

# **GUIDELINES FOR THE DEVELOPMENT OF ENVIRONMENTAL NETWORKS AND INFORMATION SYSTEMS IN EASTERN EUROPE, THE CAUCASUS AND CENTRAL ASIA<sup>1</sup>**

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## I. INTRODUCTION

### 1.1 Purpose of the document

The purpose of this document is to offer possible directions for development of information networks on environment monitoring in the countries of Eastern Europe, the Caucasus and Central Asia (EECCA) using Internet technologies, and in particular tools and guidelines of the European Environmental Agency (EEA).

The following issues are considered:

- Defining the role of national focal points in collecting and accumulating meta-data, and creating of national reference centers;
- Creating a coordinated structure for transfer of information inside countries;
- Defining priority thematic directions for exchange of data on the state of the environment;
- Creating web-sites on environmental monitoring in EECCA countries, hosted on the UNECE web-server;
- Creating Catalogues of Data Sources in EECCA countries;
- Cooperating with UNECE and EEA.

### 1.2 Glossary

Term	Definition
Meta-information	Information about data sources
EEA	European Environment Agency
EIONET	European Environment Information and Observation Network
CDS	Catalogue of Data Sources
ETC/CDS	The European Topic Center on the Catalogue of Data Sources
ReportNet	Tools set for collection, search and reporting on environment
SSL	Secure Sockets Layer – a special protocol created to support safe access to a web-server. It is the basic protocol for coded exchanges between the client and a server.
HTML	Hyper Text Markup Language
Web-interface	A way to access information using a web browser
Portal	A set of technical capacities and software that unites access to all resources (applications, databases and data warehouses, analytical and search systems and others) and through a web-interface provides user access to this information.
Host-server	Main web-server, which provides hosting services, i.e. services on placing informational data and web-pages.
CIRCA / CIRCLE	CIRCA is the main group software tool for the Interest Groups of EIONET. CIRCLE is a server with one or more copies of CIRCA installed.
ZOPE	(Z Object Publishing Environment) designed by Digital Creations, now Zope Corporation: an object-oriented platform, a new generation applications server and a set of tools for development of information portals, available as Open Source Software. Works under OS Unix, Linux, FreeBSD, MS Windows NT.

## II. MAIN DIRECTIONS

### 2.1 Systems of national information resources

A national information system includes several subsystems:

- The collection and accumulation of initial information;
- Initial processing and synthesis of the information;
- Interpretation and further processing to meet the requirements of end users;
- Information storage and archiving;
- Transfer and distribution of information products.

#### 2.1.1. A brief review of Environment Ministry web sites in EECCA countries.

Eleven of twelve Environment Ministries in EECCA countries have web sites. However, only in eight countries do Ministries manage their sites directly. In the other three countries, Presidential or the general government sites are used. Almost all these Ministry sites mainly contain information on the administrative structure of the ministry and on national environmental legislation. (Annex 1 has an overview of Environment Ministry/Committee web sites).

With regard to the quantity and updating of information, Ukraine and the Russian Federation have the most advanced sites. A new version of the Ukrainian Ministry's portal was recently released, containing information in both Ukrainian and English. The portal of the Ministry of Natural Resources of the Russian Federation contains information in Russian only. It is necessary to note, that besides the Ministerial site, in the Russian Federation there is another national portal, "*Priroda*", managed by the National Informational Agency on Natural Resources.

Web-sites of Environment Ministries in Belarus, Armenia, Tajikistan, Georgia, Republic of Moldova, Kazakhstan, Kyrgyzstan, Azerbaijan and Uzbekistan are in operation also.

For the majority of ministry sites, data and information are not regularly updated. The main reasons include:

- a lack of information to update;
- not enough human resources; and
- insufficient financial resources.

The ministry of Turkmenistan – have no web site at all. Reasons include:

- Ministry lacks sufficient resources for web site creation and support;
- A web site is not a primary goal of the Ministry today; and
- It is not a priority for the country.

#### 2.1.2. Data sources

Data sources can be divided into the following areas:

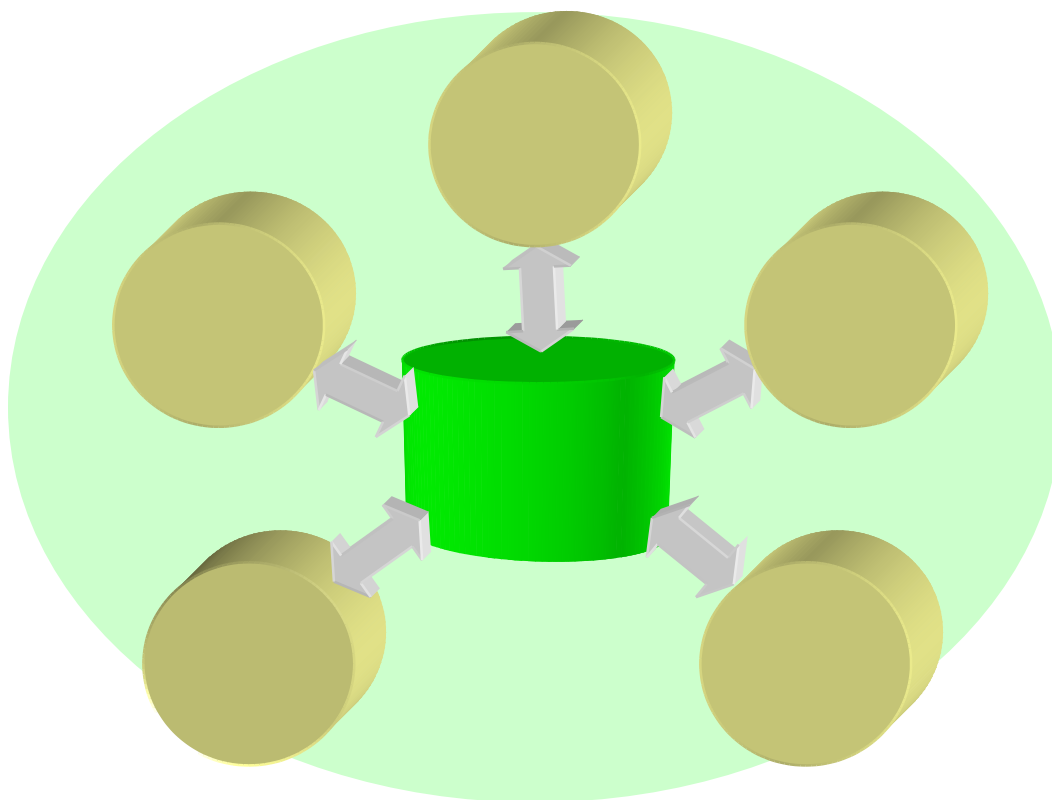
- Central and local authorities ( Ministries and committees , on environment, forest, water, fishery, soil resources and hydrometeorology);
- Enterprises and other economic actors;
- Scientific and research establishments, scientific and technical centers, libraries;
- Scientific/environmental periodicals and other literature;

- Non-governmental organizations (NGOs).

