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**Ocean Data and Information System (ODIS): a plan for the future**

By Lucy Scott

# Background & History

Over its 60+ years of operation, the International Oceanographic Data and Information Exchange (IODE) has worked with Member States to enhance marine research, exploration and development. It has done this by facilitating the exchange of information and data, and by meeting the needs of users for data and information products. As such, it supports member states in meeting the Sustainable Development Goals, the Paris Agreement on Climate Change, the Sendai Framework on Disaster Risk Reduction and also contributes to the UN Decade of Ocean Science for Sustainable development.

To continue to pursue its mission in an age of rapid and uneven digital transformations across nations, and in response to requests by member states, the IODE has implemented the Ocean Data and Information System (ODIS) after the adoption of Decision IODE-XXIV.4 in 2017. In addition, Recommendation IODE-XXVI/6.1.1 (2021) formally established ODIS as a project. IODE implemented a proof-of-concept for ODIS through the Ocean InfoHub (OIH) Project between 2020 and mid-2024, funded by the Government of Flanders, Kingdom of Belgium. This enabled IODE to develop the necessary system architecture, federation model, technology framework, and identify user needs to develop bottom-up test cases.

IODE has documented over 3100 online repositories of ocean data and information, which shows the highly complex online environment, and challenge of finding the right information from the right source (ODISCat 2023-10; https://catalogue.odis.org). It is this challenge that ODIS has been built to meet.

# The Ocean Data and Information System (ODIS)

**The Ocean Data and Information System (ODIS)** is the collection of distributed, independent, yet interoperating digital systems, voluntarily sharing (meta)data and information along co-developed and clear conventions. **The ODIS Federation** is the collection of organisations which operate “Nodes” in the ODIS network, through which they technically link and coordinate their digital operations. The interoperability conventions which all ODIS Nodes implement are formalised and operationalised in the **ODIS Architecture (ODIS-Arch)** to allow existing and emerging ocean data and information systems, from any stakeholder, to interoperate with one another. This enables and accelerates more effective development, dissemination, and orchestration of digital technology and services, as well as sharing of ocean data, information, and knowledge. **IODE hosts the ODIS Secretariat** as one of its core Programme Components for coordination and facilitation, ensuring that partners have equitable influence in the evolution of the system, and that it serves their interests and accommodates their concerns.

Joining the ODIS Federation offers a **long-term solution for any organisation, including NODCs and ADUs,** to keep ownership and complete control over their data holdings, while choosing which (meta)data to share across the growing, global ocean digital ecosystem. ODIS provides the technological capacity and coordination framework for unprecedented organisational and technical cooperation. ODIS partners will progressively deepen and broaden their interoperability across diverse stakeholders, supporting continuous innovation in an operational and practical network. Further, the reliability of the ODIS Architecture allows products and services to be built on top of the ODIS ecosystem to meet numerous policy and management demands. This can save considerable resources and significantly raise the profile of the IODE network on the global stage, while allowing IODE to share its capacities and experience with new partners.

**The overarching goal of the Ocean Data and Information System (ODIS) is to provide a sustainable and responsive digital ecosystem where users can discover the complete range of digital resources offered by IOC Member States, independent projects, and other partners within and beyond the UN Decade of Ocean Science for Sustainable Development.**

