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ICES

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CIEM

Conseil International pour
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Executive summary

The SCICOM Operational Group, Working Group on Data and Information Management (WGDIM; co-Chairs Ingeborg de Boois and Helge Sagen), met in Copenhagen, 24–26 May. 20 people representing 10 countries participated in the meeting. Additionally, seven employees of the ICES Data Centre joined the meeting for relevant agenda items. HELCOM was also represented at the meeting.

WGDIM's mission statement is "*To provide ICES with advice on all aspects of data management including data policy, data strategy, data quality, technical issues and user-oriented guidance.*"

Strategic documents: WGDIM reviewed the strategic ICES documents on data: data strategy, data policy and user engagement plan. It was decided that the user engagement plan in its current format is not relevant any more. The data strategy was updated in 2010 but not implemented. WGDIM made minor changes and will stimulate ICES to implement the strategy. The ICES Data Policy was also reviewed and WGDIM decided to work intersessionally on this document in order to finalize an updated version at WGDIM 2012.

Offspring groups: The progress of the WGDIM offspring groups SGVMS (Study group on VMS data) and DUAP (DATRAS User Advisory Panel) was evaluated. The Terms of Reference for SGVMS 2011 were modified for a variety of reasons, a.o. additional information on the legal status of VMS data.

As WGDIM felt quality flagging is a complicated topic which needs more attention than it could be given to during the WGDIM meeting, it is recommended that a workshop on quality flagging is organized.

WGDIM in relation to ICES Data Centre: The achievements of the ICES Data Centre were presented, the most important being the progress made on the incorporation of ichthyoplankton data in the ICES Data Centre databases as well as the improvement made on the version control of data and data products.

To increase insight in the functioning of the ICES Data Centre, it is recommended that the annual report created by the Data Centre is actively shared with WGDIM.

WGDIM developed a protocol for new data services. This is meant to support the ICES Data Centre in the handling of requests and is in line with the current workflow, however more explicitly defined.

Internal review: WGDIM carried out an internal review on its role as an operational group, from which future developments and challenges were defined. One of the outcomes is that the group will put forward an ASC theme session proposal on data and information management yearly, to subscribe the importance of the topic within and outside ICES.

1 Opening of the meeting

The meeting was opened by the co-chairs. 20 people participated in the meeting (Annex 1). Additionally, seven employees of the ICES Data Centre joined the meeting for relevant agenda items.

The Terms of Reference for WGDIM 2011 were as follows:

- a) Review outputs/products of offspring groups:
 - SGVMS – Study Group on VMS data
 - DUAP - DATRAS User Advisory Panel
- b) Review ICES Strategic documents and recommend updates/amendments
 - Data Policy
 - User Engagement Plan
 - Data Strategy
- c) Data Quality Flags; Review development of the data-point level quality flags recommended at WGDIM 2010. Develop a recommendation regarding data-set level quality flags
- d) Support ICES Data Centre with feedback and advice on existing products, current developments and potential new products.
 - Develop recommendation for implementation of data and data product version control
 - DATRAS
 - Regional databases
 - EcoSystemData
 - Egg / Larval database
 - Develop recommendation for implementation of a system for numbering/control of documents published by ICES that are not covered under existing arrangements (e.g. survey manuals)
- e) Review progress on recommendations from WGDIM 2010.

2 Adoption of the agenda

The agenda was adopted and is presented in Annex 2.

The Co-Chairs informed the group on the appointment that representatives of SCICOM (2) and ACOM (2), Head of ICES Data Centre and WGDIM co-Chairs will meet four times a year by WebEx to exchange ideas and keep track of developments relevant to all parties involved.

3 Review progress on recommendations from WGDIM 2010 (ToR e)

Recommendation	Status
The Egg/larval database action plan is completed in conjunction with the Data Centre and expert groups then taken forward.	WGEGGS provided their datasets to the Data Centre in order to develop a database for ichthyoplankton. MIK-IBTSWG provided information on the columns used. Progress database: see ToR d (Section 7.5).
Provide feedback to WGDIM and the Data Centre on the North Sea element of the Year of the Stomach Database.	WGSAM provided feedback to the Data Centre and this feedback was discussed. See also Section 7.7.
Consider the Baltic dataset (in its current state); whether there is enough value in undertaking further work and if so what resources are needed (i.e. volunteer experts from the Baltic States along with IT experts from the Data Centre).	WGSAM reviewed the dataset and put its findings in WGSAM 2010 report. See also Section 7.7.
Consider the proposed ICES data quality flag system and advise on appropriateness along with recommendations for amendment if necessary.	No progress made, see also ToR c (Section 6).
The proposed Data Strategy is adopted and implemented.	The Data Strategy is adopted by SCICOM. The Data Strategy is not yet implemented. See also section 5.3 and Annex 6.
ICES Secretariat staff receive training in the use and promotion of EcoSystemData and the ICES data portfolio and are encouraged to actively promote these to the expert and advisory groups.	Is not formalized but on an informal basis it is done. It is not clear whether it is working or not. Ongoing action.
A small (A4 3-fold) leaflet is produced highlighting EcoSystemData and the ICES data portfolio, this leaflet to be despatched to each expert and advisory group chair for distribution at their meetings.	No action taken due to circumstances. EcoSystemData refers to the ICES Ecosystemdata (see also ecosystemdata.ices.dk).
A protocol is developed for users (initially, internal ICES users i.e. expert and advisory groups) to request development of new data products. A draft of this protocol was developed by WGDIM (Annex 11). This protocol should be further developed intersessionally between WGDIM, the data centre, advisory and expert groups.	See Section 8.

4 Review outputs/products of offspring groups (ToR a)

4.1 SGVMS – Study Group on VMS data

SGVMS met in September 2010 and reported to WGDIM. The following recommendations were given to WGDIM:

- 1) A centralized database should be established in the ICES Data Centre in order to deliver standardized data products to Working Groups and clients.
- 2) A working group should be established to regularly work on VMS methodologies and standards, and to provide data to the ICES Data Centre.
- 3) A consultation process among WG chairs and ACOM and SCICOM should be undertaken by a competent authority to find out needs on VMS data in the ICES community to better determine the involvement of ICES in the medium and long-term.

WGDIM reviewed the recommendations and suggests the following:

Ad 1. As there is a need for VMS-based products within and outside ICES, WGDIM recommends that SGVMS enumerates the shortcomings with respect to the current systems' architecture supporting the analysis of VMS data in general and its relationship with any other data that are or may be relevant to the creation of fishery advice, and investigates in general terms the options for improvement of the current system in the short, medium and long-term.

Ad 2. As the work flow, processes and product requirements are not fully crystallized, WGDIM recommends that SGVMS continues being a study group with meetings on a yearly basis for 2 more years. WGDIM however subscribes that in the long-term there might be a need for a working group on VMS data.

Ad 3. WGDIM will discuss this in the regular planned meetings with SCICOM and ACOM representatives.

WGDIM is aware that the availability and processing of VMS data are influenced by a number of legal regulations. The DCF 2008 gives guidance on the topic. The relevant documents will be made available to SGVMS 2011 and to WGDIM.

The full proposal for SGVMS 2011, including the new Terms of Reference is given in Annex 5.

