clicking submit, you consent to allow Plymouth Marine Laboratory to store and process the personal information for the sole purpose of providing you with the content requested. Your data request may require us to share your d British Oceanographic Data Centre (BODC) with the sole purpose of providing you with the data that you have requ

Reset | Submit



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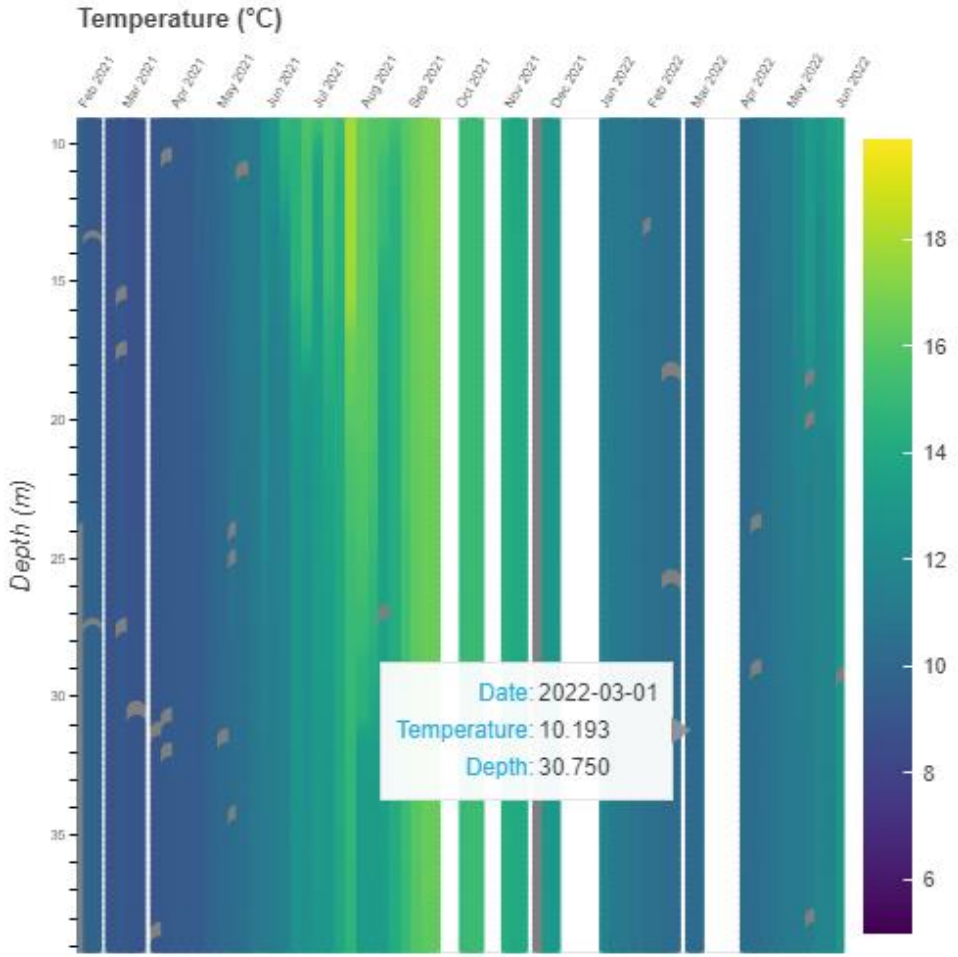
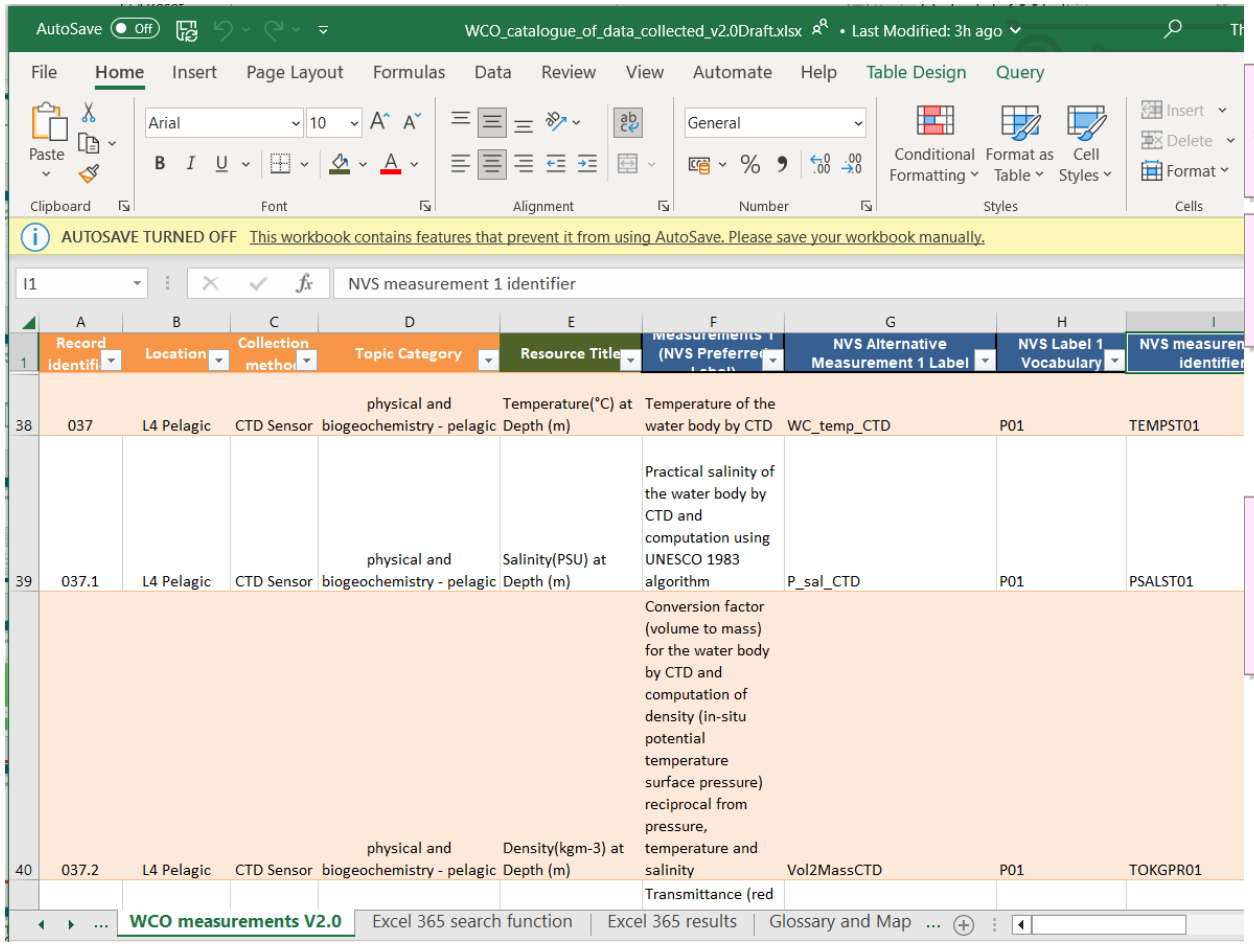
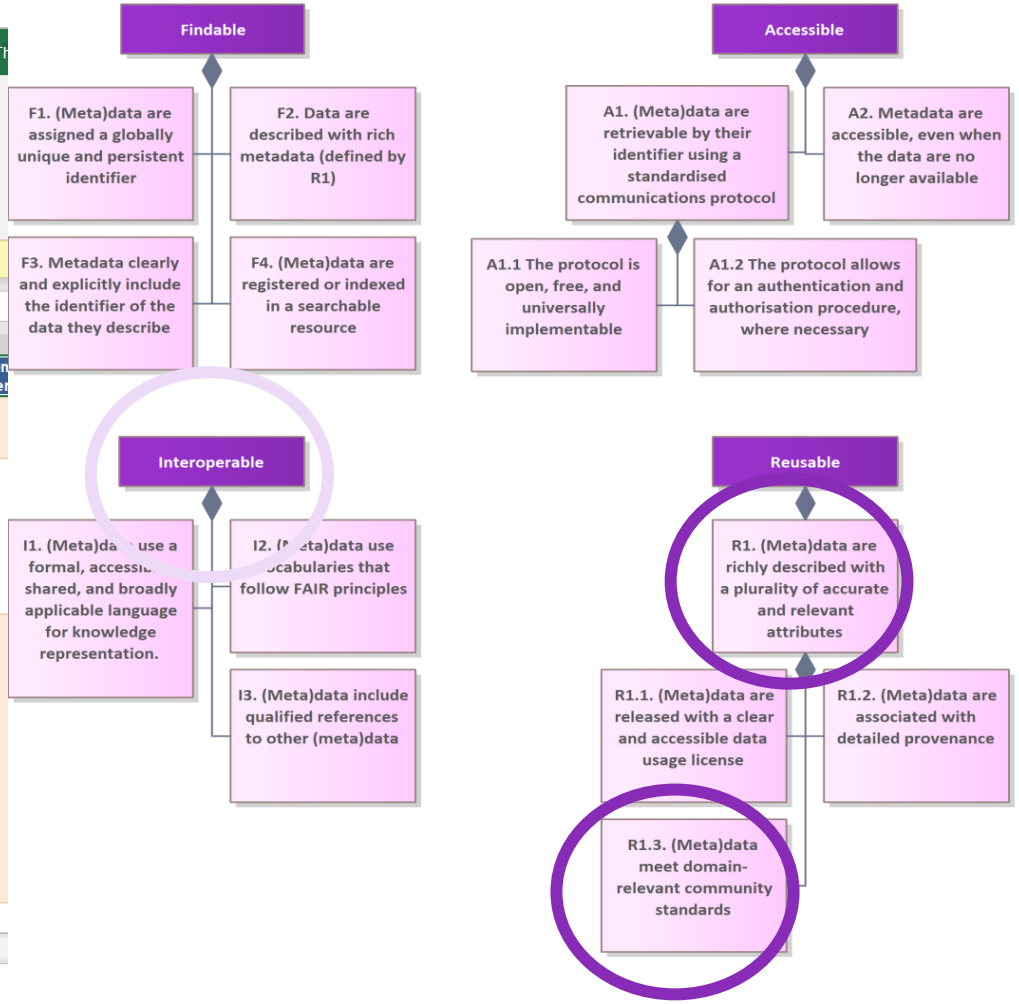
Accessible colour pallets

