



Reference Information Specifications for Europe –

Specific Support Activity SSA3-2005-012141

Project co-funded by the European Commission within the 6th Framework Programme (2002-2006)
Integrating and Strengthening the European Research Area – Priority 4: Aeronautics & Space

Data Harmonisation Requirements Version 1.0

Deliverable number: 13 [**3.1.2**]

Date: 10 February 2006

© RISE 2006 - Distribution: CO

Project started: 1st September 2005

Duration: 24 months

Project Coordinator: Nick Land, EuroGeographics



Bundesamt für
Kartographie und Geodäsie



Customer:	European Commission
Customer Reference:	Contract FP6-012141
Project Title:	RISE: Reference Information Specifications for Europe
Document Title	Data Harmonisation Requirements
Principle Author	Jörgen Hartnor, Helen Eriksson
Principal Contributors	
Responsible Partner	NLS
Reviewed By	PCMG Leads
Approved by	Nick Land
Filename	RISE13_Data_Harmonisation_Requirements_v1.0.doc
Distribution	PU
Contact	http://www.eu-rise.org/ Jorgen.Hartnor@lm.se

© Copyright RISE 2006.

This document has been prepared for use by the RISE Project Partners. It can be used or disseminated consistent with the document classification given on the front page (see coding below).	
PU	Public
PP	Restricted to other programme participants (including the Commission Services)
RE	Restricted to a group specified by the consortium (including the Commission Services)
CO	Confidential, only for members of the consortium (including the Commission Services)

Revision History			
Version	Author	Date	Comments
V1.0a	Jörgen Hartnor, Helen Eriksson	2005-11-01	1 st draft for review by RISE consortium
V1.0b	Louis Hecht, Jörgen Hartnor, Helen Eriksson	2005-12-07	2 nd draft, document restructured. Comments from Louis Hecht incorporated, more info about projects, GMES and Inspire
V1.0c	Jörgen Hartnor, Helen Eriksson	2005-12-22	3rd draft, added information about the CatchMod cluster project, and some other minor adjustments
V1.0d	Jörgen Hartnor, Helen Eriksson	2006-02-09	Final draft, added Executive summary, updated Section 7 – Analysis and Conclusions, general "polishing" of the document
V1.0		2006-02-10	Minor edits to cover pages.

Executive Summary

This is the final issue of the Data Harmonisation Requirements report for the RISE Project. This document constitutes deliverable no.13 and is produced within Work Package 3.1 of the project.

The document provides an overview of the aims of the project and of the RISE process, i.e. the spiral development process of work that RISE will follow. The document further provides an overview of the Water Framework Directive (WFD) and of the initiatives Global Monitoring for Environment and Security (GMES) and INfrastructure for SPatial InfoRmation in Europe (INSPIRE) in order to establish the environment in which the RISE project should work. It also summarises the selected GMES thematic projects and other projects relevant to RISE.

Finally, the document provides an analysis of the findings from the different GMES projects with regard to data harmonisation and gives recommendations for the further development of use cases (Work Package 3.2 of the project). The objective of the use cases is to test the methodology and guidelines developed within RISE and to form the basis for the prototype. It is suggested that, as a first priority, use cases are found within the area of diffuse nutrient leakage into rivers since both GMES and WFD requirements are represented in such use cases, all within the INSPIRE principles.

More detailed descriptions about the WFD, GMES, INSPIRE, the selected GMES thematic projects and other relevant projects can be found in the Appendices.

Contents

EXECUTIVE SUMMARY	4
CONTENTS	5
1 INTRODUCTION	11
1.1 THE RISE PROCESS	12
2 TERMS	13
3 REQUIREMENTS FROM THE WATER FRAMEWORK DIRECTIVE	16
3.1 INTRODUCTION	16
3.2 THE WFD IN BRIEF	16
3.3 SURFACE WATERS	17
4 GMES THEMATIC PROJECTS	18
4.1 INTRODUCTION	18
4.2 ARMONIA.....	19
4.2.1 <i>Project Consortium</i>	19
4.2.2 <i>Aim of the Project and Objectives to be Achieved</i>	19
4.2.3 <i>Potential Relevance to the RISE Project</i>	19
4.3 EDEN-IW.....	19
4.3.1 <i>Project Consortium</i>	20
4.3.2 <i>Aim of the Project and Objectives to be Achieved</i>	20
4.3.3 <i>Potential Relevance to the RISE Project</i>	20
4.4 EFAS.....	20
4.4.1 <i>Project Consortium</i>	20
4.4.2 <i>Aim of the Project and Objectives to be Achieved</i>	21
4.4.3 <i>Potential Relevance to the RISE Project</i>	21
4.5 GEOLAND.....	21
4.5.1 <i>Project Consortium</i>	21
4.5.2 <i>Aim of the Project and Objectives to be Achieved</i>	21
4.5.3 <i>Potential Relevance to the RISE Project</i>	22
4.6 GSE LAND	22
4.6.1 <i>Project Consortium</i>	22
4.6.2 <i>Aim of the Project and Objectives to be Achieved</i>	22
4.6.3 <i>Potential Relevance to the RISE Project</i>	23
4.7 HALO.....	23
4.7.1 <i>Project Consortium</i>	23
4.7.2 <i>Aim of the Project and Objectives to be Achieved</i>	23
4.7.3 <i>Potential Relevance to the RISE Project</i>	24
4.8 MARCOAST	24
4.8.1 <i>Project Consortium</i>	24
4.8.2 <i>Aim of the Project and Objectives to be Achieved</i>	24
4.8.3 <i>Potential Relevance to the RISE Project</i>	24
4.9 MOTIIVE.....	24
4.9.1 <i>Project Consortium</i>	24
4.9.2 <i>Aim of the Project and Objectives to be Achieved</i>	25
4.9.3 <i>Potential Relevance to the RISE Project</i>	25
4.10 ORCHESTRA.....	25
4.10.1 <i>Project Consortium</i>	25
4.10.2 <i>Aim of the Project and Objectives to be Achieved</i>	25
4.10.3 <i>Potential Relevance to the RISE Project</i>	25
4.11 PREVIEW.....	26

4.11.1	<i>Project Consortium</i>	26
4.11.2	<i>Aim of the Project and Objectives to be Achieved</i>	26
4.11.3	<i>Potential Relevance to the RISE Project</i>	26
4.12	RISK-EOS.....	26
4.12.1	<i>Project Consortium</i>	26
4.12.2	<i>Aim of the Project and Objectives to be Achieved</i>	27
4.12.3	<i>Potential Relevance to the RISE Project</i>	27
4.13	WIN.....	27
4.13.1	<i>Project Consortium</i>	27
4.13.2	<i>Aim of the Project and Objectives to be Achieved</i>	27
4.13.3	<i>Potential Relevance to the RISE Project</i>	28
5	INSPIRE – STATUS AND REQUIREMENTS	29
5.1	INTRODUCTION.....	29
5.2	GENERAL.....	29
5.3	THE PROPOSAL IN BRIEF.....	30
5.4	THE INSPIRE ANNEXES.....	30
6	OTHER RELEVANT PROJECTS	32
6.1	INTRODUCTION.....	32
7	ANALYSIS AND CONCLUSIONS	35
7.1	CROSS REFERENCE GMES/WFD/INSPIRE.....	35
7.2	SUMMARY OF USER REQUIREMENTS AS DEPICTED IN THE GMES THEMATIC PROJECTS.....	36
7.3	THE WATER FRAMEWORK DIRECTIVE.....	37
7.4	INSPIRE.....	38
7.5	INTERDEPENDENCIES AND SUGGESTIONS ON USE CASES.....	38
7.5.1	<i>Introduction</i>	38
7.5.2	<i>Suggested first priority Use Case - Diffuse nutrient leakage into rivers</i>	39
7.5.3	<i>Suggested second priority Use Case - Flooding</i>	40
7.5.4	<i>Summary of suggested Use Cases and their interdependencies</i>	41
	APPENDIX 1 – WATER FRAMEWORK DIRECTIVE – WFD	42
1	SURFACE WATERS.....	42
2	THE WATER FRAMEWORK DIRECTIVE TIMETABLE.....	48
3	GIS IMPLEMENTATION OF THE WFD.....	49
3.1	<i>GIS Requirements under the WFD and Scope of the Working Group</i>	49
3.2	<i>Reporting under the Water Framework Directive</i>	50
3.3	<i>Timetable for the Preparation and Delivery of Maps and GIS Layers</i>	50
3.4	<i>Summary of Maps and GIS Layers</i>	52
	APPENDIX 2 - INSPIRE	55
1	THE PROPOSAL IN BRIEF.....	55
1.1	<i>Metadata</i>	55
1.2	<i>Interoperability of spatial data sets and services</i>	55
1.3	<i>Network services</i>	56
1.4	<i>Portal and standards</i>	57
2	THE INSPIRE ANNEXES.....	57
2.1	<i>ANNEX I, Spatial Data Themes Referred to in Articles 9(A), 13(1) and 14(A)</i>	57
2.2	<i>ANNEX II, Spatial Data Themes Referred to in Articles 9(A), 13(1) and 14(B)</i>	58
2.3	<i>ANNEX III, Spatial Data Themes Referred to in Articles 9(B) and 14(B)</i>	58
	APPENDIX 3 - GMES BACKGROUND	61
1	INTRODUCTION.....	61
2	GMES ACTION PLAN.....	62
2.1	<i>A partnership of the key European actors</i>	62
2.2	<i>European Shared Information Services</i>	62
2.3	<i>A permanent dialogue between the stakeholders</i>	62
2.4	<i>The GMES Action Plan (2002-2008)</i>	63
2.5	<i>GMES Pilot services</i>	63

APPENDIX 4 - GMES THEMATIC PROJECTS	64
1 ARMONIA.....	64
1.1 Project Consortium	64
1.2 General Information about the Project.....	64
1.3 Anticipated Services/Products.....	65
1.4 Data Requirements.....	65
1.5 Analysis - Required Data Harmonisation.....	67
2 ASSIST.....	67
2.1 Project Consortium	68
2.2 General Information about the Project.....	68
2.3 Anticipated Services/Products.....	68
2.4 Data Requirements.....	69
2.5 Analysis - Required Data Harmonisation.....	69
3 BICEPS	69
3.1 Project Consortium	69
3.2 General Information about the Project.....	69
3.3 Anticipated Services/Products.....	70
3.4 Data Requirements.....	71
3.5 Analysis - Required Data Harmonisation.....	71
4 EDEN-IW	71
4.1 Project Consortium	71
4.2 General Information about the Project.....	72
4.3 Anticipated Services/Products.....	72
4.4 Data Requirements.....	72
4.5 Analysis - Required Data Harmonisation.....	73
5 EFAS	74
5.1 Project Consortium	74
5.2 General Information about the Project.....	74
5.3 Anticipated Services/Products.....	74
5.4 Data Requirements.....	75
5.5 Analysis - Required Data Harmonisation.....	75
6 EFFS.....	76
6.1 Project Consortium	76
6.2 General Information about the Project.....	77
6.3 Anticipated Services/Products.....	78
6.4 Data Requirements.....	78
6.5 Analysis - Required Data Harmonisation.....	79
7 GEOLAND	79
7.1 Project Consortium	79
7.2 General Information about the Project.....	81
7.3 Anticipated Services/Products.....	82
7.4 Data Requirements.....	83
7.5 Analysis - Required Data Harmonisation.....	83
8 GSE LAND.....	83
8.1 Project Consortium	84
8.2 General Information about the Project.....	84
8.3 Anticipated Services/Products.....	85
8.4 Data Requirements.....	86
8.5 Analysis - Required Data Harmonisation.....	86
9 HALO.....	86
9.1 Project Consortium	87
9.2 General Information about the Project.....	87
9.3 Anticipated Services/Products.....	87
9.4 Data Requirements.....	88
9.5 Analysis - Required Data Harmonisation.....	88
10 MARCOAST.....	88
10.1 Project Consortium	88
10.2 General Information about the Project.....	89
10.3 Anticipated Services/Products.....	89
10.4 Data Requirements.....	90

10.5	<i>Analysis - Required Data Harmonisation</i>	90
11	MOTIIVE.....	90
11.1	<i>Project Consortium</i>	90
11.2	<i>General Information about the Project</i>	90
11.3	<i>Anticipated Services/Products</i>	91
12	OASIS.....	92
12.1	<i>Project Consortium</i>	92
12.2	<i>General Information about the Project</i>	92
12.3	<i>Anticipated Services/Products</i>	93
12.4	<i>Data Requirements</i>	93
12.5	<i>Analysis - Required Data Harmonisation</i>	93
13	ORCHESTRA.....	93
13.1	<i>Project Consortium</i>	93
13.2	<i>General Information about the Project</i>	94
13.3	<i>Anticipated Services/Products</i>	94
13.4	<i>Data Requirements</i>	95
13.5	<i>Analysis - Required Data Harmonisation</i>	95
14	PREVIEW.....	95
14.1	<i>Project Consortium</i>	95
14.2	<i>General Information about the Project</i>	97
14.3	<i>Anticipated Services/Products</i>	97
14.4	<i>Data Requirements</i>	98
14.5	<i>Analysis - Required Data Harmonisation</i>	98
15	RAMFLOOD.....	98
15.1	<i>Project Consortium</i>	98
15.2	<i>General Information about the Project</i>	99
15.3	<i>Anticipated Services/Products</i>	99
15.4	<i>Data Requirements</i>	99
15.5	<i>Analysis - Required Data Harmonisation</i>	100
16	RISK_FORCE.....	100
16.1	<i>Project Consortium</i>	100
16.2	<i>General Information about the Project</i>	101
16.3	<i>Anticipated Services/Products</i>	101
16.4	<i>Data Requirements</i>	101
16.5	<i>Analysis - Required Data Harmonisation</i>	101
17	RISK-EOS.....	102
17.1	<i>Project Consortium</i>	102
17.2	<i>General Information about the Project</i>	102
17.3	<i>Anticipated Services/Products</i>	103
17.4	<i>Data Requirements</i>	104
17.5	<i>Analysis - Required Data Harmonisation</i>	106
18	SAGE.....	106
18.1	<i>Project Consortium</i>	106
18.2	<i>General Information about the Project</i>	106
18.3	<i>Anticipated Services/Products</i>	107
18.4	<i>Data Requirements</i>	108
18.5	<i>Analysis - Required Data Harmonisation</i>	109
19	SISCAL.....	109
19.1	<i>Project Consortium</i>	109
19.2	<i>General Information about the Project</i>	110
19.3	<i>Anticipated Services/Products</i>	110
19.4	<i>Data Requirements</i>	111
19.5	<i>Analysis - Required Data Harmonisation</i>	111
20	WIN.....	111
20.1	<i>Project Consortium</i>	111
20.2	<i>General Information about the Project</i>	111
20.3	<i>Anticipated Services/Products</i>	112
20.4	<i>Data Requirements</i>	112
20.5	<i>Analysis - Required Data Harmonisation</i>	113

APPENDIX 5 - OTHER RELEVANT PROJECTS 114

1	CATCHMOD CLUSTER PROJECT	114
1.1	<i>Envisaged Catchment Projects Interactions</i>	115
2	BMW	118
2.1	<i>Project Consortium</i>	118
2.2	<i>General Information about the Project</i>	119
2.3	<i>Potential Relevance to the RISE Project</i>	119
3	EUROHARP	119
3.1	<i>Project Consortium</i>	120
3.2	<i>General Information about the Project</i>	120
3.3	<i>Potential Relevance to the RISE Project</i>	121
4	HARMONI-CA	121
4.1	<i>Project Consortium</i>	121
4.2	<i>General Information about the Project</i>	121
4.3	<i>Potential Relevance to the RISE Project</i>	122
5	HARMONIQUA	122
5.1	<i>Project Consortium</i>	122
5.2	<i>General Information about the Project</i>	123
5.3	<i>Potential Relevance to the RISE Project</i>	123
6	HARMONIRIB.....	123
6.1	<i>Project Consortium</i>	124
6.2	<i>General Information about the Project</i>	124
6.3	<i>Potential Relevance to the RISE Project</i>	124
7	HARMONIT	124
7.1	<i>Project Consortium</i>	125
7.2	<i>General Information about the Project</i>	125
7.3	<i>Potential Relevance to the RISE Project</i>	126
8	HMA.....	126
8.1	<i>Project Consortium</i>	126
8.2	<i>General Information about the Project</i>	127
8.3	<i>Potential Relevance to the RISE Project</i>	127
9	SDIGER.....	127
9.1	<i>Project Consortium</i>	128
9.2	<i>General Information about the Project</i>	128
9.3	<i>Potential Relevance to the RISE Project</i>	128
10	SSE	129
10.1	<i>Project Consortium</i>	129
10.2	<i>General Information about the Project</i>	129
10.3	<i>Potential Relevance to the RISE Project</i>	129
11	WISE	129
11.1	<i>Project Consortium</i>	130
11.2	<i>General Information about the Project</i>	130
11.3	<i>Potential Relevance to the RISE Project</i>	131

Blank page.