4.2 DUAP – DATRAS User Advisory Panel

In October 2009, the Datras User Advisory Panel (DUAP) was established as a group under WGDIM. Main task for DUAP is to provide feedback, guidance and advice on the ICES DATRAS system, specifically to include liaison with data submitters and data consumers. From 2011 onward, the SharePoint is publically available (<http://groupnet.ices.dk/duap/default.aspx>).

WGDIM 2010 recommended that the functioning of DUAP should be evaluated by IBTSWG, WGBIFS and WGBEAM. From the IBTSWG evaluation, some improvements were suggested, the main being:

- In order to increase the information on the DUAP SharePoint, (links to relevant documents (e.g. old manuals, calculation documents, database model) should be provided on the SharePoint.

- To advertise DUAP, it is recommended to put a link to the sharepoint on the DATRAS website <http://datras.ices.dk/Home/Default.aspx>

Both recommendations will be put into practice by the ICES Data Centre.

A full overview of recommendations of IBTSWG will be available in the 2011 IBTSWG report. ICES Data Centre will decide whether or not a recommendation can be put into practice based on workload and technical possibilities.

Over the last year some important topics have been discussed on the DUAP SharePoint. It at least is a useful discussion panel for data uploaders. By providing more standard information on the SharePoint and by advertising the SharePoint at the download site, it is to be expected more end-users will be able to find the discussion forum.

DUAP is an easy facility for ICES Data Centre to review the DATRAS discussions.

5 Review ICES Strategic documents and recommend updates/amendments (ToR b)

5.1 User Engagement Plan

As the idea of the user engagement plan originated from the time before WGDIM had its position in the ICES community, WGDIM decided not to update the plan anymore as the group feels there is no direct benefit from it.

5.2 Data Policy

The Data Policy as available on the ICES website was reviewed and WGDIM concluded that in some aspects an update would be welcome:

Ad 1) Data security and data storage are not included in current policy.

Ad 4) Redistribution of data should be regulated by policy.

Ad 4) WGDIM 2011 Checklist for processing new databases/data products requests has been proposed as integral part of Data Policy (see also section 8)

Ad 4) Data submission requirements should state 'as soon as possible after data collection'.

Ad 5) f) Investigate the implications 'creative commons licence' might have on the ICES Data Policy. This will be a Term of Reference for WGDIM 2012.

Maybe 'annotations' could be replaced by 'data strategy'? This needs to be investigated further as the data strategy is certainly overlapping.

WGDIM recommends that a new draft version of the Data Policy that accounts for the current inadequacies in the 2006 version should be drafted for discussion at the WGDIM 2012 meeting

5.3 Data Strategy

WGDIM reviewed the Data Strategy as presented in WGDIM report 2010 and came up with some minor changes. WGDIM requests SCICOM to adopt the changes and place the Data Strategy on the ICES website.

Box 1: 3rd bullet has been concatenated in pdf version

Box 2: 1st bullet: remove 'regional' from text

2nd bullet: remove 'the' from text

Box 3: WGDIM discussed whether 'real-time data' should be specified, but decided that it is covered by the 'regional resource and marine data and information node' of the ICES Data Strategy.

Furthermore, WGDIM discussed the vision above the Data Strategy and added 'long-term data stewardship' to it.

The new version of the Data Strategy is in Annex 6. WGDIM points out that it is important that the Data Strategy not only should be adopted, but also should be implemented.

6 Data Quality Flags (Tor c)

Review development of the data-point level quality flags recommended at WGDIM 2010. Develop a recommendation regarding dataset level quality flags.

As WGDIM felt quality flagging is a complicated topic which needs more attention than it could be given to during the WGDIM meeting, it is recommended that a workshop on quality flagging is organized (WKQF, proposed chair Edward Vanden Berghe). The workshop should have a maximum of 12 participants and meet for 2.5 days, directly before WGDIM 2012, at the location where WGDIM 2012 will be held. Its goal is to give guidance to the ICES Data Centre on quality flagging, having the following Terms of Reference:

- a) Give guidance on what kind of quality flagging system is needed to meet ICES needs and to also remain compatible with other systems (interoperability)
- b) Give guidance for implementation of the proposed quality flagging system within the variety of databases at ICES
- c) Inventory of end uses of quality flagging, including an inventory of users' expectations towards ICES in terms of information about quality

Depending on the outcome of ToR c) ICES Data Centre should implement a quality control system around each data type. It will probably end up with being a system that should be able to handle any number of quality control flag schemas behind the scene and with a mapping to a simple quality control flag schema (unknown, good, questionable, bad) to be used on EcoSystemData portal.

In this workshop at least the following parties should be represented: ICES Data Centre, active WGs in the fisheries area, WGs in the biological (plankton) field, physical oceanographer, chemistry expert, HELCOM, OSPAR, European Commission. There is a strong wish for participants from all over the ICES area, including the USA.

The full proposal is available in Annex 7.

7 Support ICES Data Centre with feedback and advice on existing products, current developments and potential new products. (ToR d)

There is a close link between WGDIM and ICES Data Centre. To increase insight in the functioning of the ICES Data Centre, it is recommended that the yearly report created by the Data Centre is actively shared with WGDIM, either via the SharePoint or by e-mail.

7.1 Version control

Over the last year, ICES Data Centre has improved the data and data product version control, which facilitates e.g. the comparison of index calculations before and after data re-upload. WGDIM assumes this improvement will continue and recommends that ICES Data Centre also puts version control on the vocabularies used (RECO).

7.2 DATRAS

The main developments of DATRAS (<http://datras.ices.dk>) in 2010-2011 were presented by the ICES Data Centre. These consisted of:

DATRAS now has seven surveys opened for online management (upload and download). Interest for DATRAS development remains high as 8 surveys are on various stages of getting into DATRAS. Online screening utility is working for nearly all DATRAS surveys, and so, data-submitters are fully responsible for the upload. As a consequence, ICES Data Centre developed an online help. Data submitters now can see error explanations and potential solutions during screening. In addition, the exchange field descriptions became available at the DATRAS web-page for the major surveys. Further enhancement of FAQ systems is expected in future.

Following multiple requests for the possibility of tracking changes upon upload, a tracking and back-up system was developed and will be available in the new version of DATRAS. This has already proven to be useful.

A document describing the calculation of indices was developed for IBTS and BITS and will be available online in near future.

ITIS TSN codes will be replaced by WoRMS species codes and will be used in DATRAS from 3rd quarter 2011.

Upon request from European Commission Marine Indicator data product was developed and is now being calibrated in cooperation with the Advisory department.

WGDIM is encouraged by the progress made. The group recommends however that IBTSWG2010 (IBTSWG 2010, Annex 3, point 6) and WGBEAM2010 (WGBEAM2010, Annex 4, point 12) are followed up to improve referencing to and version tracking of survey manuals.

7.3 Regional fisheries database

The regional coordination meetings (RCMs) have been discussing options towards a regional database for catches, landing, effort etc. The Baltic region has worked with FISHFRAME (DTU-Aqua) and proposed this as a platform for a supra-regional database. It has been decided by the RCMs to manage and maintain the FISHFRAME database at ICES. However, development of the database and its functionalities will

be decided by, and possibly coded by, the user community. As a result, ICES Data Centre and DTU-Aqua are working on the migration of the database (Handover in 2012). The database will operate for the Atlantic, North Sea and Baltic region but it is open for Mediterranean to join.