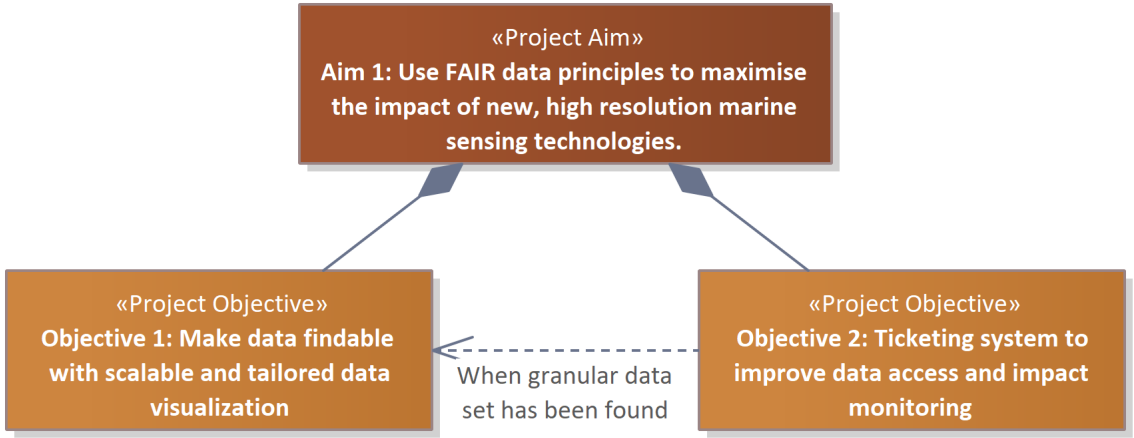


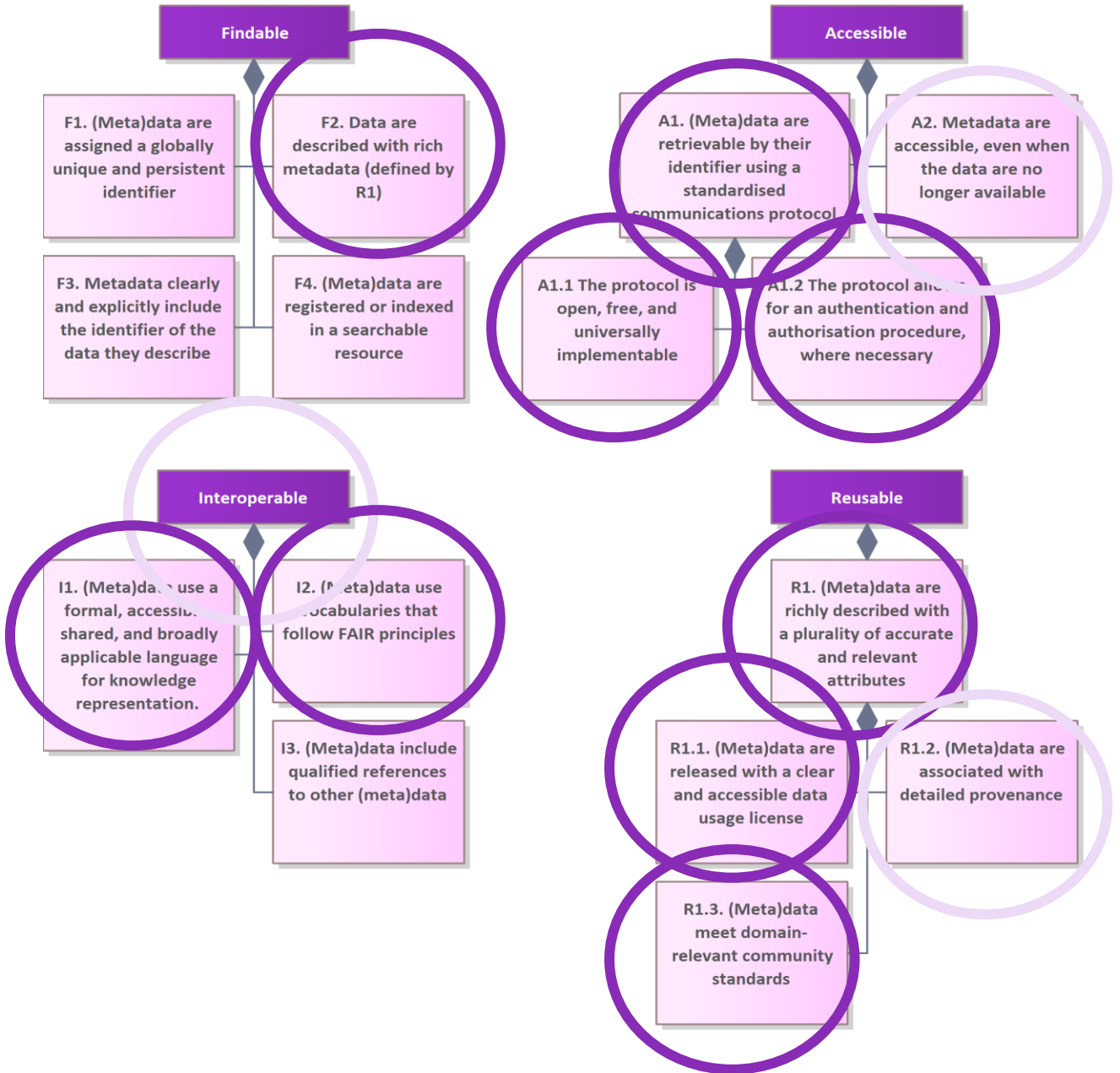
An analysis and demonstration of the toolsets developed as part of this project **Downloadable and scientist / human friendly catalogue interface**





