

REREP 1.8 Development of
National Environmental Information System -
"CrEIS"
Concept of Project

I. PILOT/CrEIS PROJECT CONTEXT

I.1. Needs and gaps

In the "Country Report on the Status and Needs of the Environmental Information System" the establishment of a national environmental agency has been identified as a priority to ensure quick improvement of the system.

To create a sound basis for a national environmental agency harmonised with the European Environmental Agency (EEA) and to ensure accessibility of environmental data to all interested parties, the following appropriate¹ pilot activities are recommended:

- Identifying existing data sources (both data generators and data collecting/processing bodies),
- Precisely describing existing data (content, format, accuracy, and, when applicable, whether it meets EEA requirements),
- Creating methodology for data gathering and processing (establishing procedures and standards that comply with EEA requirements);
- Developing an information system;
- Developing inter-institutional links and IT communication channels; and
- Identifying stakeholders and data users as well as their needs for data accessibility (and whether the data is accessible enough by the Aarhus Convention).

Bits and pieces of the information system are already in place. Data sources have identified, i.e. those institutions responsible for gathering and processing data. There is a lack of information, however, on the reliability of the data, the frequency and format in which the data is transferred, and whether the data is gathered and processed in compliance with EEA requirements.

Each data gathering institution has developed its own computer databases without regard to its specific needs and with no regard to timely exchange of data and public-access requirements.

I.2. Needs of information users

A national environmental information system would serve three main categories of users:

- The Ministry of Environment and the future environmental agency,
- Business and academia,
- The general public, including NGOs, the media, etc.

Regardless of the intended purpose of the data and information needed, users of environmental information require accurate, reliable and readily available data. Very often

¹ "appropriate" in terms of logical steps to be taken considering the Ministry of Environment's immediate needs and resources and the framework of the original project proposal RERep 1.8.

potential users do not even know what kind of data exists and what is available. That goes not only for businesses, the general public, media and NGOs but also for government bodies and institutions.

Users need environmental data that is clearly structured, easily accessible (preferably from computer databases available via appropriate web pages), accurate and reliable. As far as the general public is concerned, this data should be presented in laymen's terms whenever possible using web pages with maps and colour-coded representations of relevant data. An overview of existing data, in the form of a guide on the Ministry of Environment's web site and/or appropriate brochures, should be made available in electronic and hard copy.

I.3. Immediate Impact of the Pilot Project

(see II. Proposed Pilot Project Concept)

The project would have the following impacts:

- A web-based information system concerning bathing-water quality will enable the Ministry of Environment and general public to access data which, although gathered by five local governments (*županijski uredi*) along Adriatic Coast, is not regularly being forwarded to the cadastre and is not available to public.
- Implementation of the pilot project will also lead to enforcement of the existing Croatian ordinance on standards of coastal-water bathing areas ("Uredba o standardima kakvoće mora na morskim plažama").
- A successful pilot might serve to kick-start the development of information system infrastructure for national environmental agency.

I.4. Long-term Effects of the Project

The project would serve as a basis for further development of the environmental information system, making data available to the public and creating procedural and training models for monitoring/measuring bodies and responsible public servants.

The project will identify gaps in monitoring methods and weakness in rules for sampling frequencies and parameters required by EU directives. The project will help with the EU harmonisation process as it relates to bathing water quality. Eventually new requirements will be incorporated into river basin management plans.

Accurate and timely data will enable efficient reactions to environmental incidents and emergency situations.

Reliable data gathered over time is valuable in the implementation of local sustainable development projects, especially those related to the integration of environmental and tourism policies.

I. 5. Follow-up and Maintenance of the System

Once the pilot project's results are accepted as a guide for development of an environmental information system, The Ministry of Environment will plan its own system and be able to solicit donor resources for its further development.

Maintenance of software and equipment acquired through this pilot project will be the responsibility of The Ministry of Environment, which can do the work with in-house resources or sub-contract it to external services as appropriate.

If other SEE countries use the pilot project as a model for building their own information systems, assistance and cooperation will be established.

II. PROJECT CONCEPT

II.1. Summary

A. Project scope

Scope of "CrEIS" is development of analysis and design model for "national environmental information system", and implementation of "proof of concept" application for coastal waters bathing areas - bathing water quality.