7.4 EcoSystemData

EcoSystemData (<http://ecosystemdata.ices.dk>) is the ICES data portal. The portal currently hosts five datasets (oceanographic, fish trawl survey [DATRAS], biological community, fish predation [stomach content], contaminants and biological effects) – more than 275.000.000. measurements are available online for querying, mapping and download. The major developments in this new version are the enhanced search of data in the inventory and the new map facility that allows a simpler way to query the data holdings and visualize the results on a large map.

7.5 Egg / Larval database

The progress on the WGDIM eggs and larva action plan were presented. Taking into account feedback of WGEGBS 2010 and IBTSWG 2011 ICES Data Centre designed a database according to the ICES standards to accommodate the eggs and larvae datasets. So far four expert groups contributed datasets that will be stored in the database.

- Cod and Plaice Eggs North Sea Surveys 2004 and 2009 (WGEGBS)
- MIK Herring Larvae Survey 1977-2011 (IBTSWG)
- Sample Mackerel and Horse Mackerel Surveys (WGMEGS)
- Additionally and not in the action plan, WGEEL has delivered Anguilla DB compiled from various irregular surveys dating back from 1863.

It was decided that the species list in the database will be based on WoRMS. The relevant codes like country, ship, gear and others need to be created and synchronized for all surveys/datasets. The existing RECO vocabularies will be used where possible. Otherwise, new vocabularies will be established or linked to.

In future users will be able to view and download the data from the dedicated Eggs and Larvae website. The Eggs and Larvae data are expected to be integrated in the EcoSystemData portal.

As the action plan for the addition of egg and larval data were created for 2010–2011, WGDIM discussed the main strategy for the rest of the plan.

Basically, the ICES Data Centre only provides the housing for the data, to ensure continuity of the dataset and standardization over the datasets and to enhance mobilization of the data. As a consequence, the working groups collecting the data on ichthyoplankton (WGEGBS, WGMEGS, IBTSWG, WGIPS) will still be responsible for the content and quality control. Therefore, it is recommended that the working groups follow their regular procedure of data processing for the assessment working groups and send the data to ICES Data Centre after the assessment group has finalized working with the data. The working groups can use the same data format as they have provided the data in. WGDIM assumes that the described workflow is very close to the current process and, as a result, will have minor consequences for all parties involved. It is recommended that this workflow is evaluated at a future date by the working groups uploading the data as well as the ICES Data Centre.

7.6 ICES GIS developments

The web GIS developments within the ICES Data Centre (ICES DC) are designed to serve all of the ICES community in publishing and sharing map layers and metadata. The ICES spatial facility is seen as a component of the ICES strategic initiative on marine spatial planning. The ICES web GIS system was demonstrated as a prototype system at the WGDIM 2011 meeting and will be officially launched in June 2011.

A full overview of developments is in Annex 8.1.

7.7 Stomach data

A short outline demonstration showed the current stomach dataset, and it was noted that the EMODNET Biology portal had reported erroneous records back to ICES. The data centre has prepared a small summary document of the position and details of the errors and requested advice from WGDIM as to remedial actions. To keep the process running, it is recommended that the co-chairs of WGDIM and WGSAM and ICES Data Centre have intersessional contact to discuss WGSAM 2010 report.

7.8 Numbering/control of documents

Develop recommendation for implementation of a system for numbering/control of documents published by ICES that are not covered under existing arrangements (e.g. survey manuals)

It is recommended that the ICES Secretariat follows up the recommendations of IBTSWG2010 (Annex 3, point 6) and WGBEAM 2010 (Annex 4, point 12) regarding numbering of ICES documents (e.g. survey manuals). If the ICES Secretariat feels the need for feedback from WGDIM it should not hesitate to contact the WGDIM co-chairs. WGDIM suggests the development of a flexible numbering system that will be able to handle new document types as well.

7.9 Data duplication

WGDIM discussed the potential risks of data duplication in relation to the INSPIRE directive. Those routes, however, are often national, and within the 34 themes in the 3 annexes of the INSPIRE directive, there is considerable overlap with data that are routinely submitted to ICES. As a consequence of the potentially multiple routes of exchanging data at ICES, INSPIRE national portals and ultimately MSFD, there is an increased risk of the duplication of data. Individual datasets can become part of larger collections (e.g. through submission to one of the data systems as ICES), but may also be required to be submitted at a national level. Hence, when a dataset is submitted like this, it may be a major challenge to identify duplicates.

However, the work done on publishing data through the ICES Data Centre and by INSPIRE initiatives is considered to be more important than the issue of duplication (e.g. it is better to get data “out there” and run a risk of some duplication). WGDIM will monitor the issue of potential data duplication in ICES once the specific data submission activities with INSPIRE and MSFD become clearer.

8 Protocol for new data services

As the ICES Data Centre becomes more important as a data storage and data product centre, the number of requests for hosting new datasets and/or new data products increases too. WGDIM discussed the process that should be followed in case of requests for new data services at ICES i.e. new databases and for new data products (output). The two processes were aligned where possible. The working group tried to stay as close to the processes that are currently followed by the ICES Data Centre as it was only meant to manage expectations and make the process more transparent to requesters; therefore the ambition was not to come up with a new procedure.

8.1 Input

8.1.1 Outline of steps to be taken when a request for a new data service facility is received

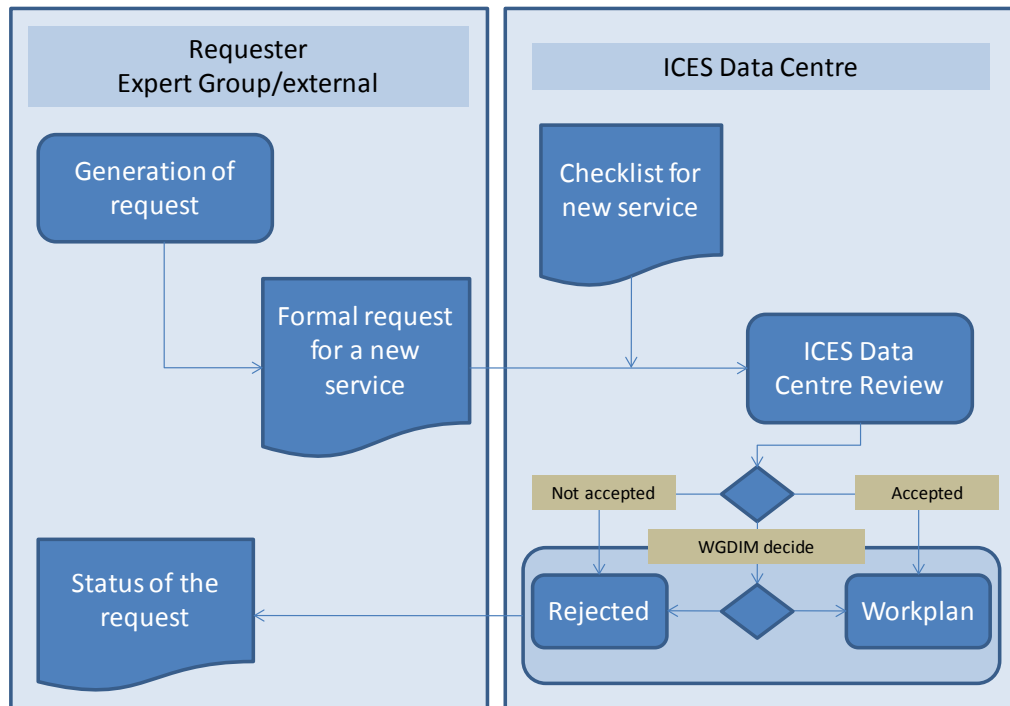


Figure 8.1. Flowchart of the decision-making process of new data storage at ICES.