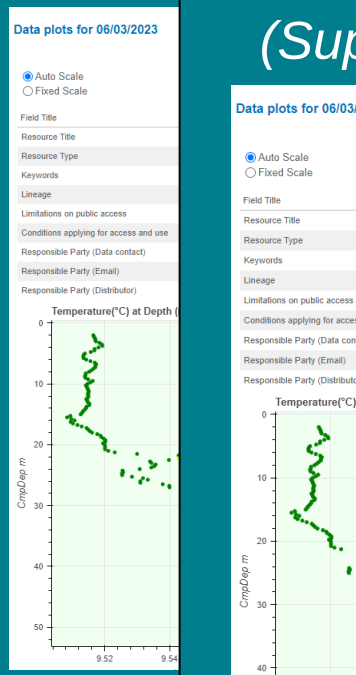
Conclusion


«Project Aim»
Aim 1: Use FAIR data principles to maximise the impact of new, high resolution marine sensing technologies.
«Project Objective»
Objective 1: Make data findable with scalable and tailored data visualization
When granular data set has been found
«Project Objective»
Objective 2: Ticketing system to improve data access and impact monitoring

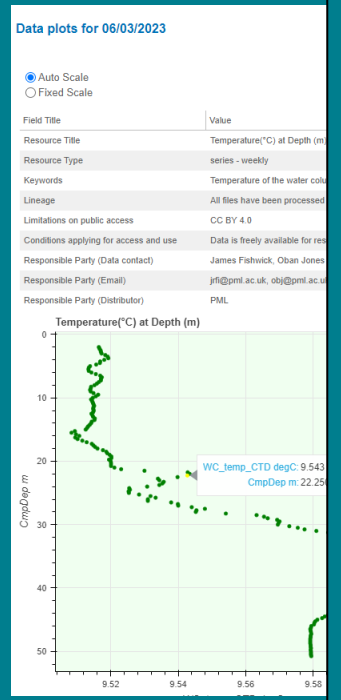

Findable
F1. (Meta)data are assigned a globally unique and persistent identifier
F2. Data are described with rich metadata (defined by R1)
F3. Metadata clearly and explicitly include the identifier of the data they describe
F4. (Meta)data are registered or indexed in a searchable resource
Accessible
A1. (Meta)data are retrievable by their identifier using a standardised communications protocol
A2. Metadata are accessible, even when the data are no longer available
A1.1 The protocol is open, free, and universally implementable
A1.2 The protocol allows for an authentication and authorisation procedure, where necessary
Interoperable
I1. (Meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.
I2. (Meta)data use vocabularies that follow FAIR principles
I3. (Meta)data include qualified references to other (meta)data
Reusable
R1. (Meta)data are richly described with a plurality of accurate and relevant attributes
R1.1. (Meta)data are released with a clear and accessible data usage license
R1.2. (Meta)data are associated with detailed provenance
R1.3. (Meta)data meet domain-relevant community standards

Project Outputs

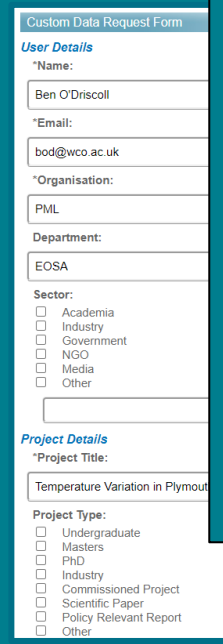
Output 1 – Improved data inte
(S



Output 2 – Improved metadata
(Supporting



Output 3 – Improved WCO impact data
(So we ca



Output 4 – A record of this implem
(Target a

DOI: **10.528**
zenodo.8101

Output 5 – A reusable design rationale
(Reference architecture)

DOI: **10.5281/**
zenodo.8096598

Available now!