1 Introduction

Europe recognises the need for action to protect the environment and ensure the security of its citizens. The European Commission (EC) is encouraging and coordinating such action through the issue of European Directives, to be carried out by national governments, and through the development of the Global Monitoring for Environment and Security (GMES) programme, which is aimed at promoting the development of Information Services to support decision makers. Central to the success of these Programmes is the development of common specifications for data documentation, collection and exchange. RISE addresses the central issue of “data harmonisation” which is widely considered a prerequisite for interoperability among geospatial information systems.

The primary aim of the RISE project is to produce **methodology and guidelines** for the creation of geospatial data implementation specifications consistent with the international and industrial standards that encompass the development of application schema and data product specifications so that Europe may realize its objectives for a sustainable and interoperable functioning of GMES services within the INSPIRE principles. For the purpose of this project, a ‘geospatial data implementation specification’ shall be comprised of the following elements: UML and GML application schema, a (human readable) feature catalogue plus other relevant parts of a data product specification. The subsidiary aims for the Project are:

- Meet the requirements of GMES, INSPIRE, Water Framework Directive, other EC policies and EU strategic objectives
- Build synergies with existing, past and future GMES, GSE and Integrated Projects.
- Work closely with the parallel EC SSA Project MOTIIVE¹
- Develop and test a subset of the implementation specifications by concentrating on the dual requirements of GMES and the Water Framework Directive (WFD), by exploiting the natural drainage basin as the fundamental level of geography to be studied.
- Raise awareness of the results and recommendations of the project.

The key outcome from the project will be the definition of a process – a repeatable methodology – for developing, adopting and maintaining data implementation specifications. Definition of this ‘repeatable methodology’ will be based upon real implementation specification needs, documented in the project for a subset of INSPIRE data components that match the priorities identified within the thematic GMES projects. The definition of the repeatable methodology will address issues concerning process and standards to be adopted, organisational models to link the user and producer communities, links to standardisation bodies for adoption of the specifications, best practice training for testing the specifications through prototyping, and a recommended ‘road map’ for implementation.

The RISE project will build upon the accomplishments and results of previous and - where possible - current projects. This report documents requirements identified within the GMES thematic projects, INSPIRE and related policy areas in the context of our concerted focus on

¹ MOTIIVE – EC SSA: Marine Overlays on Topography for Annex II Valuation and Exploitation. Plans to investigate the data harmonization issues in the ocean and marine applications area including relevant terrestrial, bathymetry and coastal elevation issues.

the Water Framework Directive (WFD). In accordance with the proposal, particular emphasis is placed on content information concerning surface water and elevation.

1.1 The RISE Process

In order to produce sustainable results and provide best support for INSPIRE, GMES and related operational scenarios, RISE is following a standardised and well-documented approach, which is described in the OpenGIS Reference Model (ORM). The ORM is an abstraction of the RM-ODP (ISO Reference Model for Open Distributed Processing, ISO/IEC 10746), which provides the framework for a Spiral Development process, which is predictable and repeatable. It serves several important facets of standards-based development: It is used to guide multi-stakeholder concurrent engineering of software-intensive systems and it has two main distinguishing features: One is a cyclic approach for incrementally growing a system's degree of definition and implementation based on requirements that are expressed as capabilities. The other is a set of anchor point milestones for ensuring stakeholder commitment to feasible and mutually satisfactory system solutions.

A Process Model answers two main questions: What should the project do next and how long should the project continue doing it? The spiral model holds that the answers to these questions vary from project to project, and that the variation is driven by risk considerations. It emphasizes the importance of having all of the project's success-critical stakeholders participate concurrently in defining and executing the project's processes (it uses risk considerations to ensure that progress is not overly slowed down by stakeholder "over participation"). It can be used to integrate software, hardware, and systems considerations, but is most important to use for software-intensive systems.

In RISE, the following steps define each spiral in the Spiral Development process:

- Requirements expressed as capabilities are described in use case scenarios.
- A universe of discourse is defined from the real world into a conceptual schema which is a model based on feature types and their properties resulting in a common terminology. As conceptual schema language, the Unified Modelling Language (UML) as profiled by ISO/TC 211 will be used.
- Based upon the conceptual schema, a GML application schema will be generated in OGC's Geography Markup Language (GML) standardised as ISO 19136.
- These results will be tested within a prototype under real world conditions and brought forward to OGC and industry for appropriate consideration and feedback.
- Incremental costs and benefits of the harmonisation efforts will be tracked and documented as repeatable sustainable capability within the exploitation guidelines.

Given the boundary conditions in the contract, with regard to finance and time, the RISE project must focus on a limited area for which the steps in the Spiral Development process will be applied. The process needs to be part of and infused into every aspect of work and resulting products/deliverables. This document identifies relevant projects that could provide input to both methodological and the application of that method of the RISE process and in particular provides a baseline about the scope, technical approach and work delivered from these projects. Information is presented to assure that we can track other projects and map their results and programmatic activities against the logic of the RISE process.

2 Terms

Application Schema

Conceptual schema for data required by one or more applications.

Conceptual Model

Model that defines concepts of a universe of discourse.

Conceptual Schema

Formal description of a conceptual model.

CSL

Core Service Land Cover

The Geoland Core Service Land Cover aims at serving the Geoland regional Observatories and a number of national level user organisations with harmonized, topical and geometric correct basic information on Land Cover.

Data Harmonisation

Providing access to data through network services in a representation that allows for combining it with other INSPIRE data in a coherent way by using within the ESDI a common set of coordinate reference systems, classification systems, application schemas, etc.

DPS

Data product Specification

Detailed description of a dataset or dataset series together with additional information that will enable it to be created, supplied to and used by another party.

ESDI

European Spatial Data Infrastructure

A Spatial Data Infrastructure may be defined as a framework of policies, institutional arrangements, technologies, data and people that makes it possible to share and use geographic information effectively.

GMES

Global Monitoring for Environment and Security

GMES is a joint initiative of the European Space Agency and the European Commission that has been set up to establish a European Capacity for Global Monitoring of Environment and Security by 2008.

GML

Geography Mark-up Language, a derivation of XML by OGC, particularly suitable for digital map transmission.

GSE

GMES Services Element

GSE focuses upon the delivery of policy-relevant services to end-users, primarily (but not exclusively) from Earth Observation (EO) sources. GSE is a key element of GMES, since it enables end-users to become involved in “closing the loop” between the operational results obtained from the present generation of EO satellites and the definition of future systems.

INSPIRE

INfrastructure for Spatial InfoRmation in Europe

Framework directive for building an infrastructure for spatial information in the Community.

Interoperability

Capability to communicate, execute programs, or transfer data among various functional units in a manner that requires the user to have little or no knowledge of the unique characteristics of those units [ISO 2382-1].

NOTE It is worth to note that strictly speaking there is no "interoperability" between data sets. The only things that can interoperate are services and systems. In the case of several heterogeneous data sources, interoperability requires "wrapping" data sources into services that conform to standards. The output of these services is what is to be harmonised, not their inputs (database schemas). Thus the legacy is maintained and can evolve to support the specified service interfaces. As a result, data producers will not have to change the structure of their data.

IP

Integrated Project

IPs are multipartner projects to support objective-driven research, where the primary deliverable is generating the knowledge required to implement the thematic priorities. IPs should bring together a critical mass of resources to reach ambitious goals aimed either at increasing Europe's competitiveness or at addressing major societal needs.

OGC

OpenGIS Consortium

OpenGIS is defined as transparent access to heterogeneous geodata and geoprocessing resources in a networked environment. The goal is to provide a comprehensive suite of open interface specifications that enable developers to write interoperational components that provide these capabilities.

ORM

OpenGIS Reference Model. The ORM is an abstraction of the RM-ODP (see description below).

RM-ODP

ISO Reference Model for Open Distributed Processing, ISO/IEC 10746.

SSA

Specific Support Action

Support activities are more limited in scope than the accompanying measures of the other European Commission Framework Programmes. These projects aim to contribute actively to the implementation of activities of the work programme, the analysis and dissemination of results or the preparation of future activities.

UML

Unified Modelling Language, an Object Oriented notation for expressing analysis and design.

WFD

Water Framework Directive - was adopted by the European Parliament and of the Council in 2000 and establishes a framework for Community action in the field of water policy and has since then been incorporated in the legislation of Member States.

XML

eXtensible Mark-up Language, increasingly used as a common standard for Internet data communication.

3 Requirements from the Water Framework Directive

3.1 Introduction

The Water Framework Directive (2000/60/EC) – “WFD” - was adopted by the European Parliament and of the Council in 2000 and establishes a framework for Community action in the field of water policy and has since then been incorporated in the legislation of Member States.

The WFD provides the major driver for achieving sustainable management of water in the EU Member States. It requires that inland and coastal waters within defined river basin districts must reach at least *good status* by 2015 and defines how this should be achieved through the establishment of environmental objectives and ecological targets.

The WFD is a complex directive which contains many regulations. It must therefore be noted that the text in this section is not meant to be a conclusive summary, but rather to highlight the requirements on surface water relevant to the RISE project. Paragraphs in *italic* are direct quotations.

3.2 The WFD in brief

Article 1 defines the purpose of the directive as follows:

The purpose of the Directive is to establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater which:

- (a) prevents further deterioration and protects and enhances the status of aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands directly depending on the aquatic ecosystems;*
- (b) promotes sustainable water use based on a long-term protection of available water resources;*
- (c) aims at enhanced protection and improvement of the aquatic environment, inter alia, through specific measures for the progressive reduction of discharges, emissions and losses of priority substances and the cessation or phasing-out of discharges, emissions and losses of the priority hazardous substances;*
- (d) ensures the progressive reduction of pollution of groundwater and prevents its further pollution, and*
- (e) contributes to mitigating the effects of floods and droughts and thereby contributes to:*
 - *the provision of the sufficient supply of good quality surface water and groundwater as needed for sustainable, balanced and equitable water use,*
 - *a significant reduction in pollution of groundwater,*
 - *the protection of territorial and marine waters, and*
 - *achieving the objectives of relevant international agreements, including those which aim to prevent and eliminate pollution of the marine environment, by Community action under Article 16(3) to cease or phase out discharges, emissions and losses of priority hazardous substances, with the ultimate aim of achieving concentrations in the marine environment*

near background values for naturally occurring substances and close to zero for man-made synthetic substances.

Article 5 defines the responsibility for each Member State to define the characteristics of the river basin district, review of the environmental impact of human activity and economic analysis of water use. The technical specifications for this work is found in Annex II and III and should be completed at the latest four years after the date of entry into force. The analyses and reviews shall be reviewed and if necessary updated at the latest 13 years after the entry into force of the directive and every six years thereafter. A more detailed timetable for the WFD is described in Appendix I.

Article 8 defines the responsibility for Member States to establish programmes for the monitoring of water status in order to establish a coherent and comprehensive overview of water status within each river basin district. These programmes shall be operational at the latest six years after the entry into force of the directive. For surface waters, such programmes shall cover:

- (i) *the volume and level or rate of flow to the extent relevant for ecological and chemical status and ecological potential, and*
- (ii) *the ecological and chemical status and ecological potential;*

3.3 Surface waters

Article 2 provides the following definitions:

“Body of surface water” means a discrete and significant element of surface water such as a lake, a reservoir, a stream, river or canal, part of a stream, river or canal, a transitional water or a stretch of coastal water.

“River basin” means the area of land from which all surface run-off flows through a sequence of streams, rivers and, possibly, lakes into the sea at a single river mouth, estuary or delta.

“Sub-basin” means the area of land from which all surface run-off flows through a series of streams, rivers and, possibly, lakes to a particular point in a water course (normally a lake or a river confluence).

Refer to Appendix 1 for a detailed description of the characterisation of surface water body types and their descriptions.

4 GMES Thematic Projects

4.1 Introduction

GMES is a joint initiative of the European Space Agency and the European Commission that has been set up to establish a European capacity for Global Monitoring of Environment and Security by 2008.

It is recalled that the target beneficiaries of GMES services are :

- **The Citizen** – GMES services should enable Europe's citizens to access better and more timely information on the state and evolution of the environment and on factors affecting their security,
- **The Public Sector** – GMES service should support public authorities and national, local and regional governments to formulate, implement and assess their policies on environmental protection, planning and security of the citizen with increased effectiveness,
- **Industry** – GMES Services should support planning, and monitoring of industrial operations and developments that impact environment or security or are subject to environmental standards and regulations.
- **Global Monitoring Programmes** – GMES services should support European leadership in global environmental monitoring and cooperation at global level.

For a more detailed description of GMES, please refer to Appendix 3.

There are a vast number of GMES projects financed by ESA and the EC. A database comprising these projects can be found at <http://www.gmes.info/98.0.html>. This database has been used a basis for this desk study. However, it must be noted that the database is not complete, and it has thus been necessary to search for complementary, relevant information.

From this database, 20 projects have been identified as being of particular relevance to the RISE project. Information about these projects is summarised in Appendix 4 of this document.

Out of these 20 projects, 12 projects have been tentatively identified as having a particular importance for the development of the use cases, the follow-on work on conceptual and application schemas, for the interoperability testing and for the creation of a methodology and guidelines document:

- ARMONIA
- EDEN-IW
- EFAS
- GEOLAND
- GSE LAND
- HALO
- MARCOAST
- MOTIIVE
- ORCHESTRA
- PREVIEW
- RISK-EOS

- WIN

These projects are briefly summarised below. For a more detailed description, please refer to Appendix 4. Projects that will be involved in a RISE use case will be contacted in person. RISE will co-operate with some of the projects and get more detailed information from others. This information will be described in the use case documentation.

4.2 ARMONIA

Applied multi Risk Mapping of Natural Hazards for Impact Assessment.

<http://www.armoniaproject.net>

Project Start Date: 2001-07-01

End Date: 2004-07-01

4.2.1 Project Consortium

The project consists of 12 different partners. The coordinator of the project is T6 Società Cooperativa from Italy.

4.2.2 Aim of the Project and Objectives to be Achieved

The overall aim of the research project ARMONIA is to provide the EU with a new harmonised methodology for producing integrated risk maps to achieve more effective spatial planning procedures in areas prone to natural disasters in Europe.

Objectives to be achieved by ARMONIA :

- Integration/optimisation of methodologies for risk assessment for different types of potentially disastrous events;
- Harmonisation of different risk mapping processes for standardising data collection/analysis, monitoring, outputs and terminology for end users (multi-hazard risk assessment);
- Design of a harmonised decision-making tool structure for applying hazard and risk mitigation in spatial planning;
- Contribution to the implementation of natural hazard awareness into the improvement of Environmental Assessment policy.

4.2.3 Potential Relevance to the RISE Project

The aim of the ARMONIA project was to create a harmonised methodology for producing integrated risk maps. As this project is completed, the RISE project might learn something from their work with the data harmonisation process. Especially the writing of the Guidelines could profit from comparing many different data harmonisation projects.

4.3 EDEN-IW

Environment Data Exchange for Inland Water.

<http://www.eden-iw.org/contents/home.html>

Project Start Date: 2001-07-01

End Date: 2004-07-01

4.3.1 Project Consortium

The project consists of 6 different partners. The coordinator of the project is the Joint Research Centre from Italy.

4.3.2 Aim of the Project and Objectives to be Achieved

The Environmental Data Exchange Network for Inland Water (EDEN-IW) project aims to develop at European level a service integrating disparate, heterogeneous, government databases on inland water.

The project has 5 main thrusts:

1. Development of advanced agent based technology to underpin rich semantic information exchange across Europe with the additional capability of communicating with other agent systems within an European and global framework, for instance the agent system employed by the US EPA in the Environmental Data Exchange Network.
2. Research and development of a specific application on Inland Water data, i.e. connect a number of relevant databases to the system.
3. Enrichment of the possibilities for environmental management by adding new types of intelligent software agents, capable of providing the citizens and decision makers with decision support and knowledge needed to manage complex environmental risk situations related to inland water.
4. Assurance of efficient and effective semantic management, by developing a relevant, specific Inland Water ontology and specific Inland Water glossaries, supported by two external reference multilingual thesauri, allowing easy extension to multi-language situations.
5. Serving the public and the user community, which currently consist of European Environment Agency, United States Environmental Protection Agency, United States Department of Defence, United States Department of Energy, European Topic Centre for Water and the Italian Ministry for the Environment.