All of these, besides being sources of the data, are also consumers of environmental information. This circumstance is a key precondition for the creation of a database containing a Catalogue of Data Sources, which is a basic system of meta-information.

### 2.1.3. Meta-information Systems (Catalogues of Data Sources)

The general scheme of mutual relations of each of the blocks with the Catalogue of Data Sources (CDS) can be presented under the following scheme (fig. 1):



**Figure 1. Scheme for a Catalogue of Data Sources**

As can be seen from the figure, the creation of a CDS, a meta-information database that can comprehensively capture data sources, depends on the cooperation of all data carriers. Thus, each EECCA country faces the task of creating or strengthening its network for the accumulation and transfer of information. Creation of CDS databases will be a first step in the development of environmental networks in EECCA countries, as well as their future integration into the European Environment Information and Observation Network (EIONET). Another, subsequent important task is the creation of a network of national consulting and topic centers, as in EIONET, to maintain the availability of the environmental information.

A further stage of development will be the creation of complex national environmental portals and the Internet presentation of meta-information and documents reflecting the actual state of environment. This would include the creation of an environmental information service that would provide access to a broad and highly representative set of users, both inside and outside the countries. This service would allow information searches in the authorities' databases of meta-data. It should also have a feedback function in order to learn the opinion of interested users.

#### 2.1.4. Environmental information services: basic databases and electronic libraries accessible through the Internet.

In many (but unfortunately not all) EECCA countries, information services on environmental subjects already exist. Among the main examples are electronic libraries that contain extensive materials devoted to environmental problems and protection. There are a significant number of electronic libraries, and these contain diverse material on environmental subjects. These libraries belong not only to state authorities and organizations, but also to non-governmental organizations (NGOs). With regard to the quantity of both electronic libraries and the environmental information they contain, Russia, Ukraine and Belarus occupy leading places.

A set of electronic magazines on environmental subjects is also accessible in the Internet.

Examples of information services and electronic magazines include:

- <http://biodiversity.ru> – “The Center for Protection of Wild Nature”, a monthly magazine.
- <http://www.ecolife.ru> – Internet magazine "Ecology and life".
- <http://www.ecolife.org.ua> – The public environmental Internet-project EcoLife.
- <http://www.sukraine.kharkov.ua> – The project “Change of environment of Ukraine: participation of citizens”.
- <http://www.library.by> – The Belorussian virtual library.
- <http://www.climate.kz> – Official site of the Kazakhstan Coordination Center on Climate change.
- <http://environmentalsecurity.report.ru> – Site on environmental safety.
- <http://www.meteo.ru> – Server of the All-Russia Scientific Research Institute of the Hydro- Meteorological Information Service – the World center of data.
- <http://www.sibrsc.ru> – The Center for Space Monitoring of Siberia.
- <http://www.biodat.ru> – Preservation of biodiversity. Set of information resources on wildlife conservation.
- Finally, the largest portal on environment issues in Russia – <http://www.priroda.ru>.

However, no country has uniform information resources that could allow users to find necessary information quickly. This rather complicates information searches, especially searches for state reports on environment, plans of action, strategies, etc.

It is also necessary to remember that information stored in archives often exists in paper form only; moreover these archives typically belong to a variety of offices. In addition, their contents are not usually described in electronic form.

### 2.1.5. Ways of creating national information resource systems.

The task of creating national information resource systems includes:

- Creation of topic and help centers at the ministries and other central establishments responsible for environment;
- Involvement of specialized services in the field of the scientific and technical information – centers of scientific and technical information (CSTI) – in the collection, processing, publishing and distribution of information;
- Processing and storage of priority data, such as databases used in the Kiev report (waste, water, soil);
- Preparation of a reference book describing specialized agencies and offices holding priority environment data (for example, issues such as air pollution, water resources, waste and recycling, biodiversity, etc.). It is necessary to specify contact persons in the reference book (listing their organization, postal address, surname, phone number, email address).

## **2.2 Priority criteria for data selection**

### 2.2.1. Process of data selection for the Catalogue of Data Sources (CDS).

It is necessary to define basic criteria and methods for data selection and the creation of a Catalogue of Data Sources database.

The most important meta-information are those data and information resources used by international organizations and official bodies:

- for the assessment of the state of environment;
- for the preparation of national and pan-European reports; and
- for presentation to secretariats of the international environmental agreements.

Records of meta-information should first of all describe data that is:

- submitted to official national reports on the state of environment;
- intensively used at the international or pan-European level;
- submitted by the official national programs on environmental monitoring; and
- included in national scientific and technical libraries.

It is necessary to take into account several issues that can reduce the value of these criteria during data selection:

- possibility of receiving meta-information requested;
- quality of the meta-information;
- expenses for the creation of meta-information; and
- procedures for updating this meta-information.

On the other hand, the value of these criteria increase for meta-information describing resources that includes priority topics.

It would be very useful to include these data catalogues, and describe their subsequent publication on the Internet, in the national state of the environment reports, in reports submitted to the secretariats of international environmental conventions and to the United Nations Commission on Sustainable Development, as well as in plans of action or programs on environment protection and sustainable development.

### 2.2.2 Priority Data Flows.

The following data flows can be considered as priorities for the countries of Eastern Europe, the Caucasus and Central Asia:

- Air quality and air pollution emissions;
- Water quality and pollution (for surface, underground and coastal waters);
- Land resources and soil;
- Nature conservation and biodiversity;
- Waste management;
- Climate change.

### **2.3 Software for creating information resources**

The European Environment Agency (EEA) has developed and used many application programs for the registration, storage and exchange of data on the state of environment. Major programs include: software for the creation and support of Catalogue of Data Sources (CDS) databases; software for the creation of web-portals (Portal Tool Kits - PTK); and software for Interest Group work (groupware CIRCA). All this software is used by the European Environment Information and Observation Network (EIONET).

