



Assessment Information

[CoreTrustSeal Requirements 2020–2022](#)

Repository:

International Council for the Exploration of the Sea

Website:

<https://ices.dk/>

Certification Date:

22 March 2021

This repository is owned by:

International Council for the Exploration of the Sea

CoreTrustSeal Board

W www.coretrustseal.org

E info@coretrustseal.org



International Council for the Exploration of the Sea

Notes Before Completing the Application

We have read and understood the notes concerning our application submission.

True

Reviewer Entry

Reviewer 1

Comments:

Reviewer 2

Comments:

CORE TRUSTWORTHY DATA REPOSITORIES REQUIREMENTS

Background & General Guidance

Glossary of Terms

BACKGROUND INFORMATION

Context

R0. Please provide context for your repository.

Repository Type. Select all relevant types from:

Domain or subject-based repository, Other (Please describe below)

Reviewer Entry

Reviewer 1

Comments:

Accept

Reviewer 2

Comments:

Accept

Brief Description of Repository

The International Council for the Exploration of the Sea (ICES) is an intergovernmental marine science organization, meeting societal needs for impartial evidence on the state and sustainable use of our seas and oceans (1). Our goal is to advance and share scientific understanding of marine ecosystems and the services they provide and to use this knowledge to generate state-of-the-art advice for meeting conservation, management, and sustainability goals (2,3). ICES has a well-established Data Centre (4), which manages a number of large dataset collections related to the marine environment. The majority of data – covering the Northeast Atlantic, Baltic Sea, Greenland Sea, and Norwegian Sea – originate from national institutes that are part of the ICES network.

The working language of ICES, according to the ICES Convention art 9.2 is both French and English (5), although the accepted practice is to only use English in all official meetings and communications.

Reviewer Entry

Reviewer 1

Comments:

Accept

Reviewer 2

Comments:

Accept

Brief Description of the Repository's Designated Community.

The ICES Data Centre provides marine data services to ICES member countries, expert groups, world data centres, regional seas conventions (HELCOM and OSPAR), the European Environment Agency (EEA), Eurostat, and various other European projects and biodiversity portals. Dataset collections are organized around specific thematic data portals as well as an overarching data warehouse.

Most science is led and conducted by approximately 200 Expert Groups. These groups, which attract more than 1500 individual scientists from 350 institutions annually, are often described as “the engine of ICES”.

Reviewer Entry

Reviewer 1

Comments:

Accept

Reviewer 2

Comments:

Accept

Level of Curation Performed. Select all relevant types from:

C. Enhanced curation – e.g. conversion to new formats; enhancement of documentation, D. Data-level curation – as in C above; but with additional editing of deposited data for accuracy

Reviewer Entry

Reviewer 1

Comments:

Accept

Reviewer 2

Comments:

Accept

Comments

90% of the data managed at ICES fall within category C curation. 10% falls within category D. Category D is related to data where the originator is no longer in possession of the data, or the data have been part of a data archeology project and experts have had to impute values based on best available knowledge. In these situations, inferred or modelled values are labelled appropriately in the the file formats, and fact sheets that relate to the dataflow contain further information on how these were derived. For example, historical catch statistics based on hand written paper records are described by a research report (6).

Reviewer Entry

Reviewer 1

Comments:

Accept

Reviewer 2

Comments:

Accept

Insource/Outsource Partners. If applicable, please list them.

We provide data management services to the network of expert groups, and others as described above. Science cooperation agreements are in place with more than 20 global and regional organizations (7). In addition, ICES is contracted by Iceland, Norway, the UK, NASCO, NEAFC, OSPAR, HELCOM and the EU to provide management advice and technical services (8).

We outsource our IT services to Motus (9), DanofficeIT (10), and to DATACON (11).

Reviewer Entry

Reviewer 1

Comments:

Accept

Reviewer 2

Comments:

Accept

Summary of Significant Changes Since Last Application (if applicable).

Reviewer Entry

Reviewer 1

Comments:

Reviewer 2

Comments:

Other Relevant Information.

(1) <https://ices.dk/about-ICES/who-we-are/Pages/Who-we-are.aspx>

(2) https://ices.dk/about-ICES/how-we-work/Pages/Advisory_process.aspx

(3) <https://doi.org/10.17895/ices.pub.5470> (strategic plan - to be revised in early 2021)

(4) <https://ices.dk/data/Pages/default.aspx>

(5) http://ices.dk/sites/pub/Publication%20Reports/ICES%20Outreach,%20Newletters%20and%20Insights/ICES_Convention_1964.pdf

(6) <https://doi.org/10.17895/ices.pub.5405>

(7) <https://ices.dk/about-ICES/global-cooperation/Pages/Cooperation-agreements.aspx>

(8) <https://ices.dk/about-ICES/global-cooperation/Pages/Affiliates.aspx>

(9) <https://www.motus.dk/da/sikkerhed/iso-certificeret-datasikkerhed>

(10) <https://www.danofficeit.com/>

(11) <https://datacon.dk/>

Reviewer Entry

Reviewer 1

Comments:

Accept

Reviewer 2

Comments:

Accept

ORGANIZATIONAL INFRASTRUCTURE

1. Mission/Scope

R1. The repository has an explicit mission to provide access to and preserve data in its domain.

Compliance Level:

4 – The guideline has been fully implemented in the repository

Reviewer Entry

Reviewer 1

Comments:

4 – The guideline has been fully implemented in the repository

Reviewer 2

Comments:

4 – The guideline has been fully implemented in the repository

Response:

Access to, and the provision of, high quality data is a cornerstone of how ICES operates as an inter-governmental organization. This is well documented in the ICES strategy (12), specifically referred to in two of the key priorities: “Essential data for science and advice” and “Evidence for decision-making”. The implementation of the strategy is supported by a Science plan (13), and an Advice plan (14). Both of these have specific aims related to ICES role to ensure the collection, quality assurance and dissemination of data. See advice priorities – “assuring quality” and “sharing evidence”, and science priority areas – “Emerging techniques and technologies” and “observation and exploration”. Furthermore, ICES makes every effort to ensure that data received are handled and stored in a way that preserves the integrity of the data as it was submitted. ICES does not harvest or ingest data from any of the regional cooperation partners. All data are provided (uploaded) by contracting parties to ICES, and provided according to guidelines and submission procedures as outlined at the dataflow level.

