

Development of National Environmental Reporting System

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Abstract

There are presented results of the research project of the Ministry of Environment of the Czech Republic “Analysis and Design of Environmental Data Models and External Czech Environmental Information System Interfaces Compatible with the EU”. The developed web information system Central Data Model is discussed. It enables to manage and monitor obligatory reporting activities of the Czech Republic. There was designed the global central data model for environmental information exchange and reporting purposes, to perform systematic attributing and thereby provide a basis for a central output data warehouse to meet reporting obligations.

1. Introduction

The research project VaV SM 720-3-03 “Analysis and Design of Environmental Data Models and External Czech Environmental Information System (CEIS) Interfaces Compatible with the EU” was started at Masaryk University (MU) in Brno in October 2003 with support of the Ministry of Environment (MoE) of the Czech Republic (Hřebíček, et al, 2003, 2004, Hřebíček/Pitner/Ráček, 2004, 2004a, 2005). There are main objectives of this three years project:

- Perform a complete analysis of the current requirements for environmental obligatory reporting, environmental data models and external interfaces, as from national and international (especially European) viewpoint.
- Perform the analysis of significant data sources from the point of view of attributing and methodologies.
- Design and implement an exchangeable Central Data Model (CDM).
- Prepare conversion of the existing sources of information into the CDM.
- Integrate the CDM into the existing structures of the information systems of the ME and the public administration, to create conditions for efficient use of data at both the national and international level.

A considerable output of this project is the information system of international environmental obligatory reporting management (IS CDM) described in this paper.

2. Analysis

The analysis of Czech reporting obligations consisted from two base parts (Ráček 2002):

- An analysis of reporting obligations and processes ensued from legislative.
- An analysis of significant national environmental data sources.

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The aim of the first part was to identify obligatory reporting processes included in legislative regulations, specify data structures of produced obligatory reports and then make the comparison of identified processes and data structures.

When analyzing reporting obligations the research team have chosen a procedure in the direction:

Regulation → Process → Data.

This procedure respects the basic division of the Reporting Obligations Database (ROD) component developed by European Environment Agency (EEA) <http://rod.eionet.eu.int>, and involves the following three steps:

- Finding the relevant legislative regulations.
- Identification of the reporting processes implied by these regulations.
- Specification of data produced in these processes.

The second part of analysis is oriented to national data sources used for obligatory environmental reporting. It means to identify the significant environmental data sources (i.e. information systems of CEIS) of the Czech Republic, analyze and describe their internal data formats, find their relation with obligatory reporting processes and design appropriate data interfaces between data sources and the IS CDM reporting management system <http://www.cba.muni.cz/cdm>.

3. Global architecture of IS CDM

The system regards to all reporting activities such as reporting processes, (which are described as process definition) and store them to reporting process repository. The function of process definition is described like reporting process in the form, which supports automated manipulation, such as modelling, or enactment by a workflow management system. The process definition consists of the network of activities and their relationships, criteria to indicate the start and termination of the process, and information about the individual activities, such as participants, associated ICT applications and data.