#### 2.3.1. Software for the creation of Catalogues of Data Sources (WinCDS, WebCDS, Java-CDS, GEMET).

This software has been developed to support systems that compile data on sources of the environment information in Europe. It is also intended to present information concerning who has what kind of information in Europe, in what form, and where and how to get access to it. In other words, a CDS database provides users with the meta-information that helps them to determine the location of information sources and then to receive the data or information they are looking for. The initial purpose of this CDS database is to support EEA and EIONET work, providing users, administrations and the public with environmental meta-information. The goals of EEA also include serving the public and making information accessible, as well as creating functional links to ongoing national, regional and international initiatives.

This software has been developed by the European Topic Center on the Catalogue of Data Sources (ETC/CDS), and it contained following tools:

- CDS Program for Windows (WinCDS)
- Web-interface for CDS (WebCDS)
- Multilingual Thesaurus (GEMET)
- Programs for updating DB CDS in on-line mode (UpdateCDS + J-CDS)

#### *CDS Program for Windows (WinCDS)*

WinCDS 2001 is one of the main tools for the management of data and information in EIONET. The basic function of this MS-Access application is to help in the collection and registration of meta-information. Its main purposes are the creation of a database on Data Sources and the maintenance of message system on the state of environment. This free-of-charge software allows the registration of data sources in the general European standard.

The information includes two categories: Addresses and Data about Sources. Addresses are hierarchically divided into information about persons and organizations. The Data about



Sources are also divided into six classes and also can be hierarchically structured. Each object should be connected with, as a minimum, one address, in order to present the contact person. Addresses and the Data about Sources are indexed according to the corresponding terms from the multilingual thesaurus (GEMET).

Here is an example of a term in the GEMET thesaurus and its translations:

**incineration of waste**

dan	affaldsforbrænding
dut	afvalverbranding
ger	Abfallverbrennung
nor	avfallsforbrenning
swe	förbränning av avfall
fre	incinération des déchets
ita	incenerimento di rifiuti
por	incineração de resíduos
spa	incineración de desechos
gre	αποτέφρωση των αποβλήτων
fin	jätteenpoltto
hun	hulladékégetés
bul	Изгаряне на отпадъци
rus	сжигание отходов
slo	spaľovanie odpadu
slv	sežiganje odpadkov, incineracija odpadkov
baq	hondakinen errausketa
usa	incineration of waste

This software also supports functions to export and import databases; it includes three variations for import /export: CDS, GELOS, and only addresses, the format SGML is used for that (Standard Generalized Mark-up Language).

*Web-interface for CDS (WebCDS)*

The basic tool to search for environment information through the Internet is the software WebCDS. It provides access to meta-information in CDS databases through the tools and techniques of the World Wide Web. WebCDS as well as WinCDS, are accessible free-of-charge. An example of WebCDS on the Internet is on the site:

<http://www.mu.niedersachsen.de/system/cds/>

WebCDS has a 3-layer architecture:

- web-server;
- application server;
- database server.

The main part of this is the application server WebCDS. It receives queries from a client part (using HTML or J-CDS) and transforms them in SQL queries which it sends to the CDS database. After receiving the answer, the application server inserts it into the report form and sends to the client part.

The application server WebCDS is a RMI-server (Java Remote Method Invocation). Both server and client parts are written in language Java.

Support of the HTML client is as follows: the CDS servlet (the server application) transforms results in HTML (the tool for generating HTML) for representation in any HTML v.3.2 compatible browser: in other words, for viewing it is necessary to have an Internet connection and a standard browser.

Support for J-CDS (Java-CDS - see <http://www.mu.niedersachsen.de/jcds/>), is realized directly through RMI and demands a specific port for bidirectional communications, just as any browser plug-in. A specific configuration is provided in case the connection is installed through a firewall. J-CDS unites several tools within one working space and gives the user convenient access to CDS data and addresses:

- *GeoView* – the tool for spatial access, i.e. use of a map. This allows users to choose the country or other limiting framework, and to move on this map. *The map of Europe is used only.*
- *GenThes* – this allows navigation through the terms and hierarchical structure of multilingual thesaurus GEMET (described below). Besides allowing searches of descriptions and synonyms of the thesaurus, GenThes supports viewing the hierarchy of the thesaurus, detailed definition of descriptions, and translations of the chosen term. The user can choose one or more terms and to get access to sources of CDS data. This is using also for search and viewing of the address with help GenThes, according to hierarchy themes and roles of EEA.
- *The navigator* allows review sources of the data and addresses. The user can see hierarchy and choose object of interest for viewing the detailed information

After searching, and independently from the specific tools used, all data are displayed in a separate window as the list of results. Then the user can combine the results of several searches, or compare them. The mini-browser, which shows results using the HTML-generating tool of WebCDS, has been created for display of the data.

Since CDS tools provide support to various languages for records, they are used in many European countries. The graphic interface allows users to choose the language supported by the GEMET thesaurus, for the search form and for reports. It thus allows them to search for information in their native language. Although it is not always possible to present data for the report in the requested language, the catalogue system tries to do if it is available.

#### *Multilingual Thesaurus (GEMET)*

The GEneral Multilingual Environmental Thesaurus (GEMET) is one of binding tools of CDS. It contains more than 6000 terms and expressions, classified in 34 groups. Each description is placed in a hierarchical structure. The set of 41 themes has been coordinated with EEA, and each description has been linked to one or more themes. Users can get access to the thesaurus through the thematic structure, through the hierarchical list or through the alphabetic list. GEMET meets the norms of the International Organization on Standardization (ISO) on monolingual and multilingual thesauruses.

The GEMET 2001 version supports 19 languages (English, English/USA, Bulgarian, German, Danish, Czech, Russian, Slovene, Finnish, Norwegian, Dutch, Swedish, French, Greek, Italian, Portuguese, Spanish, Hungarian, Slovak).