The Council (15), comprising the 20 member countries of ICES, is the principal decision and policy-making body of ICES. The Council have explicitly approved the ICES Strategic plan, the Science plan and the Advice plan. Within the ICES cooperation agreements (16) there are also explicit agreements on the provision or use of data from clients of management advice, which also recognise the overall ICES mission and ICES Data policy. The regional cooperation agreements are only frameworks; specific services for provision of data products and data services to organizations are specified in annual negotiated workplans, which are not published.

Excerpts from the ICES Advisory (17) plan explain:

"ICES mission is to advance and share scientific understanding of marine ecosystems and the services they provide and to use this knowledge to generate state-of-the-art advice for meeting conservation, management, and sustainability goals."
(p4)

"Development of these products will be informed by ICES ecosystem science, data provision, observation and exploration, and assessments of human activities that affect and are affected by marine ecosystems." (p5)

(12) <https://doi.org/10.17895/ices.pub.5470>

(13) <https://doi.org/10.17895/ices.pub.5469>

(14) <https://doi.org/10.17895/ices.pub.5468>

(15) <https://www.ices.dk/community/groups/Pages/COUNCIL.aspx>

(16) <https://ices.dk/about-ICES/global-cooperation/Pages/Cooperation-agreements.aspx>

(17) <http://ices.dk/sites/pub/Publication%20Reports/ICES%20Outreach,%20Newletters%20and%20Insights/ICES%20advisory%20plan%202019%20web.pdf>

Reviewer Entry

Reviewer 1

Comments:
Accept

Reviewer 2

Comments:
The delayed update of the ICES Data Policy is expected to be available by the next renewal of your CoreTrustSeal.

2. Licenses

R2. The repository maintains all applicable licenses covering data access and use and monitors compliance.

Compliance Level:

4 – The guideline has been fully implemented in the repository

Reviewer Entry

Reviewer 1

Comments:
4 – The guideline has been fully implemented in the repository

Reviewer 2

Comments:

4 – The guideline has been fully implemented in the repository

Response:

The ICES Data policy (18) governs overall provision, access and use rights to data that are managed through ICES. The ICES Data policy is reviewed by the ICES operational group on Data and Information on a 4 year cycle. Updates or changes are then ratified by the governing body (ICES Council). The specific licences regarding commercially sensitive (19) or biologically sensitive data (20), are reviewed by the thematic governance groups for that topic, the Data and Information group and ratified by the ICES Science Committee (SCICOM). Both ICES Council and SCICOM have representation from all contracting parties to ICES, and have voting rights.

For Vessel Monitoring System (VMS) and Logbook data (21), all users that are granted access to work with these data are required to sign and date the VMS and Logbook Data Access agreement. These signed copies are stored on the ICES extranet, and can be referred to in case of any breach of data resulting from individuals having access to these data. ICES does not have a legal department, nor a mandate to prosecute or take legal action against an entity that does not honour the conditions of the data policy or licences. In the event that we are informed, or discover, a breach of these conditions, we take contact to the entity concerned and ask them to make the necessary corrective actions.

The ICES data policy is under a process of review as per the 4 year cycle, however due to meeting disruption in 2020 caused by COVID 19, the review has been extended to 2021 to allow time for the ICES Data and Information Group to prepare the community for a proposal to change to a creative commons licence. Therefore, the current 2016 policy remains in place for 2021. One of the main aims is to move away from a bespoke data policy to one that is based on an internationally recognised uniform standard, such as creative commons.

(18) <https://ices.dk/data/guidelines-and-policy/Pages/ICES-data-policy.aspx>

(19) https://ices.dk/data/Documents/Data_Policy_RDB.pdf

(20) https://ices.dk/data/Documents/VME_DataAccess_ICES_2016.pdf

(21) https://www.ices.dk/sites/pub/Publication%20Reports/Guidelines%20and%20Policies/VMS_DataAccess_ICES.pdf

Reviewer Entry

Reviewer 1

Comments:

Accept

Reviewer 2

Comments:

See comment for R1.

3. Continuity of access

R3. The repository has a continuity plan to ensure ongoing access to and preservation of its holdings.

Compliance Level:

3 – The repository is in the implementation phase

Reviewer Entry

Reviewer 1

Comments:

3 – The repository is in the implementation phase

Reviewer 2

Comments:

3 – The repository is in the implementation phase

Response:

Cessation of funding is highly unlikely, due to the intergovernmental and disciplinary natures of ICES (22). However, there is a plan of transferral of the ICES data holdings in case funding is no longer secured, see rule 18.4 in the ICES Rules of Procedure (23). ICES also manages data on behalf of client organizations (HELCOM and OSPAR), in our agreements with them, we are bound to handover data holdings to a repository of their choosing, should ICES no longer be able to provide these services.

ICES maintains a risk register that is overseen by the executive committee (ICES Bureau) and reviewed at their meetings, at least twice per year. The risk register categorises risks by their potential impact and the likelihood of occurrence into low, medium and high risk. Each risk is evaluated and mitigation measures are taken to ensure that the risk is managed, most of the major risks are related to financial failures i.e. contracting parties not paying their cost share to ICES.

A similar approach is taken specifically within the data area, where the Data and Information Group (DIG) (24) oversees a 'Future challenges and opportunities' risk matrix – that evaluates potential threats and opportunities according to their ability to disrupt data provision, data access and technology on a high level.

It should be noted that ICES is a data collation centre, and not the originator of data. Preservation of 'original datasets' is the responsibility of the data depositors, as outlined in the ICES Data Policy.

(22) https://ices.dk/about-ICES/who-we-are/Documents/Host_Agreement_1968_ICES-DK.PDF

(23) https://ices.dk/about-ICES/who-we-are/Documents/ICES_Rules_of_Procedure.pdf

(24) <https://ices.dk/community/groups/Pages/DIG.aspx>

Reviewer Entry

Reviewer 1

Comments:

Accept

Reviewer 2

Comments:

It would be beneficial for future certifications if at least the reviewers are given access to the risk register and/or 'Future challenges and opportunities' risk matrix.