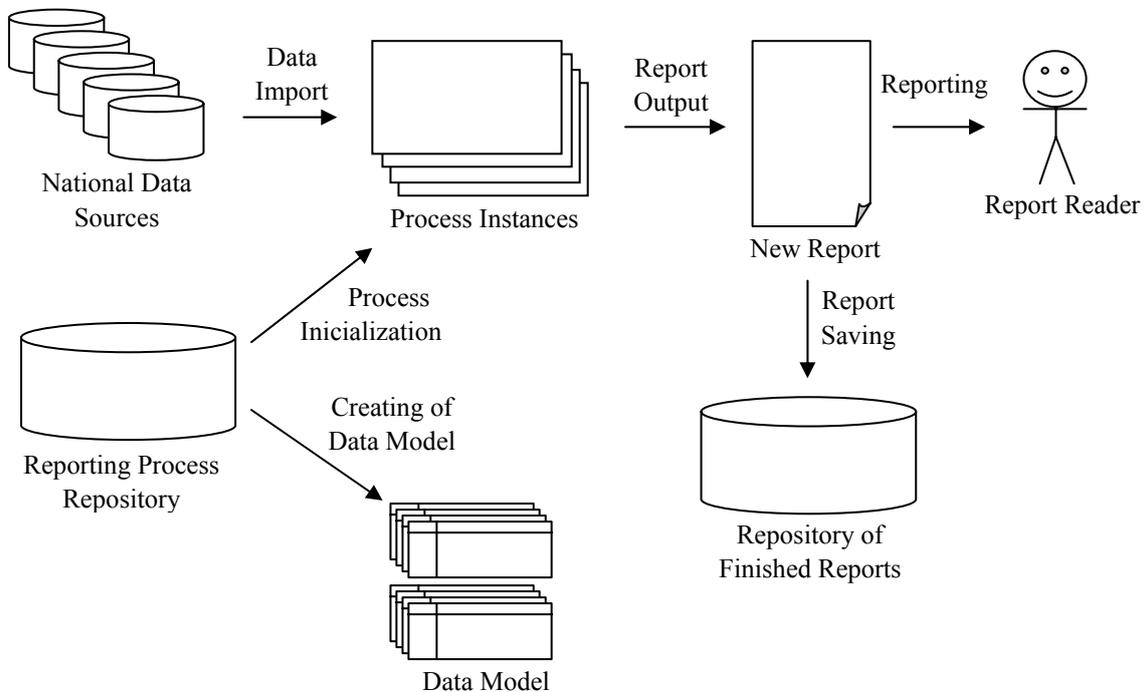


Fig. 1: A base architecture IS CDM of international environmental reporting

The logical data model of the proposed Czech reporting obligation management system is shown below. It consists of many entities that store metadata about reporting processes, used data sets and their structures, i.e., particular data models of reports. The main task of this information management system is provided by the module of information about reporting obligations. In this case, any reporting obligation in the system IS CDM is recorded as a description of the reporting process transforming input data from significant national environmental data sources to the output in the form of obligatory international reports. Thus the entity “**Obligation**” includes attributes giving information about the report dates, periodicity, responsible persons, process scenario, subsidiary applications and tools, report recipients and input and output formats. The basic structure of obligation entity complies with the structure used in system ROD of EEA but there has been added other attributes respecting the national level.

The main entities describing the national structure of reporting are “**Person**” including information about all people participating on environmental reporting in the Czech Republic, the entity “**Data Source**” containing metadata about more than 40 Czech significant environmental information systems from the CEIS, and the entity “**Application**” describing the software tools for reporting. The information about compiled and completed reports is stored in the entity “**Report**”.

The international and legislative context of reporting is stored in the entities “**Legal instruments**” and “**Classification**”. This part of the data model of IS CDM is fully compatible with the system ROD of EEA and it is automatically updated from this ROD database.

The information describing the report output data formats is available via the entity “**Data Set**” and the report data structure is recorded in the entities “**Entity**”, “**Attribute**” and “**Relationship**”, see Figure 2. This enables the automatic generation of the actual data structure of selected reports within the time period specified.

5. Implementation

The system IS CDM distinguishes two groups of its users. The user of the first group is analyst, which can insert, update and delete data incoming from analysis. He also can create requests and search information in system database. Currently, the analysts are scientists and developers of research team of the Masaryk University in Brno. The users from the second group are people who can just search and read information from the system IS CDM database, but they haven't permission to change data. Usually they are some administrative officers of the MoE, which supervises the project.

The system uses five basic data stores. Information about legal instrument is stored in data store “**Legislative regulations**”, information about identified reporting obligations and their data formats is stored in data store “**Reporting obligation**”, information about reports is stored in data store “**Reports**”. Data formats of reports are stored in data store “**Data sets**”. The Fig. 3 shows a form used for editing of a new data set. And finally, the descriptions of national significant data sources are stored in data store “**Significant data sources**”.

The system IS CDM offers two primary processes. The first process “**Editing**” inserts updates and deletes information about reporting obligation and reporting processes from data stores. The second process “**Searching**” provides search services based on the SQL technology.