4.3.3 Potential Relevance to the RISE Project

EDEN-IW has implemented use cases, developed a conceptual data model and a prototype has been developed for some of the use cases. The prototype produced in the project creates a new standard for environmental data exchange and thereby eases environmental reporting and planning.

The project is completed and the RISE project could learn from the process.

4.4 EFAS

European Flood Alert System

<http://efas.jrc.it/>

Project Start Date: January 2003

End Date: 2006

4.4.1 Project Consortium

The project consists of 6 different partners. The coordinator of the project is the Joint Research Centre from Italy.

4.4.2 Aim of the Project and Objectives to be Achieved

EFAS should provide the European Commission with useful information for the preparation and management of aid during a flood crisis. Second, National Water Authorities should benefit from additional medium-range flood information that might contribute to increased preparedness in an upcoming flood event.

A prototype of EFAS for the Elbe and Danube catchments is expected to be ready and tested by 2006. A grid-based catchment model that has been developed to simulate floods in large European river basins, LISFLOOD, will be used.

The advantages of EFAS for the European Commission are

- Overview of current flood situation in Europe for European Commission services
- Comparable results across Europe
- Fostering harmonised exchange of hydrological data and information in Europe

The advantages of EFAS for the National hydrological Institutes could be

- Additional information on possible flood situations more than 3 days in advance based on different weather forecasts
- Interpretation of flood ensemble prediction system forecasts based on full sets of EPS
- Increased exchange on flood forecasting issues and EPS research between the different institutes participating in EFAS.

4.4.3 Potential Relevance to the RISE Project

The EFAS project can be seen as an important pilot for Inspire as data collection and harmonisation is an integral part of the EFAS activity.

The prototype for the Elbe and Danube and the grid-based LISFLOOD catchments model for simulating floods in large European river basins could be of use if the RISE project decides to develop a Elbe or Danube use case.

4.5 GEOLAND

European forum on earth observation use for environment and security.

<http://www.gmes-geoland.info/index.php>

Project Start Date: 2004-01-01

End Date: 2007-01-02

4.5.1 Project Consortium

The coordinator of the project is Infoterra GmbH from Germany. The project also consist of about 34 user organisations, 26 research partners and 20 service providers.

4.5.2 Aim of the Project and Objectives to be Achieved

The Integrated Project Geoland is carried out in the context of GMES. Geoland is designed to fundamentally support this initiative, focusing on the GMES priorities “Land Cover Change in Europe”, “Environmental Stress in Europe”, and “Global Vegetation Monitoring”. Geoland particularly addresses environmentally relevant issues such as water quality, nature protection, spatial planning, the Kyoto process, and food security.

The Geoland products and services provide geo-information to support monitoring, management and decision making. Service providers may be private or public, including technical departments of the user organisations. Their service integration varies per observatory, ranging from mapping and change detection, through model assimilation, to integration into scenario tools and performing environmental assessments.

4.5.3 Potential Relevance to the RISE Project

If we decide to have a use case on nutrient leakage, we could co-operate with this project.

4.6 GSE LAND

GMES Services Element (GSE) on Land Information.

http://www.esa.int/esaLP/SEMSQU5DIAE_LPgmes_0.html

Project Start Date: 2005-10-01

End Date: 2008

4.6.1 Project Consortium

The coordinator of the project is Infoterra GmbH from Germany.

4.6.2 Aim of the Project and Objectives to be Achieved

The overall goal is to implement a European service network responding to the demand of international, national, regional and local user organisations.

The GSE Land Information Services is based on the main results related to land issues of the three projects SAGE, GMES Urban Services (GUS) and CoastWatch from the GSE consolidation phase and provides guidelines to establishing a set of priority information service centres responding to the main information needs of European institutions.

GSE Land monitoring services are aimed to deliver core land cover data and geo-information services, which are harmonised and standardised for cross-border applications.

The GSE Land monitoring services portfolio includes:

- At European scale:
 1. European Urban Atlas, mapping land use and land cover of European functional areas with more than 100 000 inhabitants, with minimum mapping unit of 0.1 ha
 2. Detailed land cover mapping compatible with Corine land cover, but with minimum mapping unit of 1 ha instead of 25 ha, updated every 3-5 years
 3. Low cost yearly updated land cover change mapping service
 4. Mapping of land cover changes within and surrounding NATURE2000 sites
- At regional to local scale:
 1. Impervious areas and soil sealing levels
 2. Inland water quality/contamination
 3. Irrigation/agricultural water consumption
 4. High resolution inventorying, assessment and monitoring of protected areas
 5. High resolution information service for the environmental management, development control and spatial planning in urban areas
 6. Monitoring impact of agri-environmental measures on rural landscape

4.6.3 Potential Relevance to the RISE Project

GSE Land Information Services are aimed to deliver geo-information services, which are harmonised and standardised for cross-border applications. They are based on general space borne geo-information on Land Cover and Vegetation (LC&V).

These services and the expertise about different models within the project could be of use if it is decided to implement a RISE use case about nutrient leakage.

4.7 HALO

Harmonised coordination of the Atmosphere, Land and Ocean integrated projects of the GMES backbone.

http://www.ecmwf.int/research/EU_projects/HALO/

Project Start Date: 2004-02-01

End Date: 2007-02-01

4.7.1 Project Consortium

The project consists of 5 different partners. The coordinator of the project is E C M W F from United Kingdom.

4.7.2 Aim of the Project and Objectives to be Achieved

The HALO SSA will prepare the architecture and system integration for the interacting part of the 3 IPs (Atmosphere, Ocean and Land) into the GMES framework, and prepare their joint transition to operational status.

HALO will optimise the interactions of the segments of the GMES Backbone by formulating agreed recommendations to the 3 IPs, and to the GMES Steering Group in the areas of:

- Scientific thematic analysis and coordination of observational, modelling and data-assimilation requirements for the interacting parts of the IPs;
- Cross fertilization of scientific thematic leading to an improvement of knowledge, and definition of the overall scientific architecture;
- Identification of shared issues in the areas of data policy implementation, data acquisition, data sharing and data dissemination, leading to proposed candidate solutions; analysis of the candidate solutions, and
- Coordinated transition to operations of the interacting part of the pre-operational systems developed in the 3 IPs.

HALO will support the joint transition of the following IPs to operational status within the GMES framework.

- MERSEA - the integrated project of the GMES Ocean theme.
- GEOLAND - the integrated project of the GMES Land Cover & Vegetation theme.
- GEMS - the integrated project of the GMES Atmosphere theme.

4.7.3 Potential Relevance to the RISE Project

HALO will seek to achieve common data standards for the traffic between the IPs (Atmosphere, Ocean and Land). Internationally agreed data representation standards will be adopted wherever possible. The choice of standards will be discussed at the HALO workshops.

The RISE project need to follow the progress of finding common data standards.

4.8 MARCOAST

MARine & COASTal environmental information services.

Project Start Date: 2005

End Date: 2008

4.8.1 Project Consortium

The project consists of 32 different partners from 10 countries. The coordinator of the project is Alcatel Alenia Space from France.

4.8.2 Aim of the Project and Objectives to be Achieved

MarCoast is a continuation of the ROSES and COASTWATCH projects and it is a GMES service network. In the future the MarCoast project to will be moved to the MarCoast network.

MarCoast proposes a set of six core services, which are:

- Oil spill surveillance and customised information,
- Oil spill drift forecast,
- Water quality monitoring and alert,
- Algae Bloom monitoring, evolution and forecasting,
- Water quality assessment service,
- Met-Ocean data.

4.8.3 Potential Relevance to the RISE Project

If the RISE project decides to have a joint use case, e.g. coastal aspects of nutrient leakage, together with the MOTIIVE project it might be suitable to involve MARCOAST.

4.9 MOTIIVE

Marine Overlays on Topography for Annex II Valuation and Exploitation.

<https://www.seegrid.csiro.au/twiki/bin/view/Marineweb/MOTIIVE>

Project Start Date: 2005-02-01

End Date: 2007-02-01

4.9.1 Project Consortium

The project consists of 11 different partners. The coordinator of the project is HR Wallingford Ltd from the UK.

4.9.2 Aim of the Project and Objectives to be Achieved

MOTIIVE addresses harmonisation requirements between the INSPIRE (Infrastructure for Spatial Information in Europe) core data component "elevation" (terrestrial, bathymetric and coastal) and INSPIRE marine thematic data for "sea regions", "oceanic spatial features" and "coastal zone management areas".

MOTIIVE will exploit the work already completed in regard to marine metadata (MarineXML) and related marine/coastal ontology development and interoperability technology, producing tools and methodologies.

4.9.3 Potential Relevance to the RISE Project

RISE will have a close working relationship with this parallel EC SSA project:

- The two projects will have a joint Harmonisation Advisory Committee (HAC).
- The initial Workshop and final Seminar will be joint activities between RISE and MOTIIVE
- The two projects could develop a joint use case
- Some deliverables from the RISE project will be important inputs into the MOTIIVE Project.

4.10 ORCHESTRA

Open Architecture and Spatial Data Infrastructure for Risk Management.

Project Start Date: 2004-09-01

End Date: 2007-08-31

4.10.1 Project Consortium

The project consists of 14 different partners. The coordinator of the project is Atos Origin from Spain.

4.10.2 Aim of the Project and Objectives to be Achieved

The project will:

- Design an open service-oriented architecture for risk management. Special attention will be paid to an integrated service and data approach including both their spatial, temporal and thematic characteristics.
- Develop the software infrastructure for enabling risk management services.
- Develop services that are useful for different thematic risk management applications (for instance forest fires or floods, man-made risks).
- Validate the ORCHESTRA results in a scenario that involves different risks, both natural and man-made, in a cross-border situation.
- Provide software standards for risk management applications, and to provide additional information about these standards in the form of a book. In particular, the de facto standard of OGC and the de jure standards of ISO and CEN are envisaged to be influenced.

4.10.3 Potential Relevance to the RISE Project

Follow ORCHESTRAS work for getting Multi-Risk Management systems to interoperate and to follow their development of software standards for risk management applications.

4.11 PREVIEW

PREvention, Information and Early Warning pre-operational services to support the management of risks.

Project Start Date: 2005

End Date: 2008

4.11.1 Project Consortium

The project consists of about 61 different partners. The coordinator of the project is EADS ASTRIUM SAS from France.

4.11.2 Aim of the Project and Objectives to be Achieved

PREVIEW address the definition, the development and the validation in pre-operational conditions of information services to support the management in all phases (Prevention, Preparedness, Response and Recovery) of: Windstorms, Forest fires, Plain floods and Flash floods, Earthquake & Volcanic risks, Landslides and Industrial accidents.

Based on the review of the operational needs and of the existing research assets, a Portfolio of Services is defined in close cooperation with end-users. Research developments are performed to transfer the most promising available results and blocks to operational use.

PREVIEW has the objective to set up an end to end operational system in 2008. It aims to provide the facilities to exchange the building blocks constituting the coupled systems (i.e., atmospheric models, land surface scheme and hydrological components) for fitting specific regional model practice. This intends to make possible the inter-operability of the various, regional or national existing components, depending on the user preferences or the national regulations, into one single distributed – and cooperative - forecasting network.

4.11.3 Potential Relevance to the RISE Project

If the RISE project decides to implement a use case about flooding, information from this ongoing project could be of use.

4.12 RISK-EOS

Earth Observation based Services for flood and fire risks management.

<http://www.risk-eos.com/>

Project Start Date: 2003

End Date: 2007

4.12.1 Project Consortium

The project consists of 15 different partners. The coordinator of the project is ASTRIUM from France.

4.12.2 Aim of the Project and Objectives to be Achieved

The Civil Protections Units from several Member States, National Meteorological Services from EUMETNET, and EADS Astrium have decided and undertaken with industrial and scientific partners a common initiative in the frame of GMES, in order to provide End-Users bodies (Civil Protections, Forecasting organisations, Environment Agencies) with a coherent set of operational Services for the Management of Natural Risks, covering all main phases of the Risks management cycle.

The objective of RISK-EOS is:

- to set-up a European operational servicing capacity, taking benefit of Earth Observation capabilities in combination with other data sources and models,
- to support the organisations and institutions mandated for the management of Natural Hazards, throughout the prevention, anticipation, response and post-response phases.

4.12.3 Potential Relevance to the RISE Project

If the RISE project decides to implement a use case about flooding a possible joint use case together with RISK-EOS could be considered.

4.13 WIN

Wide Information Network For Risk Management Integrated Project.

<http://www.win-eu.org/>

Project Start Date: 2004-09-01

End Date: 2007-09-01

4.13.1 Project Consortium

The project consists of 15 different partners. The coordinator of the project is Alcatel Space from France.

4.13.2 Aim of the Project and Objectives to be Achieved

The Wide Information Network (WIN) Integrated Project has the objective of integrating all existing reference results or initiatives to contribute to the design, the development, and the validation of what could be referred to as a "European Risk Management information infrastructure". This information infrastructure will be a major element of the future overall European Spatial Data Infrastructure (ESDI).

The primary goals of the WIN project are :

- To provide risk management actors with an open architecture plus a set of generic tools and services helping to build and organise well-structured and efficient information systems,
- To favour reuse of reference data and co-operative working between actors through the use of interconnection points, allowing to "plug" new services or new actors of the risk management,
- To propose an organisational model which, combined with the open architecture, favours a smooth and efficient system deployment,
- To manage the issue of quality and reliability of deployed services,

- To prepare the deployment on selected thematic domain, in particular to work in synergy with GSE Marine and Coastal project to facilitate future use of WIN services by oceanographic community,
- To involve stakeholders before architecture deployment in order to facilitate adoption of WIN concepts and to issue deployment roadmap,
- To deploy and evaluate WIN added value on real life experimentation evaluation.

4.13.3 Potential Relevance to the RISE Project

WIN has the objective to integrate existing reference results and to contribute to the design, development and validation of a "European Risk Management information infrastructure". This will be part of a future European Spatial Data Infrastructure (ESDI).

The RISE project need to follow the progress on the development of the ESDI.

5 INSPIRE – Status and Requirements

5.1 INTRODUCTION

The proposed INSPIRE directive is currently subject to negotiations between the European Commission, the Parliament and the Council and is expected to be finally adopted during 2007. Based on information on the ongoing negotiations, it is important to point out that the proposed directive might be changed in several aspects. The below information is based on the proposal from the EC, COM(2004) 516 final, with amendments from P6_TA-PROV(2005)0213, "Texts adopted by parliament". Text in *italic* is a direct quotation. The co-decision procedure led to a decision in the European Parliament as well as a political agreement in the Council in June 2005, which in some respects include significant changes in relation to the proposal from the Commission. The next phase of the co-decision procedure has started in November 2005.

It must further be noted that the Drafting Teams, which have been established to prepare the Implementing rules recently have started their work. The directive requires a formal adoption of those Implementing rules by the Commission following the "Comitology Procedure". An INSPIRE Committee will therefore be established in the beginning of the Transportation phase (within three months from the entry into force). Many important issues, such as level of detail for data specifications, will therefore not be known until decisions have been made according to the Comitology Procedure.

Please also note that the intention is to provide information most relevant to RISE, **not** a complete description of the proposal.

5.2 General

The EC recognises that a new approach is needed to deal with monitoring and reporting and with data management and delivery across the different levels of government. Policies need to be employed to reduce duplicated data collection and to assist and promote the harmonisation, broad dissemination and use of data. Such policies should result in increased efficiency, the benefits of which can be reinvested in improving the availability and quality of information.

Spatial information can play a special role in this new approach because it allows information to be integrated from a variety of disciplines for a variety of uses. A coherent and widely accessible spatial description of the Community territory would deliver the requisite framework for coordinating information delivery and monitoring across the Community. Spatial information may also be used to produce maps, which are a good way of communicating with the public. Unfortunately, the technical and socio-economic characteristics of spatial information make the problems of coordination, information gaps, undefined quality and barriers to accessing and using the information particularly acute.