4. Confidentiality/Ethics

R4. The repository ensures, to the extent possible, that data are created, curated, accessed, and used in compliance with disciplinary and ethical norms.

Compliance Level:

4 – The guideline has been fully implemented in the repository

Reviewer Entry

Reviewer 1

Comments:

4 – The guideline has been fully implemented in the repository

Reviewer 2

Comments:

4 – The guideline has been fully implemented in the repository

Response:

The ICES Data policy applies to data managed by ICES (when data have been provided to ICES), and to ICES activities for providing access to data managed elsewhere (i.e. through ICES webservices). The policy is reviewed by the Data and Information Group (DIG) on a regular basis, and updates are approved by the member country governing body (ICES Council). The policy states the conditions for data use, data contribution and data redistribution. It is intended to facilitate the production of science based advice and status reports, and serve the scientific community.

Exclusions to unrestricted public access (disclosure risk) are listed on the data policy website, and links given to the relevant data policy, such access conditions relate to data that are either commercially or biogeographically sensitive, or where natural persons may be identified. ICES works within an inter-governmental management advice context, and so regularly requests and manages data that are subject to legal constraints, such as EU Directives and Regional Fisheries Management Organizations rules on transmission and storing of data. For example, ICES has a specific data agreement with the North East Atlantic Fisheries Commission (NEAFC) on the preparation, transmission, storage and use of data (26). In addition, there are data governance groups that have specific expertise in working with the data that have disclosure risks i.e. Vulnerable Marine Ecosystems is overseen by the Working Group on Deepwater Ecology (WGDEC). These groups regularly review the data access and provision arrangements, and ensure necessary aggregations are

applied to data so that natural person, sensitive habitats or commercial information are sufficiently anonymized. For VMS and fishing logbook data, we are required to insist that any expert working with these data signs a specific agreement outlining how they use the data (27). ICES is not able to legally enforce this policy, but would provide evidence to a data provider of a breach in these conditions if this came to their attention.

ICES has a number of privacy policies related to personal data (28).

In the context of data collections, there is no request for personal data in the formats for ingested data to ICES as data are either aggregated or anonymized at source. The only data where personal data are potentially implied, are covered by the specific data licences as evidenced for fisheries and environmental data.

See requirement 2 for the data policies and licences of ICES.

(26) https://ices.dk/about-ICES/Documents/Cooperation%20agreements/NEAFC/20190201-NEAFC-ICES-agreement-VM S-Logbook_2019.pdf

(27) https://ices.dk/data/Documents/VMS_DataAccess_ICES.pdf

(28) <http://www.ices.dk/Pages/Privacy-statements.aspx>

Reviewer Entry

Reviewer 1

Comments:
Accept

Reviewer 2

Comments:
Accept

5. Organizational infrastructure

R5. The repository has adequate funding and sufficient numbers of qualified staff managed through a clear system of governance to effectively carry out the mission.

Compliance Level:

4 – The guideline has been fully implemented in the repository

Reviewer Entry

Reviewer 1

Comments:
4 – The guideline has been fully implemented in the repository

Reviewer 2

Comments:

4 – The guideline has been fully implemented in the repository

Response:

The ICES Data Centre (15 full-time equivalent staff) is a part of the ICES Secretariat, which is the support arm of the ICES Organisation, convened under the 1968 convention (host agreement) (29).

The ICES Data Centre is funded from a core budget (see annual report) (30), which is derived from contracting party contributions on a fixed basis, this accounts for ca. 50% of the overall budget. In addition, long standing financial arrangements, generally reviewed on 3-5 year basis with various clients and partners provide a stable base of ca. 35% of the overall budget. The remaining 15% is derived from projects and contracts. The overall budget is overseen by a finance committee (31), who maintain a capital reserve fund to ensure that in the event of a financial issue (non-payment, large unexpected cost), ICES can accommodate this. The core budget is projected for 3 years ahead of the current financial year, and agreed by ICES Council annually.

Training needs are generally identified in annual staff reviews using the SMART approach (32). The ICES Secretariat has an annual training budget and a separate travel budget, the former is used to provide training opportunities identified between staff and line managers. In addition, staff have access to a number of online learning resources, and the ICES Training programme (33) also offers some opportunities to develop specific skills. The travel budget ensures that ICES staff can attend expert group meetings, conferences and symposia related to their work and their field of expertise. The ICES Data Centre recruits qualified University level educated staff with appropriate skills and experience. ICES is an umbrella for an international network of marine science experts and institutes.

(29) https://ices.dk/about-ICES/who-we-are/Documents/Host_Agreement_1968_ICES-DK.PDF

(30) <https://www.ices.dk/sites/pub/Publication%20Reports/ICES%20Annual%20Report/Annual%20Report%202018.pdf>

(31) <https://ices.dk/about-ICES/who-we-are/Pages/Finance-Committee.aspx>

(32) <http://www.free-management-ebooks.com/faqps/goal-04.htm>

(33) <https://ices.dk/events/Training/Pages/default.aspx>

Reviewer Entry

Reviewer 1

Comments:

Accept

Reviewer 2

Comments:

Accept

6. Expert guidance

R6. The repository adopts mechanism(s) to secure ongoing expert guidance and feedback (either inhouse or external, including scientific

guidance, if relevant).

Compliance Level:

4 – The guideline has been fully implemented in the repository

Reviewer Entry

Reviewer 1

Comments:

4 – The guideline has been fully implemented in the repository

Reviewer 2

Comments:

4 – The guideline has been fully implemented in the repository

Response:

ICES works through a constellation of expert groups (ca. 200 groups), each having a specific thematic/geographic focus and expertise (34). These groups have assigned Terms of Reference (ToR's), which outline their areas of responsibility, including aspects of data governance, quality, formats that are to be used by the ICES Data Centre, or more generally by the ICES Community. The expert groups can also provide recommendations to other entities in the ICES network, such as the ICES Data Centre, on issues in data quality or processing. All experts groups have an umbrella steering group, which oversees the ToR's and Recommendations, and provides a layer of review on the governance of specific data flows. The work of expert groups, and their conduct are codified in section 4 of the guidelines for ICES groups, which is also available as a separate code of conduct document (35, 36). In addition, ICES has a number of specialised data governance groups. The Data and Information Group (DIG), is the cross-themed operational group that deals with all aspects of governance at a general level i.e. data policy, strategy, quality assurance etc. DIG is linked to a number of data governance groups that deal with specific systems/data types that perform more specific quality assurance and prioritisation. Feedback is gathered from expert groups directly working with the data, through web portal usage, and from the advice recipients (clients), where dedicated meetings run regularly to assure this. Feedback can flow between governance groups, and the ICES Data Centre, and outwards to other partners – such as other international conventions. The ICES Data Centre is an ex-officio member of all of the relevant expert, operational and governance groups where aspects of data management are important.