# Key achievements

## The ODIS Architecture (ODIS-Arch)

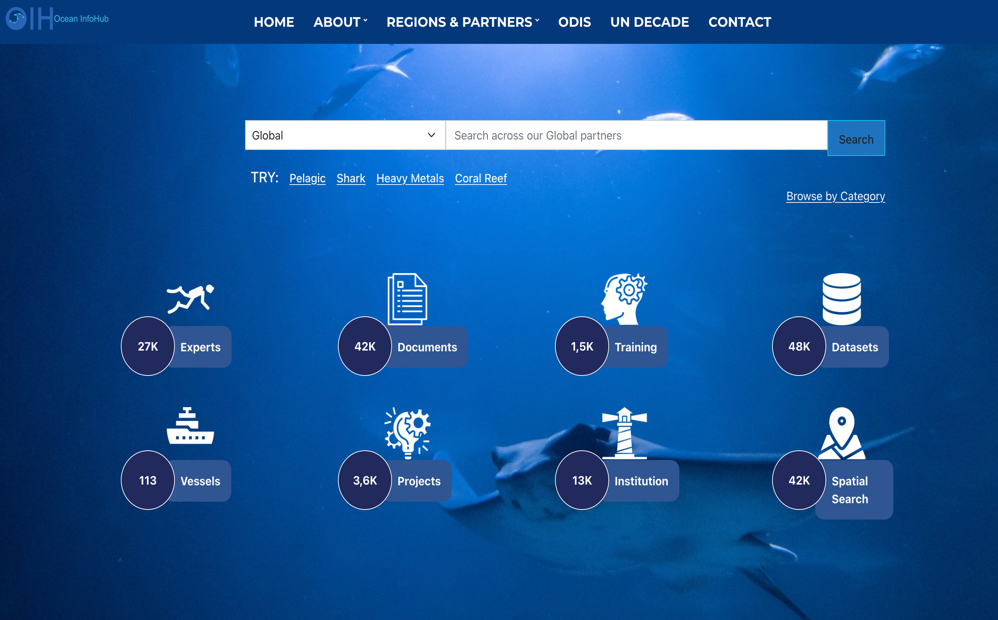
The core of ODIS is the ODIS Architecture (ODIS-Arch) - a clearly specified collection and configuration of elements that all ODIS Partners use to link to each other over the Web. A decentralised interoperability architecture, ODIS-Arch provides the basic rules with which ODIS partners co-construct an interoperating digital ecosystem. As with natural ecosystems, the ODIS ecosystem is resilient to the gain or loss of parts, and accommodates a high diversity of products and services, while maintaining its core functions. Access the ODIS architecture documentation, Github Repository: https://github.com/iodepo/odis-arch and training resources.

Due to its effectiveness and alignment with widely adopted Web architectural patterns, ODIS-Arch and the ODIS Federation model has been used as a reference architecture by several organisations and initiatives. For example, the USA’s NASA Heliophysics Digital Resource Library (HDRL) and the Heliophysics KNOWledge Network (Helio-KNOW). Additionally, the Cross-domain Interoperability Framework (CDIF) initiative coordinated by the International Science Council’s Committee on Data (CODATA) draws heavily from ODIS-Arch's outcomes, as recently reported in the WorldFAIR project, funded by the Horizon programme of the European Commission.

## Ocean InfoHub

The Ocean InfoHub (OIH) Project (2000-mid 2024), funded by the Government of Flanders, Kingdom of Belgium, and co-funded by NORAD, supported the initial development of the Ocean Data and Information System (ODIS). OIH built upon the digital exchange and interoperability offered by ODIS, to create a global portal for users to discover data, information, and other digital assets shared by ODIS partners. OIH focused on three pilot regions (Africa, Latin America and the Caribbean region, and the Pacific Small Island Developing States), to facilitate a process of co- design for the ODIS Architecture, and to enable a diverse array of partners to test and co-develop ODIS.

The OIH Global Search Hub portal (https://oceaninfohub.org) demonstrates one use of ODIS, primarily for discovery, access, and (re)use of digital assets, powered by interoperable metadata. The portal currently indexes over 130,000 metadata records in seven categories: (i) Experts (27,000); (ii) Institutions (13,000; (iii) Documents (42,000); (iv) Training (1,500); (v) Vessels (113); (vi) Projects (3,600); and (vii) Datasets (48,000).



The OIH Portal demonstrates a relatively simple application of ODIS’ potential, and yet provides an unprecedented level of ocean data and information discovery across hundreds of organisational sources.

# Interfaces to other digital ecosystems

Recognising that other communities and data federations manage ocean data and information of high relevance to the IOC and ODIS community, ODIS has created bridges to systems such as the WMO's WIS 2.0 and UNEP's WESR. While still in their early forms, these ensure that ODIS and other major data systems have a concrete foothold towards deeper interoperability.

The Ocean InfoHub Project and ODIS have already succeeded in creating a self-sustaining network of partners, but there remains much work to do to widen the collaboration to other regions and nations, build capacity and digital equity in regions with low resourcing, and continually upgrade the capabilities of the network.