The purpose of the analysis and design model is to translate the requirements into a specification that describes how to implement future integrated information system.

Second objective is to establish architecture for a system that is easy to, build, and evolve. System must be designed for performance, robustness, scalability, and testability, among other qualities.

Those qualities are going to be proved on "proof of concept" pilot application (POC).

A.1 Sources of information:

- "National capacities for environmental data gathering", 2001, The Ministry of Environment's study based on EUROSTAT's Methodology Sheets, 1999, EEA Environmental Signals, 2000, EEA Environmental Signals, 2001 and other relevant sources;
- data available in The Ministry of Environment's Cadastre of Environmental Emissions and Waste;
- data available in monitoring/measuring bodies and local governments' databases.

B. Presentation of POC application

Sets of existing data will be entered into system as to demonstrate their performance in terms of:

- data entering,
- data reading and processing,
- data availability,
- functioning of the links between measuring and monitoring bodies, local governments and The Ministry of Environment and other interested parties,
- public access to data.

In agreement with The Ministry of Environment, data on the quality of bathing water are going to be entered into database within the framework of the pilot project. Decision is based on following factors:

- five coastal counties are responsible for measuring and monitoring of bathing water,
- data are being gathered but hardly available on local or national level,
- need of public access via Internet.

Access to database (input, monitoring and publishing) will be realized completely through web interface (see II.3.4 section for details about web application concept.)

Note: As newly established needs related to the RERep project 4.3.23 “Promotion of networks and exchanges in the countries of SEE” have occurred, the agreement has been reached between project managers to extend activities of RERep 1.8 to enable development of Neretva river delta information website within the scope of RERep 1.8 as well.

II.2 Project implementation main deliverables

Main deliverables are defined according to RUP and project scope:

- Stakeholder Requests document
- Vision document
- Business Case
- Risk List
- Glossary
- Software development plan
- Software architecture document
- Test plan (with test results for POC)
- Deployment plan
- Implementation model (for "POC" application)
- POC application (Product + training for relevant personnel)

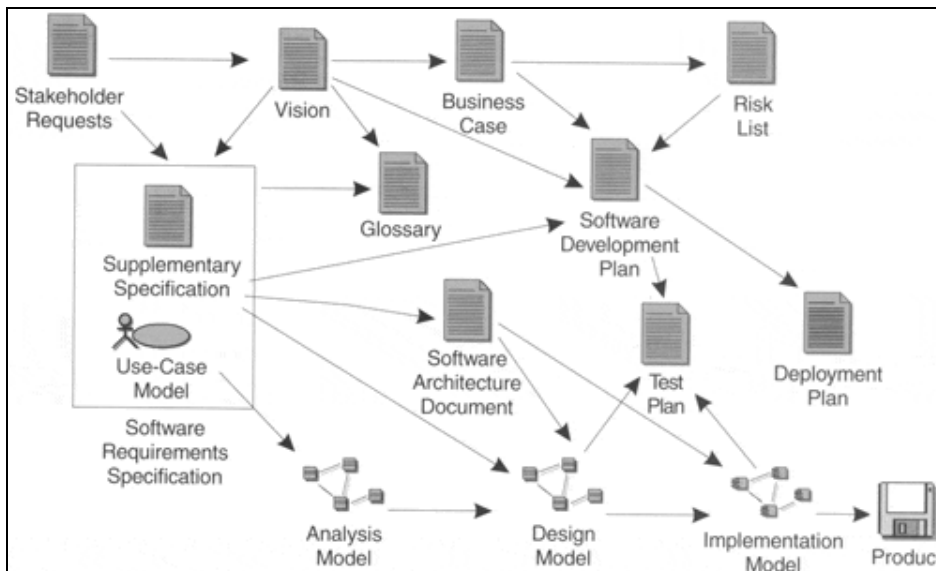


Figure 1 Project workflow using RUP² terminology

² The Rational Unified Process.

II.3 Description of key activities

Project is conceived as completely structured model that reference geographic, socioeconomic, demographic, meteorologic and other factors for particular environmental indicator in model, as well as measurements, observations and assessments of all parameters which influence particular indicator.