In addition to this, ICES works closely with its advice recipients (clients), which also have expert groups and committees. Clients provide feedback and recommendations from their own users to the ICES Data Centre. This is achieved through presentations, reports, bilateral meetings where this feedback can be evaluated and decisions taken back to the ICES governance structure.

ICES works closely with a number of International bodies to feed requests/recommendations up to the global systems, and to bring global recommendations back down into the ICES network. For example, ICES is an active associated data unit (ADU) of the IODE programme of the IOC (International Oceanographic Commission), and sitting on the Coordinating Working Party on Fishery Statistics (CWP) convened under the FAO.

(34) Some of the thematic governance groups:

<https://ices.dk/community/groups/Pages/WGDG.aspx>

<https://ices.dk/community/groups/Pages/WGSFDGOV.aspx>

(35) http://www.ices.dk/about-ICES/Documents/Guidelines_for_ICES_Groups.pdf

(36) http://www.ices.dk/about-ICES/Documents/CM-2018_Del-05_CoC.pdf

Reviewer Entry

Reviewer 1

Comments:

Accept

Reviewer 2

Comments:

Accept

DIGITAL OBJECT MANAGEMENT

7. Data integrity and authenticity

R7. The repository guarantees the integrity and authenticity of the data.

Compliance Level:

3 – The repository is in the implementation phase

Reviewer Entry

Reviewer 1

Comments:

3 – The repository is in the implementation phase

Reviewer 2

Comments:

3 – The repository is in the implementation phase

Response:

All data files delivered to ICES are stored in their original form. The ICES Data Accessions database (DAD) has been in use since 2007, and is the main tool for recording all information about a data file (who, what, when, purpose). Each

accession receives a unique Accession ID that is used to track the data through all ICES systems. All the data file submissions are generically available in a meta view, in addition the thematic portals have more detailed views of the accessions (37). In 2021, a new version of the Accession system is planned, the upgrade would include the ability of a data provider to include a DOI so that the data object can be traced back to the originator, and tracked in product use/downloads. In addition, the accession system would allow for the minting of new DOI's on new versions/data products, so that outputs from the ICES data portals can be more readily tracked and referenced. Currently ICES have setup a number of webservicees linked to a local database of DOI's with associated metadata to create and track DOI's that ICES mint (handle: 10.17895/ices.data.xxx), which would be linked to the accessions system.

The majority of data files are uploaded to a thematic database, where information about the file/originator/person loading are captured, as well as the Accession ID. The databases are all on a SQL server platform, where full transaction logs are used. The meta-information is included in the various web portals that display the data, and allow downloading of the data. In some cases, it is not the intention of the web portal to show individual files, but rather aggregated datasets across space and time – in these cases the metadata may not be relevant at the file level.

ICES uses specific file formats or conventions for all data types (38). These formats have defined fields, and controlled vocabularies (39) are used where appropriate. To control whether submissions are according to the format, files are screened prior to submission using either WebGUI's, web services or XML validation schemas and tools (40). The screening checks for an array of consistency, validation and content checks, ensuring that the format and vocabulary are in compliance. An overview of such checks is available through the online quality check web app (41). Additional checks to the data are made manually by the data officer. In case of file corruption, an error would be raised at the inception of the automatic screening, and for files that do not have any automated checking, this would be detected and rejected by the data officer when assigning the data to an accession number in the ICES Accession system.

Dataset collections, comprising multiple data submissions, have a corresponding metadata record in the ICES public GeoNetwork (42), which conforms to ISO 19115/19139 and INSPIRE metadata standards.

As a general principle, and enshrined in the ICES Data Policy (section 6: Data quality), ICES does not change data it receives. However, transformations may be undertaken to include these data in the ICES database. Resubmission of data can run either automatically or manually with intervention from a data officer. In all cases, resubmissions receive an accession identifier, and data providers are encouraged to describe the reason for the resubmission, and any differences from the original submission. The original submission is removed from the database, and the new data are loaded. The original data file, and the audit trail in the accessions database are preserved, and the original data file is flagged in the accessions as removed.

File formats and vocabularies are version controlled, with the versioning available in the corresponding system or described in the label of the file format. Vocabulary version control is expressed in major and minor versions (i.e 1.12) and the corresponding modified date visible on public web application. The management console contains the full audit trail to all vocabularies, in some cases i.e. the Platform and Station code request management, extensive auditing of all field changes are captured and annotated. Vocabularies are overseen by a reference change management process, where suggested changes are documented and the relevant expert group or data management group assess the impact and scope of the change, and either accept, modify or deny the change accordingly.

Data depositors are all defined within a recognised institute. We do not receive/accept data from unverified or unsolicited data sources; ICES uses a Customers Relations Management (CRM) system to record the names and institute affiliations of all data submitters, and for the more recent data streams we ensure that the institute is recorded in the European

Directory of Marine Organisations (EDMO) (43).

(37) <https://data.ices.dk/accessions/allaccessions.aspx>

(38) <https://datsu.ices.dk/web/selRep.aspx>

(39) <https://vocab.ices.dk/>

(40) <https://datsu.ices.dk/web/screen.aspx>

(41) <https://ices.dk/data/tools/Pages/quality-control.aspx>

(42) <https://gis.ices.dk/geonetwork/srv/eng/catalog.search#/home>

(43) <https://edmo.seadatanet.org/search>

Reviewer Entry

Reviewer 1

Comments:

Accept

Reviewer 2

Comments:

The planned (and delayed) new version of the Accession system is expected to be in place by the time of your next renewal.