**ODIS in numbers** (retrieved on 15/10/2024)

* 42 Partners
* 50 Nodes
* 665,305 digital resources/entities described

More information can be found in the ODIS Dashboard

# The path ahead

ODIS has demonstrated that a well-coordinated network of distributed and independent systems can interoperate and more effectively exchange ocean data and information for the benefit of all. As such, it has laid a foundation for a sustainable, co-developed, and open interoperability solution at the heart of a thriving digital ocean ecosystem. **To achieve this future, the coordination and convention-building role of IODE is essential:** its ability to balance needs and capacities to ensure effective partnership will be central to the extension of ODIS into new frontiers.

Further, **ODIS has the potential to revolutionise, enhance, and streamline the operations of the IODE** in pursuit of its mission**.** ODIS allows real-time monitoring of data and information exchange across its partners, a model which can be extended across IODE’s core stakeholders to match the new demands of the digital revolution. Its current form has concretely demonstrated the feasibility of lightweight, but interoperable, data exchange and encourages further development and extension to new data, information, and other digital assets including software, modelling capacities, and digital twin components. These capacities also allow the identification of new opportunities, gaps, and new challenges in global ocean data sharing.

Furthermore, ODIS offers effective and sustainable means to enhance and **unlock more value** from the >100 National Oceanographic Data Centres (NODCs), Associate Data Units (ADUs) and Associate Information Units (AIUs). These centres manage and make available millions of ocean observations that contribute to ocean data products and services developed and used by other IOC programmes. ODIS offers a **long-term solution for NODCs, ADUs and new partners** to keep ownership and complete control over their data holdings, while choosing which (meta)data and services to share with a growing global ocean digital ecosystem. It is expected that in the coming years, **the further involvement of NODCs and ADUs,** with direct technical support where needed, will facilitate their accession into the ODIS Federation, significantly increasing their visibility and impact.

## Proposed detailed work plan 2025-2026

The immediate plan for the ODIS Programme, (since August 2024, ongoing), is to transition products and services from the Ocean InfoHub Project to the ODIS Programme component. This will include:

1. Revising and raising contracts, reviewing all public-facing portals and materials, revising new public awareness materials for ODIS, and preparing management systems, operating working groups, budgets and work plans for the upcoming years.
2. The project will provide technical and procedural guidance and documentation as well as related training to assist data/information providers as well as diverse user communities with the necessary capacity to actively and equitably participate in ODIS.
3. ODIS will develop additional functionality to support end-users.
   1. This will focus on the creation of data products and services derived from the interoperable data mesh ODIS Nodes create.
   2. End-users identified by the ODIS Operations Committee and Steering Committee (see below) will assist in prioritising function development.
4. ODIS will support the OceanData 2030 Programme, registered under the UN Decade of Ocean Science for Sustainable Development.
5. Together with OceanData 2030, ODIS will further strengthen and broaden a bridge to other digital ecosystems such as WMO's WIS2.0. IODE and ODIS will support Marine Spatial Planning and Sustainable Ocean Planning in implementing interoperable data flows.
6. Efforts commence to ensure all sub-programme activities under ODIS establish functional Nodes in ODIS.
7. Update the Steering Committee, with new, higher-level mandate focusing on 5-10 year strategy to ensure ODIS has relevance and utility in a rapidly changing technological landscape.
8. Establish an ODIS Operations Group (ODIS-Ops) to expand the technical coordination and decision-making processes (currently performed by personnel in OIH WP2) to members from every ODIS Node
   1. ToR - Ocean Data Information Systm Operations Committee
   2. Consultation with regional leads in the Operations Group to identify regional priorities, challenges, and opportunities, and inform global strategy.
9. Two partner communications sent with ODIS communications materials (1st high level, 2nd technical)
10. Revison and integration of ODIS and OIH flagship websites: https://odis.org/ and https://oceaninfohub.org/
11. Finalisation of branding and organisational identity materials: logos, brochures, promotional videos.
12. Establishment of an online presence and steering committee for OceanData 2030
13. Raise contracts for technical contractors.
14. Embed/cross-link global search hub capabilities of OIH to ODIS websites for more seamless user experience.
15. Complete the automation of IODE’s ODIS technical coordination, diagnostic, and data product generation processes (e.g. those that keep OIH up to date), initiated by content that ODIS Nodes maintain in ODIScat.
16. Raise resourcing to upgrade ODIScat to match new capabilities and interest provided by ODIS and OIH.
17. Create further training resources to support potential ODIS partners in building and maintaining high-quality digital asset catalogues compatible with ODIS-Arch (training directed for NODCs and ADUs that do not already have an online metadata catalogue).

