FIRMS - a proposal for a web-based system to collect and disseminate information on resources, fisheries and their management

High level requirements (Revision 1)

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Data ownership in FIRMS

This section strives to clarify the various dimensions of the concept of data ownership, highlight its legal, moral and costs implications, with practical implementation ways proposed for FIRMS.

Definitions

As a preamble, it might be useful to recall workflow related to information publishing: an information is (i) created (i.e. collected, elaborated by author); (ii) edited (put in some form), with text or not) and documented with meta-data (source, date, key words, etc…); (iii) checked and approved (by the authority having the ownership); (iv) published by the publisher; (v) consulted by the users.

The general concept of ownership would be matched by the following definition:

Information ownership: the ownership of information credits its originator as legal possessor. Property rights confer to the owner the full control on the publication and its use by a third party. It acknowledges the right to defend the published material, and entails the responsibility to maintain it (updating).

The Data ownership in the FIRMS Partnership Arrangement

The contribution of partners to FIRMS is based on this information ownership concept, and has been stipulated in the Partnership Arrangement document and its related draft information management policy:

> In principles of the FIRMS partnership arrangement: "information contributions related to fisheries remain within the full control and **ownership** of the Partner which has primary monitoring or management responsibility over resource and fishery units, including control of what and when information is made available, and how it is processed"
>
> In the Information Management Policy document: "Para.1: The FIGIS system is a tool for disseminating information provided by many different partners, each holding data in different databases (or otherwise). Data in the FIRMS system will be loaded and maintained by professionals belonging to many different organisations. In this distributed system, **information remains under the full responsibility and control of data owners**, and in that respect, information available through FIRMS shall be disseminated ensuring source and citations of **responsible Party** together with information on the nature, origins and quality of the information"
>
> "Quality Assurance (QA) of information submitted by partners: **Partners are responsible for the information submitted and the QA associated with that information**. Therefore, the veracity of this QA will depend on the needs of partners and their **level of responsibility**. Where appropriate, information submitted by partners may include a general description of their QA protocols".

Legal implications

The Copyright belongs to the Data owner. For that reason the data owner must be a legally established entity. In a collaborative information system like FIRMS, the Data owner keeps the copyright of the data unless he/her decides to relinquish it to the public domain, and co-defines how this information can be used and presented.

A FIRMS concept tightly associated with Copyright is the Cover Page.

The Cover page is the public visit card of any FIRMS web-based document. It contains simple bibliographic-like information, which is used together with additional information for citation purpose.

Moral obligations

Moral Commitment: In a voluntary Partnership Arrangement such as FIRMS, the Partner Data owner commits to provide information it owns or holds in trust.

Cost implications

The FIRMS partner supports financial costs implied by the contribution of information in FIRMS.

Handling of Data ownership at system level in FIRMS

We describe herewith the concepts implemented in the system in response to FIRMS requirements on Data ownership.

Reference Object: The information unit managed by the system is a referenced object placed under ownership of a Partner. A reference object belongs to one of the domains managed by FIRMS: it is a marine resource, a fishery or a management system.

Observation: unit of reporting on an existing reference object. An observation is structured in topics holding information details which the data owner is responsible for, and commits (agrees) to contribute (example: geographic localisation, assessment of a stock, management measures regulating a fishery, objectives of a management system, etc…). Various observations may be generated over a single object because of the need to report at various time intervals (for instance each IATTC report may generate a new yearly observation over a stock object), or because different Partners may report on the same object including during the same period (e.g. as part of its review on the status of world fishery resources, FAO may report over the "Resources in Baltic sea" as well as ICES in its ACFM report overview).

Collection: a set of information (reference objects, observations) managed together in an homogeneous way by a data owner, hence responding to similar processing methods and quality assurance rules; also the primary level of assignment of user rights, which means that all the reference objects belonging to the same collection are subject to the same user rights settings. A collection is systematically associated with a single data owner institutional name (an Institution, or a Programme). Collection is a handy concept in FIRMS where in most cases objects and their attributes are homogeneously managed by packages, e.g. the 15 Stocks under the ICCAT management mandate, or the 135 under the ICES assessment mandate. A collection can be reduced to one object, e.g. CCSBT and its Southern Bluefin Tuna stock.

Ownership: in FIRMS, the **responsible Party** mandated to assess, manage, monitor and report (or produce) information on the status of a marine resource or fishery is considered an **Institution**. Another institutional level called **Programme** has also been designed to cover the cases where the responsible Party has delegated to this programme responsibility to elaborate the content (e.g. FAO Fisheries Department and the GFCM statutory body), or the case where more than one institution jointly produce and share responsibility for the content of an object. The shared ownership is implemented through a jointly established Programme.

