Access to Environmental Information – Towards a Digital Global Knowledge Marketplace

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Abstract

Die Europäische Umweltagentur (EEA) arbeitet zusammen mit dem United Nations Environment Programme (UNEP) an der Errichtung eines virtuellen Marktplatzes für Umweltinformationen. Dieser soll zunächst die Informationsreservoirs der Netzwerke beider Organisationen, dem European Information and Observation Network (EIONET) und UNEP‘s Global Environmental Information Exchange Network, Infoterra, verfügbar machen. Der Marktplatz wird sich aber nicht auf eine reine Publikationsfunktion beschränken. Vielmehr wird er interessierten Teilnehmern die Möglichkeit bieten selbst Informationen bereit zu stellen und mit anderen Anbietern in Kontakt und Austausch zu treten. Dabei steht die Beteiligung einem möglichst breiten Spektrum möglicher Anbieter offen. Neben öffentlich rechtlichen Organisationen sollen sowohl der traditionelle wie der ‚grüne‘ industrielle Sektor und der private Nutzer angesprochen werden.

1. The Background

(Environmental) information is being generated at an exponentially growing rate. To date about 20 million scientific articles are being published each year; increasing parts of it are available on the Internet. At the same time discovery of information resources is becoming more and more difficult. With the Directory of Information Resources the European Environment Agency has successfully started a structured approach towards making environmental information available to a wider public. This catalogue is continuously evolving into the backbone of a Web portal to European environmental information (EEA, 2000). The portal is being built on a network of about 500 national information centres across Europe, the EIONET.

Currently a project is being started together with the United Nations Environment Programme (UNEP) to build a “Global CDS” by integrating both the EIONET and UNEP’s Infoterra network of 178 information centres.

However, as the information society is evolving rapidly, a rather static catalogue system offering an extensive but nevertheless finite number of information sources

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does not acknowledge the variety of Internet technology and demands. There clearly is a need for a dynamic system accounting for both the exponential growth of information and the rapidly dwindling half-life of that information itself. There is also a need to cater for the growing need of information seekers to exchange experiences and requests with other seekers of information as well as with the information providers.

Rooting around for the best information is a time consuming and expensive venture. Placing and processing offers/orders for information, services and products online is much quicker and cheaper (Peet, 2000).

Regarding the current trends and developments in dealing with user needs in a central portal/one-stop gateway, the concept of a digital marketplace seems to be a successful approach. The availability of a (distributed) information pool on the one hand and the opportunity to do business based on that information at the same site and time on the other, offers benefits for both users and providers (Symonds, 2000).

Moreover, the digital marketplace brings together different forms of organisation (e.g. administrative bodies, non governmental organisations, corporate industry) dealing with the same 'goods', i.e. information, services and products with an environmental impact.

2. The Vision

Central information repositories will be installed in each region (cluster of countries) to bundle the available environmental information relevant on this regional scale. Initially this will be achieved by building regional Directories of (Environmental) Information (DIR) using EEA's Catalogue of Data Sources approach. These continental CDSs will then be networked to a global system (figure 1).

Each regional catalogue will subsequently be developed to provide a portal to the broader environmental information available in the countries of that region. In a second step this portal will be enhanced by providing services such as environmental news, exchange of ideas, opinions, data, technology, material and contact information.

The idea is to build a global marketplace for environmental knowledge, where information resources, data and ideas may be marketed and exchanged. The marketplace will be the place where people with an environmental background, ambitions or resources connect in order to share both knowledge and resources to meet environmental challenges.