## Performance indicators

The following indicators are proposed to guide IODE in its coordination role for the ODIS Federation. Indicators are to be interpreted holistically and not all indicators are to be understood as “more is better”. For example, fewer meetings but stable or increased Node accession and/or data flow across the ODIS Federation is a desirable outcome. Further, as Nodes optimise their data systems, they may share fewer metadata records with ODIS: this may be an indicator of improved data and service management, rather than a negative development. Conversely, a sudden increase in data shared by a Node may indicate a technical error or data management approach incompatible with other ODIS Partners. Understanding and reporting on the reasons behind indicator fluctuations will assist IODE in supporting ODIS Partners to co-operate effectively.

**Table 1: Proposed indicators to monitor the performance of ODIS**

|  |  |  |
| --- | --- | --- |
| **Indicator** | **Data source(s)** | **Disaggregation axes (examples)** |
| Number of ODIS Partners | ODIS dashboard, IODE coordination logs | LDCs, SIDS, UN Regions |
| Number of online ODIS Nodes | ODIS dashboard | LDCs, SIDS, UN Regions |
| Number of organisations working towards ODIS accession | ODIS Secretariat, ODIS Operations Committee, Partner reporting | LDCs, SIDS, UN Regions |
| Time from first contact with an ODIS candidate to accession | ODIS Secretariat | Nation, sectors (e.g. governmental, corporate, research, citizen science), LDCs, SIDS, UN Regions |
| Number of ODIS asset downloads | IODE ODIS Secretariat, repositories used to archive ODIS assets (e.g. Zenodo) | Download requests by nation, LDCs, SIDS, UN Regions |
| Richness of metadata records used to construct the IODE’s ODIS Knowledge Graph | IODE ODIS Secretariat, IODE ODIS Knowledge Graph diagnostics | Disciplinary/thematic areas, UN Regions, nations, UN vs non-UN groups |
| Completeness (vs minima described in ODIS-Arch) of metadata records used to construct the IODE’s ODIS Knowledge Graph | IODE ODIS Secretariat, IODE ODIS Knowledge Graph diagnostics | Disciplinary/thematic areas, UN Regions, nations, UN vs non-UN groups |
| Number of searches conducted via the Ocean InfoHub Portal | OIH Web Analytics, IODE ODIS Secretariat | Searches conducted from IPs in LDCs, SIDS, UN Regions; searches resulting in user forwarding to partner resources, searches by thematic category |
| Number of data sources declared in the provenance of records shared over ODIS | IODE ODIS Secretariat, IODE ODIS Knowledge Graph diagnostics | Disciplinary/thematic areas, UN Regions, nations, UN vs non-UN groups |
| Number of consortia co-maintaining ODIS-Arch specifications | IODE Secretariat | Disciplinary/thematic areas, UN Regions, nations, UN vs non-UN groups |
| Number of stable interfaces to partner data systems | IODE ODIS Secretariat, ODIS Knowledge Graph Diagnostics | Governance/maintenance of data systems by LDCs, SIDS, UN Regions, UN vs non-UN data systems, thematic (e.g. terrestrial, atmosphere, biodiversity) |
| Number of coordination meetings | IODE ODIS Secretariat | By Steering Committee, Operations Committee, UN Region, nation, Disciplinary area, ad hoc working group |

Indicators for 2027 anticipate the integration of ODIS into the emerging IOC Data Space and will focus on its contributions to key data and information flows within these architectures. Naturally, these are subject to revision in 2026, as the IOC Data Space takes form.