8.1.2 Checklist for the request of new data services at ICES Data Centre

The framework used to identify the relevant information were the what, why, when, who, how questions. From this, a checklist for data service requests was developed.

The access to data should always be in line with ICES Data Policy, ICES Data Centre Guidelines.

- 1) Request justification:
 - Relevance / Rationale for the requester
 - Relevance / Rationale for the Expert Groups
 - Strategic importance for ICES

- 2) Request description:
 - (Online) Database (options, more than one possible):
 - Data housing
 - Data checking (if yes, valid variable ranges, mandatory variables should be provided)
 - Automatic uploading facility
 - Output interface (if yes, a description should be provided)
 - Other
- 3) Database definition:
 - Metadata information
 - Basic dataset description
 - Description of existing systems
 - Repository of the originator
 - External linkages (e.g. to vocabularies)
- 4) Database delivery deadline
- 5) Definition of responsibilities:
 - Database maintenance
 - Data update
 - Data quality
 - Data conversion (if relevant)
 - Expert Group's own resources
- 6) Customer definition:
 - Contact person
 - Data owner (options):
 - Personal (individual researchers, students, etc.)
 - Organization
 - Project (like EU projects)
 - ICES working groups or expert groups
 - Data end-use description:
 - Who
 - How
 - What

Prioritizing of requests was not discussed as it is assumed that this is part of the ICES Data Centre's review process.

8.2 Output

The subgroup was tasked with discussing how the ICES Data Centre should handle product requests from requesters inside and outside ICES, including the ICES expert groups and ICES advisory groups.

8.2.1 Outline of steps to be taken when a request for data output is received.

- 1) The request should be forwarded to the ICES Data Centre.
- 2) If the product is available through the website or the product could be produced by automated processes on the website the ICES Data Centre gives advice on how this can be extracted.
- 3) If the product isn't available through the website the ICES Data Centre sends a set of predefined questions to the data requester. Predefined questions are outlined below.
- 4) Based on the answers given by the data requester the ICES Data Centre decides whether this product can be produced by ICES or if the requester ought to be given information about other places to attain the product.

The predefined questions are a mechanism to prioritize the requests. For equal request priorities, the Head of the ICES Data Centre should be consulted before any decision is made.

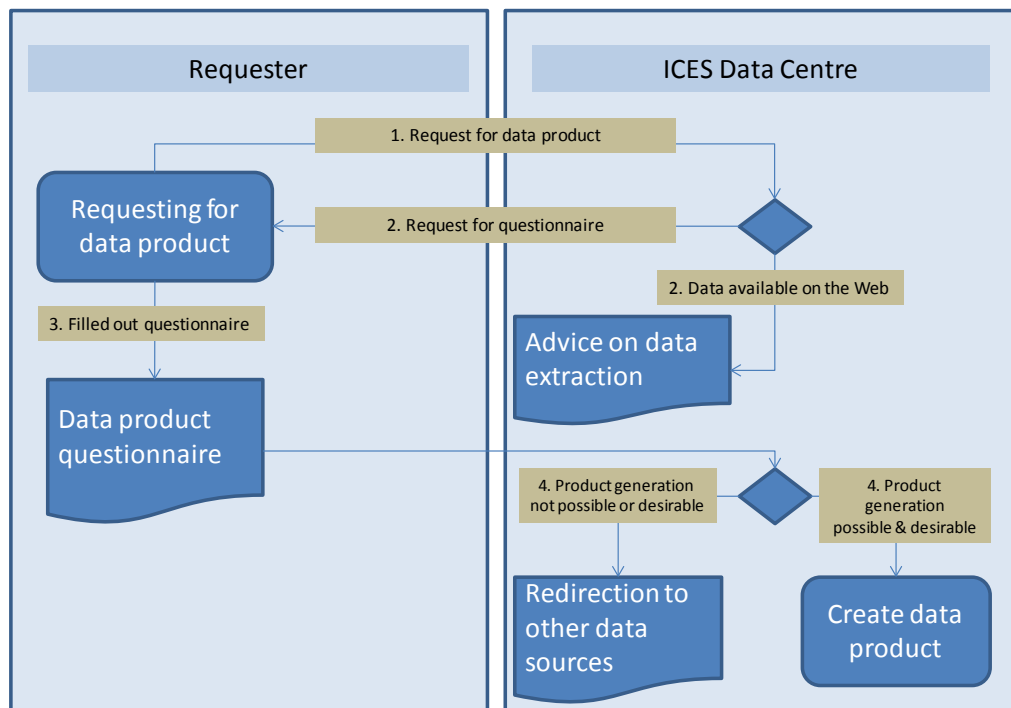


Figure 8.2. Flowchart of the decision-making process of new data output from ICES.

8.2.2 Checklist for the request of data output from ICES Data Centre

The following checklist to handle product requests is suggested:

- 1) Data selection definition:
 - Parameters
 - Geographical area
 - Period
- 2) Output definition:
 - Product description (options):
 - Raw data

- Calculated data (e.g. indices)
- Other output (e.g. maps)
- Output format required
- 3) Output delivery deadline
- 4) Customer definition:
 - Contact person
 - Type of request (options):
 - Personal request (individual researchers, students, etc.)
 - Organization request
 - Project request (like EU projects)
 - ICES working groups or expert groups request
 - Commercial use request

9 Other topics

9.1 Internal review

The working group reviewed issues surrounding visibility and role in communication with working groups and the ICES Data Centre. Internally the group conducted a SWOT analysis that identified a number of strengths, while also finding challenges yet to overcome.

9.1.1 Strengths

The new position as an operational group, and the agreement to regularly report to ACOM and SCICOM will greatly enhance WGDIM's ability to deliver a clear vision and strategic approach to data in ICES.

A major recognized strength was the diversity of the group membership. This diversity is both in terms of expertise fields and roles (data-user and -manager). In turn this wide range of membership leads to an extended network via the working groups' members.

The close link with the ICES Data Centre is important for WGDIM and enhances understanding and advice in both directions. Participation of Data Centre staff in the working group meeting is warmly welcomed and leads to additional expertise of the group.

As a result of the changing role of WGDIM, the terms of reference have changed considerably during its lifetime, approaching more strategic elements of data and information management as expressed in the working groups' mission statement. The adaptability of the working group members is a considerable strength that will manifest itself at the challenges of improving the groups' visibility, and promoting broad scale initiatives that will enhance interaction with other working groups.

9.1.2 Challenges

Although the link to the ICES Data Centre is close, it was recognized that the change in role of WGDIM to that of an operational group, may pose challenges in terms of its visibility and engaging with other working groups. However, a number of initiatives have already been identified which would greatly improve the interaction between WGDIM and other working groups without eroding the role of the ICES Data Centre. In particular, these initiatives were (1) to actively propose regular theme sessions in

data-related subjects at the annual science conferences, and (2) to propose increased visibility of data projects in the next revision of the ICES website structure.