User roles: the various roles in FIRMS are: **Editor** prepares information to be published; a **Reviewer** assists the Data owner in the approval of the information to publish; **Approver** has the responsibility of final approval and publication; an **Administrator** ensures the consistency of the overall data base and assists where necessary in conflict resolution.

User rights defined over reference objects and observations: creation, edition, deletion, visualisation, publication

Table 1 below shows the orchestration of workflow through roles and rights

	Create	**Edit**	**Delete**	**Visualise**	**Publish**
Editor	Reference objects Observations	Observations	proposes Reference objects and Observations for deletion	Public and Restricted area	-
Reviewer	-	-	-	Public and Restricted area	-
Approver	-	-	Confirms Reference objects to be deleted Deletes Observations	Public and Restricted area	Submits Reference objects for publication Publishes observations(1)
Administrator(2)	-	-	Final action on deletion of Reference objects	Public and Restricted area	Final Publishing of objects Administrate users, collections, etc…
Public	-	-	-	Public area	-

(1) Once creation of an object has been approved, data owner has full control over the content published for that object. In FIRMS, this means that data owner can decide to publish or not the observations reported on this object (whether by himself or another FIRMS partner), and which observation will be published up-front.
(2) Role fulfilled by FIRMS Secretariat.

In conclusion of this chapter, two examples are provided to show how the various activities required for implementing successfully FIRMS are taken care of through institutional and system roles. Table 2 presents these activities and roles in the context of a mono-programme partner (ICES example[1]) while table 3 in the context of a partner with multiple delegated authority (FAO/CECAF example).

[1] This doesn't pre-empt of ICES views on this matter.

In the case of ICES[1]:

- The ultimate responsible Party or entity (formally holding the copyright and the moral obligation to provide information) would be ICES.
- The operational responsible entity to which all rights (except copyright) are delegated by ICES would be the Council's Secretariat acting on behalf of its members.
- The responsibility to ensure the information quality may be delegated by the Secretary to the competent subsidiary body (e.g. the Scientific Advisory Committee or Management Sub-Committee). This Committee provides the Source of the information to be contributed to FIRMS. In the absence of specialised Information staff in the Committee, the formatting responsibility may be delegated to the technical "Secretariat", i.e. the technical staff of ICES operating as technical Secretaries of these committees.

In the case of FAO statutory bodies: CECAF (article VI body) for example:

- The ultimate responsible Party or entity (formally holding the copyright and the moral obligation[2] to provide information) is FAO/Fisheries Department under which aegis the committee is established.
- The operational responsible entity to which all rights (except copyright) are delegated by FAO is the Secretary of the Commission acting on behalf of FAO and of the Committee members.
- The responsibility to ensure the information quality may be delegated by the Secretary to the competent subsidiary body (e.g. the Scientific Advisory Committee or Management Sub-Committee). In the absence of specialised staff in the Committee, the oversight and formatting responsibility is delegated to the technical "Secretariat", i.e. the technical staff of FAO operating as technical Secretaries of Working Groups and Working Parties.

[1] This doesn't pre-empt of ICES views on this matter.

[2] In the case of FAO, the collection, processing and distribution of data is indeed statutory and foreseen in the FAO Constitution.

Table 2: FIRMS partner – e.g. ICES

	Institutional roles		**Systems' role**				
Activities	... Programming/ budgeting activity	creator of intellectual content (source)	Editor	Approver	Copyright holder	Administrator	Publisher
- Stock assessment - Management advice formulation	ICES Secretariat	ICES Scientific Committee					
Report preparation,			ICES Secretariat				
final review and publishing	ICES Secretariat			ICES Secretariat			
Decision maker for resources allocation	ICES				ICES		
FIRMS overall consistency	FIRMS Secretariat					FIRMS Secretariat	
System maintenance	FIDI						FIDI
Decision maker for resources allocation	FAO/FI						

Delegation of responsibilities ⟶

Publication workflow - - - - ▸ (change of colours symbolise change of institutional actors, hence breaks in workflow)

Table 3: **Article 6 FAO bodies**: e.g. CECAF

	Institutional roles		**Systems' role**				
Activities	... Programming/ budgeting activity	creator of intellectual content (source)	Editor	Approver	Administrator	Publisher	Copyright holder
- Stock assessment - Management advice formulation	CECAF Secretariat	- CECAF Scientific Committee - CECAF Commission					
Technical advise, final review and publishing	Marine Resources service		Marine Resources service	Marine Resources service			
FIRMS overall consistency	FIRMS Secretariat				FIRMS Secretariat		
System maintenance	FIDI					FIDI	
Decision maker for resources assignment	FAO/FI						FAO/FI

Delegation of responsibilities ⟶

Publication workflow - - - - ▸ (change of colours symbolise change of institutional actors, hence breaks in workflow)

FIRMS business targets

Partnership Agreement references

4.1. The general benefits of the Arrangement are to enable the Partners:

4.1.1. to assist them in fulfilling their commitment to improving transparency and accuracy of information on the status and trends of fisheries, while respecting confidentiality and security under which the information has been submitted, in ways that satisfy the owners of information concerned.