**Table 2: Proposed indicators to monitor the performance of ODIS, post 2027**

|  |  |  |
| --- | --- | --- |
| **Indicator** | **Data source(s)** | **Disaggregation axes (examples)** |
| Contribution to IOC data products and services | IOC Data Space diagnostics and provenance | Disciplinary/thematic areas, UN Regions, nations, UN vs non-UN groups |
| Contribution to SDG data products and services | SDG Custodian agencies, ODIS Knowledge Graph diagnostics | Disciplinary/thematic areas, UN Regions, nations, UN vs non-UN groups |
| Number of online services drawing from ODIS (e.g. EOV data portals, GOOS Data Services, digital twin exchange services) | IODE ODIS Secretariat, ODIS Knowledge Graph Diagnostics | Disciplinary/thematic areas, UN Regions, nations, UN vs non-UN groups |

## Proposed detailed budget 2025-2026

Funding requirements to maintain ODIS operations and development over the period 2025-2026 are tabulated below. Table 3 is the proposed budget. Tables 4 and 5 are highly restricted alternatives at reduced budget levels.

**Table 3: Proposed per annum budget for 2025-2026**

|  |  |
| --- | --- |
| ***Role*** | ***Funding allocation (USD)*** |
| Coordination and project management | 80,000 |
| Graph Operations / Digital engineer / Backend developer | 72,000 |
| Technical support and capacity development | 72,000 |
| Administrative support | 25,000 |
| Front-end services and portal development | 50,000 |
| Travel, including missions for outreach and capacity development | 20,000 |
| **Total per annum** | **$319,000 USD** |

**Total 2025-2026: $638,000**

**Table 4. Per annum budget for 2025-2026 with a 100,000 USD ceiling**

|  |  |
| --- | --- |
| ***Role*** | ***Funding allocation (USD)*** |
| Coordination and project management 50% | 40,000 |
| Graph Operations / Digital engineer / Backend developer 25% | 20,000 |
| Technical support and capacity development 25% | 20,000 |
| **Total per annum** | **$100,000 USD** |

**Table 5. Per annum budget for 2025-2026 with a 150,000 USD ceiling**

|  |  |
| --- | --- |
| ***Role*** | ***Funding allocation (USD)*** |
| Coordination and project management | 80,000 |
| Graph Operations / Digital engineer / Backend developer | 26,000 |
| Technical support and capacity development | 26,000 |
| Administrative support | 18,000 |
| **Total per annum** | **$150,000 USD** |

*Note: the services of the principal architect of ODIS, lead of the technical implementation and of its strategic development are not included in Tables 3,4 or 5. This role has been provided through the alignment of work/tasks from projects funded by the European Commission’s Horizon programme (e.g. WorldFAIR[[1]](#footnote-1), MARCO-BOLO[[2]](#footnote-2), BiOcean5D[[3]](#footnote-3)) as well as the Helmholtz Metadata Collaboration[[4]](#footnote-4). The estimated per annum cost of this role (part-time) is 50,000 - 80,000 USD.*

## Proposed medium-term budget for 2027-2030

Following the consolidation of the IODE coordination technologies and organisational processes (outlined in 4.1), the anticipated plan for ODIS from 2027-2030 will centre on provide core functionality and sustained architecture to the emerging IOC Data Space[[5]](#footnote-5). This will entail the expansion of ODIS’ core functionalities and coordination efforts to keep pace with the demands of global digital transformation, particularly in the age of AI-driven technologies. The budget proposed in Table 6 is a conservative estimate, given the rapidly changing digital landscape within which ODIS is and will operate.

Together with OBIS, GOOS, OSS, and SDG custodians within IOC (such as that for indicator 14.3.1), ODIS will co-develop and serve as a common foundation for enhanced data, information, and web-service portals tailored to the needs of key user groups. These will include portals and data services for the GOOS EOVs, as well as for SDG indicators, thematic and disciplinary communities (e.g. portals for UN Ocean Decade Programmes and their post-2030 successors), digital twins, and AI agents. A set of minimal viable products (MVPs) for EOV and SDG data sub-systems within ODIS are already in development, in collaboration with GOOS and OBIS.

ODIS will support all IOC sections in enhancing discoverability and interoperability of their data and information, specifically for product development and member state support.