It is possible to see the list of terms and expressions on one of the pages of the European Topic Center on the Catalogue of Data Sources (ETC/CDS):

[http://www.mu.niedersachsen.de/cds/etc-cds\\_neu/library/select.html](http://www.mu.niedersachsen.de/cds/etc-cds_neu/library/select.html)

Also, the GEMET thesaurus is available as PDF-file, an XML-file and as a file of the visualization tool ThesShow. (<http://www.eionet.eu.int/GEMET>)

#### *Programmes for updating DB CDS on-line (UpdateCDS 2.0)*

An update Module for CDS has been developed with the Swiss Agency for the Environment, Forests and Landscape. The main goal was to overcome problems with exchanges to meta-information data across various formats. The new approach provides direct access to the CDS database through the Internet, simplifying the process of modernization and data maintenance. It is one of the newest CDS programs, created as the Java-applet. It unites search and editing functions with tools for the collection, indexation and support of meta-information through the Internet. Through this client-server application, rather simple in installation, the client always receives the latest version of tools and modules as well as GEMET. These functions are made through a JavaWebStart application (<http://java.sun.com/products/javawebstart/>), necessary on the client side.

Access (rights for reading and recording) to a database is processed by the users' manager (via ID, password, super-user, etc.). Three levels of user access are supported:

- *Interested parties* have the right to search in a database;
- *Authorized Users* have the right to search and modify data; and
- *Administrators* have all rights, also system level: *DBMS*, i.e. system, where all data sets are saved.

For the import / export of DB CDS in XML, the format is developed using *XML Data tools* software (<http://www.eionet.eu.int/software/xmldatatool>).

The best example of a WebCDS is the Swiss web-site: the Swiss Catalogue of Data Sources on an environment (<http://www.ch-cds.ch>).

#### 2.3.2. Software for portal creation, portal tool kits (PTK): ZOPE.

A portal is a site that provides gates for access to different sources. These sources can include data in different organizations and use different services, i.e. databases or application servers. It supports news services and thematic collections of links to documents, sections, sites.

The Portal Tool Kits (PTK) have been developed for the creation of web-portals of network EIONET. The ZOPE platform was used for the creation of PTK. This is an object-oriented platform, an application server that allows the creation of dynamic web-applications and interactive sites. It is a database of transaction objects, writing not only content and users data but also dynamic templates, HTML, scripts, search systems, and communications with a relational database (RDBMS) and code. It is powerful model of development "through the Internet", i.e. it allows updating of a web site from any point in a network with an integrated, incorporated model of safety. Here concept of "reliable transfer of the control" is used: the safety architecture also allows transfer of control over parts of a web site to other organizations or persons. The transactional model addresses not only a database of objects, but also plural relational databases, thus creating dense integration. A set of additional appendices for expansion of a basic toolkit are also written. These are new contents – objects and relational databases - expand content management, e-commerce applications, documents management and systems of tracking of mistakes and events. ZOPE contains its

own processing HTTP, FTP, WebDAV, XML-RPC queries, and also it can be shared with Apache and another web-servers.

Most importantly, Zope is distributed free-of-charge as Open Source Software.

EIONET PTK supports a dynamic homepage from the Zope database. The content is classified by channels, categories, themes and countries. The basic point of the contents can be a link to the Interest Group of CIRCA, and link to file or other web site (URL).

The basic purpose EIONET PTK, besides integration, is the creation of a joint community of suppliers of operative information. The community of sites users provides links to various services; PTK accumulates these data for creation of portal contents. This system of mutual relations already works between EIONET and its Network Control Centre, i.e. all news and frequently asked questions are displayed on the basic EIONET portal.

Several PTK elements are recommended for portal creation:

- *LDAPUserFolder*, for integrating Zope with the CIRCLE catalogue of sites or the central site EEA. It allows CIRCLE usernames and their passwords for identification, for increased of interactivity of users. The model is not installed, if it is not necessary.
- *ZopeLDAP* is used to search information on users. In EIONET it is used for program MeetingManagement.
- *MySQLDA* integrates MySQL and Zope, i.e. it supports access to DBMS MySQL. Demands preinstalled MySQL.
- *MeetingManagement* supports meetings, including meeting announcements based on different criteria, participant confirmation, e-mail sent to all participants. Also the program *vCalendar*, allows through a simple click on the link importing meeting data into the personal information manager (PIM).
- *Yihaw directory* (Yahoo! Inspired Hierarchical Arranged Web Directory) allows the creation and support of a hierarchical catalogue of links, files, articles, etc., similarly to Yahoo! catalogues, and to Open Directory Project catalogues.
- *RDFSsummary*. One definitions of a portal is that all what users need should be accessible on one page. Sometimes, data what required exists on several servers. This program will allows web sites to collect summary information from other network nodes (web sites) and imports them to the users site. The content is a standard announcement, but it can also be via frequently asked questions (FAQ) or new messages. The exchange format is based on XML and is called RSS (Rich Site Summary). EIONET uses RSS for transfer of news and announcements to other web sites.
- *RDFCalendar*. This calendar which accumulates all events such as conferences, programs start, training courses, etc. from other sources in format RSS + event. Demands of installation RDFSsummary 2.x

All these elements and set of others, as well as itself Zope v.2.6, are accessible on site Zope (<http://www.zope.org>). Especially it would be desirable to mark tools for internationalization of web sites, Zope Unicode support, Localizer, EasyLanguageService. Also there are excellent development for Zope in the Russian-speaking Internet (<http://www.zope.net.ru>) and in Ukrainian (<http://www.zope.net.ua>).

### 2.3.3. Software for the joint work of interest groups: CIRCA.

CIRCA is toolkit for group work (groupware), based on web-technology online services developed for working groups and committees. CIRCA stands for Communication and Information Resource Centre Administrator.

This software was developed under the European Commission Programme “Data exchange between Administrations”, based on the needs of the state and public administrations. It enables a given community (i.e. committees, working groups, design groups, etc.), geographically scattered across Europe and beyond, to support a dedicated Internet space where they can together use information and documents, participate in forums of discussion, and use other software functions for collective work

The user can change language of the Graphic User Interface (GUI), switch “GUI Language”. So far, only three languages are supported for GUI, English, French and German, but it is possible to create support for other languages. Also, the user adjusts the preferable sequence of languages via the switch “Data language preferred order”: i.e. in a document search, if the chosen language it is absent it is searched in language which follows on the list, etc..

Each version of the CIRCA environment is organized around of Interests Groups (IG), that is a private working space for a group of people that need to cooperate for achieve common aims and tasks. Though each IG inherits the same configuration (an emblem, place, etc.), this environment can be adjusted also at IG level. For each IG, the information is limited by the "participants".