4.1.2. to make available to the public, through dissemination channels referred to in Annex 2, information on fisheries status and trends in ways that provide background for, and facilitate interpretation of, fishery resources assessments and fishery management advisory reports. This information covers, *inter alia*:

4.1.2.1. the distribution and population dynamics of a fishery resource;

4.1.2.2. the techniques, nature, conduct and production of the fisheries for that resource;

4.1.2.3. the fishery management systems in place or being developed, and

4.1.2.4. indicators of the effect of such management.

FIRMS concepts' definitions

In the following section, definitions based on the FAO Fisheries Glossary[3] are proposed for the core concepts considered in the Partnership Arrangement for reporting in FIRMS.

Aquatic Resource: Biotic element of the aquatic ecosystem, including genetic resources, organisms or parts thereof, populations, etc. with actual or potential use or value (*sensu lato*) for humanity. Fishery resources are those aquatic resources of value to fisheries.

Fishery Resource: In general, refers to elements of a natural aquatic resource (e.g. strains, species, populations, stocks, assemblages) which can be legally caught by fishing. It may sometimes be taken as including also the habitat of such resources.

Stock: A group of individuals in a species occupying a well defined spatial range independent of other stocks of the same species. It can be affected by random dispersal movements and directed migrations due to seasonal or reproductive activity.

A Fishery is an activity leading to the harvesting of fish, within the boundaries of a defined area. The fishery concept fundamentally gathers indication of human fishing activity, including from economic, management, biological / environmental and technological viewpoints (see Fishery definition in FAO Fisheries glossary).

It should be possible to identify a Fishery by reference to an existing aquatic resource.

A Management unit is a Fishery unit considered by an Authority for a purpose of management, usually within a jurisdiction and/or with established legal rights. Jurisdiction is interpreted here as "the limits or territory within which some authority may be exercised."[4]

[3] From FAO Fisheries Glossary: see http://www.fao.org/fi/glossary/default.asp for additional information, including source of this definition

[4] Source Merriam Webster dictionary at http://www.merriam-webster.com/home.htm

Management: The art of taking measures affecting a resource and its exploitation with a view to achieving certain objectives, such as the maximisation of the production of that resource. Management includes, for example, fishery regulations such as catch quotas or closed seasons. Managers are those who practice management.
Cooke, J.G. (1984), Glossary of technical terms. In Exploitation of Marine Communities, R.M. May (ed), Springer-Verlag

Management authority: The legal entity which has been assigned by a State or States with a mandate to perform certain specified management functions in relation to a fishery, or an area (e.g. a coastal zone). Generally used to refer to a state authority, the term may also refer to an international management organisation.
FAO (1998): Guidelines for the routine collection of capture fishery data. FAO Fish. Tech. Pap, 382: 113 p.

Examples of a Management authority are a regional body, a state, provincial government, or local fishing community.

Management System: functional system governed by an authority having a mandate to perform specified management functions focusing on a territory, a production system or a fishery. This functional system is usually formalised through a legal framework.
FIGIS

Examples of production systems as understood here are: Marine Capture fisheries, Inland Capture fisheries, Coastal fisheries, Culture based fisheries, Aquaculture

The degree of formalisation of a Management system may vary from thoroughly established systems driven by a Regional Fishery Commission, to a recognised traditional rights based system at fishermen community level.

Modelling these definitions in FIRMS

Information domains

FIRMS will fundamentally manage 3 information domains:

- *Aquatic Resource* represents the biological dimension. It covers the previously defined terms Aquatic Resource, Fishery Resource and Stock.
- *Fishery* represents the exploitation and usage dimension. . It covers the previously defined term Fishery and therefore that of Management Unit. Note that a Fishery object can be generated from a Resource or Stock object.
- *Management System* describes the institutional framework and the set of rules used to reach management objectives.

From a software system view point, what fundamentally differentiate these domains are the mandatory object descriptors and the set of topics subject of reporting. For example, the object descriptors for an Aquatic Resource are Species and Water Area, and the topics used for reporting focus on biological assessment and state and trends. For a Fishery, the mandatory descriptors are a Fishing Area and a set of Fishing Activity Descriptors (or the target species or group of species) and the topics used for reporting essentially focus on the exploitation patterns, the post harvest usage, the production system , the status and trends of the Fishery. A Fishery qualified as Management Unit will rather focus on management considerations. Annex 1 provides the detailed model proposed for each of these domains.