8. Appraisal

R8. The repository accepts data and metadata based on defined criteria to ensure relevance and understandability for data users.

Compliance Level:

3 – The repository is in the implementation phase

Reviewer Entry

Reviewer 1

Comments:

3 – The repository is in the implementation phase

Reviewer 2

Comments:

3 – The repository is in the implementation phase

Response:

The ICES Strategic plan, and the subsidiary documents – the ICES Science and Advisory plans outline the focus of data that we actively manage and maintain. In addition, other data collections are requested by the clients of ICES. In all cases,

the data are largely in the geographic focus area of ICES (Northeast Atlantic), and tied to the advice and science outputs that we provide to clients.

Requests to host/maintain data outside of the usual scope, are documented and processed as recommendations to specific entities in ICES. Overall, the ICES Data Centre will consult with the relevant thematic expert groups, and the Data and Information Group (DIG) to assess the feasibility, impact on resources and relevance to the ICES strategy to preserving these data. In many cases, ICES will use its knowledge of other marine data infrastructures to guide a decision on where the best place to maintain and host data that fall outside the ICES Mission.

ICES uses specific formats for data submissions (44). These formats are defined in cooperation with the community and the metadata needed to interpret the data is either a part of the format or provided at the point of data submittal. Where possible, ICES adopts existing standards and formats. However, many of the ICES formats predate today's standards. Best efforts are made to map to these standards.

Metadata are actively managed and reviewed by the ICES Community and the ICES Data Centre. New requirements are added through time, and data providers may be asked to provide additional information to bring their submissions into line with updated standards.

(44) <https://datsu.ices.dk/web/selRep.aspx>

Additional links:

Data validation

<http://ices.dk/data/tools/Pages/data-validation.aspx>

Data formats

<http://ices.dk/data/tools/Pages/Data-formats.aspx>

Automatic quality control checks

<http://ices.dk/data/tools/Pages/quality-control.aspx>

Reviewer Entry

Reviewer 1

Comments:

Accept

Reviewer 2

Comments:

Accept

9. Documented storage procedures

R9. The repository applies documented processes and procedures in managing archival storage of the data.

Compliance Level:

3 – The repository is in the implementation phase

Reviewer Entry

Reviewer 1

Comments:

3 – The repository is in the implementation phase

Reviewer 2

Comments:

3 – The repository is in the implementation phase

Response:

See requirement 7 for the data ingestion procedure, and requirement 3 for risk management. All data files, while remaining in the original format/media they were entered into the accessions system in, are also loaded into relational databases. The relational databases are considered the primary storage media of any submitted data, and are actively managed and kept within two major versions of the latest release of any vendor provided software updates. All data files are stored on the in-house file storage network, and no files are retained on other media i.e. floppy disks from original pre-2000's submissions. The file storage system is regularly updated to new software and hardware, to ensure viability. Processes and procedures for each data flow are documented in a dedicated database and generally we follow ICES best practices in data management (45).

(45) <https://doi.org/10.17895/ices.pub.4889>

Reviewer Entry

Reviewer 1

Comments:

For your next renewal, please be more explicit about the repository's process to handle storage media deterioration.

Reviewer 2

Comments:

Accept

10. Preservation plan

R10. The repository assumes responsibility for long-term preservation and manages this function in a planned and documented way.

Compliance Level:

3 – The repository is in the implementation phase

Reviewer Entry

Reviewer 1

Comments:

3 – The repository is in the implementation phase

Reviewer 2

Comments:

3 – The repository is in the implementation phase

Response:

Currently, ICES has no formally accepted data preservation plan as a single entity. This is something that will be addressed through the ICES Data and Information Group in their work cycle for the next period.

It should be noted that ICES is a data collation centre, and not the originator of data. Preservation of 'Original datasets' is the responsibility of the data depositors, as outlined in the ICES Data Policy.

All data and metadata received at ICES, are imported into a relational database, which keeps the structure and semantics for each data entity and is related to a set of controlled vocabularies (46). Therefore, output formats are defined independently of how the data are stored, and therefore future changes in formats, standards and technology are adapted to on the output side in a dynamic way. For images, the storage format is a well-known and appropriate standard, and tested regularly for backwards compatibility. All images are stored in the latest version of the current standard.

The IT and Data Centre teams are under the same management structure, and share personnel and tasks to ensure that the functioning of hardware and software systems is optimal. All systems and hardware are kept within warranty, and specifically for software - that ICES keeps within 2 version releases of the latest major release of a software/app. Onsite and offsite backup is covered in requirement 15. All original files are maintained on actively managed file servers, and are accessible via generic text reading software to ensure future readability.

The documentation for all the major data portals and back-end systems is stored on the ICES intranet (Microsoft Sharepoint), in addition public materials are posted on the ICES website/ICES library. Github repositories are used specifically for documenting data products/outputs.

All servers and content storage are virtualized and backed-up to onsite and cloud locations. This means that a transfer of service/custody could be performed technically to a suitable host. The custody would follow rule 18.4 of the ICES Rules of Procedure (47).

The ICES data policy (48), effective from 2016, will be updated as part of a regular review in 2020, and covers the responsibilities and rights of data providers. Privacy policies are published on the ICES website and the ICES Data and Information Group (DIG) review the data streams in the context of privacy/GDPR on an annual basis. Provisions for personal privacy are written into the ICES Data Calls (where applicable) and the specific policies for commercial and Vessel data. All data downloads are accompanied by a data disclaimer readme file, which provides links to the data policy, and any supporting information. ICES uses the 'future challenges' tracker (see requirement 3) to regularly review and update relevant preservation and continuity issues, such as software compliance, security, format compatibility and interoperability.

ICES has client contracts, but there are hundreds of data providers who provide data voluntarily, and as such there is no

basis for a formalised contract i.e. SLA. ICES is therefore not able to make contracts with each individual data provider. The 'contract' is encoded in the ICES convention, the data policy and enforced through specific data calls (49, 50, 51).