II.3.1 Metabase development

Crucial task in modeling of "CrEIS" is Metabase designing process assumes development of reference structure that describes each defined environmental indicator. In addition to indicator's name, measuring unit and type of the impact on the environment (according EEA's DPSIR), metabase has to make available all sources of data on an indicator. Therefore, metabase contains also international and national legislation regulating specific indicator, relevant scientific documentation, list of institutions responsible for monitoring/measuring/data gathering, environmental area (soil, water, air...), period of time covered etc.

In other words, metabase represents synthesis of all existing data on each indicator. Hierarchy on territorial principle (local political division, EMEP net) shows indicator's value for chosen territory; integral metabase, through values of all indicators, point out state of the environment at zero (highest) level.

Process of metabase's design consists of identifying dependence of particular indicator's attributes, data flow between authorized institutions, list of references that are not available in electronic format (and, consistently, plan for their translation into electronic format), developing hierarchy model for outlining indicators' geographic distribution and finally construction of metabase.

National «data on data» base will be created on one of existing commercially available metabases chosen in agreement with the The Ministry of Environment and EEA.

II.3.2 Software architecture overview

"CrEIS" must be highly modular and extensible system. J2EE framework has emerged as the leading standard for large scale applications. The following diagram outlines the chosen architecture for "CrEIS". Layers are created to help reduce the coupling between code and ease maintenance. A controller (written as a Java Servlet) is used to encapsulate global control logic such as access control and error handling. Business logic is implemented using a combination of EJB Session Beans and Java classes. All database access is encapsulated primarily as a layer of Java classes that use Entity Beans to interact with the database server. Finally, JSP pages and JavaBeans will be the primary mechanism to code the HTML user interface and interact with the business logic layer.

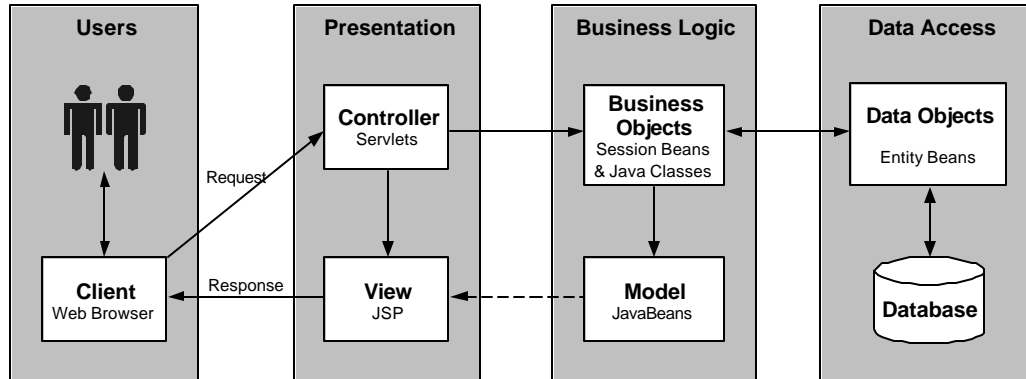


Figure 2.