Data management as a discipline is a constantly evolving task, and it was recognized that the working group could benefit from increasing its intersessional communication. As a result, the group will seek to establish a LinkedIn group for increased knowledge exchange. It is envisaged that the group will be established as an internal communication tool for working group members at first, but with the option of including other ICES working groups or the ICES Secretariat where necessary, and if proven effective, perhaps to open to the wider community.

The position of WGDIM within ICES needs to be balanced in the terms of reference for the working group to avoid the risk of working at a too detailed level in terms of specific data implementations.

9.1.3 Achievements

In order to keep track of the visible output or effect of WGDIM, the group listed its achievements since 2009.

First of all, the improved feedback mechanism between WGDIM and the ICES Data Centre leads to increased standardization of (meta)data and improvement of data systems.

The other main achievements are listed below.

Establishment of new groups (relevant to data-users inside ICES):

- SGVMS
- DUAP
- WKQF (proposal)

Strategic documents (relevant to SCICOM, ACOM, ICES Data Centre):

- Data strategy
- Checklist for request of new data service at ICES
- Checklist for request of new data output from data stored at ICES

Addition of new datasets to ICES (relevant to data-users inside and outside ICES):

- Stomach dataset 1981-1991
- Development of eggs and larvae database

9.2 Future developments

9.2.1 Data supply chains in fisheries advice

Liam Caffrey gave a presentation on the current data supply chains within the fisheries management process (Figure 9.2.1a). The presentation also included suggestions for improvements (Figure 9.2.1b). The main messages of the presentation were:

- Fisheries Science needs to examine the way it manages data in order to make the most of that data.
- Key to this is the standardization and integration of data that enables operations management to run effective supply chains, guaranteeing consistency, accuracy, and adhering to data protection obligations

- Fisheries Science needs to embrace more business and IT thinking as practiced in the commercial world.
- Addressing these points will enable a major improvement in the accuracy, timeliness and agility of fisheries advice

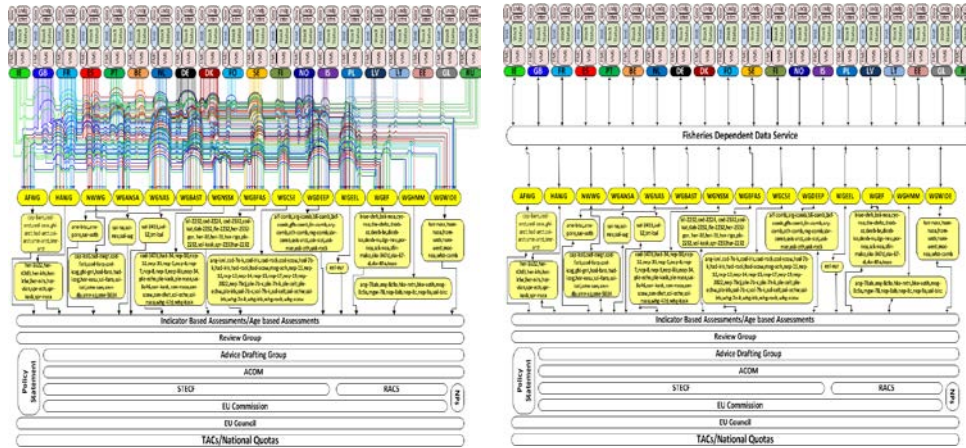


Figure 9.2.1a. Current supply chain. Figure 9.2.1b. Possible supply chain.

Marine litter

A European Commission working group is working on quantifying and categorizing marine litter and the ICES Data Centre was involved in this project. There are implications for trawl surveys and other data collecting activities within ICES. As this topic is still in the formative stages and at present there are no action items. Despite this, some survey expert groups already started the collection of marine litter data.

Strategic initiatives on Marine Biodiversity and MSFD

Marine Biodiversity (Strategic Initiative): ICES has established a Strategic Initiative on Biodiversity Advice and Science and as part of that initiative a workshop was held “to identify policy drivers, scope issues and solutions relating to biodiversity science and advice and to suggest a future work plan to develop biodiversity science and advice in ICES.” (ICES CM 2011/SSGHIE:02). The outcome resulted in a number of data-related items that the ICES Data Centre will need to consider and address. The WGDIM is called on to assist in evaluating the issue of biodiversity datasets and their continuity as they relate to this strategic initiative.

It is recommended that the coordinators of the strategic initiative on the MSFD should have direct communication with the co-chairs of WGDIM, to keep the working group informed about the progress. Only then, WGDIM will be able to anticipate future data or data product needs.

9.2.2 Other developments

There was a review of future developments that will involve the ICES Data Centre.

Within a cooperative project between SAHFOS, ICES, and the University of Plymouth (UK), a large historical plankton dataset dating back to the early 1900s (1901 to 1912) has been digitized and quality checked. The data from more than 13,000 samples will be entered into the ICES holdings along with metadata to explain what has been done and how to interpret the holdings. A specific webpage will provide access to the data.

Venerable marine ecosystems (VME's): the Working Group on Deep-water Ecology (WGDEC) 2011 recognized a need for a unified database into which they could submit data to assemble working group products and to exchange data. It is envisioned that by 2012, the ICES Data Centre will need to have a link to the OSPAR habitats database, an expanded data format to include species, and links to other parallel activities as a data provider.

Otoliths reference database: One outcome of the workshop held in March 2011 on Age Reading of European and American Eel was the request that ICES host an Otolith image database and associated metadata as a reference collection. Because there is no precedent for hosting reference collections, the ICES Data Centre needs advice on what to do when they get these requests (see also Section 8.1).

9.3 Proposal for theme session on ASC 2012

The group agreed to send in a theme session proposal for ICES ASC 2012 (Bergen, Norway), titled 'Recent advances in the mobilization of data and information in support of Marine Ecosystem Science'. The full proposal is in Annex 9.

Annex 1: List of participants

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Annex 2: Agenda

Meeting Agenda for WGDIM 2011 in Copenhagen (Denmark) 24–26 May.

Tuesday 24 May

09.00

Opening greetings and aims for the day [Co-chairs]

Local arrangements [V. Piil]

09.30

Review meeting schedule and items for discussion [Co-chairs]

Appoint rapporteurs for meeting [Co-chairs]

Short feedback of meeting with SCICOM and ACOM chairs [I. de Boois]

ToR e: Review progress on recommendations from WGDIM 2010 [I. de Boois]

- Review recommendations

10.30 *Coffee break*

11.00 ToR a: Review outputs/products of offspring groups: SGVMS – Study Group on VMS data and DUAP - DATRAS User Advisory Panel

- SGVMS – Study Group on VMS data [C. Pinto]
- DUAP - DATRAS User Advisory Panel [I. de Boois]

11.45 ToR d: Support ICES Data Centre with feedback and advice on existing products, current developments and potential new products.