(46) <https://vocab.ices.dk/>

(47) https://ices.dk/about-ICES/who-we-are/Documents/ICES_Rules_of_Procedure.pdf

(48) <https://ices.dk/data/guidelines-and-policy/Pages/ICES-data-policy.aspx>

(49) <http://ices.dk/data/tools/Pages/Data-calls.aspx> and technical guidelines

(50) http://ices.dk/sites/pub/Publication%20Reports/Guidelines%20and%20Policies/12.05.03_Criteria_for_use_of_data_in_ICES_advisory_work.pdf

(51) http://ices.dk/sites/pub/Publication%20Reports/Guidelines%20and%20Policies/12.05.01_Guidelines_on_late_data_submission.pdf

Reviewer Entry

Reviewer 1

Comments:

Accept

Reviewer 2

Comments:

Current delays are understood. It is hoped that efforts will be made by the time of your next renewal to overcome these delays, with the drafting of documents—such as a preservation plan—highly necessary.

11. Data quality

R11. The repository has appropriate expertise to address technical data and metadata quality and ensures that sufficient information is available for end users to make quality-related evaluations.

Compliance Level:

4 – The guideline has been fully implemented in the repository

Reviewer Entry

Reviewer 1

Comments:

4 – The guideline has been fully implemented in the repository

Reviewer 2

Comments:

4 – The guideline has been fully implemented in the repository

Response:

Each data flow, and its associated portal, provides contextual information consisting of links to expert group reports i.e. scientific assessments, FAQ's, factsheets and information on how the data are collected and in what setting they are used. In some cases, specific information is given on the limitations of use of the data for other purposes other than what it was gathered for.

Each data stream, through its relevant governance group, have specified the necessary attributes of data and metadata in accordance with the intended use of the data. Data collection and data processing standards are based on community best practice guidelines (52), either published directly on the ICES publications repository (for example fish trawl survey protocols (53)), or via other international best practice repositories (for example ocean best practices (54)).

Quality Control checks (55) are specified by the relevant governance group for the data stream, which has representation from data providers, data users and technical experts on data management. The majority of these checks are documented in the portals directly and quality control is largely automated through online screening programmes such as the ICES Data Screening Utility or XML and Schematron – or combinations of these. In addition, the quality control checks are available through a standard interface. Quality control and quality assurance procedures are undertaken by the ICES expert groups at various stages in the life cycle of data: at data collection, groups of experts will evaluate the latest data against the entire dataset and document variations in working group reports for the specific survey/data collection available in the ICES publications library (56). When the data are used in assessment, the assessment report, and the associated management advice, comment on the quality of the data, which is fed back to the data submitter and the ICES Data Centre. Some of the data streams have additional automated scripted quality control performed via publically available R scripts in the ICES Github repositories (57).

The majority of data managed in ICES is directly used by either ICES working groups, or clients, for the production of assessments on the marine environment. Feedback is therefore an important aspect of the entire process, and enshrined in the operating procedures of scientific assessment in the ICES context. ICES operates through a system of recommendations, which allows one group of experts to make a recommendation to another part of the ICES network – the majority of feedback on data quality and issues is documented in this way. The Data Centre also receives direct feedback through its direct communication channels (email, websites etc.) and also by participating directly in expert group meetings related to the application of the data. ICES, with agreement from data providers, redistributes parts of the datasets to other large network data infrastructures. With this, data quality control reports are provided back to ICES, which is an additional quality control beyond what the network and data officers themselves perform.

(52) <https://tinyurl.com/ICESguidelines>

(53) <http://tinyurl.com/p3ec6s2>

(54) <https://www.oceanbestpractices.net/>

(55) <https://ices.dk/data/tools/Pages/data-validation.aspx>

(56) <https://ices.dk/publications/library/Pages/default.aspx>

(57) <https://www.ices.dk/data/tools/Pages/Software.aspx>

Reviewer Entry

Reviewer 1

Comments:

Accept

Reviewer 2

Comments:
Accept

12. Workflows

R12. Archiving takes place according to defined workflows from ingest to dissemination.

Compliance Level:

3 – The repository is in the implementation phase

Reviewer Entry

Reviewer 1

Comments:
3 – The repository is in the implementation phase

Reviewer 2

Comments:
3 – The repository is in the implementation phase

Response:

Data flows are documented according to a standard schema that is hosted on a relational database. An interface to the database allows the information to be queried, updated and distributed. Currently this database is only available to the data management team at ICES as it includes information that may be a security risk to publish online. The schema includes information on roles, ownership, who provides data, which data policies apply to incoming/outgoing data, the data quality approach, target audience, links to metadata and governance groups, and the process for ingestion of data. Changes to the dataflow and associated metadata and reference vocabularies are documented in the aforementioned database, the process for the updating of a dataflow is managed through the relevant governance group and follows a standard 'master change' process where the change is first assessed in terms of impact on existing datasets and processes and then data providers and users are consulted via their working group structures (or external client committees), the change is communicated and agreed through this process and is usually documented within the system as a recommendation (to implement) with a proposed timeline. In most cases, the data flow change is backwards compatible for existing data and ingestion practices, it can however rarely occur that data need to be re-supplied from the data originator in order to effect the change in the dataflow; such cases are agreed by the governance group in consultation with data providers according to the impact on resources and quality of the resulting data, and the time needed to comply.

Schematics of the data flows actively managed by the ICES Data Centre are being drawn and will be published by ICES. These will be based on the information hosted in the aforementioned database, and follow a standard production and

review process. Changes to the data flows will result in changes to the data flow schematics. Similarly to data flows, the schematics follow a standard 'master change' process. So far, ICES has published one data flow schematic (58), and the remaining schematics are under production.

For details on security, please refer to requirement 3.

(58) <https://doi.org/10.17895/ices.advice.6101>

Reviewer Entry

Reviewer 1

Comments:
Accept

Reviewer 2

Comments:
Accept

13. Data discovery and identification

R13. The repository enables users to discover the data and refer to them in a persistent way through proper citation.

Compliance Level:

4 – The guideline has been fully implemented in the repository

Reviewer Entry

Reviewer 1

Comments:
4 – The guideline has been fully implemented in the repository

Reviewer 2

Comments:
4 – The guideline has been fully implemented in the repository

Response:

Data can be queried at a detail level through a number of online interfaces. The main ICES data portal (59) offers searching by time, free-format and predefined areas, data types, parameters and taxonomic rank. Each of the additional thematic portals offers detail data searching according to the most common type of search related to that data type, as defined by the related governance groups.