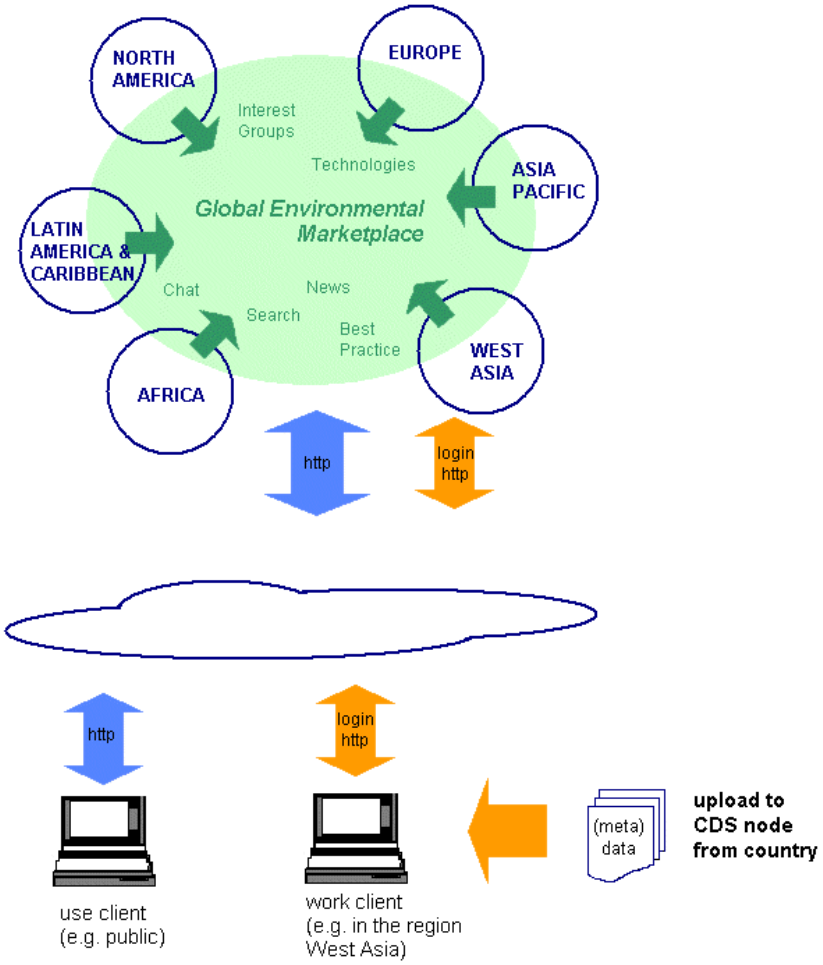

Figure 1
Global Marketplace Network

3. The Marketplace

The term ‘digital marketplace’ in this context encompasses two main approaches:

Portals or horizontal marketplaces on the one hand are concerned with combining different themes and branches while vertical portals (vortals) concentrate on single

branch (Otmar F. Winzig, 2000). Taking into account the variety of environmental themes and topics, the environmental marketplace should of course incorporate both approaches.

In its first instance the environmental marketplace will pool the information resources residing with environmental administrative bodies, leading to a globally shared environmental information reservoir. As such it will be a tool to assist policy and decision making, while fostering awareness of environmental issues and challenges at the same time.

In order to successfully respond to these challenges, the best available technology and practices for tackling these issues will need to be made available. Thus, the second step will add a suite of characteristic features such as:

- Environmental Online News Service (daily breaking news)
- List Server / Electronic News Letter
- Virtual Meeting Rooms
- Search and retrieve all or dedicated CDS node information (XML files) on request of a user
- Posting service to place offers/requests for information, product, services etc.
- Thematic views on information resources, news reservoir, information exchange, ...
- Customisable access for individual user profiles (general public, administration, science, business)

4. The Technological Approach

The technological implementation is mainly based on the applications and architecture developed at ETC/CDS, supporting EEA's 'open source' strategy through the use of components that have already shown their competitiveness and performance in the market (e.g. Apache web server, Linux OS etc.). The Catalogue of Data Source will again form the backbone of the service. It has been designed on the basis of a 3-tier architecture as shown in figure 2. The application logic is mainly coded in Java.

4.1 Presentation Tier

The client uses a standard web browser to connect to the application via the servlet enabled web server. The web server connects to the application server which returns the query results in HTML format (the web server and the XSLT are not shown on this figure).

4.2 Application Tier

The application layer consists of an application server implemented with Java servlets, server-side programs that service http requests. The query results returned by the database engine are mapped into XML. XSL Transformation using XSL Stylesheets converts the XML entity results into HTML.