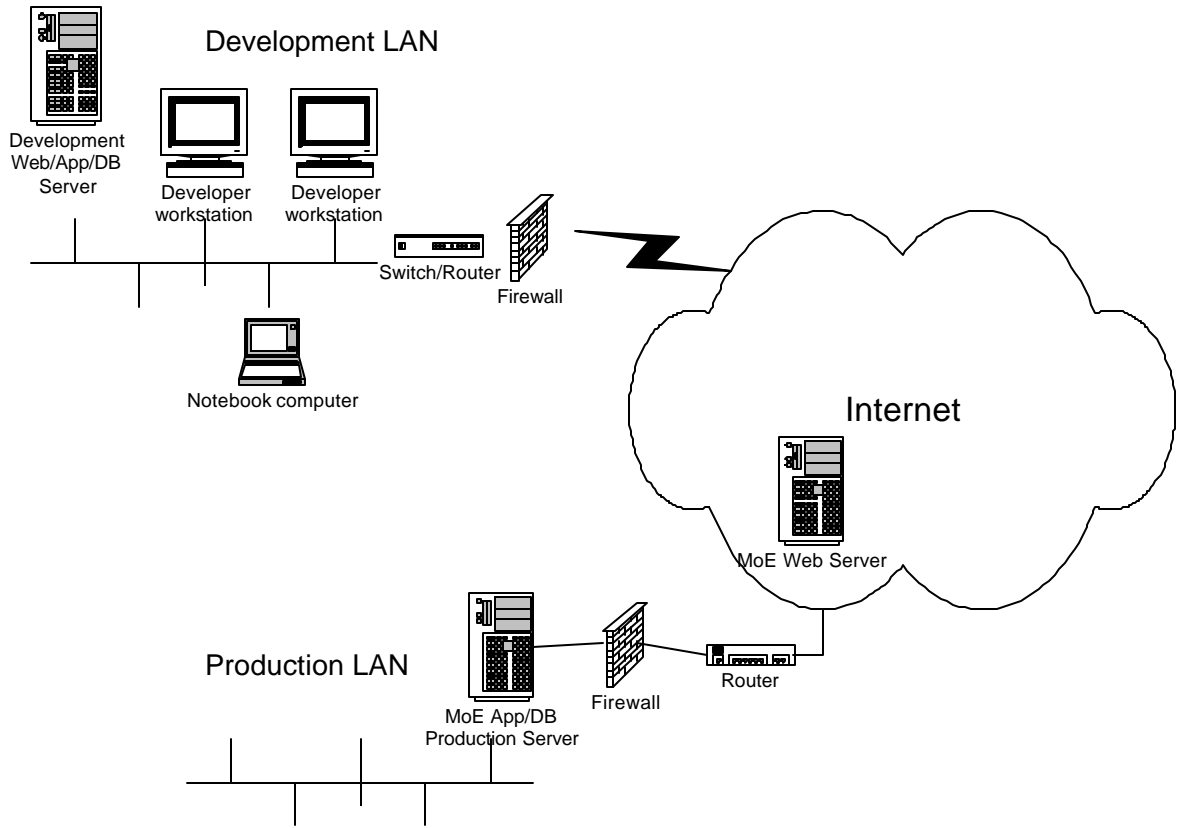
Illustration clearly shows system's four layers in a way that not only clearly separates presentation and data access but also introduces "Business Logic" layer in which processing of data is separated from presentation and data storing.

Same logic is illustrated on page 8, II.3.3 Technical architecture overview where is graphically shown how each of three layers has its own separate server: database server (data layer), application server (processing layer) and web server (presentation layer).

In our Concept, access via Internet (web) is the only planned access. Figure 2. clearly picture Users (clients) accessing data via Web Browser. Internet and The Ministry of Environment Web Server are also included into illustration on p. 8, II.3.3 Technical architecture overview.

Shortly, pilot project is designed as a demonstration how environmental data can be gathered, processed and accessed via Internet.

II.3.3 Technical architecture overview



Figure

3.

II.3.4 Proof of concept application (quality of bathing water)

Indicator "quality of bathing see water" will be fully described in metabase, existing data will be entered into database, links with relevant data sources established and necessary procedures and training for relevant personnel provided.

Functioning of the application will be presented to all interested parties, including general public and NGOs. NGOs, data providers and data users (authorized institutions) will be provided with training and workshop programmes about the pilot project and its results. General public will be provided with necessary information via The Ministry of Environment's web, pilot project's web and public media. Costs of those trainings and information providing is included into budget, see p. 10, items 5. Education & 8. Documentation.

Data entering will be realized through web-forms pages, protected by login/password schema. Processing, storing into database and response will be generated by business object layer (see [II.3.2](#)) and presented to user as success/failure web page.

After data entering/updating availability to monitoring bodies will be realized through second group of dynamically generated web pages, again protected by login/password.

Public access to data will be realized through third group of dynamically generated web pages (publicly available) enhanced with geographic maps with numeric and color-coded information about quality of bathing water in specific area.

Public accessibility will be further improved by including links to our pilot project web server from various relevant web sites in Croatia (The Ministry of Environment, news and web portals...)