The proposal focuses specifically on information needed in order to monitor and improve the state of the environment, including air, water, soil and the natural landscape. Much of this information needs to be underpinned by "multi-purpose" spatial data. In an infrastructure for spatial information, not all spatial data themes need to be subject to the same degree of harmonisation, nor can they be brought within the infrastructure at the same pace. This Directive therefore contains three distinct annexes, all of which refer to spatial data needed by a broad

range of environmental policies. Depending on whether spatial data is to be used for geo-referencing other spatial data, on whether harmonised spatial data is needed within the context of policies that directly or indirectly affect the environment and on the degree to which harmonisation is already underway within the Community, different target dates for implementing INSPIRE requirements and different stringency levels for harmonisation apply. It should be noted that the spatial data themes in the annexes determine only the scope of the directive and of the measures referred to. They do not determine how spatial information should be organised or harmonised.

INSPIRE will not set off an extensive programme of new spatial data collection in the Member States. Instead, it is designed to optimise the scope for exploiting the data that are already available, by requiring the documentation of existing spatial data, the implementation of services aimed at rendering the spatial data more accessible and interoperable and by dealing with obstacles to the use of the spatial data. INSPIRE will pave the road for a progressive harmonisation of spatial data in the Member States.

5.3 The proposal in brief

INSPIRE has five Principles:

1. Data should be collected once and maintained at the level where this can be done most effectively
2. It should be possible to combine seamlessly spatial data from different sources and share it between many users and applications
3. Spatial data should be collected at one level of government and shared between all levels
4. Spatial data needed for good governance should be available on conditions that are not restricting its extensive use
5. It should be easy to discover which spatial data is available, to evaluate its fitness for purpose and to know which conditions apply for its use.

In addition to many “administrative” clauses, the proposal somewhat details the requirements on Metadata, Interoperability of spatial data sets and services, Network services and Data-sharing and re-use. Refer to Appendix 2 for a detailed description of these requirements.

5.4 The INSPIRE Annexes

There are many kinds of spatial data. If all were to be handled at once, it would be very difficult and very costly. During the process preceding the proposal there has therefore been many discussions on definitions and how to structure the implementation. In the proposal, the spatial data themes are distributed in three Annexes, each with different timetables.

Below is a table describing spatial data themes being included in the directive. The differences between the three Annexes are mainly related to the timetable (data components being described in Annex I to the Directive will be implemented earlier).

Refer to Appendix 2 for a detailed description of content of the INSPIRE Annexes.

ANNEX I	ANNEX II	ANNEX III
1. Coordinate reference systems	1. Elevation	1. Statistical units
2. Geographical grid systems	2. Identifiers of properties	2. Buildings
3. Geographical names	3. Cadastral parcels	3. Soil
4. Administrative units	4. Land cover	5. Land use
5. Transport networks	5. Orthoimagery	6. Human health and safety
6. Hydrography	5a. Geology	7. Utility and government services 7a. Environmental monitoring facilities
7. Protected sites		8. Production and industrial facilities
		9. Agricultural and aquaculture facilities
		10. Population distribution – demography
		11. Area management/restriction/regulation zones & reporting units 11a. Areas under anthropogenic stress
		12. Natural risk zones
		13. Atmospheric conditions
		14. Meteorological geographical features
		15. Oceanographic geographical features
		16. Sea regions
		17. Bio-geographical regions
		18. Habitats and biotopes
		19a. Renewable energy resources

6 Other Relevant Projects

6.1 Introduction

The use cases will be based on the reporting requirements of the WFD and deal with a subset of the relevant GMES thematic themes. The RISE project will thus need to collect relevant user requirements from the different GMES projects, and also to get some more specific information about the reporting requirements of the WFD from other projects.

Since WFD was adopted by the European parliament and of the Council in 2000, many new projects have started, all with the aim that in different ways aid the member countries to implement the WFD in their respective country and also to aid the countries in the monitoring of water status and in the reporting to the EC.

These projects have many different consolidations. Many projects are research projects supported by the EC under the Fifth and Sixth Framework Programmes, but there are also projects that are funded in other ways.

Most of these projects participate in the CatchMod (Catchment Modelling) cluster project, where the projects cover a wide range of subjects, dealing with specific issues in water management, in international co-operation and collaborative planning, modelling methodologies and ICT tools. The objectives of clustering are to exchange information, discuss and solve common problems, make use of each others intermediate products and expertise: reach beyond the limited possibilities of isolated projects. Besides obvious collaboration on specific water and modelling issues, exchange of experience and approaches to end-user involvement, stakeholder participation and socio-economic issues are crosscutting themes for many of the CatchMod projects.

Below is a brief description over the selected projects that could be of interest for the RISE project. Please refer to Appendix 5 for a more detailed description of these projects and for a description of the CatchMod cluster project.

Project	Full name	Start-End date	Objective	Potential Relevance to RISE
BMW	Benchmark Models for the Water Framework Directive	Start: 2002-01-01 End: 2005-01-01	To establish a set of criteria to assess the appropriateness of integrated models for the use in the implementation of WFD, by creating a toolbox. It will help model users to select appropriate tools for their specific needs and management tasks.	The Toolbox is open to anyone. The RISE project could try to use it when implementing one of the use cases.
EUROHARP	Towards European Harmonised Procedures for Quantification of Nutrient Losses from Diffuse Sources	Start: 2002-01-01 End: 2005-12-31	To provide end-users with evaluation of the nine contemporary quantification tools for estimation of diffuse nutrient (N, P) losses. To develop an electronic tool-box for identification of benchmarking methodologies for the quantification of diffuse nutrient losses.	The toolbox could be of use for the RISE project when implementing the use cases.
HARMONI-CA	Harmonised Modelling Tools for Integrated Basin Management	Start: 2002-10-01 End: 2007-09-30	To create a forum for unambiguous communication, information exchange and harmonisation of the use and development of ICT-tools relevant to integrated river basin management, and	The reports and guidelines from Harmon-CA can be of use for the RISE project when implementing use cases.

Project	Full name	Start-End date	Objective	Potential Relevance to RISE
			the implementation of the WFD.	
HarmoniQuA	Harmonising Quality Assurance in model based catchments and river basin management	Start: 2002-01 End: 2005-12	To provide a Quality Assurance framework for use in model based river management. It will consist of a knowledge database linked to a toolbox called MoST, with the functionality to: <ol style="list-style-type: none"> 1. Guide: to ensure a model has been properly applied; 2. Monitor: to record decisions, methods and data used in these tasks; 3. Report: to provide suitable reports. 	The knowledge database and the MoST toolbox can be of use for the RISE project when implementing use cases.
HarmoniRiB	Harmonised Techniques and Representative River Basin Data for Assessment and Use of Uncertainty Info in Integrated Water Management	Start: 2002-10-01 End: 2006-03-31	The objectives of the project is to: <ul style="list-style-type: none"> • To establish a practical methodology and a set of tools for assessing and describing uncertainty originating from data and models. • To provide a conceptual model for data management that can handle uncertain data. • To provide well documented datasets suitable for studying the influence of uncertainty on management decisions. 	RISE should follow HarmoniRiB's progress on the practical methodology and tools for describing uncertainty and the implementation of the conceptual model that handles uncertain data.
HarmoniIT		Start: 2002-01-01 End: 2005-12-31	HarmoniIT is a research project aiming at the development and implementation of a European Open Modelling Interface and Environment (OpenMI) that will simplify the linking of hydrology related models. The establishment of the OpenMI will support and assist the strategic planning and integrated catchment management required by the Water Framework Directive.	The OpenMI can be of use for the RISE project when implementing use cases.
HMA	Heterogeneous Missions Accessibility	Start: 2005 End: 2007	<ul style="list-style-type: none"> • Consolidate scenarios and interoperability requirements • Define the EO DAIL architecture • Define and prototype an interoperable protocol for catalogue, order, mission planning • Define approach for User Management • Define approach for online data access • Address interoperability requirements 	Follow HMA's work on interoperability requirements etc.
SDIGER	A cross-border inter-administration Spatial Data Infrastructure to support WFD information access for Adour-Garonne and Ebro River Basins	Start: 2005-01 End: 2006-12	SDIGER is a pilot project on the implementation of the Infrastructure for Spatial Information in Europe (INSPIRE).	The SDIGER project has developed two use cases, "Water Abstraction Application" and "WFD Reporting Application". There have been discussions about a shared RISE-SDIGER use case.
SSE	Service Support Environment	SSE is an ongoing service	<ul style="list-style-type: none"> • facilitate access to EO data from ESA and other missions, • increase sustainability of EO data provision, by widening the range of offered data sources, • make the operations of EO missions more efficient. 	Follow SSE's work in the set up of open operational services for Earth Observation in Europe.

Project	Full name	Start-End date	Objective	Potential Relevance to RISE
WISE	Water Information System for Europe	Start: 2003 End: 2010	<p>WISE will cover all water-related information arising from EU water policy (Water Framework, Urban Waste Water Treatment, Nitrates, Bathing Waters and Drinking Water Directives) as well as the upcoming Marine Strategy and Flood Action Programmes. In addition WISE will include other water-related datasets such as EIONET-Water developed by EEA and those arising from relevant water research projects.</p> <p>WISE is a system merging spatial and non-spatial data from various physical locations. In this respect, an important aspect will be the hosting of geo-referenced data, making WISE a building block for INSPIRE.</p> <p>It is planned that WISE, in a limited form, will be made available to the public in 2006 and be fully operational by 2010.</p>	RISE will interact with WISE.

7 Analysis and Conclusions

7.1 Cross reference GMES/WFD/INSPIRE

The RISE project should build on the results of previous projects and develop synergies with and give impetus to current activities and projects relevant to the project. It will identify and build upon the common spatial data requirements identified within the GMES thematic projects and related policy areas but with a specific focus on the Water Framework Directive (WFD).

The table below describes the cross reference between specific and common spatial data requirements derived from the thematic GMES projects and listed in the GMES call, the EC proposal for INSPIRE (version “as adopted by the Parliament”) and WFD. The themes that are in **bold** depict how these themes are dealt with in the three initiatives.

GMES Call	EC INSPIRE proposal Annex 1	EC INSPIRE proposal Annex II	EC INSPIRE proposal Annex III	Water Framework Directive Applicability
1. Geographical location	Coordinate reference systems Geographical grid systems Geographical names			Mandatory to meet reporting requirements of districts, networks and features
2. Administrative units	Administrative units		Statistical units	Districts of competent authorities Background Background
3. Properties, buildings and addresses		Identifiers of properties Cadastral parcels	Buildings	
4. Elevation		Elevation		Mandatory to meet reporting requirements Background
5. Geo-physical environment		Geology	Soil	Groundwater bodies
6. Land surface / land cover		Ortho-imagery Land cover		Background
7. Transport	Transport networks			Background
8. Utilities and facilities			Production and industrial facilities Agricultural and aquaculture facilities	Significant point source pollution
9. Society and population			Human health and safety Population distribution - demography Utility and government services Environmental monitoring facilities	Settlements - Background
10. Spatial planning / Area regulation	Protected sites		Land use Area management/ restriction, regulation zones & reporting units	Surface water body Monitoring networks Groundwater Monitoring Networks Drinking water, economically significant, recreational, nutrition sensitive, habitat protection areas
11. Air and climate			Atmospheric conditions Meteorological	

GMES Call	EC INSPIRE proposal Annex I	EC INSPIRE proposal Annex II	EC INSPIRE proposal Annex III	Water Framework Directive Applicability
12. Water / Hydrography 13. Ocean and seas	Hydrography		geographical features	Surface Water Body categories and types Coastal waters Transitional waters
14. Biota/biodiversity			Sea regions Oceanic geographical features	
15. Natural resources			Bio-geographical regions Habitats and biotopes Renewable energy resources	
16. Natural and technological risks 17. Areas under anthropogenic stress			Natural risk zones	
			Areas under anthropogenic stress	

7.2 Summary of user requirements as depicted in the GMES thematic projects

The need for integration and harmonisation of data is one common denominator among all the projects in the desktop study. Most projects also recognise the lack of a suitable standard. To the extent possible, existing standards are used, but when no such standard is available, the projects have had to develop their “own” common language.

The user requirements and needs in these aspects are summarized below.

Project	Need for Integration/Harmonisation
ARMONIA	The technological domain is in the need of an integrated approach among different hazards: different data, different information, different output can be better managed if harmonised in terms of metadata as well as procedures and results.
EFAS	Due to a lack of standardization often even within the same country, different data formats and different reference systems need to be considered and much manual work is involved in the data conversion.
EDEN-IW	Integrating distributing heterogeneous inland water database resource has been challenging for the EDEN-IW project because of the number of possible heterogeneous schema and the difficulty in normalising numerous syntactical mappings between heterogeneous database schemas.
GEOLAND	CSL (Core Service Land Cover) users request that to a certain extent the thematic content of the land cover classes is consistent with the CLC nomenclature, the only European standard on EO based Land Cover data bases. This assures that overall consistency and comparability are maintained as far as possible, and relevant information is delivered in a harmonized way.
HALO	HALO will seek to achieve common data standards for the traffic between the IPs; the volume of data traffic between the IPs will be dominated by meteorological information, where economics will almost require the adoption of common standards. The second type of datasets with large data volumes will be those satellite datasets required by two or more IPs, but for different purposes. Again the economics of the data acquisition and archiving will almost require the adoption of common standards between these elements of the GMES Backbone and the satellite data producers. Internationally agreed data representation standards will be adopted wherever possible.

Project	Need for Integration/Harmonisation
OASIS	The exchange of information related to the tactical situation is extremely important. In order to facilitate these exchanges, the definition of a "common language" which describes this tactical situation is needed. This is what is called in OASIS project the "emergency Tactical Situation Object" (TSO). A draft version of the TSO will be public at the end of September 2005.
PREVIEW	The PREVIEW project will have to define some data exchange standards, such as the ALMA (Assistance for Land-surface Modelling activities) data exchange convention. The project must also take account for hydrological models, this is will be done reengineering the ALMA norm of the WMO (World Meteorological Organization) and developing a "universal" coupler for the exchange of data between the computation modules.
SAGE	Core users have agreed on a harmonised approach adapted to their individual requirements. Although the portfolio description addresses specific policy requirements, the concept can easily be adapted to a wide range of environmental and planning applications. SAGE products follow quality assurance means defined jointly by service providers and users. SAGE partners have committed themselves to follow European standards and recommendations on harmonisation of data formats and thematic contents to assure comparability of information over national borders.

7.3 The Water Framework Directive

The WFD calls for substantial reporting from all EU Member States and lays down directions on the topics to be reported and the timetable for the various reports.

The WISE project, a joint initiative of DG Environment, The European Environment Agency (EEA) Eurostat (ESTAT) and the Joint Research Centre (JRC) will stepwise implement the data upload, sharing and analysis requirements of the WFD, related "Wet"-directives and supranational environment data reporting. It is intended that WISE will cover all water-related information arising from EU water policy (Water Framework, Urban Waste Water Treatment, Nitrates, Bathing Waters and Drinking Water Directives) as well as the upcoming Marine Strategy and Flood Action Programmes. In addition WISE will include other water-related datasets such as EIONET-Water developed by EEA and those arising from relevant water research projects.

The implementation of the WISE project will be guided by the INSPIRE principles. Services will be defined that are based on Member States' information systems and data. Initiatives on common data modelling would contribute to solve the issue of data harmonisation without expensive manual data integration work.

It is obvious that a close co-operation between WISE and RISE is of mutual benefit.

It must also be noted that the EC has recently, 18 January 2006, issued a proposal for a Directive on the assessment and management of floods, COM(2006) 15 final 2006/0005(COD).

The objective of the proposed Directive is to reduce and manage the risks which floods pose to human health, the environment, infrastructure and property. It will provide for flood mapping in all areas with a significant flood risk, for coordination within shared river basins, and for producing flood risk management plans through a broad participatory process. The proposed Directive and the measures taken to implement it are closely linked to

implementation of the WFD. Flood risk management and water quality management are part of integrated river basin management. They involve the same river basins and regions and the same local communities and stakeholders. Consequently, there is a very strong linkage between the water quality management already in progress under the WFD and the flood risk management measures envisaged under this proposal.

7.4 INSPIRE

The following agreed general principles for INSPIRE provide much of the foundation for the technical work related to data harmonisation, in particular the first three:

- Data should be collected once and maintained at the level where this can be done most effectively
- It should be possible to combine seamlessly spatial data from different sources and share it between many users and applications
- Spatial data should be collected at one level of government and shared between all levels
- Spatial data needed for good governance should be available on conditions that are not restricting its extensive use
- It should be easy to discover which spatial data is available, to evaluate its fitness for purpose and to know which conditions apply for its use.