- DATRAS: presentation of major developments [V. Soni/A. Osypchuk]
- Egg / Larval database: state-of-the-art [A. Osypchuk/C. Pinto]
- Regional databases: state-of-the-art and future developments [N. Holdsworth]
- EcoSystemData: presentation of major developments [C. Pinto]
- Stomach data [C. Pinto]
- ICES Spatial Facility [H. Jensen]

13.00 *Lunch*

14.30 ToR c: Data Quality Flags; Review development of the data-point level quality flags recommended at WGDIM 2010. Develop a recommendation regarding dataset level quality flags

- Proposal questionnaire for WG's and other important partners [I. de Boois]

15.00 Future developments - I

MSFD (EU Marine Strategy Framework Directive): within EU and ICES the MSFD is discussed frequently. Although not all consequences of the MSFD are completely clear yet, there might be a need for storage of new data and there will be a need for indices correlating to the MSFD descriptors.

- Presentation on some perspectives at the Marine Institute (Ireland) with respect to the architectures and approaches to managing fisheries

data in a manner that is compatible with the goals of the Ecosystems Approach to Fisheries Management. [L. Caffrey]

- Underwater noise [G. Dawson]

15.30 *Tea break*

16.00 Subgroup work

Subgroup theme	Output
(SG)VMS	Recommendation for: The consultation process among WG chairs and ACOM and SCICOM to find out needs on VMS data in the ICES community to better determine the involvement of ICES in the medium and long-term. (recommendation SGVMS) WGVMS if appropriate If necessary/useful, other relevant recommendations based on SGVMS report (http://www.ices.dk/reports/SSGSUE/2010/sgvms10.pdf)
Follow-up of eggs/larvae action plan	Update of the plan, including: implications for resources Data responsibility

17.30 Summary of Day 1 [Co-chairs, subgroup rapporteurs]

Wednesday 25 May

9.00 Finalize subgroup work Monday

9.30 Aims of the day, appointment of rapporteur, feedback from subgroups
[Co-chairs, subgroup rapporteurs]

9.45 Future developments – II [N. Holdsworth]

- Otoliths reference database
- WGDIM role in Workshop on Marine Biodiversity (WKMARBIO)
- Marine litter

10.30 *Coffee break*

11.00 Subgroup work

Subgroup theme	Output
Guidelines for new ICES Data Centre activities (input)	Checklist for clients (input). See also http://www.ices.dk/reports/SCICOM/2010/WGDIM10.pdf Annex 11
Guidelines for new ICES Data Centre activities (output)	Checklist for clients (output). Finalizing http://www.ices.dk/reports/SCICOM/2010/WGDIM10.pdf Annex 11

12.30 *Lunch*

14.00 Subgroup work

Subgroup theme	Output
Data policy and Data strategy	Short review of the data policy and data strategy: are there any omissions, are they functional, are they in line with each other, etc. http://www.ices.dk/datacentre/datapolicy.asp (data policy) http://www.ices.dk/reports/SCICOM/2010/WGDIM10.pdf (data strategy)

Subgroup theme	Output
WGDIM's profile	List of opportunities for WGDIM in the coming years
15.30	<i>Coffee break</i>
16.00	Subgroup work
Theme session ASC 2012	Proposal for theme session on data (interoperability) at ICES ASC 2012
WGDIM's achievements	In order to present ourselves, some clear achievements should be identified

17.30 Summary of Day 2 *[Co-chairs, subgroup rapporteurs]*

Thursday 26 May

9.00	Aims of the day, appointment of rapporteur	<i>[Co-chairs]</i>
9.15	Finalize report writing	<i>[all]</i>
10.00	Report writing and agreement	<i>[Co-chairs]</i>
11.00	<i>Coffee break</i>	
11.25	Recommendations for 2012	<i>[Co-chairs]</i>
12.00	Summary of intersessional work and ToRs 2012	<i>[Co-chairs]</i>
12.30	Dates of next meeting	<i>[Co-chairs]</i>
13.00	Closure	<i>[Co-chairs]</i>

Annex 3: WGDIM Terms of Reference for the next meeting

The **Working Group on Data and Information Management** (WGDIM), chaired by Ingeborg de Boois (Netherlands) and Helge Sagen (Norway), will meet in Copenhagen, Denmark, 23–25 May 2012 (Wed-Fri) to:

The following terms of reference are proposed for WGDIM 2012:

- a) Review outputs/products of offspring groups:
 - SGVMS – Study Group on VMS data
 - DUAP - DATRAS User Advisory Panel
 - WKQF – Workshop on Quality Flagging
- b) Review ICES Strategic documents and recommend updates/amendments
 - Data Policy
 - Data Strategy
- c) Support ICES Data Centre with feedback and advice on a number of topics, including existing products, current developments, potential new products, and the potential risk of data-duplication resulting from multiple submission roots, evaluation of the checklists.
- d) Review progress on recommendations and actions from WGDIM 2011. (co-chairs)
- e) Create a theme session proposal on a WGDIM related topic for ICES ASC 2013.
- f) Investigate the implications ‘creative commons licence’ might have on the ICES Data Policy
- g) Develop a set of options using a top–down approach for ICES’ strategic position regarding VMS, the level of involvement required in the short, medium and long-term

WGDIM will report by DATE to the attention of the SCICOM.

Supporting Information

Priority	The Group provides ICES with solicited and unsolicited advice on all aspects of data management including technical, data policy and data strategy and user oriented guidance. This Group flies the flag for ICES in setting standards for global databases. It also provides an important interface for oceanographic, environmental, and fisheries data management in ICES, and promotes good data management practice.
Scientific justification	<p>a) the group should keep track of developments in and progress of groups initiated by WGDIM</p> <p>b), c), f), g) are direct results of WGDIM’s main priority: The Group provides ICES with solicited and unsolicited advice on all aspects of data management including technical, data policy and data strategy and user oriented guidance.</p> <p>e) WGDIM sees the proposal for a theme session at ASC as a spin-off of it’s main priority: It also provides an important interface for oceanographic, environmental, and fisheries data management in ICES, and promotes good data management practice.</p>

Resource requirements	The resource required to undertake additional activities in the framework of this group is negligible.
Participants	The Group is expected to be attended by some 20–30 members and guests with half of the members from each of the two categories , data managers and data users
Secretariat facilities	Meeting facilities, organization and facilitation of WebEx meetings (WGDIM co-chairs with SCICOM and ACOM representatives, 4x a year).
Financial	No financial implications.
Linkages to advisory committees	ACOM
Linkages to other committees or groups	–
Linkages to other organizations	There are linkages with relevant international bodies and programmes like PICES, IOC/IODE, GOOS, SeaDatanet, IPY, etc., with emphasis on IOC and its Working Committee on International Oceanographic Data and Information Exchange (IODE).