Thus, a virtual space is created, access to which is possible through the Internet with use of any browser. For access it is necessary to have the User Identifier (UserID) and password. For greater safety, an IG can code its data, using the SSL-protocol, and in addition use Certificates (Client Authentication). Similar to a working group or committee, in each IG one member will act as chairman or leader: in CIRCA they are called the Leader. In CIRCA there are two types of users. The first - *registered*, with UserID and the password, can become a member of one or more IG. Unregistered users have access only to the public IG space, and only to information that has been classified as public by the IG Leader.

The type of access to Interests Group is based on the predetermined, configured user profile, *Class*. The class is a certain object of IG and a subgroup of its Participants with certain right of access and status for notices. The leader can create new classes for his Interest Group or can change rights of access or conditions for an existing class. Also, the Leader has the right to add new users, change membership to a certain class, and reset user passwords, but cannot change personal user information. Only the users and the administrator have this last right.

Resources. From the main menu users can access the following Services:

- *Information* - provides access to information pages in HTML format and to useful links to other sites;
- *Library* - provides access to the library, which is the archive organized in sections and subsections with multilingual documents (for example, all languages of community), accessible in one or more versions. Documents can be seen, downloaded or sent via e-mail. Users can be automatically notified by e-mail of any changes in any specific section of Library. Users with appropriate access rights can also easily upload documents and to create a forum of discussion on this document;

- *Directory* is an access to lists of Members and Contacts. Members have access to the Interests Group, whereas Contacts is the list of partners of the Group. The leader has also access to the Catalogue of the Site and operates membership, adds or deletes members, changes classes and resets passwords of existing members.
- *Meetings* - planning, creation and the publication of Meetings within the limits of the Group. It is possible to create and take part in a virtual meeting (chat).
- *Newsgroups* - a forum for discussion among members of working groups or projects;
- *Administration* - tools for the administration and management of the IG, accessible only to leaders and administrators. Such parameters as *Enable/Disable Public Access*, also *Enable/Disable Registered Access* are set. The name and the description of Interests Group can also be changed.
- *E-mail* - allows to use the various functions such as integrated lists of addressees to send mail to all IG members.
- *Search* – this will consider the multilinguality of any document or the information to which the user has access;
- *Help*: an interactive help function.

CIRCA v.3.0 can be run on a server under OS SUN Solaris, HP/UX, Linux.

## **2.4 Development of informational network, cooperation with UNECE and EEA**

### 2.4.1. Creation or enlargement of contacts inside EECCA countries

The primary goals and purposes of the initial stage of development of information networks on environment monitoring consist of creating a network of national contact points in the EECCA countries, at the corresponding environment ministries (or committees).

To create an information network inside each country, it is necessary to create a contacts network, or to use and enlarge an existing network. Today, in each of the EECCA countries there exists a network for the collection of information for national state of the environment reports and bulletins, based on monitoring data.

Also, in some countries regulations on environment monitoring system determine the responsibility of different state authorities, norms and procedures for activities in this area, and also institutional mechanisms for coordination in the fields of monitoring and data exchange at interdepartmental level.

Legislative definitions of ways to transfer the information, and definitions of interdepartmental mutual relations at a national level, promotes the goal of monitoring and the reporting on the state of environment.

The common structure of a network for the transfer and accumulation of meta-information on the environment is illustrated in the scheme in fig. 2.

For the definition of a network of meta-information transfer, it is necessary to identify persons responsible for main data flows. These can also be the contact points for international environmental organizations, such as UNECE and EEA. Defining the network, as well as its creation and the development of contacts will strengthen cooperation between various departments inside the country and will improve the exchange of information at the international level.

It is necessary to create a document in which the network's hierarchy will be shown, along with the members of this network (for each, organization, name, post address, phone, fax, e-mail). This list is necessary to organize and set priorities for data flows (for example, in areas such as: air quality and pollution, water quality and pollution, soil, etc.). If more than one person is responsible for the information on some data flows, it is necessary to specify all of them. If one person is responsible for several data flows, it is necessary to specify his data under each flow for which he has responsibility. In the case that nobody is identified as the responsible person for a data flow, it is possible to skip this flow and change (add) this information in future.

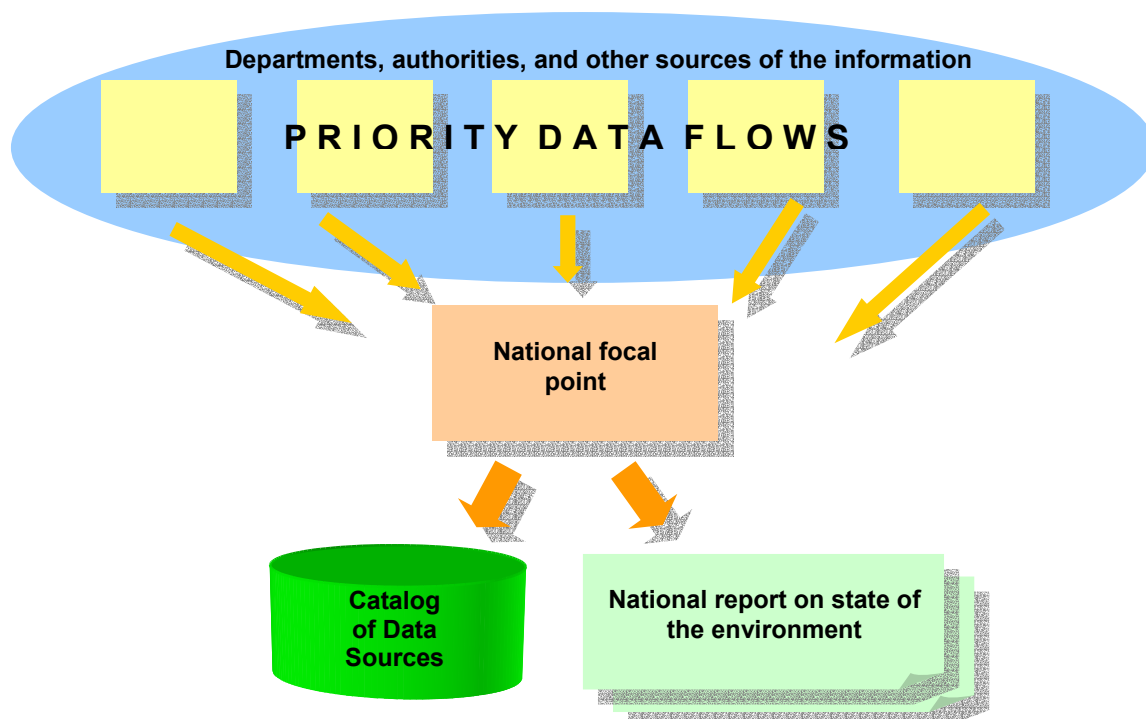


Fig. 2.