The ongoing work by the INSPIRE Drafting Teams will result in Implementing Rules. Of particular interest is the Drafting Team relating to **Spatial data harmonisation requirements**. Below is an excerpt of the work programme for this Drafting Team:

The Implementing Rules will take the form of:

- *Harmonised data specifications*
- *Arrangements for the exchange of spatial data*

For all spatial data in Annex I, II, III the harmonised data specifications shall cover the definition and classification of the spatial objects relevant to the spatial data and the way in which they are geo-referenced.

In particular for Annex I and II data, the Implementing Rules shall address the following harmonisation and exchange aspects of spatial data:

- *a common system of unique identifiers for spatial objects;*
- *the relationship between spatial objects;*
- *the key attributes and the corresponding multilingual thesauri commonly required for a wide range of thematic policies;*
- *the way in which information on the temporal dimension of the data is to be exchanged;*
- *the way in which updates of the data are to be exchanged.*

Clearly, a very close working relationship between RISE and this Drafting Team would be of mutual benefit.

7.5 Interdependencies and suggestions on use cases

7.5.1 Introduction

The RISE project should develop methodology and guidelines for data harmonisation with a focus on hydrology and elevation. These themes are covered in the GMES, WFD and INSPIRE initiatives, but from various viewing angles. It is however obvious from the table in

section 7.1 above, that the least common denominator is to be found within the river basins. The specific use cases should therefore be based on the reporting requirements of the WFD and deal with a subset of the relevant GMES thematic themes, thus serving a broad range of user interests. The desk top study of the relevant GMES projects indicates a strong interest in flooding and nutrient leakage. Therefore, these themes could be selected as RISE use cases. Obviously, the coastal zone is the common area of interest between RISE and MOTIIVE, and therefore a joint use case on the coastal aspects of nutrient leakage and flooding can be found here.

However, the time and funds allocated to the RISE project, doesn't allow for the use cases to address all aspects of data harmonisation within river basin management. Rather, well defined areas must be found in which all three initiatives are involved. It must further be remembered that the objective of the use cases is to provide "real world" inputs to the testing and prototyping of the methodology and the guidelines.

As the linkage to the WFD is much stronger for nutrient leakage than for flooding, it is therefore suggested that use cases be found **within diffuse nutrient leakage into rivers** as the first priority with **flooding** as a possible second priority. Please note that also these use cases could be too wide and it may thus be necessary to focus on more delimited topics inside these themes. The exact definition work is suggested to be carried out together with the relevant parties involved in each use case.

7.5.2 Suggested first priority Use Case - Diffuse nutrient leakage into rivers

The relevance for the Use Case **Diffuse nutrient leakage into rivers** with respect to the initiatives is:

- WFD: each Member State is required to provide information on surface water status (i.e. ecological and chemical status) in accordance with the timetable depicted in Appendix 1, section 3.3, starting in 2007.
- GMES: diffuse nutrient leakage emanates mainly from agriculture and forestry, which topics are well suited for Earth Observation.
- INSPIRE: this use case involves several themes, for instance hydrography, elevation, geology, orthoimagery, land cover and soil.

A close interaction with the WISE project and the INSPIRE Drafting Team on Data Specifications is suggested.

To cover the **cross-sector aspects** of data harmonisation, a well defined suitable area in Sweden is suggested to be selected. The reasons for this suggestion being that:

- Sweden has, as one of the few countries in Europe, produced a suggested standard for surface water that is in compliance with the WFD. Obviously this provides a very good starting point for the tentative use case.
- The Swedish partners in the GMES projects AquaSage, Geoland and GSE Land have a strong focus on diffuse leakage into rivers. This would help the development of a possible RISE use case substantially in so far that the potential end users are well aware of the various initiatives and their implications. Naturally, important inputs will also be information from the various modelling projects within the field of nutrient leakage. The above GMES projects have incorporated the results of some of these modelling projects and have also developed their own modelling.

The exact geographical area for the use case within Sweden needs to be carefully selected together with the involved parties to ensure that the relevant aspects of data harmonisation are dealt with and that enough data is available, both geographical and “in-situ”.

The methodology and guidelines are also suggested to be tested and compared vis-à-vis work already carried out by HR Wallingford in Scotland. Tentatively, this work could be carried out by the MOTIIVE project, for which HR Wallingford is the co-ordinator.

The **cross-border aspects** of data harmonisation is suggested to be covered by a use case in Swedish-Norwegian border as well as testing and comparing the methodology and guidelines within the SDIGER project, covering the Garonne and Adour rivers located at the border between France and Spain and – possibly – in the rivers Saar and Mosel at the borders between Germany, France and Luxembourg.

Also, there is a possibility for a joint use case under the responsibility of MOTIIVE to study the effects of nutrient leakage in the coastal waters, taking the relevant information produced by RISE into account, but from the recipient perspective. Such a use case would also be within the WFD since the WFD also covers the coastal waters. For instance, there is a possibility to detect algae blooms from Earth Observation and try to link it to land related activities such as agriculture and forestry.

7.5.3 Suggested second priority Use Case - Flooding

Subject to the availability of time and funds, a use case could also be found within the area of flooding. The relevance for the use case **Flooding** with respect to the initiatives is:

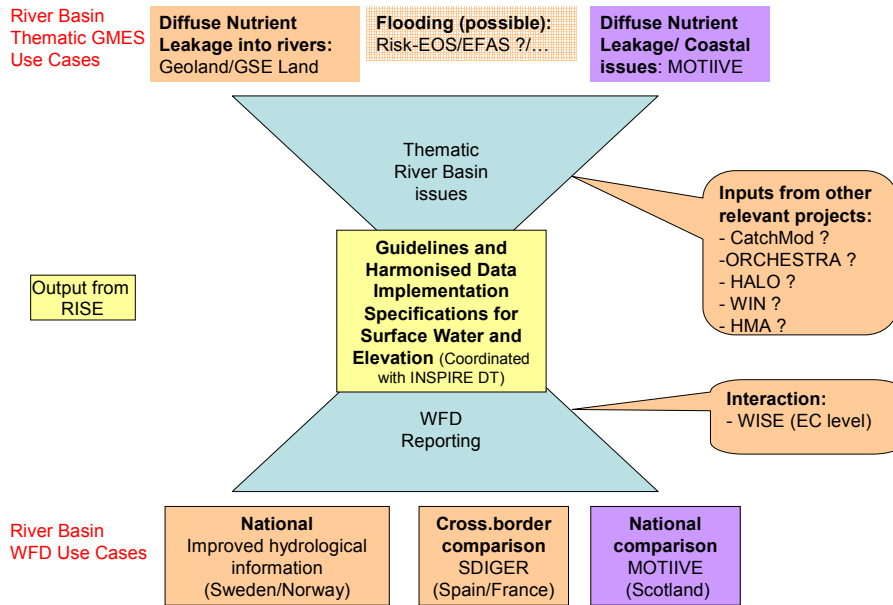
- WFD: the WFD sets no objective on flood risk management. However, each Member State shall identify those bodies of groundwater that could be affected by flooding and it is obvious that the quality of surface waters could be heavily affected by floods. It must also be noted that the recently issued proposal for a Directive on the assessment and management of floods will – if adopted – be closely linked to the WFD.
- GMES: Earth Observation is well suited for rapid information on the extent of flooding
- INSPIRE: this use case involves several themes, for instance hydrography, elevation, geology, orthoimagery, land cover and soil.

Should this use case be implemented, the organisation and geographical area need to be defined in a similar manner as for the nutrient leakage use case.

7.5.4 Summary of suggested Use Cases and their interdependencies

The below figure depicts the interdependencies between the various activities. It also suggests which projects to contact for discussions on co-operation in development of possible use cases.

The RISE Project, Use Cases & Interdependencies



APPENDIX 1 – Water Framework Directive – WFD

1 Surface waters

In Annex II of the WFD the below characterisation of surface water body types and their descriptions can be found.

1.1. Characterisation of surface water body types

Member States shall identify the location and boundaries of bodies of surface water and shall carry out an initial characterisation of all such bodies in accordance with the following methodology. Member States may group surface water bodies together for the purposes of this initial characterisation.

(i) The surface water bodies within the river basin district shall be identified as falling within either one of the following surface water categories - rivers, lakes, transitional waters or coastal waters - or as artificial surface water bodies or heavily modified surface water bodies.

(ii) For each surface water category, the relevant surface water bodies within the river basin district shall be differentiated according to type. These types are those defined using either .system A. or .system B. identified in section 1.2.

(iii) If system A is used, the surface water bodies within the river basin district shall first be differentiated by the relevant ecoregions in accordance with the geographical areas identified in section 1.2 and shown on the relevant map in Annex XI. The water bodies within each ecoregion shall then be differentiated by surface water body types according to the descriptors set out in the tables for system A.

(iv) If system B is used, Member States must achieve at least the same degree of differentiation as would be achieved using system A. Accordingly, the surface water bodies within the river basin district shall be differentiated into types using the values for the obligatory descriptors and such optional descriptors, or combinations of descriptors, as are required to ensure that type specific biological reference conditions can be reliably derived.

(v) For artificial and heavily modified surface water bodies the differentiation shall be undertaken in accordance with the descriptors for whichever of the surface water categories most closely resembles the heavily modified or artificial water body concerned.

(vi) Member States shall submit to the Commission a map or maps (in a GIS format) of the geographical location of the types consistent with the degree of differentiation required under system A.

1.2. Ecoregions and surface water body types

1.2.1. Rivers

System A

<i>Fixed typology</i>	<i>Descriptors</i>
<i>Ecoregion</i>	<i>Ecoregions shown on map A in Annex XI</i>

<i>Type</i>	<p><i>Altitude typology</i> <i>high: >800 m</i> <i>mid-altitude: 200 to 800 m</i> <i>lowland: <200 m</i></p> <p><i>Size typology based on catchment area</i> <i>small: 10 to 100 km²</i> <i>medium: >100 to 1 000 km²</i> <i>large: >1 000 to 10 000 km²</i> <i>very large: >10 000 km²</i></p> <p><i>Geology</i> <i>calcareous</i> <i>siliceous</i> <i>organic</i></p>
-------------	--

System B

<i>Alternative characterisation</i>	<i>Physical and chemical factors that determine the characteristics of the river or part of the river and hence the biological population structure and composition</i>
<i>Obligatory factors</i>	<p><i>altitude</i> <i>latitude</i> <i>longitude</i> <i>geology</i> <i>size</i></p>
<i>Optional factors</i>	<p><i>distance from river source</i> <i>energy of flow (function of flow and slope)</i> <i>mean water width</i> <i>mean water depth</i> <i>mean water slope</i> <i>form and shape of main river bed</i> <i>river discharge (flow) category</i> <i>valley shape</i> <i>transport of solids</i> <i>acid neutralising capacity</i> <i>mean substratum composition</i> <i>chloride</i> <i>air temperature range</i> <i>mean air temperature</i> <i>precipitation</i></p>

1.2.2. Lakes
System A

<i>Fixed typology</i>	<i>Descriptors</i>
<i>Ecoregion</i>	<i>Ecoregions shown on map A in Annex XI</i>
<i>Type</i>	<p><i>Altitude typology</i> <i>high: >800 m</i> <i>mid-altitude: 200 to 800 m</i> <i>lowland: <200 m</i></p> <p><i>Depth typology based on mean depth</i> <i><3 m</i></p>

	<p>3 to 15 m >15 m</p> <p><i>Size typology based on surface area</i></p> <p>0,5 to 1 km² 1 to 10 km² 10 to 100 km² >100 km²</p> <p><i>Geology</i></p> <p>calcareous siliceous organic</p>
--	---

System B

<i>Alternative characterisation</i>	<i>Physical and chemical factors that determine the characteristics of the river or part of the river and hence the biological population structure and composition</i>
<i>Obligatory factors</i>	<p>altitude latitude longitude depth geology size</p>
<i>Optional factors</i>	<p>mean water depth lake shape residence time mean air temperature air temperature range mixing characteristics (e.g. monomictic, dimictic, polymictic) acid neutralising capacity background nutrient status mean substratum composition water level fluctuation</p>

*1.2.3. Transitional Waters**System A*

<i>Fixed typology</i>	<i>Descriptors</i>
<i>Ecoregion</i>	<p><i>The following as identified on map B in Annex XI:</i></p> <p>Baltic Sea Barents Sea Norwegian Sea North Sea North Atlantic Ocean Mediterranean Sea</p>
<i>Type</i>	<p><i>Based on mean annual salinity</i></p> <p><0,5.: freshwater 0,5 to <5.: oligohaline 5 to <18.: mesohaline 18 to <30.: polyhaline 30 to <40.: euhaline</p>

	<p><i>Based on mean tidal range</i></p> <p><i><2 m: microtidal</i></p> <p><i>2 to 4 m: mesotidal</i></p> <p><i>>4 m: macrotidal</i></p>
--	---

System B

<i>Alternative characterisation</i>	<i>Physical and chemical factors that determine the characteristics of the river or part of the river and hence the biological population structure and composition</i>
<i>Obligatory factors</i>	<p><i>latitude</i></p> <p><i>longitude</i></p> <p><i>tidal range</i></p> <p><i>salinity</i></p>
<i>Optional factors</i>	<p><i>depth</i></p> <p><i>current velocity</i></p> <p><i>wave exposure</i></p> <p><i>residence time</i></p> <p><i>mean water temperature</i></p> <p><i>mixing characteristics</i></p> <p><i>turbidity</i></p> <p><i>mean substratum composition</i></p> <p><i>shape</i></p> <p><i>water temperature range</i></p>

*1.2.4. Coastal Waters**System A*

<i>Fixed typology</i>	<i>Descriptors</i>
<i>Ecoregion</i>	<p><i>The following as identified on map B in Annex XI:</i></p> <p><i>Baltic Sea</i></p> <p><i>Barents Sea</i></p> <p><i>Norwegian Sea</i></p> <p><i>North Sea</i></p> <p><i>North Atlantic Ocean</i></p> <p><i>Mediterranean Sea</i></p>
<i>Type</i>	<p><i>Based on mean annual salinity</i></p> <p><i><0,5.: freshwater</i></p> <p><i>0,5 to <5.: oligohaline</i></p> <p><i>5 to <18.: mesohaline</i></p> <p><i>18 to <30.: polyhaline</i></p> <p><i>30 to <40.: euhaline</i></p> <p><i>Based on mean depth</i></p> <p><i>shallow waters: <30 m</i></p> <p><i>intermediate: (30 to 200 m)</i></p> <p><i>deep: >200 m</i></p>

System B

<i>Alternative characterisation</i>	<i>Physical and chemical factors that determine the characteristics of the river or part of the river and hence the biological population</i>
-------------------------------------	---

	<i>structure and composition</i>
<i>Obligatory factors</i>	<i>latitude longitude tidal range salinity</i>
<i>Optional factors</i>	<i>current velocity wave exposure mean water temperature mixing characteristics turbidity retention time (of enclosed bays) mean substratum composition water temperature range</i>

1.3 Establishment of type-specific reference conditions for surface water body types

- (i) *For each surface water body type characterised in accordance with section 1.1, type-specific hydromorphological and physicochemical conditions shall be established representing the values of the hydromorphological and physicochemical quality elements specified in point 1.1 in Annex V for that surface water body type at high ecological status as defined in the relevant table in point 1.2 in Annex V. Type-specific biological reference conditions shall be established, representing the values of the biological quality elements specified in point 1.1 in Annex V for that surface water body type at high ecological status as defined in the relevant table in section 1.2 in Annex V.*
- (ii) *In applying the procedures set out in this section to heavily modified or artificial surface water bodies references to high ecological status shall be construed as references to maximum ecological potential as defined in table 1.2.5 of Annex V. The values for maximum ecological potential for a water body shall be reviewed every six years.*
- (iii) *Type-specific conditions for the purposes of points (i) and (ii) and type-specific biological reference conditions may be either spatially based or based on modelling, or may be derived using a combination of these methods. Where it is not possible to use these methods, Member States may use expert judgement to establish such conditions. In defining high ecological status in respect of concentrations of specific synthetic pollutants, the detection limits are those which can be achieved in accordance with the available techniques at the time when the type-specific conditions are to be established.*
- (iv) *For spatially based type-specific biological reference conditions, Member States shall develop a reference network for each surface water body type. The network shall contain a sufficient number of sites of high status to provide a sufficient level of confidence about the values for the reference conditions, given the variability in the values of the quality elements corresponding to high ecological status for that surface water body type and the modelling techniques which are to be applied under paragraph (v).*
- (v) *Type-specific biological reference conditions based on modelling may be derived using either predictive models or hind casting methods. The methods shall use*

historical, palaeological and other available data and shall provide a sufficient level of confidence about the values for the reference conditions to ensure that the conditions so derived are consistent and valid for each surface water body type.