Annex 4: Recommendations

Actions for follow-up by ICES Secretariat

Recommendation
1. Proposal SGVMS (Annex 5)
2. Proposal Workshop on the Legal Aspects of VMS Data (Annex 5)
3. Proposal Workshop on Quality Flagging (Annex 7)
4. Organization of 4 webex meetings per year with designated representatives of SCICOM (2), ACOM (2) and Head of ICES Data Centre and WGDIM co-chairs
5. Implementation of the latest version of the ICES Data Strategy (Annex 6)
6. Follow-up of recommendations IBTSWG2010 (Annex 3, point 6) and WGBEAM 2010 (Annex 4, point 12) regarding numbering of ICES documents (e.g. survey manuals). See Section 7.8

Recommendations to other parties

Recommendation	Adressed to
1. it is recommended that the yearly report created by the Data Centre is actively shared with WGDIM, either via the sharepoint or by e-mail. (section 7)	ICES Data Centre
2. It is recommended that the working groups follow their regular procedure of data processing for the assessment working groups and send the data to ICES Data Centre after the assessment group has worked with the data. (section 7.5)	WGEGGS, WGMEGS, IBTSWG (MIK), WGIPS
3. It is recommended that this workflow is evaluated by the working groups uploading the data as well as the ICES Data Centre. (section 7.5)	WGEGGS, WGMEGS, IBTSWG (MIK), WGIPS, ICES Data Centre
4. it is recommended that the co-chairs of WGDIM and WGSAM and ICES Data Centre get into contact intersessionally to discuss the feedback from WGSAM. (section 7.7)	Co-chairs WGSAM, co-chairs WGDIM
5. It is recommended that ICES Data Centre also implements version control on the vocabularies used (RECO; section 7.1)	ICES Data Centre

Action list WGDIM

Action	Adressed to
1. Create a WGDIM group on LinkedIn to facilitate intersessional activity	Jens Rasmussen
2. Outreach of activities: e.g. Publication about achievements WGDIM in ICES Inside Out or other relevant information sources Presentation about WGDIM on SG meetings at ASC	Daphne Johnson, Ingeborg de Boois, Taco de Bruin
3. it is recommended that the co-chairs of WGDIM and WGSAM and ICES Data Centre get into contact intersessionally to discuss the stomach database. (section 7.7)	Co-chairs WGDIM
4. The coordinators of strategic initiative on the MSFD should have direct communication with the co-chairs of WGDIM (section 9.2)	Co-chairs WGDIM
5. Discuss VMS requirements within ICES with SCICOM and ACOM representatives and ICES Data Centre	Co-chairs WGDIM
6. Submission theme session proposal 2012 (Annex 9)	Helge Sagen

7. Submission of SG and WK proposals	Ingeborg de Boois
8. Preparation of ToR f 2012	Peter v.d. Kamp, Taco de Bruin
9. Preparation of ToR g 2012	
10. Prepare a draft version of the Data Policy that accounts for the current inadequacies in the 2006 version for discussion at the WG2012 meeting	Peter Wiebe, Ingeborg de Boois, Neil Holdsworth
11. Finalize WKQF participant list (Annex 7)	All

Annex 5: SGVMS review

SGVMS Terms of Reference as suggested by SGVMS 2010

2010/2/SSGSUE06 The Study Group on VMS data, its storage, access and tools for analysis (SGVMS) chaired by Heino Fock, and Vanessa Stelzenmüller, Germany, will meet in Hamburg, Germany, 7–9 September 2011 to:

- ~~a) Review and consider implications for VMS data management at ICES based on the ICES strategic position on VMS data and data needs as defined by ICES working groups, and determine resources required to accomplish the goals of the strategy;~~
- ~~b) Work on standardized data products for the ICES data centre;~~
- ~~c) Test and undertake quality assurance measures for standardized data products;~~
- ~~d) Review ongoing work for analysing VMS data and developing standardized data products.~~
- ~~e) Review, report on and develop the outputs of the ICES SIBAS Workshop on 'Biodiversity indicators for assessment and management' (for more detail, see Supporting Information).~~

~~If ToR a) becomes invalid dependent on a pending decision on the ICES strategic position on VMS data, the study group will meet by correspondence only.~~

The new Terms of Reference for SGVMS 2011 are:

- a) Review and consider implications for VMS data management at ICES based on the data needs as defined by ICES working groups (e.g. WGDEC and WGDEEP Use cases) taking into account the ICES strategic position on VMS data;
- b) Work on standardized data products for the ICES Data Centre based on user needs. This should include:
 - i) development of standardized methodologies if not available;
 - ii) quality assurance (testing and measures) for standardized data products and methodologies;
- c) Review ongoing work for analysing VMS data and developing standardized data products and methodologies;
- d) Enumerate the shortcomings with respect to the current systems' architecture supporting the analysis of VMS data in general and its relationship with any other data that are or may be relevant to the creation of fishery advice;
- e) Investigate in general terms the options for improvement of the current system in the short, medium and long-term;
- f) Investigate the possibilities, usefulness and accessibility of AIS data for providing fishing vessel tracks.

WGDIM will provide the relevant documents concerning the legal position of VMS data under the DCF to the co-chairs of SGVMS.

SGVMS will report by 1 October 2011 for the attention of SSGSUE, WGDIM and SCICOM.

Supporting Information

Priority	The current activities of this Group will lead ICES into issues related to the ecosystem effects of fisheries with reference to the ICES Science Plan 2009-2013 and the European Common Fisheries Policy (2008/949/EC).
Scientific justification	<p>Science Plan No: 4.2.</p> <p>Term of Reference a)</p> <p>VMS and logbook data are sensitive data and European states and their national agencies will presumably be reluctant to share raw data. The European Commission (COM(2010)461 final) has so far only suggested to build up a data centre to compile and distribute data among endusers. Thus, it is not yet clear how in practice VMS data will be stored and processed. In turn, ICES will need to analyse fisheries patterns to provide substantiated advice for CFP. However, by holding VMS data, even in some aggregated form, ICES and its expert groups will have the option to re-use the data time and again when the DCF states clearly that provision should be for a stated purpose. ICES in its Science Plan has decided to take a leading in research on fisheries affects on ecosystem and research fields and purposes for where VMS data are essential, should be clearly stated.</p> <p>Term of Reference b)</p> <p>Several analysis tools are available, and it essential to not only work on case studies of a limited number of vessels, métiers or nationalities, but to start to build up a comprehensive database all fisheries for which VMS is available.</p> <p>SGVMS 2010 identified a series of Quality Assurance measures which will be tested and applied to the ICES dataset.</p> <p>Term of Reference c)</p> <p>Update information on available tools.</p> <p>Term of Reference d)</p> <p>Comprehensive summary dealing with the shortcomings which is easy to read for end-users not dealing with VMS data on a daily basis</p> <p>Term of Reference e)</p> <p>Follow-up of term of reference d. The shift to EAFM and the development of the MSFD should be taken into account.</p> <p>Term of reference f)</p> <p>As AIS data are collected automatically, they might be an additional source of information for the collection of fishing tracks.</p>
Resource requirements	<p>Advice on the legal basis for sharing of VMS data in accordance with Data Collection Framework, VMS Control Order and European Human Rights legislation must be available.</p> <p>VMS and logdata are provided to study group members through their national agencies. For the storage of data in an ICES data centre/base, preparatory steps and maintenance need to undertaken by ICES. The additional resource required to undertake additional activities in the framework of this group is negligible.</p>
Participants	The Group is normally attended by some 20–25 members and guests. If legal expertise is required, i.e. sufficient legal advice is not available beforehand, administrators from EC and others should also be invited.
Secretariat facilities	None.
Financial:	No financial implications.
Linkages to advisory committees	There are no obvious direct linkages with the advisory committees.

Linkages to other committees or groups	There is a very close working relationship with all groups dealing with EAM, in particular WGECO.
Linkages to other organizations	The work of this group is closely aligned with similar work in OSPAR and HELCOM.