III: BUDGET

Rough estimates for budget distribution based on proposed activities and The Ministry of Environment needs:

1. <u>Hardware</u>	EUR 40.000
2. <u>Links</u>	EUR 8.000
(for items 1. and 2. see Annex 1)	
3. <u>Software</u> IT experts: 210 Wkdys x ? 200	EUR 42.000
4. <u>Organization</u> (Encompasses administration of the project: office costs, stationary & expendable supplies, printing, mailing, project secretary fees, fuel etc)	EUR 7.000
5. <u>Education</u> Encompasses training and motivation programmes for 4 main target groups: 1. data source personnel that carries out measuring&monitoring, 2. data collecting personnel: relevant functions in 5 coastal counties responsible for forwarding data to The Ministry of Environment's Cadastre, 3. Ministry of Environment's personnel, 4. public & other interested parties: NGO, media, local communal & business organizations (tourist industry...) Expenses include: training / tutors' costs, travel & accomodation, training materials.	EUR 20.000
6. <u>Installation</u> IT experts: 40 Wkdys x ? 200	EUR 8.000
7. <u>Control</u> (Verification & validation of project design) IT experts: 25 Wkdys x ? 200	EUR 5.000
8. <u>Documentation</u> Encompasses costs of gathering information, developing and editing of project documentation considering target groups specified under item 5. Education: - information gathering: check list, protocols, reports - project development plans & procedures - project manual* - instructions for data providers and data users	EUR 20.000
TOTAL: (say: onehundredfiftythousand EUR)	EUR 150.000

* Project Manual should contain both aspects from the point of completed pilot project and from the point of further possible development of the project towards comprehensive integrated environmental IS.

IV. HUMAN RESOURCES

1. business processes designer (2x)
2. web programmer (1x)
3. Java programmer (1x)
4. database designer (1x)
5. system administrator (1x)
6. communication engineer (1x)
7. trainers (2x)
8. researchers (4x)
9. project manager (1x)

Annex:

- a) **Hardware & Software specification (specific prices may be subject to change during the project implementation)**

		EUR Pcs	Total
Developer Workstation		2500 3	7500
Form factor	Mini Tower		
Processor type	Pentium 4		
Processor speed	2000 MHz		
Processor cache	512 KB		
Hard drive type	EIDE		
Maximum storage	80 GB		
Memory	512 MB		
Operating system	Microsoft Windows 2000 Professional		
Optical drive	48X-20X CD-ROM		
Monitor	19inch FD Trinitron (17.9 inch Viewable)		
Notebook			
Processor type	Pentium III	2000 1	2000
Processor speed	1000 MHz		
Processor cache	512 KB		
Display	(Std) 15.0 in SXGA+ (1400x1050) TFT Display		
Hard drive type	EIDE		
Memory	512 MB		
Maximum memory	1024 MB		
Operating system	Microsoft Windows 2000 Professional		
Optical drive	8X-2.3XDVD		
Development Server		2000 1	2000
Processor type	Pentium III		
Processor speed	1GHz		
Processor cache	256KB		
Storage	EIDE 120 GB		
Memory	1048 MB		
Optical drive	48X-20X CD-ROM		
Monitor	17inch FST (15.9inch Viewable)		
App/DB Server		9000 2	18000
Processor type	Dual Pentium III		
Processor speed	2* 1.13 GHz/133MHZ -512KB Cache		
Processor cache	512 KB		
Storage	ServeRAID -4Mx Ultra160 SCSI Controller		
	RAID 1 - Primary Array - 2 HDDs required		
	2*18.2 GB 10K-rpm Ultra160 SCSI Hot-Swap SL HDD		

	IBM 20/40GB DLT Internal SCSI Tape Drive (FH)		
Memory	2048 MB		
Maximum memory	4096 MB		
Optical drive	48X-20X CD-ROM		
Monitor 17inch FST (15.9inch Viewable)			
Web Server		4000 1	4000
Form factor	Tower		
Processor type	Pentium III		
Processor speed	1000 MHz		
Processor cache	256 KB		
Memory	1024 MB		
Maximum memory	4096 MB		
Optical drive	48X-20X CD-ROM		
PCI Fast/Wide Ultra SCSI Adapter			
IBM 18.2 GB 10K-rpm Ultra160 SCSI SL HDD)			
Monitor 17inch FST (15.9inch Viewable)			
Networking			
10/100BaseT Modular Router w/2 WAN slots, 8M Flash/32M DRAM		3000 2	6000
1-Port Serial WAN Interface Card			
1-Port ISDN withNT-1WAN Interface Card(dial and leased line)			
Cisco 1700 IOS Firewall			
Lan Switch		1000 1	1000
Leased line per month 256 kbita		1000 6	6000
		TOTAL:	46500