How to loosen possible tensions among open science, security and integrity within the Virtual Academy framework

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Open science ≠ Open access

Approach based on **collaboration and transparency**

Sharing of research outcomes is a need

«sharing as widely and open as possible, as closed as necessary»: **maximized and controlled**

Research outcomes: **pubblications, datasets**, **sw tools, methodologies, workflows, protocols, services, digital lab, ….**
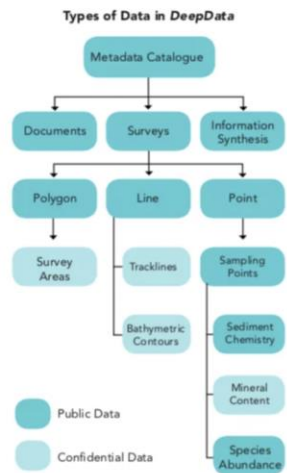
Open Science:
the new normality

Decisional processes and definition of policies

Digital Twins of the Ocean (DITTO)

Decade Programme
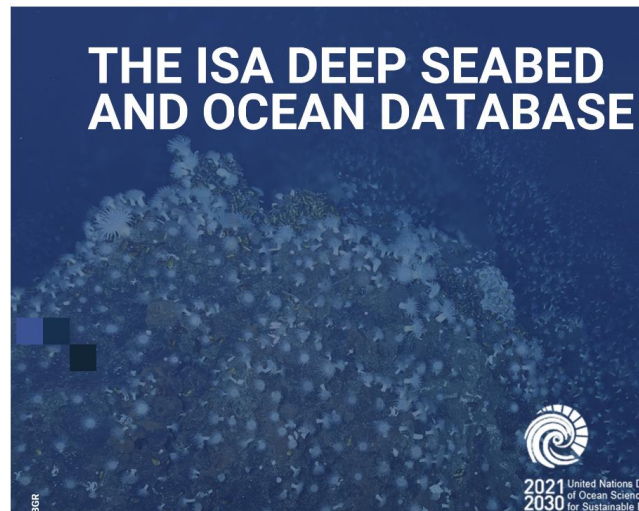
DeepData

DeepData Contents

DeepData contains information on mineral resource assessment (geological data) and environmental baseline/assessment data. However, only the environmental data will be accessible to the public. This will include biological, physical and geochemical parameters of the marine ecosystems from the seafloor to the ocean surface. The geological data is formally identified as confidential in the regulations on prospecting and exploration of mineral resources (**ISBA/19/A/9, ISBA/19/C/17, ISBA/16/A/12/Rev.1, and ISBA/18/A/11**).

- The types of data to be submitted to ISA, as well as the procedures to be followed to ensure data confidentiality, are also clearly provided in these regulations.
- Contractors are required to submit the metadata and results of their sample analysis from exploration surveys in contract areas using the reporting templates published by the LTC. Such templates are to be found in the Recommendations for guidance of contractors for the assessment of the possible environmental impacts arising from the exploration for marine minerals in the Area (**ISBA/19/LTC/8**) and the content, format and structure of annual reports (**ISBA/21/LTC/15**, Annex IV).
- The reporting templates developed to facilitate the submission of structured geological and environmental data are available on ISA's website1. In addition to "structured data" extracted from templates, DeepData also hosts "unstructured information," including maps, photographs, videos, graphics and relevant publications published in peer-review journals received from contractors.
- The Geographical Information System (GIS) is part of DeepData functionalities. As such, it allows visualization of contract areas, reserved areas and designated areas of particular environmental interest (APEIs). GIS information accessible through

THE ISA DEEP SEABED AND OCEAN DATABASE

Types of Data in *DeepData*

Public Data

Confidential Data

Open science: implementation mechanisms

Actions by funding agencies, implementation of national OS plans, international coordination actions, actions by research performing organizations,......

- " FAIR Data" & " FAIR-by-Design»
- "Data Management Plan"
- Open science infrastructure
- Education
- Research assessment
- ….

Open Science:
a contribute to research integrity

Open science implicitly enables behaviors that mitigate lack of integrity in research

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integrity |int'|

1 the quality of being h

The European
Code of Conduct for
Research Integrity
REVISED EDITION 2023

2.7 Publication, Dissemination, and Authorship

• Authors, research institutions, publishers, funders, and the research community acknowledge that negative results can be as relevant as positive findings for publication and dissemination.

• Authors are accurate and honest in their communication to colleagues, policy-makers, and society at large.

• Authors are transparent in their communication, outreach, and public engagement about assumptions and values influencing their research as well as the robustness of the evidence, including remaining uncertainties and knowledge gaps.

2.5 Data Practices and Management

• Researchers, research institutions, and organisations ensure appropriate stewardship, curation, and preservation of all data, metadata, protocols, code, software, and other research materials for a reasonable and clearly stated period.

• Researchers, research institutions, and organisations ensure that access to data is as open as possible, as closed as necessary, and where appropriate in line with the FAIR Principles (Findable, Accessible, Interoperable and Reusable) for data management.

• Researchers, research institutions, and organisations are transparent about how to access and gain permission to use data, metadata, protocols, code, software, and other research materials.

Security & integrity in an open science framework

Current mitigation actions

Data management plan in Horizon Europe

Data security: *Will the data be safely stored in* ***trusted repositories for long term preservation and curation****?*

Trusted repository

They have mechanisms ***for the accuracy and integrity of datasets and metadata,*** *as well as procedures to liaise with depositors where issues are detected. They meet generally accepted international and* ***national criteria for security to prevent unauthorized access and release of content*** *and have* ***different levels of security depending on the sensitivity of the data being deposited to maintain privacy and confidentiality.***

Policy making

Not only datasets but also sw tools, methodologies, workflow, protocols, services, digital labs, etc.

Different types of research outputs

The new normality

What guidelines for security and integrity mitigation actions should be implemented by the services of an open science supporting infrastructure?

SIGRE, Roma 29 novembre 2023