Annex 6: Data Strategy (updated)

ICES will be a leader in marine data and information management, providing best practices, data mobilization and services and long term data stewardship for its advisory and science groups and the wider marine and maritime communities

A service for ICES advisory and science groups

- ICES Data Centre will provide the advisory and science groups with data and products tailored for their needs
- ICES will ensure that data services are closely linked to the advisory and science group products
- ICES data will form an integral part of new services envisaged under the SCICOM and ACOM leadership, such as marine spatial service, climate change, biodiversity and information feeds of advisory content

A leader for best practice in the management of marine data

- ICES Data Centre will be recognised as a centre of excellence in the stewardship and mobilisation of marine data and information
- ICES will implement international standards for marine data and information
- ICES will continue to contribute to the development and adoption of new standards for meta-data and spatial data through regional and international cooperation
- ICES will endeavour to embed these standards in the wider marine network through training, promotion, dissemination and online materials

A regional resource and marine data and information node

- ICES data will be utilised and made available to a greater number of potential end users through project participation and new co-operations with emerging infrastructures
- ICES will be seen as a resource for the marine and maritime research communities
- ICES will have tools that enable the majority of users to access all the data online
- ICES will be a trusted source of marine data and information of a known quality
- ICES will continue to act as a steward for marine data sets that could otherwise be lost to the marine community
- ICES will continuously review, update and apply the ICES Data Policy
- ICES data Centre will continue to identify new or underutilised streams of data that can be incorporated into the ICES Data portfolio and encourage the network of ICES scientists to contribute to this process

Annex 7: Proposal WKQF 2012

The **Workshop on Quality Flagging (WKQF)**, chaired by Edward Vanden Berghe, and with a closed list of maximum 12 participants, will meet in Copenhagen, Denmark, 21-23 May 2012 (Mo-Wed morning) to:

- a) Give guidance on what kind of quality flagging system is needed to meet ICES needs and to also remain compatible with other systems (interoperability)
- b) Give guidance for implementation of the proposed quality flagging system within the variety of databases at ICES
- c) Inventory of end uses of quality flagging, including an inventory of users' expectations towards ICES in terms of information about quality

Depending on the outcome of ToR c) ICES Data Centre should implement a quality control system around each data type. It will probably end up with being a system that should be able to handle any number of quality control flag schemas behind the scene and with a mapping to a simple quality control flag schema (unknown, good, questionable, bad) to be used on EcoSystemData portal.

Suggested participant list:

Neil Holdsworth, ICES Data Centre

Extra person ICES Data Centre

Hernan Garcia (NODC), chemical and physical oceanographer

Christopher Zimmermann, fisheries assessment

Nan Galbraith (WHOI, OceanSites)

Bill Burnett (OceanSites)

BODC, via Lesley Rickards, SeaDataNet person

GE-BICH chair (IODE)

Cyndy Chandler (WHOI, participated in GE-BOCH-V)

Murray Brown (IODE-OceanTeacher)

1 person HELCOM/OSPAR

1 person European Commission

1 person (QARTOD)

1 person (AODC-JF / IMOS)

Annex 8: Presentations ICES Data Centre

8.1 ICES web GIS developments (Hans Mose Jensen)

The web GIS developments within the ICES Data Centre (ICES DC), is designed to serve all of the ICES community in publishing and sharing map layers and metadata. The ICES web GIS system was demonstrated as a prototype system at the WGDIM 2011 meeting and will be officially launched in June 2011.

In the last decade the need to support marine spatial planning and integrated area based science has been steadily growing. This development is also promoted by the implementation of the INSPIRE Directive (2007/2/EC), establishing the spatial infrastructure in Europe and the Marine Strategy Framework Directive (2008/56/EC) that necessitates an integrated, area based ecosystem approach. In ICES a joint ACOM/SCICOM strategic initiative on area-based science and management was established last year. An outcome of this initiative was the workshop on the science for area based management: coastal and marine spatial planning in practice (WKCMSPP) that was held last year. Another outcome was the establishment of a strategic initiative group (STIG-MSP) that will identify approaches to facilitate and encourage integrated analysis and exchange of spatial data within and between expert groups.

In order to support the developments towards marine spatial planning and integrated area-based science, the ICES DC in cooperation with STZ Geoinformatik in Rostock, has developed a web GIS system that can capture spatial layers including metadata and make them discoverable and accessible for all users. It has been important to use best practices and widely accepted standards in the system. The metadata are stored in the ISO19115/19139 format, but the required information has been kept to a minimum due to the wide scope of layers and uses expected in the system. The metadata requirements for INSPIRE are currently being evaluated for inclusion.

The developed system builds on GeoServer (web map services; <http://map.ices.dk/geoserver>) and GeoNetwork (metadata handling; <http://geo.ices.dk/geonetwork>) that are both open source projects. The system integrates their functionalities and creates the important linkage between the spatial datasets and their metadata.

The system has open access for all users, but in order to upload data and metadata the user will have to be registered. The collection of spatial layers can be searched based on geographic extent, keywords, category, title, etc. The GIS viewer allows layers to be viewed one at a time or in combination with the possibility to explore the attribute information of the spatial objects in the layers. All layers can also be accessed as web map services or downloaded for use in various GIS applications and other map clients.

The new web GIS system increases the use and usability of spatial layers being generated by ICES expert groups and it promotes increased exchange of spatial data between ICES expert groups and the marine community in general.

Annex 9: Theme session proposal ASC 2012

Theme Session on Data and Information Management

Proposed for the 2012 ICES ASC

Title: Recent advances in the mobilization of data and information in support of Marine Ecosystem Science.

Theme Session Chairs: Ingeborg de Boois (Netherlands), Daphne Johnson (USA), Helge Sagen (Norway)

Keywords: Marine Data Use Cases, Visualization, Interoperability, Data discovery, Knowledge based systems

Data discovery has become a very important component in the quest to provide marine scientists and ecosystem and fisheries managers with improved access to data and information. This will enable the scientific community to produce more comprehensive and timely advice. Although there is an overwhelming amount of data accessible, there remain significant difficulties to let fishery, oceanographic, and other marine environmental data interoperate with each other. In addition, the tools to enable fishery and environmental assessments needed to respond to the requirements for ecosystem-based management initiatives are still in a state of development. Future developments will be driven both by environmental legislation and large interdisciplinary research projects.

This theme session will provide the opportunity to update the community on new approaches and endeavours by inviting scientists and data managers, data specialists and decision-makers, visualization specialists, and all interested end-users to present and/or demonstrate:

- New and cutting-edge “Use cases” to enhance data search, discovery, utilization and interoperability.
- Tools for visualization of data.
- Data publication
- *de facto* standards and vocabularies, and how to establish them as widely accepted standards
- Examples of enhanced data availability and visibility
 - Success stories and other experiences
 - 'Behind the scene' aspects of data
 - Instruments that enable discussion with stakeholders (e.g. map tables)

Justification: This theme session is proposed because the field of marine data management and informatics is progressing rapidly and it is very important that information about the developments be shared broadly within the ICES community. It is a follow up to the data management sessions at the 2006 and 2008 ICES ASC meetings. Both sessions attracted a large number of contributions.