Handling of reference objects

In response to the Partnership Arrangement, a careful handling of reference objects is a critical aspect in the maintenance of a consistent FIRMS system. A number of rules will therefore be established based on objects creation, validation, and publication rights assigned to their data owners.

Annex 2 of the Partnership arrangement provides elements of Data ownership, indicating Institutions, Programmes and Collection(s) concerned. Upon signature of the Partnership arrangement, FIRMS administrators configure accordingly the FIRMS data base. As introduced in the data ownership section of this document, data owner rights are established at Collection level. All objects belonging to a Collection will be managed according to the rights established for that Collection.

The creation of reference objects is based on Marine Resources inventories, Fisheries inventories, and the identification of relevant Management Systems. Once the inventories are validated by the data owners in their native Excel templates, they are loaded and published in the FIRMS system through the set of tools that are presented in paragraph "*Tools: editing and maintenance*".

The creation and publication of objects in FIRMS responds to a strict quality control process, according to rights assigned to Data owners and FIRMS administrators as described in section "Handling of Data ownership at system level in FIRMS". At any time, objects can be added following these principles. Each object will be identified at user level by a unique name established following FIGIS standard naming conventions, hence controlled by the FIRMS administrator. One aim here is to avoid having two objects of the same domain having the same name.

Once created, objects can be modified at any time by the Data owner. Modifying objects means changing its descriptors (e.g. for Aquatic resource: list of areas or species referenced) or its intrinsic properties (e.g. local name, classifier attributes). Two objects belonging to the same domain should not be defined using the same descriptors. This will be checked as part of the object modification workflow. The Data owner may be willing to modify the Name as well, but such modification will be submitted to FIRMS administrator for reasons already presented.

The positioning of Reference objects between each others is another important aspect for accessing them in a meaningful context: hierarchies (tree-like relationships) can be established between objects of the same domain. Thus the Baltic Cod resource can be set as the parent of different cod stocks located in the Baltic. These hierarchical relationships will be used for browsing, navigation and possibly summary purpose. A single object can be part of more than one hierarchy: FIRMS will include a default global hierarchy for each of the 3 main domains (Aquatic Resource, Fisheries and Management Systems); FIRMS will also offer the possibility to host regional hierarchies according to Data owners' requirements.

Handling of observations

Once objects are created, reporting (i.e. adding observations) over objects is possible. Simple workflow will be offered to FIRMS partners to report on a routine basis on these objects. Thus, observations will be attached to the referenced object, and will thereby enrich the object attributes and other attributes used as classifiers (e.g. typologies) with Observations' specific attributes. One of the observations is privileged by the Data owner (e.g. the most recent one)

for up-front display of the object. This observation is called the "Fact Sheet" of the reference object. The other observations will be simply accessed at secondary level.

The creation and publication of observations in FIRMS is entirely under the control of the Data owner and doesn't involve intervention of the FIRMS administrator, as described in Table 1.

A FIRMS Partner other than the Data owner of a referenced object may submit an observation on this object. In this case, the object Data owner will decide if this observation can be published.

Implementation: tools proposed

> Partnership arrangement
>
> 4.2. In addition to what may be provided for in Annex 2, the Partner will, for FIRMS purposes, have access to:
>
> 4.2.1. FIRMS tools for the editing, dissemination and maintenance of information;

Standards used

XML[5] is the format used to structure FIRMS information, to drive its display, and to exchange it between the Partner and the FIRMS system. The Metadata structuring the FIRMS harmonised information (called FIMES[6]) is described using an XML schema, available from the FIGIS web-site.

The version 3.5 of FIMES will provide the Metadata support to FIRMS. This XML Metadata standard is itself based on international XML standards, namely Dublin Core and the FAO AGMES[7]. With respect to thesauruses and classifications, FIMES integrates references to ISO and CWP[8] classifications, and extends these with FIRMS ones where necessary.

Preparation of XML reports: the FIMES Metadata provides a mean to organise FIRMS information using the following features:

- structuring source text using the standard FIMES topics, down to the applicable level; the applicable level takes into account FIRMS agreed standard topics[9] (required), and non standard sub-topics found in FIMES which Partner wishes to utilise (optional);
- structuring source text respecting the source document headers, in a way that can be combined with the standard FIMES topics (optional);
- adding tables (possibly from DB generated outputs), images, and other formatting elements (optional);
- marking-up specific terms, either for linking to other FIGIS Referenced objects (e.g. Species or Gear fact sheets) or other internet information resources, or for indexing, or for specific data base processing (optional);

[5] XML: Extended Mark-up Language
[6] FIMES: FIsheries Metadata Element Set – see http://www.fao.org/fi/figis/devcon/index.html
[7] AGMES: AGricultural Metadata Element Set – see http://www.fao.org/agris/agmes/
[8] CWP: Coordinating Working Party on Fishery statistics – see http://www.cwpnet.org
[9] as per FIRMS Steering Committee decisions.

- linking to other observations of similar or different domains. For example through the logical association "stock is exploited by a fishery" found in a Stock observation, a Stock report may be associated with the related Fishery report (optional).

Tools: editing and maintenance

The information content to be contributed in FIRMS may initially exist in different formats: word reports structured or not against Partners' standard templates, or data base format. Various tools are offered to the FIRMS partner having the responsibility to format and publish this information in FIRMS:

On-line editing (OLE) service: this is the simplest tool for users not willing to deal with the XML format. Using web-based forms, OLE enables modifications on observations loaded, or creation of new observations. The on-line editing will include two facilities: I) initiate an observation according to Partners' metadata and template(s); ii) clone an existing observation in order to create a new observation based on a few modifications of the cloned one.

XML editing and upload: The full power of FIRMS can be reached through the handling of XML files. An XML editor is used to format the information according to the FIMES DTD, through copy/paste like operations from a source document.

In order to transfer the Partner's XML report in FIRMS, a file-to-system upload service is offered to users authorised as editors. This web service includes the reviewing, validation and publication step under the approver control.

in order to get more detailed feedback on the requirements for FIRMS, on-line test prototypes of upload and on-line editing will be provided to FIRMS partners within the six first months of the application development

XML generation through (semi-) automatic conversion: If Partner's source template or format makes it possible, a semi to fully automated conversion may be envisaged. The resulting XML file result of this conversion may be either uploaded using the file-to-system upload operation described above, or posted on Partner's files server in order to be dynamically invoked from the FIRMS system.

- the automated conversion is a strong requirement for ICES which has to report yearly on about 135 monitored stocks. The design of a converting tool is planned as part of this application development. Other Partners may thereafter benefit of the same methodology if it proves successful.

These different basic methods can be mixed. For example, from a cloned observation generated through OLE, the user may download the source XML file then edit with an XML editor only those fields requiring change;

Tools: content dissemination

Mock-ups of FIRMS pages and Graphic User Interface design prototype pages will be prepared for feedback by Partners

The FIRMS web-site:

FIRMS will disseminate its information through the FIRMS web-site. This web-site will be powered by the FIGIS tools, thus benefiting from FAO distributed databases and systems (such as News and Events, Document repositories, etc...). Two options are proposed for the FIRMS internet domain name: a FAO independent domain name, such as http://www.FIRMSpartners.org , or benefiting from the FAO recently adopted policy a FAO sub-domain name such as http://firms.fao.org.

The first development milestone will be a draft of the FIRMS web-site. A URL will be provided to Partners for feedback. Comments are also expected on the FIRMS domain name.

Queries on the FIRMS database:

The FIRMS web-site will offer a set of tools for users to compose queries and extract information from the data base according to pre-defined report templates.

Full text search: a search box based on full text search algorithm will be available from various pages of the FIRMS web-site. This facility will return lists of objects and/or observations available in the FIRMS web-site together with information on the class they belong to (stock, fishery, management unit, management system, meeting, news, event, publication, etc.). These algorithms could differentiate plain text, from marked-up text (i.e. offering more controlled returns).

FIRMS partners are called to suggest the type of requests that would invoke such full text search tool in order to help define how to configure it

Query Panel: the FIRMS web-site will also provide 3 distinct entry points for users to select Aquatic Resources objects, Fisheries objects, or Management Systems objects. This tool is used for searching reference objects (and not observations). From each entry point, query panels tailored to each domain will be offered, presenting different levels of query complexity, including:

- A browser presenting the objects within their FIRMS default hierarchy. Partners' hierarchies will also be available if invoked.
- An advanced query panel will assist the user in establishing lists of values to be searched by criteria. Criteria include objects descriptors or classifier attributes of the objects. This query panel will present various text search boxes (e.g. for the species, for the gear type, or for the area criteria), or drop-down lists for controlled terms (for example for the Partner institution's acronym). In addition, a specific tool (the geographical query panel) will be available to select a set of geographical references from maps showing different levels of resolution for each standard reference system (FAO Statistical Areas, Large Marine Ecosystems, EEZs or Countries, etc.).

The query definition will include the selection of the query output format.

A query primarily aims at identifying referenced objects matching query criteria. By default, the query panel will build query with "OR" logical operator within each query criteria and "AND" operator between the query criteria.

Examples of the tools which will provide the building blocks to the above requirements are available on the FIGIS web-site. Partners are expected to provide feedback on the above requirements and these tools

Dynamic browser at:
http://www.fao.org/figis/servlet/TabSelector?tb_ds=Capture&tb_act=ACTION&tb_grp=RESET&tb_mode=TABLE

Geographical query tool at:
http://www.fao.org/figis/servlet/FiRefServlet?ds=subservlet&session=querytool&xp_name=Stocks&url=/figis/kimsmaps/qt[3Fquery[3Dmap[26outformat[3Dxml[26layer[3Dfa

Draft GUI of the query tools will be passed to Partners as soon as available, for review and feedback

Query results for full text search tool

An internet search engine like list could be returned: the name of the object, the class it belongs to, an indicator of relevance together with the sentence embedding the text matching query result.

Query results for query panel tool

Query result lists will be tailored to each FIRMS domain.

For the Aquatic resources domain for example, the list of Aquatic Resources resulting from a query should highlight for each Aquatic Resource object:

- its name;
- the value of the classifier attribute indicating of the Aquatic Resource is considered as a biological stock);
- the possible existence of observations, distinguishing the observation set as master (i.e. driving the fact sheet) from the other observations;
- if the fact sheet exists, the reporting year of the observation;
- if existing, the number of other observations, differentiating between observations reported by the object's data owner, and observations reported by other data owners (Figure 1).

The Aquatic Resource objects fitting the search criteria are by default sorted by relevance, data owner acronym, Aquatic resource name. The user should be able to resort the list (e.g. by Aquatic Resource name, by Owner and Aquatic Resource name, etc.).

Name	Biotic Type	Owner Acronym	Fact Sheet	Other observations from Owner	Other		Relevance
Hake in the Gulf of Lions	Stock	GFCM	1998	1	2	List	****
Hake in the Tyrrhenian Sea	Stock	GFCM	1993	1	2	List	**
Hake in the Adriatic Sea	Res.	ADRIAMED	-	1	2	List	**

Figure 1 – Aquatic Resources query result

For the Fisheries domain, same type of requirements could apply. In particular, each record would be displayed with an indication of whether or not the fishery is considered a Management unit. Special care will be born on presenting Fishery objects which can be hardly be fully understood if not presented in their hierarchical context may be difficult names by nature more complex than stock names: Fishery short names could for example be presented within their hierarchical context as this would give them more significance.

FIGIS Fishery Title
Southern and Western tuna and billfish fishery
Bigeye fishery
Longline fishery
Purse seine fishery
Skipjack fishery
Industrial fishery
Artisanal fishery
Swordfish fishery
Australian longliners fishery
Taiwanese longliners fishery
Yellowfin tuna fishery
Longline fishery
Purse seine fishery
Artisanal fishery

FIRMS partners should provide feedback on these proposals, and are welcomed to suggest ways Fishery lists, or Management Systems lists, can be presented.

Display of single Aquatic Resource, Fishery, or Management System objects content

For each domain, complete information on each object will be presented through three types of layout. These layouts will allow visual differentiation at first glance. All will display clear reference to the data ownership – with institution's logo - including the cover page.

The Fact sheet is the FIRMS central product. It includes the key descriptors and intrinsic attributes of the object, and the topics born by the observation set as master.

The details on ownership will be viewable in a separate window. Ownership elements will in particular include links to Data owner's institution fact sheet (Name, contact address, logo, URL, ...), and to the Collection description fact sheet, specifying processing methods and quality assurance rules followed to prepare the information (in essence, containing partners annex 2 of the FIRMS partnership arrangement);

The details on editing operations will be accessible to users having maintenance rights.

The Identity section will strive to provide at glance (e.g. with graphics) the identity of the object.

This concept is currently implemented in the FIRMS Stocks prototype, through the use of thumbnail for species, and dynamically generated maps for areas.

see for example http://www.fao.org/figis/servlet/static?xml=\st9.xml&dom=stock

Partners will be invited to feedback on layout proposals (mock-ups) and suggest ways of representing identity of FIRMS domain objects

Hierarchies: FIGIS and data-owner hierarchies should be accessible from the fact sheet.

examples of hierarchy presentation are available on the FIGIS web-site. Partners are invited to provide feedback on this tool

see Topic Tree map just below title banner at
http://www.fao.org/figis/servlet/FiRefServlet?ds=topic&fid=3440&xp_lqid=tpl_16998
see Species Tree map just above Synonyms section at
http://www.fao.org/figis/servlet/FiRefServlet?ds=species&fid=2910
see Gear Type Tree map at
http://www.fao.org/figis/servlet/FiRefServlet?ds=geartype&fid=202

Sources of information which have been used to produce a FIRMS web document: list of bibliographic like references, and link to the corresponding internet resources when available.

Links to 'foreign' observations: a specific section of the fact sheet (and of the identity sheet) entitled "related information" should list the observations belonging to other objects from which links where established to the current object. From each item listed under "related information", the hyper-link would access directly the topic of the observation from where the link was established.