- (vi) *Where it is not possible to establish reliable type-specific reference conditions for a quality element in a surface water body type due to high degrees of natural variability in that element, not just as a result of seasonal variations, then that element may be excluded from the assessment of ecological status for that surface water type. In such circumstances Member States shall state the reasons for this exclusion in the river basin management plan.*

1.4 Identification of Pressures

Member States shall collect and maintain information on the type and magnitude of the significant anthropogenic pressures to which the surface water bodies in each river basin district are liable to be subject, in particular the following.

Estimation and identification of significant point source pollution, in particular by substances listed in Annex VIII, from urban, industrial, agricultural and other installations and activities, based, inter alia, on information gathered under:

(i) *Articles 15 and 17 of Directive 91/271/EEC;*

(ii) *Articles 9 and 15 of Directive 96/61/EC²;*

and for the purposes of the initial river basin management plan:

(iii) *Article 11 of Directive 76/464/EEC; and*

(iv) *Directives 75/440/EC, 76/160/EEC³, 78/659/EEC and 79/923/EEC⁴.*

Estimation and identification of significant diffuse source pollution, in particular by substances listed in Annex VIII, from urban, industrial, agricultural and other installations and activities; based, inter alia, on information gathered under:

(i) *Articles 3, 5 and 6 of Directive 91/676/EEC⁵;*

(ii) *Articles 7 and 17 of Directive 91/414/EEC;*

(iii) *Directive 98/8/EC;*

and for the purposes of the first river basin management plan:

(iv) *Directives 75/440/EEC, 76/160/EEC, 76/464/EEC, 78/659/EEC and 79/923/EEC.*

Estimation and identification of significant water abstraction for urban, industrial, agricultural and other uses, including seasonal variations and total annual demand, and of loss of water in distribution systems.

² OJ L 135, 30.5.1991, p. 40. Directive as last amended by Directive 98/15/EC (OJ L 67, 7.3.1998, p. 29).

³ OJ L 31, 5.2.1976, p. 1. Directive as last amended by the 1994 Act of Accession.

⁴ OJ L 281, 10.11.1979, p. 47. Directive as amended by Directive 91/692/EEC (OJ L 377, 31.12.1991, p. 48).

⁵ OJ L 375, 31.12.1991, p. 1.

Estimation and identification of the impact of significant water flow regulation, including water transfer and diversion, on overall flow characteristics and water balances.

Identification of significant morphological alterations to water bodies.

Estimation and identification of other significant anthropogenic impacts on the status of surface waters.

Estimation of land use patterns, including identification of the main urban, industrial and agricultural areas and, where relevant, fisheries and forests.

1.5. Assessment of Impact

Member States shall carry out an assessment of the susceptibility of the surface water status of bodies to the pressures identified above.

Member States shall use the information collected above, and any other relevant information including existing environmental monitoring data, to carry out an assessment of the likelihood that surface waters bodies within the river basin district will fail to meet the environmental quality objectives set for the bodies under Article 4. Member States may utilise modelling techniques to assist in such an assessment.

For those bodies identified as being at risk of failing the environmental quality objectives, further characterisation shall, where relevant, be carried out to optimise the design of both the monitoring programmes required under Article 8, and the programmes of measures required under Article 11.

2 The Water Framework Directive timetable

By December 2003

- Bring Directive into domestic law (Art. 24 of the WFD requires this)
- Define River Basin Districts

By December 2004

- Complete first analysis of the physical characteristics of the RBDs (characterisation - Art. 5), and assessment of pollution, human and other impacts on them
- Establish a register of protected areas in each RBD (Art. 6 and 7)

By December 2005

- Identify significant upward trends in groundwater and establish trend reversal (Art. 17)

By December 2006

- Establish environmental monitoring programmes (Art. 8)
- Publish a work programme for producing the first River Basin Management Plans (RBMPs) (Art. 14)
- Establish Environmental Quality Standards for priority substances and controls on principal sources (Art. 16)

By December 2007

- Publish an interim overview of the significant water management issues in each RBD for general consultation (Art. 14)

By December 2008

- Publish draft RBMPs for consultation (Art. 14)

By December 2009

- Finalise and publish first RBMPs (Art. 13)
- Finalise a programme of measures to meet objectives and include a summary of first RBMPs (Art. 11)

By December 2010

- Ensure water pricing policies are in place (Art. 9)

By December 2012

- Ensure all programmes of measures are fully operational (Art. 11)
- Publish timetable and work programme for second RBMPs
- Report progress in implementing the first RBMPs (Art. 15)

By December 2013

- Review progress of the first RBMP cycle:
- Review characterisation and impact assessments for RBDs and the economic analysis of water use
- Publish an interim overview of the significant water management issues to be addressed in the second RBMPs

By December 2014

- Publish second draft RBMPs for consultation

By December 2015

- Achieve environmental objectives specified in first RBMPs (Art. 4)
- Finalise and publish second RBMPs with revised programme of measures

By December 2021

- Achieve environmental objectives specified in second RBMPs
- Finalise and publish third RBMPs with revised programme of measures

By December 2027

- Achieve environmental objectives specified in third RBMPs

3 GIS implementation of the WFD

For more information, please see Common Implementation Strategy for the Water Framework Directive (2000/60/EC), *Guidance document n.o 9 Implementing the Geographical Information System Elements (GIS) of the Water Framework Directive*, http://www.wrrl-info.de/docs/Guidance_doc_9_GIS_klein.pdf

3.1 GIS Requirements under the WFD and Scope of the Working Group

The WFD requires that Member States report a considerable amount of information in the form of maps. Even though only annex I and annex II of the Directive explicitly state that the respective maps should as far as possible be available for introduction into a GIS, it is obvious that the best way to provide most of the requested information will be in the form of GIS layers. This is due to the fact that most of the data is to be presented in its spatial context and that questions like ‘where are the critical areas?’, ‘how much area is involved?’, or ‘which points are in a designated area?’ can easily be answered when the data are kept in their spatial context and when the background database has the appropriate design.

The provision of (or access to) the requested GIS layers will not only facilitate the reporting of the Member States themselves; it will also facilitate the further compilation and analysis of the information as a basis for the Commission’s own reporting obligations under the WFD.

Such development is also in line with current efforts under the INSPIRE (Infrastructure for Spatial Information in Europe) initiative of the Commission and the Member States, aiming at the development of a harmonised European spatial data infrastructure.

Many parties are involved in the implementation of the WFD, ranging from local water authorities to the European Commission. Regarding this wide range of parties, having different practices for water management, different reporting obligations and different levels of technical abilities, this guidance document strives to keep specifications as simple as possible, based upon standards where feasible, and according to best current technical options.

While the Directive clearly specifies which information should be provided in the form of maps, it gives little information on the technical specifications for these maps. The goal of the GIS working group under the Common Implementation Strategy, therefore, was to elaborate such specifications and to make them available in the form of the Guidance Document. The Guidance Document should help the Member States with the preparation of the GIS layers in such a way that they follow a common and agreed standard. This will not only facilitate the compilation of a European-wide picture, but it will also be a first step towards a more integrated spatial data infrastructure for Europe.

The implementation of the WFD requires the handling of spatial data both for the preparation of the River Basin Management Plans and for the reporting to the Commission. In the first case GIS techniques will be essential for the derivation of various information layers (e.g., on the characteristics of river basins and water bodies, on the chemical and ecological status of water bodies), while in the second case GIS will be the tool for the preparation and delivery of the GIS layers required for the reporting. Considering the limitations in time, the fact that many aspects of the analysis are still under discussion in other working groups, and the immediate needs stemming from the WFD implementation, it was decided that the current focus of the GIS Working Group should be on the WFD reporting obligations.

3.2 Reporting under the Water Framework Directive

The WFD is specifying which information should be reported in form of maps and when. The Guidance Document identifies these maps, the various GIS layers that are needed to make up these maps, their content and structure and how to document and to access or transfer them. The WFD itself falls short in giving more detailed technical specifications with respect to the requested GIS layers. As a consequence, a common understanding had to be achieved on issues such as the contents of the various maps, the scale and positional accuracy of the data, and the reference system and projections to use. Given the fact, that the various GIS layers will be part of a European picture, it was further necessary to consider issues such as the harmonisation at boundaries and the use of common identifiers. Recommendations are further given on the standards to be implemented for data exchange and data access and on the content and structure of the metadata to accompany each layer.

3.3 Timetable for the Preparation and Delivery of Maps and GIS Layers

The following table indicates when individual maps or GIS layers have to be made available either internally to a River Basin District (⊗) or externally to the Commission (●).

Actions related to GIS	Related Map (App. II)	Year 20..													
		03	04	05	06	07	08	09	10	11	12	13	14	15	
Assigning individual river basins, groundwaters and coastal waters to individual river basin districts (RBD)		⊗													
Provide the Commission a list of the competent authorities for RBD	2		•												
GIS layer containing names of the main rivers and boundaries of the river basin districts	1		•												
Map of the geographical location of the [surface water body] types consistent with the degree of differentiation required under system A	4**		•												
Summary report of the analyses required under art.5 (*)				• ¹											
Summary report of the analyses required under art.8 (*)						• ²									
Publishing of river basin management plans:								•							
Map of the location and boundaries of surface water bodies	3		⊗					•*							
Map of the ecoregions and surface water body types	4**		⊗					•*							
Map of the location and boundaries of groundwater bodies	5		⊗					•*							
Summary of the register of protected areas (location and description of the legislation under which they have been designated)	11		⊗					•							
Map of the surface water monitoring networks	6				⊗			•							
Map of the groundwater monitoring network	10				⊗			•							
Map of the results of the monitoring programmes for protected areas	12							•							
Map for each river basin district illustrating the classification of the ecological status for each body of surface water	7							•							

Actions related to GIS	Related Map (App. II)	Year 20..													
		03	04	05	06	07	08	09	10	11	12	13	14	15	
Map for each river basin district illustrating the classification of the ecological potential for each body of surface water	7							•							
Map for each river basin district illustrating chemical status for each body of surface water	8							•							
Map of groundwater quantitative status	9							•							
Map of groundwater chemical status	9							•							
Review and updating of the analysis of the characteristics and of the review of the impact of human activity on the status of surface waters and on groundwater within a river basin district												⊗			
Review and updating of the river basin management plans														•	
Presentation in map form of the monitoring results for the period of the previous river basin management plan														•	

⊗ Deadline at Member State level

• Deadline for reporting

(1) 22 March 2005

(2) 22 March 2007

(*) The Directive does not specify whether the "summary report", which has to be delivered in 2005 should contain maps. The Expert Advisory Forum on Reporting will clarify this question. If it is decided that the summary report needs to contain maps, then maps No. 3 and 5 need to be delivered in 2004 instead of 2009. Map No. 4 needs to be delivered both in 2004 and 2009.

(**) Map No. 4 is requested twice: in 2004 according to article 5 and annex II-vi, and in 2009 according to article 13 and annex VII-1.1.

3.4 Summary of Maps and GIS Layers

Data collection and map making are the responsibility of the River Basin Districts and the member States. It is recognised that for data collection an input scale of 1:250.000 or better should be a common goal in the long term. The reporting scale of the maps, however, may either be 1:250.000 or 1:1.000.000 in the short term and should be 1:250.000 in the long term. Only the very general maps No.1 (*River Basin Districts Overview*) and No.2 (*Competent Authorities*) might be reported at smaller scales of up to 1:4,000,000. To describe the specifications, the GIS-layers are divided in three main groups:

1. Basic information and characteristics of the river basin district,
2. Monitoring network,
3. Status information of surface- and groundwater bodies and protected areas.

Special attention should be given in case of transboundary harmonisation of GIS datasets. In this context, the possibility to use as far as possible already harmonised data is recognised. This is especially true for the case of large international river basins (e.g., the Rhine or the Danube river basin), where the harmonisation work could be substantial. An example of such a database could be EuroGlobalMap at a scale of 1:1.000.000, which is currently under development. For the short-term reporting, this EU-wide database could be an option. In the long term, the scale of reporting may be 1:250.000, as far as an identical and harmonised database (e.g., EuroRegionalMap) is available.

GIS-layers are assigned to maps based on the strongest relation. For example, the layer 'River Basin District' is assigned to the map 'River Basin District - Overview'. Some layers can also be part of other maps, which is also indicated. Besides the background layers used for readability of the maps, 15 layers are necessary to make the 12 required maps. The table below presents a summarised view of the maps and layers.

Map Name	Layer Code	Layer Name	Feature Type	Availability and Reporting Dates ¹
1: RBD-Overview				
	SW1	River basin district (RBD)	polygon	12/2003 (RBD) 06/2004 (CEC)
	SW2	River basin, sub-basin	polygon	
	SW3	Main Rivers ²	line	
2: Competent Authorities				
	D7	District of competent authorities	polygon	12/2003 (RBD) 06/2004 (CEC)
3: Surface Water Bodies (SWB) – categories -				
	SW4	Surface water bodies - Rivers - Lakes - Transitional waters - Coastal waters if applicable, indicated as artificial SWB or heavily modified SWB	line polygon polygon polygon	12/2004 (RBD) 12/2009 (CEC)*
4: Surface Water Bodies (SWB) – types -				
	SW4a	Types of Surface Waterbodies	attribute of SW4	12/2004 (RBD) 12/2004 (CEC)* 12/2009 (CEC)*
	D6	Ecoregions	polygon	
5: Groundwater Bodies				
	GW1	Bodies of groundwater	polygon	12/2004 (RBD) 12/2009 (CEC)*
6: Monitoring Network for Surface Water Bodies				
	SW5a	Operational monitoring sites. Inclusive monitoring sites for habitat and species protected areas	point	12/2006 (RBD) 12/2009 (CEC)
	SW5b	Surveillance monitoring sites	point	
	SW5c	Monitoring sites drinking water abstraction points from surface water	point	
	SW5d	Investigative monitoring sites	point	
	SW5e	Reference monitoring sites	point	

- (1) RBD: The date when the map or layer needs to be available within the River Basin District.
CEC: The date when the maps need to be reported to the European Commission. Note: The date of December 2009 is the publication date of the River Basin Management Plans. They should be reported to the Commission within 3 months of their publication.
- (2) Main Rivers: selection of the rivers from the Water Bodies Layer of map No. 3.
- (*) Date of reporting for maps No. 3 and 5 might change to 2004. See also the timeschedule in section 3.1. Map no. 4 needs to be reported in 2004 and 2009 (see also table 3.1.1)

Map Name	Layer Code	Layer Name	Feature Type	Availability and Reporting Dates ¹
7: Ecological Status and Ecological Potential of Surface Water Bodies				
	SW4b	Ecological status	attribute of SW4	12/2009 (RBD) 12/2009 (CEC)
	SW4c	Ecological potential	attribute of SW4	
	SW4d	Bad status or potential causes by (non-) synthetic pollutants.	attribute of SW4	
8: Chemical Status of Surface Water Bodies				
	SW4e	Chemical status	attribute of SW4	12/2009 (RBD) 12/2009 (CEC)
9: Groundwater Status				
	GW1a	Quantative status of groundwater bodies	attribute of GW1	12/2009 (RBD) 12/2009 (CEC)
	GW1b	Chemical status of groundwater bodies	attribute of GW1	
	GW1c	Pollutant trend	attribute of GW1	
10: Groundwater Monitoring Network				
	GW2a	Groundwater level monitoring network	point	12/2006 (RBD) 12/2009 (CEC)
	GW2b	Operational monitoring network chemical	point	
	GW2c	Surveillance monitoring network chemical	point	
11: Protected Areas				
	PA1	Drinking water protection areas	polygon	12/2004 (RBD) 12/2009 (CEC)
	PA2	Economically significant aquatic species protection areas	polygon	
	PA3	Recreational waters	point	
	PA4	Nutrition-sensitive areas	polygon	
	PA5	Habitat protection areas (FFH)	polygon	
	PA6	Bird protection areas	polygon	
12: Status of Protected Areas				
	PA7	Status of protected areas	attribute of PA1-PA6	12/2009 (RBD) 12/2009 (CEC)

(1) RBD: The date when the map or layer needs to be available within the River Basin District.

CEC: The date when the maps need to be reported to the European Commission. Note: The date of December 2009 is the publication date of the River Basin Management Plans. They should be reported to the Commission within 3 months of their publication.

APPENDIX 2 - INSPIRE

1 The proposal in brief

In addition to many “administrative” clauses, the proposal somewhat details the requirements on Metadata, Interoperability of spatial data sets and services, Network services and Data-sharing and re-use.