Dataset collections, comprising multiple data submissions, have a corresponding metadata record in the ICES public GeoNetwork (60), which conforms to ISO 19115/19139 standards, and INSPIRE metadata compliancy.

In 2021, a new version of the Accession system is planned, the upgrade would include the ability of a data provider to include a DOI so that the data object can be traced back to the originator, and tracked in product use/downloads. In addition, the accession system would allow for the minting of new DOI's on new versions/data products, so that outputs from the ICES data portals can be more readily tracked and referenced. Currently ICES have setup a number of webservices (61) linked to a local database of DOI's with associated metadata to create and track DOI's that ICES mint (handle: 10.17895/ices.data.xxx), which would be linked to the accessions system. Implementing wide usage of DOI's within ICES is seen as an enhancement, as the current system allows tracking of data submissions through the associated Accession number, and data outputs and data products can be referred to by using persistent URI's or related meta-data URL's.

Most of the ICES data portals offer webservices that are catalogued in the metadata portal. The metadata portal is on GeoNetwork, which facilitates machine harvesting.

ICES provides information about its datasets to SeaDataNet (62), Ocean Biogeographic Information System (63), FAO (64), the Arctic Data Committee (65), and to IODE (66).

In the ICES Data Policy section 7 (67), a generic citation format is specified. In specific portals and downloads there might be extended citation formats, which are provided with examples.

(59) <https://ecosystemdata.ices.dk/>

(60) <https://gis.ices.dk/geonetwork/srv/eng/catalog.search#/home>

(61) <https://www.ices.dk/data/tools/Pages/WebServices.aspx>

(62) <https://edmed.seadatanet.org/search/>; <https://cdi.seadatanet.org/search>

(63) <https://mapper.obis.org/?nodeid=4bf79a01-65a9-4db6-b37b-18434f26ddfc&instituteid=10573>

(64) <http://firms.fao.org/firms/en>

(65) <https://arcticdc.org/>

(66) <https://catalogue.odis.org/>; <https://catalogue.odis.org/search/16535>

(67) <https://www.ices.dk/data/Documents/ICES-Data-policy.pdf>

Reviewer Entry

Reviewer 1

Comments:

Accept

Reviewer 2

Comments:

See comment for R7.

14. Data reuse

R14. The repository enables reuse of the data over time, ensuring that appropriate metadata are available to support the understanding and use of the data.

Compliance Level:

4 – The guideline has been fully implemented in the repository

Reviewer Entry

Reviewer 1

Comments:

4 – The guideline has been fully implemented in the repository

Reviewer 2

Comments:

4 – The guideline has been fully implemented in the repository

Response:

For most datatypes, specific documentation is provided on the data access portal – in the form of publications, FAQ's and factsheets that provide context and guidance on how the data have been employed, and any issues to be aware of when re-using the data for different purposes. For some datatypes, there are specific internationally recognised standards, such as Cruise Summary Reports (68), that accompany the data and provide rich metadata. For derived data products, linkages are provided to the assessment report in which the product is used. For example, a stock assessment output will have a metadata record that links to the management advice that it was used within (69).

Standard formats are used (70), and users have access to the description of formats, including, for some projects, previous formats. There is a limited set of data that was inherited from a previous data host to a client that is undergoing conversion to a standard format.

Changes to the dataflow and associated metadata and reference vocabularies (71) are documented in a database, the process for updating of a dataflow is managed through the relevant governance group and follows a standard 'master change' process where the change is first assessed in terms of impact on existing datasets and processes and then data providers and users are consulted via their working group structures (or external client committees), the change is communicated and agreed through this process and is usually documented within the system as a recommendation (to implement) with a proposed timeline. In most cases, the data flow change is backwards compatible for existing data and ingestion practices, it can occur that data need to be re-supplied from the data originator in order to affect the change in the dataflow. Such cases are agreed by the governance group in consultation with data providers according to the impact on resources and quality of the resulting data, and the time needed to comply.

Data are managed and provided in formats that are mandated and used by the community of marine experts. These formats are reflected in the corresponding database structures, and changes or extensions to these formats can be accommodated in line with the governance processes. ICES does not hold the original version of any incoming data, as outlined in the ICES Data Policy. All data and metadata received at ICES, are imported into a relational database, which keeps the structure and semantics for each data entity and is related to a set of controlled vocabularies. Therefore, output formats are defined independently of how the data are stored, and therefore future changes in formats, standards and technology are adapted to on the output side in a dynamic way. Furthermore, ICES does not have a mandate to mint DOI's on behalf of data providers who supply primary data, nor can ICES compel them to mint their own DOI's or provide

other types of persistent URI, but this practice is encouraged as part of the ICES best practice on data management.

(68) <https://www.seadatanet.org/Standards/Metadata-formats/CSR>

(69) <https://standardgraphs.ices.dk/ViewCharts.aspx?key=13150>; a specific example:

<https://ices.dk/sites/pub/Publication%20Reports/Advice/2019/2019/agn.27.nea.pdf>

(70) <https://datsu.ices.dk/web/selRep.aspx>

(71) <https://vocab.ices.dk/>

Reviewer Entry

Reviewer 1

Comments:

Accept

Reviewer 2

Comments:

Accept

TECHNOLOGY

15. Technical infrastructure

R15. The repository functions on well-supported operating systems and other core infrastructural software and is using hardware and software technologies appropriate to the services it provides to its Designated Community.

Compliance Level:

3 – The repository is in the implementation phase

Reviewer Entry

Reviewer 1

Comments:

3 – The repository is in the implementation phase

Reviewer 2

Comments:

3 – The repository is in the implementation phase

Response:

Generally, ICES works with standards required by the marine data community, and references standards in best practice collections and framework agreements with clients (72). ICES, as an international coordinating body, also sets standards which are used throughout the community, and used for the ingestion and dissemination of data (73). Recognised international standards, such as ISO 19115 and 19139 for metadata, INSPIRE, and OGC compliant GIS services, web services according to SOAP (74) and/or RESTful service standards are used. Data formats (for input and output) are defined, reviewed and maintained by the international community through data governance groups (see requirement 7 Data integrity and requirement 12 Workflows).