6. Conclusions

The information system IS CDM of international obligatory environmental reporting of the Czech Republic was developed under the co-ordination of the Czech Ministry of the Environment, using standardized internal attributing (Hřebíček/Pitner/Benko, 2003). It was consulted with author of the system ROD of EEA (EEA 2004).

Nový datový slovník

Název	<input type="text"/>	<small>atribut "název" je povinný a musí být vyplněn</small>
Krátký název	<input type="text"/>	
Identifikátor	neuveđen	<small>atribut "identifier" na webu DD ... musí být vyplněn. Přidáváme-li DS, který není z webu DD, pak necháme "neuveđen" !!</small>
Krátký popis	<input type="text"/>	
Klíčová slova	<input type="text"/>	
EEA témata	<input type="text" value="Acidification [Okyselování]"/> <input type="text" value="Air quality and air pollution [Kvalita ovzduší a znečištění ovzduší]"/> <input type="text" value="Biodiversity Change and Nature [Změna biodiverzity a Příroda]"/> <input type="text" value="Chemicals [Chemické látky]"/> <input type="text" value="Climate change [Změna klimatu]"/>	<small>podržení klávesy Ctrl při klikání můžete vybrat více témat</small>
Metodologie	<input type="text"/>	
Návod k vyplnění	<input type="text"/>	
Plánovaná frekvence aktualizací	Jednou	
Verze	<input type="text"/>	
Registrační autorita	ACCQBAMS meeting [Meeting of the Parties to ACCQBAMS, via the ACCQBAMS Secretariat]	

Internet

Fig. 3: A data set editor

It enables to manage and monitor obligatory reporting activities in the Czech Republic and design the global central data model for environmental information exchange and reporting purposes, to perform systematic attributing and thereby provide a basis for a central output data warehouse to meet reporting obligations.

Another field closely related to information/reporting obligations is informing the public, as stipulated by the new European legislative requirements. This solution reflects these requirements too. It has to provide an information base for strategic planning, supra-field information support for public administration, and cooperation with the business sphere.

Bibliography

- EEA 2004: Guide to updating the EEA's Reporting Obligations Database (ROD). <http://eea.eionet.eu.int:8980/Public/irc/eionet-circle/eionet-teleomatics/library?l=/reportnet/rod/>
- Hřebíček, J. et al, 2003. Project VaV 250-3-30. *Analysis and Design of Environmental Data Models and External EIS Interfaces Compatible with the EU - Annual report.* (in Czech). Brno: Masaryk University, 2003.
- Hřebíček, J. et al, 2004. Project VaV 250-3-30. *Analysis and Design of Environmental Data Models and External EIS Interfaces Compatible with the EU - Annual report.* (in Czech). Brno: Masaryk University, 2004.
- Hřebíček, J., Pitner, T., Benko, V. (2003): Standardization of Environmental Data and Information Management in the Czech and Slovak Republic. *Proceedings of 17th International Conference Informatics for Environment Protection* held in October 2003, Cottbus. 117-124.

- Hřebíček, J., Pitner, T., Ráček, J., 2004. Environmental Information Management in the Czech Republic with respect to Reporting Obligation. *Proceedings of 17th International Symposium Informatics for Environmental Protection, Sh@ring*. Geneva : Universite de Geneve, 2004. , p. 447-457.
- Hřebíček, J., Pitner, T., Ráček, J., 2004a. Analysis of Environmental Reporting Obligations Compatible with the EU. *In Proceedings of the IADIS International Conference Applied Computing 2004*, Ed. by N. Guimarães, P. Isaiás. Lisbon, Portugal, p. III-12.
- Hřebíček, J., Pitner, T., Ráček, J., 2005. Analysis of Environmental Information Management in Czech Republic. *In 6th International Symposium on Environmental Software Systems (ISESS'05)*. Sesimbra, Portugal : International Federation for Information Processing, (to appear).
- Ráček, J., 2002. Workflow of Environmental Administrative Processes in Czech Republic. *Proceedings of 16th International Symposium Informatics for Environmental Protection, Environment Communication in the Information Society*. Vienna : ISEP, 2002., p. I-432 - I-435.