**Table 6: Proposed per annum budget for 2027-2030**

|  |  |
| --- | --- |
| ***Role*** | ***Funding allocation (USD)*** |
| Coordination and project management, including support for region-specific coordination | 160,000 |
| Digital Architect, Chief technical lead | 100,000 |
| Graph Operations / Digital engineer / Backend developer | 150,000 |
| Technical support and capacity development | 150,000 |
| Administrative support | 50,000 |
| Front-end services and portal development | 70,000 |
| Travel, including missions for outreach and capacity development | 40,000 |
| **Total per annum** | **720,000** |

# Proposed decisions/recommendations

**Revision of the Terms of Reference of ODIS**

**Draft Decision IODE-XXVIII.xx**

The IOC Committee on International Oceanographic Data and Information Exchange,

**Recalling** the establishment of the IOC Ocean Data and Information System Project (ODIS) through decision IODE-XXIV.4,

**Recognizing** that a major component of the ocean data and information system landscape is not linked to the IOC and the need to collaborate with those communities/systems to achieve improved accessibility, unrestricted use and interoperability of data and information,

**Recognizing further** the key role that distributed and interoperable data, information, and digitized knowledge resources will have during the UN Decade of Ocean Science for Sustainable Development,

**Recalling further** that the IOC decided that IODE will work with existing stakeholders, linked and not linked to the IOC, to improve the accessibility and interoperability of existing data and information, and to contribute to the development of a global ocean data and information system, to be referred to as the IOC Ocean Data and Information System, leveraging established solutions where possible, including existing IODE systems and others,

**Noting with appreciation** that IODE has:

1. established the IOC Ocean Data and Information System Catalogue of Sources Project (ODISCat) in 2019,
2. started the implementation of the Ocean InfoHub project as a three-year project (2020-2023) funded by the Government of Flanders (Kingdom of Belgium).

**Recommends** the revision pf the terms of reference of ODIS as attached in Annex A and terms of reference of the Steering Group for ODIS (SG-ODIS) as attached in Annex B to this recommendation,

**Invites** all IOC programmes, IOC regional subsidiary bodies and partner organizations to collaborate by mobilizing their communities to enter information into the ODIS-Cat system, and to participate in the OIH and ODIS.

**Annex A to Decision IODE-XXVIII.xx**

**Terms of Reference of the IOC Ocean Data and Information System (ODIS)**

Objectives:

The objectives of ODIS are to:

1. develop the IOC Ocean Data and Information System (ODIS) as an e-environment where users can discover data, data products, data services, information, information products and services provided by Member States, projects and other partners associated with IOC,
2. work with partners, linked and not linked to the IOC, to improve the accessibility and interoperability of existing data and information. It will contribute to the development of a global ocean data and information system, to be referred to as the IOC Ocean Data and Information System, leveraging established solutions where possible,
3. start its development using already existing “ecosystem components” such as, *inter alia*, the ODIS Catalogue of Sources (ODISCat), the Ocean InfoHub project, and all IODE data and information products and services, and to add components within and outside the IODE programme as these become available to and interoperable with the ODIS ecosystem.

**Annex B to Decision IODE-XXVIII.xx**

**Terms of Reference of the IODE Steering Group for the IOC Ocean Data and Information System (SG-ODIS)**

The SG-ODIS will:

1. In coordination with the ODIS Secretariat, propose a one-, five-, and ten-year vision and mission for the ODIS Programme Component, revised each year,
2. Review high-level strategies and working plans for the ODIS Programme Component, prepared by the ODIS Operations Group (ODIS-Ops, see Annex C), proposing changes as needed,
3. Advise the ODIS Secretariat and ODIS-Ops on relevant developments in national, regional, global, or sectoral data and information policy, law, and practice which may impact ODIS operations,
4. Propose and, where feasible, facilitate coordination between ODIS Secretariat and new stakeholder or other interest groups,
5. Identify funding sources to further develop ODIS.

Membership: The IODE Steering Group for ODIS will be composed, *inter alia*, of:

1. A Chair or Co-Chairs
2. Representatives from IOC Programmes,
3. Invited Experts, prioritising the coverage of regions, digital capacity levels, sectors, UN Ocean Decade Programmes, and key groups pursuing, consolidating, or maintaining digital sovereignty,
4. Representatives of major interest groups and selected ODIS partners including regional/international organisations developing multi-year / decadal data strategies or with unique insight into strategically relevant issues,
5. A representative of the IODE Secretariat,
6. A representative of the UN Ocean Decade Data Coordination Group.