For long term development, we track future needs using the Risk register and Future Challenges tracker as described in Requirement 3. Risk mitigation and opportunities are then translated into objectives in the overall ICES 5 year rolling strategic plan, and turned into specific implementation tasks in the IT and Data Centre annual budget/workplan. Software and hardware upgrades happen continuously throughout the workplan, see requirement 10. ICES provides a number of Service Level Agreements to clients, and therefore maintain IT support contracts that enable continuity of services at a high level (above 99%).

The Data Centre uses back office software products and versions that are commonly agreed and defined as the standard for use in products and applications that ICES produces (SQL server, office365, VisualStudio, DevOps, GitHub). The Data Centre back office software is primarily based on Microsoft products, which have been the core development software for the past 15 years. Exceptions to these are ArcGIS, and GeoNetwork. The majority of documentation is inline/online and related to the software. ICES does not generally support using proprietary software add-ins on any tools or products that it makes available on public domains. The software inventory is maintained alongside the asset register on the IT sharepoint knowledge base. This lists the software deployed by asset, and in addition the server software deployed on virtual machines.

One should note that licencing for software is also maintained online as part of subscription management i.e. for Microsoft and Adobe products

The storage capacity, and the internet bandwidth are reviewed annually, and more frequently when new requirements emerge ie. A new project that requires large uploads. We operate 2 x 10Gb internet lines to ensure continuous service. Our Internet Service Provider is required to monitor incoming and outgoing traffic and provides regular reports on performance, and more immediate alerts should there be a risk of saturation or outage. The IT department have a full backup and disaster recovery plan – both for a short-term, and a long term outage.. We maintain physical (disk) and offsite backups/ and mirrored infrastructure. The main platform is virtualised (VMWare), and our IT contract suppliers have SLA's that will provide replacement hardware infrastructure in a short turnaround, so that the ICES system can be restored to a new location/platform rapidly. ICES is implementing more and more services in the cloud via office365 and Sharepoint (our main ICES community extranet), reducing the physical infrastructure on site.

(72) <https://www.oceanbestpractices.net/>

(73) <https://www.ices.dk/data/guidelines-and-policy/Pages/ICES-data-type-guidelines.aspx>

(74) <https://en.wikipedia.org/wiki/SOAP>

Reviewer Entry

Reviewer 1

Comments:

Accept

Reviewer 2

Comments:

Accept

16. Security

R16. The technical infrastructure of the repository provides for protection of the facility and its data, products, services, and users.

Compliance Level:

4 – The guideline has been fully implemented in the repository

Reviewer Entry

Reviewer 1

Comments:

4 – The guideline has been fully implemented in the repository

Reviewer 2

Comments:

4 – The guideline has been fully implemented in the repository

Response:

Overall, ICES uses a central risk register (see requirements 3 and 15) to assess the likelihood and impact of risks related to the core business, including IT and Data management risks. The IT team oversees a group/role based user access managed through Microsoft Active Directory, which is also available in the cloud to ensure continuity and access to cloud services using the same user rights/authentication. Extensive logs of activity within the network, active directory, and the extranet are monitored for suspicious activity, and the IT team assesses new threats in consultation with external service contract suppliers. The IT team oversees a number of service contracts related to the security of the physical hardware, the network and software. Generally, call out and response times are managed through SLA's and in most cases we have onsite support within 4 hours. Disaster recovery plans are referred to in Requirement 15. The IT team log all incidents in a central ticketing system, which is used for escalation of incidents, and also the knowledge base for historical incidents. The IT team meets with the Head of Data every 2 weeks and reviews a project board of all ongoing activities to ensure that the IT system is continuously updated and maintained against outage of any kind.

ICES has duplicate Firewalls, which have been upgraded to the latest recommended security level. All data, database servers and critical business software and content are behind the firewall and the web architecture separates out the service layers to ensure that there is no direct route from outside of the firewall into the ICES network or systems (i.e SQL injection etc.). ICES hosts many physical meetings, and all visitors are given access to a separate wifi network, so there is a segregation between visitors and ICES staff. Access to the building is controlled by security cards and pin codes, which

are time limited. The servers and network equipment are housed in a secure fire retardant vault, and access is limited to key IT Staff.

ICES staff can remotely access the network using VPN, which requires that they use an ICES laptop with security certificates installed and updated. IT consultants can only access the system by TeamViewer, which is administered by the ICES IT team – can only happen when an IT staff member is overseeing the session.

All users within the ICES Extranet (Sharepoint) are logged in the active directory, and permissions managed at the group level. For some datastreams, an additional layer of authentication is used (session tokens) that allow time limited access to certain data uploads/downloads. ICES operates well documented staff and extranet IT policies, which ensures that all passwords are following current best practice regarding length, mix of characters and frequency of change. Likewise, the IT staff maintain an oversight of current software used within the ICES network, and keep these updated with security patches as per vendors recommendations. ICES does not host software that is out of service warranty, where no active updates are available for the given app. The ICES network, and extranet are protected by virus protection (server and client side), malware threats, offsite email scanning at the Internet Provider, as well as monitoring of threats at the IP gateway by the IP, all of which are actively monitored by the IT team.

There are various staff rules on the use of IT and the network, employees leaving the organisation go through a checklist to ensure they are deactivated from the active directory, and their access to other systems i.e. ICES Github are removed.

Reviewer Entry

Reviewer 1

Comments:

Accept

Reviewer 2

Comments:

Accept

APPLICANT FEEDBACK

Comments/feedback

These Requirements are not seen as final, and we value your input to improve the CoreTrustSeal certification procedure. Any comments on the quality of the Requirements, their relevance to your organization, or any other contribution, will be considered as part of future iterations.

Response:

ICES is perhaps one of the older organizations applying for CTS (110+ years); the challenge we have is relating the formally accepted documentation of the ICES framework that date back to the 1960's to the modern terminology and

requirements of the CTS. A good example is data preservation, which is core to a lot of ICES work but not encoded in a formal way that the CTS requires. Having said that, we're addressing such issues but as an inter-governmental organisation, this takes a little effort/time.

Reviewer Entry

Reviewer 1

Comments:

Reviewer 2

Comments: