

**FIRMS Technical Working Group Meeting****Second Session****Rome, Italy, 01-04 April, 2008****OUTLOOKS ON WORKFLOW****Author: FSC Secretariat*****Purpose of this document***

This document is to raise awareness as to how workflow might evolve towards more dynamic information generation mechanisms thanks to application of standards and systems' interoperability solutions. Starting with an overview of needs for dynamic solutions, it reviews experiences regarding the external use of FIRMS-FIMES Metadata, and considers the possible role of the fisheries ontology server in order to ease interoperability between systems.

1. Overview of needs for dynamic solutions

An increasing number of national fisheries centres of excellence are setting-up advanced fisheries information systems with capacities to generate on-line reports of statistics, maps, indicators, ... In parallel, reports containing analyses and reviews on status of resources and fisheries are increasingly published on the web, progressively accompanied by inventories of resources, fisheries, ecosystems as means to formalize and systematize the reporting process within information systems. These developments are naturally going to converge towards on-line fisheries reports merging these different processes and integrating these sources. Prospects are therefore that data owners will make available their inventories and related reports through their own web dissemination tools.

This trend is a chance for more comprehensive and up-to-date information. Increased availability of electronic on-line reports also precludes an enhanced potential for information exchange. This move will be greatly facilitated by the availability of a recognized international Metadata standard for fisheries information exchange. This move will also require standard protocols in order to take care of actual purpose for published reports, quality levels, updates, heterogeneity of formats.

The next paragraphs provide insights of how the FIRMS-FIMES Metadata standards might be exploited by institutions for their own use, while facilitating information exchange. Also insights of how the ontological concepts and tools developed as part of the Networked Ontologies project (NeOn) might constitute the foundations for efficient protocols for information exchange.

2. External use of FIRMS-FIMES Metadata

The FIMES Fisheries schema is being designed for reuse as it is, or for development of “local” schemas building from the FIMES data dictionary and catering for local needs. Through the three examples which follow, one strives to explain how such reusability is effectively exploited by three institutions, which are the key aspects to be paid attention, and the outstanding issues.

Example of uses

GFCM

- integral use of FIMES schema; FIRMS status and trends reports extracted from standard stock assessment reporting and peer review workflow using Excel templates; FIRMS XML reports repackaged for unaltered presentation as part of GFCM website;

ISTAM project:

- integral use of FIMES schema, with plans of extension where necessary;
- one issue related to the extension is the integration of their own classification and controlled terms, a need which is recurrent;

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- FIMES is the format used by the Regional Fisheries Information System (RFIS) for the dynamic generation of fisheries reports; these reports partly extract data from database, partly enable editors to author content
 - since system owner defines unilaterally which are the reports to be dynamically produced, the issue is that of defining a protocol that enables the Global system to be aware of the existence of the published reports, to be aware of updates on existing reports, to set quality levels, to assist relating reports (from same system, or from other systems) with each others, ... and that enables system owner to be aware of the registration of a fishery report in the global system (management and appropriation of unique global ID).

ICCAT

Key points are for the use of:

- “local” ICCAT schema building on FIMES foundations, use of an ICCAT name space; key points are: widely shared understanding of semantic as part of Data dictionary, easy reformatting of local to global schema;
- ICCAT needs:

3. Possible role of the fisheries ontology server

After a brief introduction of Ontologies and FAO initiatives in this respect, this paragraph highlights needs regarding future FIRMS and STF global inventories developments which the fishery ontology might serve.

3.1 Fao initiatives in fishery ontologies: the NeOn project

3.1.1 *Some definitions and background*

Semantic web – The goal of the Semantic Web initiative is as broad as that of the Web: to create a universal medium for the exchange of data. It is envisaged to smoothly interconnect personal information management, enterprise application integration, and the global sharing of commercial, scientific and cultural data. Facilities to put machine-understandable data on the Web are quickly becoming a high priority for many organizations, individuals and communities.

The Web can reach its full potential only if it becomes a place where data can be shared and processed by automated tools as well as by people. For the Web to scale, tomorrow's programs must be able to share and process data even when these programs have been designed totally independently.

Ontology – An ontology defines the terms used to describe and represent an area of knowledge. Ontologies are used by people, databases, and applications that need to share domain information (a domain is just a specific subject area or area of knowledge, like medicine, tool manufacturing, real estate, automobile repair, financial management, etc.). Ontologies include computer-usable definitions of basic concepts in the domain and the

relationships among them [...]. They encode knowledge in a domain and also knowledge that spans domains. In this way, they make that knowledge reusable. *Ontologies* provide the semantic underpinning enabling intelligent access, integration, sharing and use of data.

NeOn Project

NeOn is a four year project begun in March 2006. Its goal is to advance the state of the art in using ontologies for large-scale semantic applications in distributed organizations. It aims at improving the capability to handle multiple networked ontologies that exist in a particular context, are created collaboratively, may be highly dynamic and are constantly evolving. Specifically NeOn will:

- support the development of powerful tools to manage ontologies, including creation, maintenance and enrichment of ontologies in distributed environment;
- create a service and an open infrastructure with cost-efficient solutions, oriented to new generation of semantic applications that can take advantage of ontologies to deliver richer, more intelligent search and query operations;

For doing so, emphasis is put on standards: standard OWL language for sharing ontologies, standard services such as WSDL for accessing the ontology model;

In NeOn, FAO/FI provides the data sources for the elaboration of the fisheries ontology, and the requirements for a large scale application scenario entitle Fish Stock Depletion Alert System (FSDAS). FSDAS and the fisheries ontology will be used for testing the NeOn toolkit. The first version of the toolkit was released in June 2007 and permits the creation and editing of ontologies. Current toolkit work is focused on adding additional functionalities to support workflow requirements and more advanced maintenance and versioning scenarios that were identified during requirements gathering.

3.2 How a fishery ontology server would fulfil FIRMS needs

3.2.1 Distributed ontologies for bridging gaps between global and local classifications

The FIMES Fisheries schema is being designed in order to enable development of “local” schemas building from the FIMES data dictionary and catering for local needs. These local schemas will in particular cater for local classifications, such as local gear classifications, or local descriptors for Status and Trends (see “FIMES schema” section of paragraph “Stock status descriptors” in Document FIRMS TWG2/2008/2).

Action requested from TWG2:

Through short presentations and interactive exercises, the working group will get clarification as to how Fishery ontology based services could assist FIRMS data management processes, specifically:

- to structure mapping between FIRMS’ descriptors and Partners’ descriptors;
- to enable decentralized maintenance services;

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- to provide web-services for upstream Word to XML converter tools or in on-line editing processes;

3.2.2 Organization of fisheries concepts and relationships in the ontology server

Paragraph 1.3 of document FIRMS/TWG2/2008/3 explains that fishery objects are classified according to different thematic approaches. It also explains the type of relationships existing between objects belonging to different thematic approaches. These aspects are currently taken care of in the fact sheets as part of the FIMES schema. An Ontology would be able to model these Fisheries domain requirements, and following advantages would evolve from services provided by the NeOn toolkit:

- Progressive enrichment of the web of relationships between fisheries recorded as part of FIRMS or STF processes: by regularly scanning FIRMS reports, the ontology would be able to capitalise over time and sources an increasing number of i) authored relationships, ii) relationships inferred from fisheries descriptors (species, areas, gear types, etc...);
- From such controlled semantic backbone, an ability to integrate heterogeneous data sources beyond the parties who have previously agreed on definitions as part of the FIMES schema development;

Action requested from TWG2:

With the assistance of ontology specialists, the working group will discuss these prospects.

3.2.3 Supporting management of global inventories and assignment of unique identifiers

As introduced in paragraph 1, in distributed system architecture, Partners generated fisheries would primarily be published on their server. They would become part of the Global system once registered with a unique identifier in the Global registry of fisheries, with the minimum set of required descriptors.

Action requested from TWG2:

The working group could discuss the advantages of managing a global inventory of fisheries through the assignment of unique identifiers, while getting clarification as to how NeOn toolkit could assist in the management of such unique identifier.

3.2.4 Supporting creation of contextual workspaces facilitating users navigation across related fisheries

This is the ultimate vision. Once fisheries are registered in the Ontology server with unique identifiers, users worldwide can construct their dashboard by selecting the fisheries and have them represented in a space diagram.