1.1 Metadata

Article 8

1. Member States shall ensure that metadata are created for spatial data sets and services, and that those metadata are kept up to date.

2. Metadata shall include information on the following:

(a) the conformity of spatial data sets with the implementing rules referred to in Article 11(1);

(b) rights of use of spatial data sets and services, and any costs pertaining to them;

(c) the quality and validity of spatial data;

(d) the public authorities responsible for the establishment, management, maintenance and distribution of spatial data sets and spatial data services;

(e) the spatial data sets to which public access is limited in accordance with Article 19 and the reasons for such limitation.

3. Member States shall take the necessary measures to ensure that metadata are complete and of appropriate quality.

Article 9

Member States shall create the metadata referred to in Article 8 in accordance with the following timetable:

(a) no later than [3 years after the entry into force of this Directive] in the case of spatial data sets relating to the themes listed in Annexes I and II;

b) no later than [6 years after the entry into force of the Directive] in the case of spatial data sets relating to the themes listed in Annex III.

1.2 Interoperability of spatial data sets and services

Article 11

1. The Commission shall, in accordance with the procedure referred to in Article 30(2), adopt implementing rules laying down the following:

(a) specifications for the harmonisation of spatial data;

(b) arrangements for the exchange of spatial data.

2. Representatives of the Member States at national, regional and local level may, by virtue of their importance as producers, holders and providers of spatial data, as well as natural and legal persons with an interest in the spatial data concerned by virtue of their role in the spatial information infrastructure that includes user, producer, added value service provider or coordinating body shall be given the opportunity to participate in preparatory discussions on the content of the implementing rules provided for in paragraph 1, prior to consideration by the Committee referred to in Article 30 .

Article 13

1. In the case of spatial data sets corresponding to the themes listed in Annex I or II, the implementing rules provided for in Article 11(1) shall meet the conditions laid down in paragraphs 2, 3 and 4.

2. The implementing rules shall address the following aspects of spatial data:

- (a) a common system of unique identifiers for spatial objects;
- (b) the relationship between spatial objects;
- (c) the key attributes and the corresponding multilingual thesauri commonly required for policies which may have a direct or indirect impact on the environment;;
- (d) the way in which information on the temporal dimension of the data is to be exchanged;

Article 14

The implementing rules provided for in Article 11(1) shall be adopted in accordance with the following timetable:

- (a) no later than [2 years after the entry into force of this Directive] in the case of spatial data sets relating to the themes listed in Annex I;
- (b) no later than [5 years after the entry into force of this Directive] in the case of spatial data sets relating to the themes listed in Annex II or III.

1.3 Network services

Article 18

1. Member States shall establish and operate a network of the following services for the spatial data sets and services for which metadata have been created in accordance with this Directive:

- (a) discovery services making it possible to search for spatial data sets and spatial data services on the basis of the content of the corresponding metadata and to display the content of the metadata;
- (b) view services making it possible, as a minimum, to display, navigate, zoom in/out, pan, or overlay spatial data sets and to display legend information and any relevant content of metadata;
- (c) download services, enabling copies of complete spatial data sets, or of parts of such sets, to be downloaded;
- (d) transformation services, enabling spatial data sets to be transformed;
- (e) “invoke spatial data services” services, enabling data services to be invoked. Those services shall be easy to use, available to the public, and accessible via the Internet or any other appropriate means of telecommunication.

2. For the purposes of the services referred to in point (a) of paragraph 1, as a minimum the following combination of search criteria shall be implemented:

- (a) keywords;
- (b) classification of spatial data and services;
- (c) spatial data quality and accuracy;
- (d) degree of conformity with the harmonised specifications provided for in Article 11;
- (e) geographical location;
- (f) conditions applying to the access to and use of spatial data sets and services;
- (g) the public authorities responsible for the establishment, management, maintenance and distribution of spatial data sets and services.

3. The transformation services referred to in point (d) of paragraph 1 shall be combined with the other services referred to in that paragraph in such a way as to enable all those services to be operated in conformity with the implementing rules provided for in Article 11.

1.4 Portal and standards

The EC is expected to establish and operate a Community geo-portal and Member States shall provide access to the services referred to in Article 18 (above) through this portal as well as through their own access points.

Also, Article 27 stipulates that: *The standards adopted by European standardisation bodies in accordance with the procedure laid down in Directive 98/34/EC and by international standardisation bodies may support the implementation of this Directive.*

2 The INSPIRE Annexes

There are many kinds of spatial data. If all were to be handled at once, it would be very difficult and very costly. During the process preceding the proposal there has therefore been many discussions on definitions and how to structure the implementation. In the proposal, the spatial data themes are distributed in three Annexes, each with different timetables.

Below is a detailed description of all the INSPIRE Annexes.

2.1 ANNEX I, Spatial Data Themes Referred to in Articles 9(A), 13(1) and 14(A)

1. Coordinate reference systems

Systems for uniquely referencing spatial information in space as a set of coordinates (x,y,z) and/or latitude and longitude and height, based on a geodetic horizontal and vertical datum

2. Geographical grid systems

Harmonised multi-resolution grid with a common point of origin and standardised location and size of grid cells.

3. Geographical names

Names of areas, regions, localities, cities, suburbs, towns or settlements, or any geographical or topographical feature of public or historical interest.

4. Administrative units

Units of administration dividing national territory for local, regional and national governance. The administrative units are separated by administrative boundaries. Also includes the boundaries of national territory and the coastline.

5. Transport networks

Road, rail, air and water transport networks and related infrastructure. Includes links between different networks. Also includes the trans-European transport network as defined in Decision 1692/96/EC²⁵ and the future revisions of this decision.

6. Hydrography

Hydrographic elements, both natural and artificial including rivers, lakes, transitional waters, reservoirs, aquifers, channels or other water bodies, where appropriate in the form of networks and linked with other networks. Includes river basins and sub-basins as defined in Directive 2000/60/EC.²⁶

7. Protected sites

Area designated or regulated and managed to achieve specific conservation objectives.

25 Decision n° 1692/96/EC on Community guidelines for the development of trans-European transport network.

26 Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, OJ L 327, 22.12.2000, p. 1.

2.2 ANNEX II, Spatial Data Themes Referred to in Articles 9(A), 13(1) and 14(B)

1. Elevation

Digital elevation models for land, ice and ocean surface. Includes terrestrial elevation, bathymetry and shoreline.

2. Identifiers of properties

Geographic location of properties based on address identifiers, usually by road name, building number, postal code.

3. Cadastral parcels

Areas defined by cadastral borders, with specific legal status of ownership.

4. Land cover

Physical and biological cover of the earth's surface including artificial surfaces, agricultural areas, forests, (semi-)natural areas, wetlands, water bodies.

5. Orthoimagery

Geo-referenced image data of the Earth's surface, from either satellite or airborne sensors.

5a. Geology

Geology characterised according to composition and structure, and the changes and restructuring it has undergone in its stratification. Includes bedrock and geomorphology.

2.3 ANNEX III, Spatial Data Themes Referred to in Articles 9(B) and 14(B)

1. Statistical units

Units for referencing census or other statistical information.

2. Buildings

Geographical location of buildings.

3. Soil

Soils and subsoil characterised according to depth, texture, structure and content of particles and organic material, stoniness, erosion, where appropriate mean slope and anticipated water storage capacity..

5. Land use

Territory characterised according to its current and future functional dimension or socioeconomic purpose (e.g. residential, industrial, commercial, agricultural, forestry, recreational).

6. Human health and safety

Geographical distribution of morbidity and mortality linked directly (epidemics, spread of diseases, natural disasters, health effects due to environmental stress, air pollution, chemicals, depletion of the ozone layer, noise, etc.) or indirectly (food, genetically modified organisms under applicable Community legislation, stress, etc.) to the quality of the environment. Geographical distribution of road accidents.

7. Utility and government services

Utility and government services comprise underground and above-ground utility networks and facilities such as drains, waste treatment, energy supply, telecommunications and water supply, and administrative and social government services such as authorities, schools and hospitals.

7a. Environmental monitoring facilities

The installation and operation of environmental monitoring facilities entail the observation and measurement of emissions, of the state of environmental media (marine environment, inland surface waters and underground waters, air and soil) and of other parameters of the ecosystem (biodiversity, ecological conditions for plant growth, etc.) by or on behalf of the authorities.

8. Production and industrial facilities

Industrial production sites. Includes water abstraction facilities, mining, storage sites.

9. Agricultural and aquaculture facilities

Farming equipment and production facilities (including irrigation systems, greenhouses and stables).

10. Population distribution – demography

Geographical distribution of people aggregated by grid, region, administrative unit or other analytical unit. This also includes population characteristics and activity levels

11. Area management/restriction/regulation zones & reporting units

Areas managed, regulated or used for reporting at international, European, national, regional and local levels. Includes dumping sites, restricted areas around drinking water sources, nitrate-vulnerable zones, regulated fairways at sea or large inland waters, areas for the dumping of waste, noise restriction zones, prospecting and mining permit areas, river basin districts, areas for management of the coast and reporting units relevant to the environment.

11a. Areas under anthropogenic stress

Areas under anthropogenic stress including polluted areas and noise and radiation zones.

12. Natural risk zones

Vulnerable areas characterised according to natural hazards (all atmospheric, hydrologic, seismic, volcanic and wildfire phenomena that, because of their location, severity, and frequency, have the potential to seriously affect society), e.g. floods, snowslides, avalanches, forest fires, earthquakes, volcanic eruptions, landslides and subsidence .

13. Atmospheric conditions

Physical conditions in the atmosphere. Includes spatial data based on measurements, on models or on a combination thereof and includes measurement locations.

14. Meteorological geographical features

Weather conditions and their measurements; precipitation, temperature, evapotranspiration, wind speed and direction.

15. Oceanographic geographical features

Physical conditions of oceans (currents, salinity, wave heights, etc.).

16. Sea regions

Physical conditions of seas and saline water bodies divided into regions and sub-regions with common characteristics.

17. Bio-geographical regions

Areas of relatively homogeneous ecological conditions with common characteristics.

18. Habitats and biotopes

Geographical areas characterised by specific ecological conditions and physically supporting the organisms that live there. Includes terrestrial or aquatic areas distinguished by geographical, abiotic and biotic features, whether entirely natural or semi-natural. Includes small features of the rural landscape – hedgerows, brooks, etc.

19a. Renewable energy resources

APPENDIX 3 - GMES Background

1 Introduction

GMES is an initiative set up jointly by the European Commission and the European Space Agency. It represents, in simple terms, a concerted attempt to produce better policy relevant information. This will require bringing data and information providers together with users, to allow them to better understand each other and to agree on how to make useful information available to the people who need it most. The establishment of GMES is contributing to secure access to such information from a wide range of sources. Thus it becomes a strategic tool in the implementation of a whole range of European policies, from environment, agriculture and transport to development cooperation and external relations.

A central goal is to make full use of Earth-based in-situ monitoring capacities as well as airborne and space-based Earth observation. Air pollution forecasts, which are now a standard feature of news media, exemplify how high-quality and timely information can be utilised by the man or woman in the street.

As a strategic initiative targeting the environmental policies of the Union, the 6th Environmental Action Plan will benefit fully from enhanced quality information. The subjects addressed cover: air, water, soils and vegetation, the oceans, management of natural risks. The first to benefit from this more efficient information provision will be the European and national environmental institutions, public services, private industry, academia and ultimately the citizen.

As the second main policy domain, GMES addresses the security of European citizens, among others from the point of the European citizen's civil protection. It also includes actions outside our territory, such as humanitarian aid.

A key task is to create and maintain a European technical Information capacity – encompassing observation systems and servicing elements - allowing the production and easy access to the information necessary for environment and security policies.

GMES will make full use of existing capacities and identify needs for adaptation and complements. On that basis actions will be initiated in the Implementation Period 2004-2008. During this period we see GMES building further institutional and political background, together with the justification for the development of monitoring infrastructure, including earth-observation satellites.

One of the reasons for the GMES initiative is that today, the many organisations involved in the production of information tend to work side by side rather than jointly. Programmes tend to be temporary with an ad hoc character, rather than long term oriented. Limited effort is made to foster the generation and use of information compared to the investments made in the acquisition of primary data. There are gaps in observation and data collection systems. Moreover these systems are rarely compatible and data assembled in a routine fashion is not always sufficient or appropriate to produce policy relevant information. Despite progress, our understanding of the functioning of the environment and its relation to human activities is still in its infancy in a series of domains. This limits our capacity to perform the correct observations and to interpret the observed data. The combination of these causes results in a

rather low efficiency of the current European capacity to produce policy relevant information, with some notable thematic exceptions, like operational meteorology. The GMES initiative will address these issues. Clearly it will not do so by duplicating existing activities, but by offering a frame which will bring about synergies between the activities of the European actors and complement them where gaps exist. The expected benefits are better information for users and a more active economy in Europe in the sectors related to information production.

2 GMES Action Plan

In 2008 the capacity for GMES should be an operational system consisting of three main components

- a partnership of the key European actors
- European Shared Information Services
- mechanisms to maintain the dialogue between stakeholders of information production and use.

The whole action plan can be found in

http://www.gmes.info/library/files/Reference%20Documents/com2004_0065en01.pdf

2.1 A partnership of the key European actors

A number of public organisms (in particular the European Environment Agency, EC, ESA, EUMETSAT, European Union Satellite Centre) hold competencies in one or the other areas of the chain of production of information (e.g. data collection, information production, information dissemination). In addition, some non governmental organisations (e.g. Eumetnet, EuroGOOS, Eurogeographics, Eurogeosurvey) focus a large part of their activities on these subjects. Within their domain of specialisation they play a crucial role of co-ordination of the activities of their corresponding national organisations. However co-ordination is insufficient across the domains, both at the national and at the European level. Two examples are often quoted for their potential for improvement: i) between space and in situ observing organisations and programmes; ii) between environmental observations and environmental statistics. In 2008 the key European actors should thus have one common strategy and a clear repartition of tasks between themselves to maintain and develop further a shared European information system for GMES

2.2 European Shared Information Services

The European capacity comprises facilities corresponding to the various stages of the chain of production and dissemination of information : standardisation of the data observation and data collection; production of information and services; documentation of data and of information; provision of access to these. It consists of large numbers of distributed facilities, co-ordinated in a way that their individual outputs can easily and routinely be assembled into policy relevant information. It also includes space borne and in situ observation facilities, both of which are indispensable and mutually reinforcing.

2.3 A permanent dialogue between the stakeholders

The information needs of the users evolve over time as do the technological capabilities. The GMES system thus must be able to detect such changes at a very early stage and take them into account. A mechanism of dialogue will be established to allow two-way exchanges between all those who play a role in the production and use of information (research centres,

industry, governmental and non governmental bodies), and to send feed-back messages to the European partnership and GMES management.

2.4 The GMES Action Plan (2002-2008)

An Action Plan in two stages has been agreed and put in place between EC and ESA in consultation with the respective member countries⁶. The Initial Period was completed at the end of 2003. It documented the issues facing the production of information relevant to the European environment and security policies and recommended actions to establish the European capacity for GMES. The Implementation Period (2004-2008) started the establishment of the core structuring elements of the GMES capacity and will prepare the post-2008 Operational Period.

2.5 GMES Pilot services

There is a political commitment to start delivering a “core capacity” of GMES operational services by 2008. GMES must therefore progress from the current project-based approach to an integrated, European-wide system serving EU needs.

The European Commission and the European Space Agency (ESA) has identified three GMES pilot services that will have first priority to be developed within GMES. The selection is based on existing and mature capacities and structures, on user uptake and on conditions for long-term sustainability (i.e. 10-20 years). The implementation should be strongly “user driven”, i.e. include a consolidation of user requirements and a confirmation of their commitment. The three services are:

- **Land Monitoring**
Objective - Provide core land cover data for delivering timely, relevant information on land use and land cover changes for a number of targeted policy areas at global (e.g. climate change modeling, development), European (e.g. water, biodiversity, agricultural) national and local scale (e.g. urban, spatial planning)
- **Marine Core Services**
Objective - Need for European capacities for: International treaties and European policies, marine resources exploitation, transport & offshore operations, hazards & pollutions, coastal management, seasonal climate prediction, marine research
- **Information for Crisis (Emergency) Management**
Objective - Enhance European capacity to respond to crises and emergencies associated with natural and man made disasters (e.g. floods, fires, earthquakes, landslides, tsunami, industrial accidents), through relevant and timely information (Europe and World)

APPENDIX 4 - GMES Thematic Projects

Below is a description of the 20 GMES thematic projects that have been identified as being of particular relevance to the RISE project. These projects serve as a base for the desktop study of the GMES user requirements.