It is possible to see an examples of information networks on the sites of members of EIONET network. These lists include the national focal point and the persons responsible for the transfer of information. For example, the information network of the national focal point in Bulgaria: <http://nfp-bg.eionet.eu.int/eionet-bg.html#nfp>.

A model for the network is found in Annex 2.

It is necessary to develop and transfer the network list to UNECE. The information on information networks of the EECCA countries will be located on “the closed part” of server UNECE, access to which will be possible for registered participants of this project only, i.e. national focal points, members of the Working Group on Environmental Monitoring and officials of EEA.

#### 2.4.2. The costs of creating meta-information.

Cost of creating a meta-information records for developing a Catalogue of Data Sources is an important factor. It has been assessed, that creation of one record of a meta-information takes on average 30 minutes, including indexation (on records of thesaurus GEMET) and registration in a database. Thus, this is the major cost factor.

To implement all recommendations regarding the selection and creation of meta-information records in a Catalogue of Data Sources, it is estimated that up to 120 records should be created in 2003. The number of records can be reduced there are difficulties in indexing or if modifications /additions to the system of classification in some areas are necessary, etc.

#### 2.4.3. UNECE and EEA technical support of national focal points.

According to the project, in order to support the start of work of national coordinators, technical assistance, techniques (hardware) and software will be transferred to EECCA environment ministries (or committees).

The configuration of hardware (see table 1) selected takes into account modern technologies and their appropriate requirements. Future needs were also taken into account. The configuration is sufficient for work with modern software (standard set of software). In view of the analytical development of software for personal computers, this configuration is also sufficient for work with future applications in the next 2-3 years. The set of hardware includes: a personal computer, laser printer, scanner and analog modem.

The standard set of software (see table 1) includes OS MS Windows XP Pro, MS Office XP Pro, and the anti-virus package Symantec Norton Antivirus 2002. The selection of this set was made according to both modern technologies, and widespread use. This will exclude necessity of additional training of the personnel. Software also contains necessary components for the installation of programs for the creation of CDS databases (WinCDS), including MS Access.

No	Description
1	<b>Case:</b> <i>Mini-tower with power supply 250 watt</i> <b>Main board:</b> <i>chipset Intel® 850E</i> <b>Memory:</b> <i>512Mó</i> <b>Processor:</b> <i>Intel® Pentium® 4 Processor 2,80 GHz</i> <b>HDD:</b> <i>80Гó EIDE Ultra ATA-100 (7200 o/m)</i> <b>Optical Devices:</b> <i>CD-RW 48x/24x/48x + DVD-ROM 16x</i> <b>FDD:</b> <i>3.5" 1.44MB</i> <b>Video:</b> <i>Integrated Intel® Extreme Graphics</i> <b>Communications:</b> <i>Integrated Intel Pro 10/100</i> <i>Modem 56K v.90 (v.92 ready) Fax /Data/Voice</i> <b>Monitor:</b> <i>Flat screen 17" LCD TFT 1280 x 1024</i> <b>Keyboard:</b> <i>Standard keyboard PS/2, English/Russian</i> <b>Mouse</b> <i>PS/2</i>
2	<b>Laser Printer:</b> <i>A4, 1200dpi, Parallel/USB</i> <i>Cable USB</i>
3	<b>Scanner:</b> <i>Desktop Scanner A4, USB 2.0, 1200x 1200 dpi</i>



	<i>Cable USB</i>
4	<b>Software:</b> <b>Antivirus software:</b> <i>Symantec Norton Antivirus 2002</i> <b>OS:</b> <i>Microsoft® Windows® XP Professional (with documents and Recovery CD)</i> <b>Office software:</b> <i>Microsoft Office XP Professional - Word, Excel, Outlook, Publisher, PowerPoint, Access</i>

Table 1.

Reliable access to Internet is necessary for full-functioning work of the node. Quality of access depends on local Internet Service Providers (ISP). Due to the sharply different conditions, quality and cost of services, the choice of the provider is a task for the national coordinator.

The next stage is the installation of software for the creation of Catalogue of Data Sources (WinCDS), and the beginning of creation of records of the meta-data. Records should be entered in English and/or Russian languages (official languages of UNECE). The operational environment and the software support both languages. The keyboard included is bilingual, i.e. it supports both English and Russian.

When the first five records of the meta-data will be entered, a copy of the database should be transferred to UNECE for checking. After the receiving confirmation that the information is correctly entered, record creation should continue. When the first 20 records are saved in the database, it is necessary to send a copy of the DB CDS file for uploading on the web-site.

#### 2.4.4. Cooperation and use of UNECE technical potential

In order to present all of CDS databases from EECCA countries on the Internet, they will be placed on the UNECE web site. To load CDS databases and web-pages, access to UNECE FTP-server will be provided through SSL-connections. Synchronization of databases will be made at the request of the national coordinator, as needed for the accumulation of a meta-information.

To support national coordinators, a help-desk will be created in the UNECE. The main task of this service will be to help national coordinators (national focal points) resolve technical problems that may arise as they work with the software, upload copies of CDS databases, etc. The help will be provided via e-mail. Working languages will be English and Russian.

The UNECE's Web server hosting EECCA Catalogues of Data Sources and web-sites works using MS Windows 2000 Server with the established web-server MS IIS v.5.0 and MS SQL-Server.

#### 2.4.5. Cooperation between UNECE and EEA

In this project, the Working Group on Environmental Monitoring will collaborate closely with EEA, including not only the use of experience, principles and the methods that have been elaborated by the Agency, but also in the permanent exchange of information and in the organization of joint seminars.

Within the framework of this project, a working meeting on EIONET network questions will be organized in Bulgaria in September, 2003. Both representatives of national network focal points and experts from EECCA countries who are members of the Task Force on Tools and Guidelines will take part.