**Annex C to Decision IODE-XXVIII.xx**

**Terms of Reference of the Operations Group for the IOC Ocean Data and Information System (ODIS-Ops)**

The IODE will assemble an ODIS Operations Group (ODIS-Ops), comprising one representative from each ODIS Partner maintaining one or more ODIS Nodes[[6]](#footnote-6),.

Tasks. The main tasks of ODIS-Ops will be:

1. To ensure the uninterrupted operation of ODIS Nodes attending to issues detected by the ODIS-SG, ODIS Secretariat of the IODE’s ODIS-PC or by other ODIS Partners,
2. To promote broader and deeper interoperability between all ODIS Nodes, beginning at metadata / asset catalogues, and progressing to subject data, services, and other capacities as identified,
3. To guide their Nodes, and ODIS as a whole, in fulfilling the UN Decade of Ocean Science for Sustainable Development’s Data and Information Strategy and its Implementation Plan, and - more broadly - addressing its Challenges,
4. To participate in monthly meetings (online) not exceeding 60 minutes, distributed across time zones of the Group’s members,[[7]](#footnote-7)
5. To contribute to or produce status briefings on the state of the Federation as a whole, and of individual Nodes, detailing any issues limiting data and information exchange, as well as any opportunities to enhance it,
6. To identify and work to resolve any issues relating to data and information exchange and cross-Federation interoperability, by posting and pursuing issues on the odis-arch GitHub repository[[8]](#footnote-8) or another appropriate repository,
7. To make the Group aware of regionally, nationally, or locally specific requirements, regulations, or legal frameworks regarding data access and/or exchange which may affect the operations of the ODIS Federation,
8. To identify and describe opportunities for ODIS to provide utility to (potential) user groups and others,
9. To review and regulate the addition, suspension, or removal[[9]](#footnote-9) of ODIS Nodes to/from the Federation,
10. To report operational affairs to the ODIS Chair, ODIS-SG, and ODIS-PC, and consult these bodies for strategic and programmatic guidance.

Membership. Membership of ODIS-Ops shall include:

1. Chair or Co-Chairs (\*)
2. One technical expert which has been selected by each ODIS Partner operating at least one ODIS Node, charged with representing that Partner,
3. External experts, in advisory roles, in areas relevant to the activities of the Group,
4. Representatives of IODE in its coordination role,
5. Other, ad hoc members, as agreed by the regular membership,

Membership will be for a period of one year (renewable).

(\*) A Chair and Co-Chair will be elected at the end of the first meeting (and thereafter annually) by the members of the Group.

[end of document]

1. *https://cordis.europa.eu/project/id/101058393* [↑](#footnote-ref-1)
2. *https://cordis.europa.eu/project/id/101082021* [↑](#footnote-ref-2)
3. *https://cordis.europa.eu/project/id/101059915* [↑](#footnote-ref-3)
4. *https://helmholtz-metadaten.de/en* [↑](#footnote-ref-4)
5. *Led by IODE and GOOS*  [↑](#footnote-ref-5)
6. An “ODIS Node” is a data system which provides a machine-to-machine interface to the digital assets each ODIS Partner wishes to share. An ODIS Node 1) has a current and valid registration in the ODIS Catalogue of Sources (ODISCat), 2) provides sufficient metadata in ODISCat for its asset catalogues to be discovered and processed, 3) maintains its asset catalogues in a form which is interoperable across the ODIS Federation, and in compliance to the ODIS Architecture specifications, and 4) provides valid (meta)data and services described by its asset catalogue to other Nodes across the Federation. [↑](#footnote-ref-6)
7. Where resources allow, ad hoc, in-person meetings may be organised, particularly to more effectively resolve or pursue regional or thematic issues or opportunities. [↑](#footnote-ref-7)
8. <https://github.com/iodepo/odis-arch> [↑](#footnote-ref-8)
9. ODIS Nodes may be suspended or removed if they begin producing erroneous, invalid, or poor quality (meta)data, or if their products are incompatible with the ODIS Architecture and interoperability conventions. Nodes may be reinstated as soon as any outstanding issues are resolved and interoperability is verified. [↑](#footnote-ref-9)