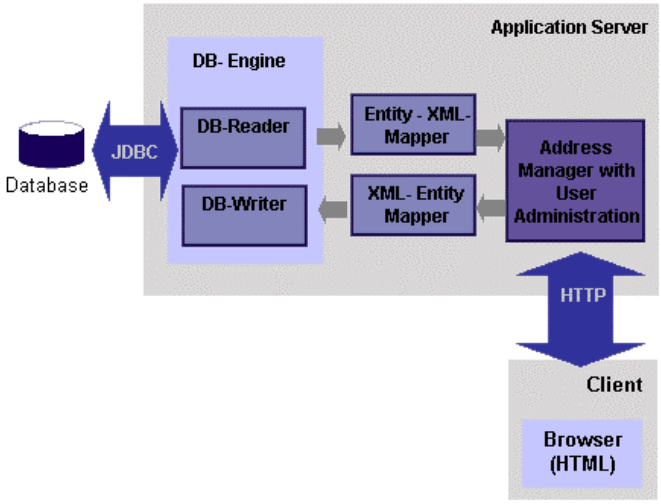

Figure 2
General Architecture

The User Administration Module manages the different user levels (normal user; authorised user with writing rights; super-user = administrator) trying to contact the application server. Different HTML forms to search and modify data (corresponding to users' level) appear next.

The database engine (a software layer that allows the flexible construction of database queries) is used as application server and is responsible for creating proper SQL statements, accessing the database (DB Reader and DB Writer) and handling the results. It provides high level access to the database results, which are used to create the XML format by means of the Document Object Model (DOM) as specified by the W3C. Additionally, it provides a high level, object-oriented abstraction of the queries (so-called Entity Queries), thus reducing future maintenance efforts. The database engine uses JDBC and adds some important features, such as a thread-safe connection pool (fast establishment of database connections) and statement generators for different database management systems (e.g., Oracle, MS SQL Server and Informix)

The results of the database query are mapped to XML according to the pre-defined DTD by the Entity-XML-Mapper. In the opposite direction the XML files which are to be written into the database are mapped to entities used for querying the database (XML-Entity-Mapper).

A query handler (not shown in the figure) operates in between 'DB-Engine' and 'Address Manager' and deals with requests for entities. It receives a query, starts the query, assembles the entity and returns an XML-View of the data (XML generation for result lists and detailed results).

As not all browsers fully support XML yet, XML data will be translated to HTML by the means of XSL Transformations (XSLT), using pre-defined XSL StyleSheets. Finally, the results are forwarded to the client via http.

(An example of such an application is the State of the Environment Reports Information System *SERIS*, which uses XSLT to build HTML-pages from the XML data. http://service.eea.eu.int/seris/index.shtml).

4.3 Data Tier

The third tier is a database server that provides the application layer with the data via JDBC (SQL Server or ORACLE database).

4.4 Extensible Markup Language

Both the environmental information pool and the additional marketplace features will build on XML as a means of exchanging, editing and presenting information sources. EEA has already developed XML based exchange modules based on the Dublin Core element set (Dublin Core Metadata Initiative, 2000).

The separation of data from presentation enables the seamless integration of data from diverse sources. Moreover, by applying different style sheets (e.g. different 'views' for different user profiles) and applications data may be displayed and processed in whatever manner desired. Data encoded in XML can be delivered over the Web to the desktop. No retrofitting is necessary for legacy information stored in mainframe databases or documents, and because HTTP is used for delivering XML over the wire standard browser functionality is the only requirement for participation in the digital marketplace (MSDN-Online, 1999).

5. Conclusions

The Internet is currently subject to a reorganisation process. Digital marketplaces as a means of bundling information and generating structured access to globally dispersed information resources are replacing more 'conventional' ways of exchanging information and organising business processes. Currently the

phenomenon is driven by economic factors in order to save costs and resources. It is mainly focussed on 'hard' goods. However, there is a growing interest in using this approach to market 'soft' goods like information resources as well. Several initiatives have discovered that the environmental marketplaces hold great potential (Environmental News Network: http://www.enn.com,
Umwelt.de: http://www.umwelt.de). While these organisations either have a regional (ENN) or ideological (Umwelt.de) background, the global knowledge marketplace proposed here would be open to all sources. With regard to the thematic pluralism of environmental information, an environmental marketplace must provide both vertical and horizontal solutions. By combining different organisations of the industrial and administration sector of environmental branches, the global digital marketplace would become the exchange platform for all matters concerned with environmental issues.

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