### III. CONCLUSIONS

This document illustrated methods to develop information networks for environmental monitoring in the countries of Eastern Europe, the Caucasus and the Central Asia. The development and architecture of such networks for the collection of information inside countries and the definition of the role of national coordinators (national focal points) were also described, as were relations between national coordinators, UNECE and the European Environmental Agency.

Tools for the creation of Catalogue of Data Sources (CDS) databases, and presentation of their information on the Internet, were described.

Within the framework of the existing project, the Environment Ministries (and Committees) of EECCA countries will receive the equipment (PC, printer, scanner and modem) as well as financial support for their connection to the Internet.

After installation of the software for creation of “Catalogue of Data Sources” databases, records of the meta-data will be created. Databases CDS will be published on the web-server of UNECE.

The terms of reference for the contract between the United Nations Economic Commission for Europe and the Ministries (departments) on environment of Eastern Europe, the Caucasus and Central Asia countries are provided in Annex 3.

**Annex 1. Assessment of the web-sites of Environment Ministries (and Committees) in EECCA countries (21.01.04)**

Country	Link	Access speed	Relevance to the definition of portal	Which S/W used for web pages or technology	Server's S/W	Broken Links	Informativeness from 1 to 3 points <sup>2</sup>
Armenia	<a href="http://www.mnpiac.am/">http://www.mnpiac.am/</a>	Low	No	MSFrontpage 4.0	Apache 1.3.27/ PHP 4.3.1	No	2
Azerbaijan	<a href="http://www.eco.gov.az/">http://www.eco.gov.az/</a>	Low	No	PHP	Apache 1.3.2/ PHP 4.3.1	No	2
Belarus	<a href="http://www.president.gov.by/Minpriroda">http://www.president.gov.by/Minpriroda</a>	High	Yes	Not defined	Apache 2.0.40/DAV/2	No	3
Georgia	<a href="http://www.parliament.ge/SOEGEO/english/institut/moe/moe.htm">http://www.parliament.ge/SOEGEO/english/institut/moe/moe.htm</a>	Low	No	Not defined	Apache 1.3.27/PHP 4.2.3	Yes	1
Kazakhstan	<a href="http://www.nature.kz/">http://www.nature.kz/</a>	Low	No	Not defined	Not defined (Nursat)	Yes	2
Kyrgyzstan	<a href="http://www.ecomon.kg/">http://www.ecomon.kg/</a>	Low	No	Not defined	Apache 1.3.2 (Win32)	No	2
Moldova	<a href="http://www.moldova.md">http://www.moldova.md</a>	Low	Yes	PHP	Apache 1.3.27/PHP 4.2.3	No	2
Russian Federation	<a href="http://www.mnr.gov.ru/index.php">http://www.mnr.gov.ru/index.php</a>	High	Yes	PHP	Apache 1.3.22/PHP 4.2.2	No	3
Tajikistan	<a href="http://www.mop.tojikiston.com">http://www.mop.tojikiston.com</a>	Low	No	Not defined	Apache 1.3.23/PHP 4.1.0	Yes	1
Turkmenistan	-	-	-	-	-	-	-
Ukraine	<a href="http://www.menr.gov.ua/">http://www.menr.gov.ua/</a>	High	Yes	PHP	Apache 1.3.27/PHP 4.2.3	No	3
Uzbekistan	<a href="http://www.uznature.uz/">http://www.uznature.uz/</a>	Low	Yes	PHP	Apache 1.3.23/PHP 4.1.2	Yes	2

One of the most remarkable examples is the portal of the National Information Agency on Natural Resources of Russian Federation.

	Link	Access	Relevancy to the definition of portal	Which S/W used for web pages or technology	Server	Broken Links	Informativeness from 1 to 3 points
NIA "Natural Resources"	<a href="http://www.priroda.ru">http://www.priroda.ru</a>	easy	yes	PHP	Apache 1.3.27/PHP 4.2.2	No	3

<sup>2</sup> From 1 – basic information to 3 – extended information, ‘-’ means no web-pages

## **Annex 1: Assessment of the web-sites of Environment Ministries (and Committees) in EECCA countries**

### **Armenia**

Ministry of Nature Protection - <http://www.mnpiac.am/>

The Ministry's site.

Site is in developmental stage.

Language: English and Armenian

### **Azerbaijan**

Ministry of Natural Resources and Environmental Protection - <http://www.eco.gov.az/>

The Ministry's site.

Languages: Azeri and English.

### **Belarus**

Ministry of Natural Resources and Environmental Protection -

<http://www.president.gov.by/Minpriroda>

Part of the President's web site.

Languages: English and Russian

### **Georgia**

Ministry of Environmental Protection -

<http://www.parliament.ge/SOEGEO/english/institut/moe/moe.htm>

Part of the Parliament's web site.

Only basic information about the Ministry and regional commissions is available.

Languages: English and Georgian

### **Kazakhstan**

Ministry of Natural Resources and Environmental Protection <http://www.nature.kz>

The Ministry's site.

Languages: Russian

### **Kyrgyzstan**

Ministry on Environment and Emergency <http://www.ecomon.kg>

The Ministry's site.

Languages: Russian

### **Republic of Moldova**

Ministry of Ecology, Construction and Territory Development - <http://www.moldova.md>

This is the Governmental site. There is some information about the Ministry and its activities.

Languages: Romanian, Russian, English

### **Russian Federation**

Ministry of Natural Resources - <http://www.mnr.gov.ru/index.php>

The Ministry's site.

The portal of the National Information Agency on National Resources, under the Ministry –

<http://www.priroda.ru> – is Russia's biggest portal on environmental data. It united seven other portals, including a news-portal, maps-portal, and a catalogue of resources-portal, forums-portal, library-portal, tv-portal, and a portal of legal advice.

Language: Russian

**Tajikistan**

Ministry of Environment Protection - <http://www.mop.tojikiston.com/>

The Ministry's site.

Languages: Russian and English (planned).

**Turkmenistan**

Ministry of Nature Protection

No site

**Ukraine**

Ministry of Ecology and natural Resources - <http://www.menr.gov.ua/>

The Ministry's site.