Example:

Albacore in the South Atlantic – Related information available:
Resource – Albacore in the Atlantic – ICCAT- Stock Assessment reports – 1998
Fishery – Tuna purseiners in the Atlantic – ICCAT – Fisheries descriptions – 1998
Management Unit – Tuna Fisheries in the Atlantic – ICCAT - Fisheries descriptions – 1998

Body of the observation report: the body displays the Partner's report according to the way the information has been structured in topics. A fact sheet is potentially composed of structured text, images, tables, and dynamically built graphs, tables or maps. The FIRMS

editor can decide where to place images, if a table should be opened by default in the body of the fact sheet or if it should be visible only when invoked by users. The standard FIRMS topics used to structure the report will be displayed differently from partners specific topics: for example, standard topics would be displayed using banners, while partners specific topics would be shown using bold fonts. The body also include links to related observations (to be defined by the editor). These links would for example cover co-occurring observations on a stock and the fishery exploiting this stock.

The Identity Sheet:
When no master observation has been defined, the fact sheet is replaced by an Identity sheet.

It shows descriptors and classifier attributes of the object and includes links to observations available on this object that would not have been set as master observations, or to observations from other objects having established links to the current object.

The Observation Sheet:
It presents the topics of an observation not selected as master observation (secondary observation) and which Data owner has decided to maintain accessible. These secondary observations can be past observations from the Data owner, or observations made by other data owners.

Partners are invited to feedback on these proposals and suggest ways of representing Identity sheets and Observation sheets

Standard tabular reports

The FIRMS software will be able to extract tabular reports for virtually any topic used to structure FIRMS information; however this will be effectively exploitable only for topics documented in systematic ways.

From the query results page generated for each domain, a set of standard tabular reports (with compulsory and optional attributes) could be available to the public for analytical work through on-line display or file download.

Collections specific tabular reports could be as well available with restricted access to Data owners.

Partners are invited to suggest types of tabular reports
that should be extracted from FIRMS and to which target users such extraction should be made accessible (eg only reserved to the Partner, to all FIRMS partners, or opened to the public).

Annex 1 – FIRMS Information domains: data description

Aquatic Resource

- FIRMS name of the Aquatic Resource (in English, French and Spanish)
- Local name provided by the data owner and language ISO 2 alpha code
- A reference to a Reference Aquatic Resource Object
- A reference to a Collection Object
- A reporting date: a year is attached to each observation object
- One or many Species or Group of Species. Each Species or Group of Species is represented by a title and may include a reference to a FIGIS Species Reference Object (using a code system and a code).
- One or many Water Areas. We distinguish 3 types of water areas: statistical, environmental and competence. Each area is represented by a title and may include a reference to a FIGIS Area Reference Object (using a code system and a code).

  Remark: The list of possible code systems depends on the type of area.
- Foreign system identifier(s) of the Aquatic Resource: each foreign system identifier is documented by a Code System and a code value.
- A rank used to order observations made against the same reference object.

Reporting Topic Attributes

- General text
- Topic Habitat and Biology: text and 5 referenced attributes: Sea Water Environment, Bottom Type, Climate, Environmental group and Biological/Physiological status of target species.
- Topic Geographical distribution: text and 1 referenced attribute for shared stocks classifying the distribution of the stock in relation to national jurisdictions.
- Topic Water Area Overview: text, reference(s) to area profiles domain objects, and 1 referenced attribute: Spatial Scale of consideration of the Aquatic Resource (see list of values in annex).
- Topic Structure: text, reference(s) to Aquatic Resource domain objects (reference object or observation) and 1 referenced attribute indicating if the Aquatic Resource is a Stock according to biological criteria.

  Remark: the relationship established with other Aquatic Resource(s) is not hierarchic
- Topic Exploitation: text and reference(s) to Fishery domain objects (reference object or observation object)
- Topic Bio-assessment: text, reference(s) to aquatic resource domain objects (reference object or observation) and the following sub-elements:
  - available data: text,
  - method: 2 attributes name and class, assumption (text), methodology and result (text)
  - results,
  - biological state and trends,

- scientific advice,

Remark: Comparing to the previous version of the application, the Assessment topic is not anymore restricted to objects qualified as "Biological Stock".

- Topic Management: text and reference(s) to other objects (reference object or observation) from the domains Aquatic Resources, Fisheries or Management System.

  Remark: it is still not decided if an Aquatic Resource can be or not a Management Unit. In that case, we will have a more detailed Management Topic, including:
  - Referenced attribute indicating that the aquatic Resource is a Management Unit
  - sub-topics like objectives, strategies, etc... (see proposed Schema for more details).
- Topic Status and Trend: text and the referenced attribute Status of exploitation.
- Topic Statistics containing text and hyper link(s) to FIGIS Statistical Data sets
- Topic Historical Data containing text
- Topic Source describing the source of information used to produced the observation (text or bibliographic references)
- Topic Bibliography giving some bibliographic references (text or bibliographic references)

Fishery

- FIRMS name of the Fishery (in English, French and Spanish),
- Local name provided by the data owner and the ISO 2 alpha code of the language
- A reference to a Reference Fishery Object
- A reference to a Collection Object
- A reporting date: a year is attached to each observation object
- Fishing Area: set of geographical units. Each unit has a title, and may refer to a FIGIS area by providing its code system and the code. Coding systems are categorised according to their use: delimitation of statistical units, of areas of competence, of environmental areas or of political areas. The same reference system may be used under different categories.

  Remark: If the Fishery object is qualified as a Management Unit, the category used to reference the area must be “Political” or “Competence”.
- At least one descriptor of the fishing activity:
  - Fishing Gear(s) including reference to FIGIS Fishing Gear objects
  - Vessel type(s) including reference to FIGIS Vessel type objects
  - Fishing technique(s) including reference to FIGIS Fishing technique objects
  - Fishing community(ies)
  - Flag State(s)
  - Fishing port
  - Exploitation Form
  - Handling mode

  or (not exclusive) the species or group of species targeted by the fishery. Each Species or Group of species may include a reference to a FIGIS Species Reference Object

- Referenced attribute Perspective
- Start year
- End year
- Foreign system identifier(s) of the Fishery: each foreign system identifier is documented by a Code System and a code value.
- A rank used to order observations made against the same reference object.

Reporting Topic Attributes

- General text
- Topic Historical Data containing text
- Topic Ancestor Fishery: text and reference to a Fishery Reference Object
- Topic Structure: include text and reference(s) to other Fishery Object (reference or observations)
- Topic Fishing Activity with the following sub-topics:
  - Fishing Season
  - Target Species
  - Bycatch Species (same as associated species?)
  - Discard species
  - Incidental species
  - Fishing Area Overview plus three referenced attributes:
    - Depth range (referenced attribute),
    - Distance from the port (referenced attribute),
    - Bottom type, water temperature(referenced attribute)
  - Fishing Gear
  - Vessel type description (including On-board processing facilities, crew information: number and ethnic group)
  - Fishing technique description (same as strategy?)
  - Fishing community description
  - Exploitation Form description
  - Handling mode description

- Topic Exploitation, with a referenced attribute Status (active, closed, collapsed…) and the following sub-topics:
  - Text
  - Reference(s) to Aquatic Resource Object (reference or observation)
  - Available data
  - Exploitation indicators
    - Catch and landing
    - socio-economic indicators
      - number of persons involved, number of fishermen involved
      - Market : distribution scale (referenced attribute)
      - Value (price / kg)

    - [biological] Assessment overview

  Remark: the socio-economic indicators could be at higher level (Socio-economic performance assessment)

- Topic Management, with a referenced attribute indicating that the Fishery is a Management Unit
  - Text
  - Reference(s) to other objects (reference object or observation) from the domains Aquatic Resources and Fisheries.
  - The following sub-topics if the Fishery is a Management Unit:
    - Topic Management System Overview including text and a reference to a Management System Reference Object.
    - Management Objectives,
    - Management Strategies,
    - Management Methods,
    - Management Advice,
    - Management Resolutions,
    - Management Problems.
- Topic Post harvest information
- Topic Issues
- Topic Statistics containing text and hyper link(s) to dynamically generated Statistical Data
- Topic Status and trends (including a status of exploitation typology)
- Topic Source describing the source of information used to produced the observation (text or bibliographic references)
- Topic Bibliography giving some bibliographic references (text or bibliographic references)

Management System

Object descriptors

- Title
- Reporting Year
- Cover page
- The mandated authorities: country or institution
- at least on of the following reference:
  - Jurisdiction area (Water area category competence or political)
  - A Sector (e.g. Inland fishery, marine Fishery, etc...)
  - A Fishery

Remark: examples of a Management authority are a regional body, a state, provincial government, or local fishing community. The legal rights exerted by this management authority on the (portion of) fishery should be subject to a typology.

Reporting Topic attributes

- The legal framework reflecting the formal status of the management system. This includes the mandate of the management authority, the governing rules (e.g. a law, set of decrees, management plan, 5 years development plan).
- The participating institutions and their mandates.
- Structure of the Management System: text and reference to other related management systems.
- Reference to the Management Units focus of the application of selected policies, management methods and measures.
- Management Objectives
- Management Strategies
- Management Methods, including Method performance
- Management Resolutions
- Management Problems