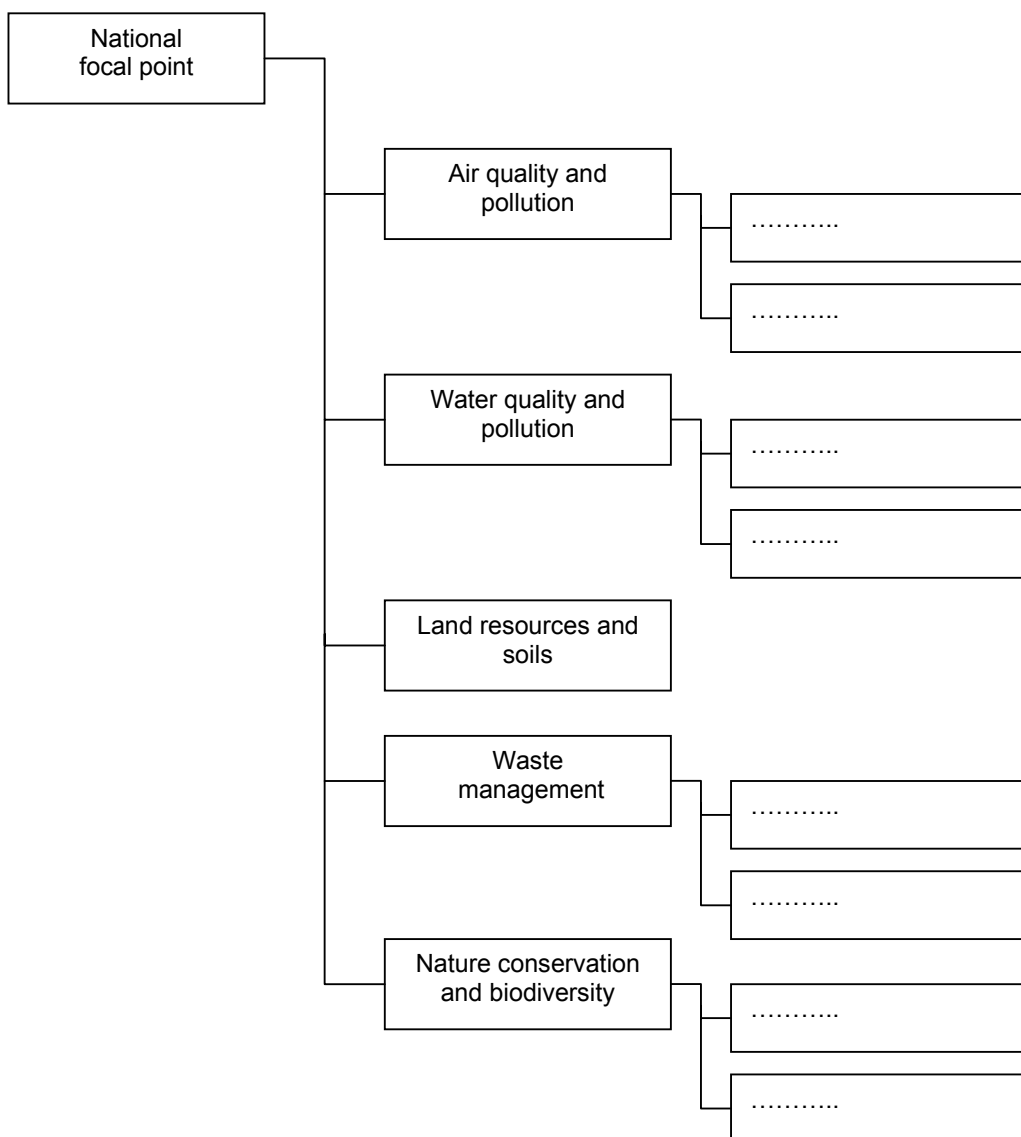
Languages: Ukrainian, English

**Uzbekistan**

State Committee for Nature Protection

The Committee's site <http://www.uznature.uz>

Languages: Uzbek, English, Russian.

**Annex 2: Information network of a national focal*****Example***

Country: .....

**National Focal Point**

Name .....

Title .....

Organisation .....

Postal address: .....

.....

Telephone .....

Fax .....

E-mail .....

**Air quality and pollution (including ozone layer)***Person/persons responsible for the data flow in the country.*

Name .....

Title .....

Organisation .....

Postal address: .....

.....

Telephone .....

Fax .....

E-mail .....

**Water quality and pollution***Person/persons responsible for the data flow in the country.*

Name .....

Title .....

Organisation .....

Postal address: .....

.....

Telephone .....

Fax .....

E-mail .....

**Land resources and soils***Person/persons responsible for the data flow in the country.*

Name .....

Title .....

Organisation .....

Postal address: .....

.....

Telephone .....

Fax .....

E-mail .....

**Nature conservation and biodiversity***Person/persons responsible for the data flow in the country.*

Name .....

Title .....

Organisation .....

Postal address: .....

.....

Telephone .....

Fax .....

E-mail .....



**Waste management***Person/persons responsible for the data flow in the country.*

Name .....

Title .....

Organisation .....

Postal address: .....

.....

Telephone .....

Fax .....

E-mail .....

**Climate change***Person/persons responsible for the data flow in the country.*

Name .....

Title .....

Organisation .....

Postal address: .....

.....

Telephone .....

Fax .....

E-mail .....

### **Annex 3: Terms of Reference**

for an Institutional Contract between the United Nations Economical Commission for Europe and Ministries (Committees) of Eastern Europe, the Caucasus and Central Asia countries (contractors).

The Contractor, according to the contract with UNECE, should:

- Receive the equipment (PC, printer, scanner) from UNDP office in the country and install in a special defined office – **one week** after equipment is supplied to the UNDP office in the country.
- Connect PC to Internet and an open e-mail box of National Focal Point – two weeks after equipment is received.
- Install EEA software to the PC – one week after receiving both PC and software.
- Identify the network of persons responsible for the main data flows in the country, submit information about this network to the UNECE Secretariat via e-mail as MS Word attachment (in Russian and/or English) - two weeks after the contract with UNECE is concluded.
- Submit the first 5 records to the UNECE Secretariat via e-mail or File Transfer Protocol (FTP) - two weeks after receiving both PC and software.
- Submit new set of records (20-30) to the UNECE Secretariat via e-mail or FTP – every week.
- Make at least 120 records and submit to the Secretariat via e-mail or FTP – three months after receiving both PC and software.
- Upload national meta-information (State of environment reports, national reports to the bodies of international conventions and to the Commission on Sustainable Development, national environmental programs and action plans, databases prepared for the Kiev Assessment) onto the national and /or UNECE web-site - three months after receiving both PC and software.
- Submit final financial report and report on completion of the tasks upon the contract by 13 November 2003.