1 ARMONIA

Applied multi Risk Mapping of Natural Hazards for Impact Assessment

<http://www.armoniaproject.net>

Project Start Date: 2001-07-01

End Date: 2004-07-01

1.1 Project Consortium

The coordinator of the project is :

T6 Società Cooperativa

c/o Katja Firus

Via Genova, 30

00184 Roma, Italy

Phone: +39-06-47823286

Fax: +39-06-47882798

E-mail: k.firus@t-6.it

The other partners are :

- Staffordshire University, Institute for Environment and Sustainability Research, UK
- Geological Survey of Canada, Natural Resources, Terrain Sciences Division, Canada
Landslide Project, Canada
- Ceske Centrum pro Strategicka Studia, Water Management Department, Czech Republic
- Università degli Studi di Napoli Federico II, Department of Spatial Planning, Italy
- Geological Survey of Finland, Land use and environment department, Finland
- HR Wallingford Ltd, Dept. Water, UK
- Universität Dortmund, Institute of Spatial Planning, Germany
- European Commission - DG Joint Research Centre, Institute for Environment and Sustainability - Land Management Unit, Italy
- Potsdam Institut fuer Klimafolgenforschung, Departement Integrated Systems Analysis, Germany
- Politecnico di Milano, Department of Land Use and Urban Planning, Italy
- Algosystems SA, Research & Development Department, Greece
- Lancaster University, Department of Geography, UK

1.2 General Information about the Project

Europe is vulnerable to a wide variety of natural geophysics and meteo-climatic hazards. These hazard result in loss of life, damage to or destruction of property and infrastructure, and

pose significant health and safety problems. Last decades have been interested by several disasters such as:

- floods, including coastal;
- earthquakes;
- windstorms;
- volcanic eruptions;
- landslides.
- others can also be relevant economically such as tsunami, fire, snow avalanches, desertification, soil erosion, coastal dynamics, heavy rainstorm, sea level change, karst collapse, subsidence.

The overall aim of the research project ARMONIA (Applied multi Risk Mapping of Natural Hazards for Impact Assessment) is to provide the EU with a new harmonised methodology for producing integrated risk maps to achieve more effective spatial planning procedures in areas prone to natural disasters in Europe

Objectives to be achieved by ARMONIA :

- Integration/optimisation of methodologies for risk assessment for different types of potentially disastrous events;
- Harmonisation of different risk mapping processes for standardising data collection/analysis, monitoring, outputs and terminology for end users (multi-hazard risk assessment);
- Design of a harmonised decision-making tool structure for applying hazard and risk mitigation in spatial planning;
- Contribution to the implementation of natural hazard awareness into the improvement of Environmental Assessment policy.

1.3 Anticipated Services/Products

The strategic impacts of ARMONIA can be generally summarised as:

- implementing multi-hazard and risk methodologies with a special regard to climate change effects that may result in increased occurrence of extreme events and impacts on the anthropogenic system
- harmonising techniques and processes of analysis of multiple hazards and risk assessment;
- promoting more effective cooperation among different disciplines involved in spatial planning, as well as between scientific experts and decision makers;
- incorporating multi-hazard and risk assessment into a new European directive/guideline for the harmonisation of hazard/risk mapping to be applied in spatial planning.

1.4 Data Requirements

Recent scientific research and international bodies – mainly UNESCO, the United Nations and the European Commission but also others – have made the following forecast concerning the near future, based on the experience of the past decades:

- changing global environment conditions (natural climate trends and human-induced change) may contribute to an increase in the frequency and severity of natural disaster incidents;
- new and increasing kinds of technological accidents; these have been almost not experienced in the past;

- technological advances reduce some hazards but add complexity to old threats (e.g., high rise building fires);
- emergence of new kinds of technological accidents that can lead to disasters (e.g., telecommunication failures, computer accidents, biotechnology hazards);
- vulnerable populations (aged, handicapped, etc.) are likely to suffer increased impact by events (e.g. hurricanes affecting retirements communities); and
- increasingly, localities will have disastrous conditions created by sources quite distant (e.g. desertification, radiation from Chernobyl).

The following figure represents the selected approach for the ARMONIA project, where hazard and risk assessment methodologies, for all possible hazards, have been harmonised.

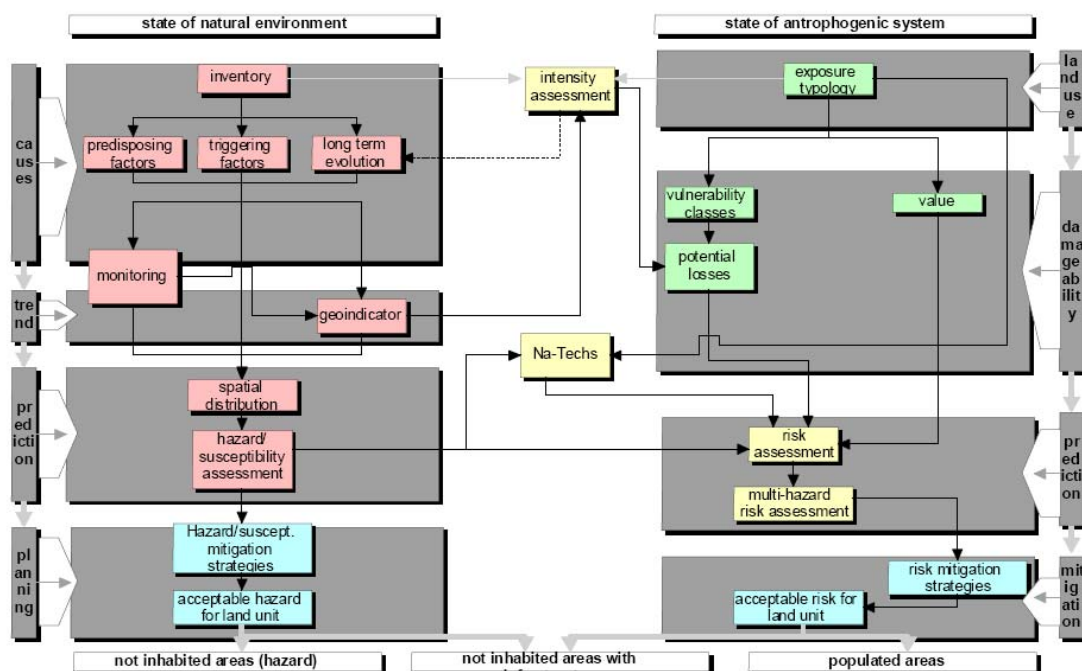


Figure 1: Flow chart for multi-hazard risk assessment and zoning
Source: TEMRAP project, ENEA

Common points among different hazard procedures include:

- collection of basic predisposing factors (e.g. rough data like geological maps, land use maps.) to be shared among different experts; the same is for collecting and exploiting satellite and ground based data;
- investigation an data on long term relationship with climate change and variability;
- investigation and data on triggering factors, often the same for different typology of hazards (e.g. floods and landslides);
- monitoring network, providing data for different purposes;
- exposure typology and distribution;
- vulnerability function, especially when dealing with long term, not direct, systemic vulnerability;
- multi-hazard risk assessment, to be expressed in a common manner (e.g. monetary cost, victims, etc.).

1.5 Analysis - Required Data Harmonisation

The technological domain is in the need of an integrated approach among different hazards: different data, different information, different output can be better managed if harmonised in terms of metadata as well as procedures and results. In such a way data are permanently available to end users and can be periodically updated, according to development of science. On the other hand centralised systems, or distributed and connected via web, must be open to improvement also coming from outside the original group collecting data and modelling them. This is to avoid any monopoly from any dominating group.

Gaps to solve include:

- the integration of ground based monitoring systems with satellite ones capable to investigate change detection (especially high resolution like IRS, IKONOS, QUICK BIRD, MIVIS) need to be solved;
- adequacy of monitoring network all over the territory;
- long term sustainable monitoring;
- implement “cadastre” scale and approach for land information system;

Some general problem still remain, in the field of hazard and risk assessment:

- present technology is clearly demonstrating that there is a need of not duplicating data collecting but investigating new procedure and algorithms, based on sound monitoring data (e.g. integrated ground based and satellite); major efforts of scientific community should be in basic processes, also in relationship to climate change, new technology for monitoring and, modelling and methodologies for harmonising data and processes as essential output for end users;
- the wide diffusion and duplicating of information (also via web) is not helping in understanding the paternity of basic data, creating uncertainties on the output. Quality assurance is a possible short cut, may be the solution if a robust set of guidelines and methodologies can guide the process;
- information managers are now becoming an essential tool for navigating into the flooding of data but they should not substitute science experts as counterpart of end users. End users should be capable to generate demand and to apply correctly policies for natural disasters prevention, mitigation and management. Very often science is not easily transferred into legislation because of difficulties to synthesise complex processes into simple and applicable rules; in the mean time there is a lack of awareness from end users (e.g. policy makers) due to scarce sensitivity with respect to scientific knowledge; also end user must be able to address scientific research to their specific need, in order to implement culture but also to transfer knowledge into practical applications.

Finally, the XXIst century is requiring harmonisation of data, methodologies, technologies, and management for the benefit of citizens. Only a joint approach among all this actors may give a real benefit for our society. Other solutions seem to be not applicable.

2 ASSIST

Alpine Safety, Security & Informational Services and Technologies

Project Start Date: 2005-06-20

End Date:

2.1 Project Consortium

The coordinator of the project is :

VCS Aktiengesellschaft

Ulli Leibnitz

Borgmannstrasse 2

D-44894 Bochum

Phone: +49-234-9258-113

Fax:+49-234-9258-190

E-mail: ulli.leibnitz@vcs.de

The ASSIST consortium includes seven partners from Austria, Germany, Italy and Switzerland. It consists of organisations with different scopes (avalanche prediction, mountain rescue, development of complex server infrastructures, generation of enhanced Earth Observation products, integration of mobile field equipment with positioning and communication capabilities, etc.)

Partners:

Telematica e.K., Germany

Gamma Remote Sensing Research and Consulting, Switzerland

Swiss Federal Institute for Snow and Avallanche Research, Switzerland

Alpine Safety and Information Centre, Austria

2.2 General Information about the Project

The scope of the ASSIST Project is to bring together different existing systems and infrastructures for the environment and risk monitoring and improve the security for inhabitants and tourists in the alpine region.

The goal is to implement pre-operational services and realise advanced integrated safety and information services for the Alps. The advanced services shall be based on already operational crisis and information and crisis communication systems (pre-cursor services as e.g. ESIS). The overall objective of the proposed project is to specify, design, implement and validate a generic system architecture for the production and exchange of data products used for risk prevention and risk event management.

The project will focus on risks typical to mountainous areas e.g. avalanches, landslides, debris flows, floods, etc.

2.3 Anticipated Services/Products

The backbone of the overall concept are so-called “Service Nodes”. These nodes are autonomously operated by organisations which are responsible for risk management (such as police, hospitals, fire fighters and air and mountain rescue). The Service Nodes are capable to

- request and ingest raw input data (satellite-borne, air-borne and terrestrial)
- process the input data into products suitable for risk prevention and crisis management
- distribute the products within the “User Network” (fixed and mobile regional risk management centres and - in case of risk events - up to the mobile staffs in field)
- exchange products with other Service Nodes operated by different organisations (e.g. police, hospitals, ambulance services, air rescue, fire fighters, etc.)

These Service Nodes will be laid out to support both

- day-to-day monitoring and predictions of risk mitigation scenarios
- operation during concrete crisis situations with different requirements in terms of data products, data timeliness and distribution.

The initial validation of the system will be performed within a small triangle between Austria, Italy and Switzerland

2.4 Data Requirements

The project will combine satellite based observation data such as synthetic aperture radar (SAR) images and high-resolution optical satellite data with existing airborne and meteorological data.

2.5 Analysis - Required Data Harmonisation

ASSIST is a new project, existing problems and data requirements are not well described.

3 BICEPS

Building an information capacity for environmental protection and security

Project Start Date: 2003-01-01

End Date: 2004-05-01

3.1 Project Consortium

The coordinator of the project is :
Natural Environment Research Council
Sarah Claridge
Monks Wood, Abbots Ripton
PE28 2LS HUNTINGDON
UNITED KINGDOM
Phone: -
E-mail: sls@ceh.ac.uk

Partners:

Environmental Information Services
Imperial College Of Science, Technology And Medicine, United Kingdom

3.2 General Information about the Project

BICEPS will provide expert assessment of scientific and technical aspects of GMES activities, funded through the EESD GMES dedicated call. Specifically, it will:

- review outputs from thematic projects against their success in delivering policy-relevant information to target groups and other potential users;
- assess how the availability, content and characteristics of data and how current scientific and technical capacity might constrain the ability to generate appraisal , including novel indicators of environmental quality and methods of assessing trends in environmental states;
- synthesise an overview (across themes), report to the GMES Forum and participate in discussions of the issues raised;
- contribute conclusions from the above assessment into proposals to establish an operational European capacity for GMES.

3.3 Anticipated Services/Products

The outcome of this project was a report, "Review of the European Requirement for Monitoring, Second Interim Report, Version 4.1" by B K Wyatt, D.J. Briggs, P. Ryder and C de Hoog (August, 2003).

Some of the emerging general conclusions from this report were:

- *Design Principles*
The design principle for GMES should be based on the integration of existing monitoring capacity, aimed at building links across the interfaces between such systems, identifying and remedying gaps and introducing practices that facilitate the exchange and integration of data and information across thematic and institutional boundaries.
- *Policy Priorities and Information Need*
Whilst the focus is necessarily on environmental and security issues at the EU level, the information supplied through GMES must also help support EU obligations globally, and policy implementation at the national and sub-national level. Likewise, whilst a major priority will be to provide information required by existing policy, it should also have the capability to serve future policy needs.
- *Understanding Decision-Making, Information Production and Data Flows*
A considerable gulf still exists between data providers and scientists, on the one hand, and decision-makers (including politicians) on the other. A major contributor to this lack of understanding is the lack of a common language between scientists, policy-makers and the public.
- *Inadequacies in Methods for Generating Policy-Relevant Information*
Priority should be given to achieving advances in methods of cost-benefit and cost-effectiveness assessment, and to strengthening concepts (and awareness of the limitations) of indicators. Furthermore standard (more automated) tools need to be developed to facilitate the development of policy-related information.
- *Inadequacies in Tools for Data Linkage and Transfer*
There is a need to review the factors that have limited the success of previous attempts to set up gateways to, and clearing houses for, environmental data in the EU, but also to investigate and evaluate 'best practice' in data access and data linkage, as a basis for developing new and effective strategies for the GMES. An important contribution to the delivery of this is expected to come from the recently-announced projects within the ESA GMES Service Element (GSE) programme in the form of a strategy for improved harmonisation and exchange of relevant data.
- *Interdependencies between Monitoring and Research*
GMES itself can help to maximise the impact of research findings on policymaking, through the establishment of a common information infrastructure comprising a common data policy, common standards and structures and the removal of many of the present obstacles to accessing and using publicly funded data and associated findings.
- *Commonalities and Opportunities for Data Sharing*
There is considerable scope for greater integration of monitoring, especially within specific policy areas but also, to a lesser extent, between them. These, however, may lie less in the use of common indicators, information or base data, and more in improved linkage of monitoring systems (e.g. by adding different sensors to the same platform, or by co-ordinating ground- and space-borne monitoring).

- *The Role of Modelling*
Modelling plays a vital function in the provision and synthesis of information and will be fundamentally important to the operation of GMES. One strategy that is likely to be important is the use of nested approaches, in which high-resolution models, capable of modelling the time-dependent behaviour of a particular environmental process, are embedded within a smaller scale, lower-resolution model, from which boundary conditions can be imported.
- *Scale and Scalability*
The implication is that the priority for the development of the GMES backbone may be to design common standards and improved inter-operability between monitoring systems, rather than to strive for regimented monitoring schemes aimed at uniform data products. A key message with regard to monitoring for environment and security is that 'one size does not fit all'.
- *GMES Structure and Prioritisation*
Because of the all-encompassing scope given to the GMES initiative, it is crucial to agree criteria that will set the priorities for the progressive implementation of GMES and, in particular, of the Shared Information System. These prioritisation criteria are likely to include considerations of need (user demand), potential added value, strategic issues (e.g. achievement of European autonomy in key areas), strategic-technical importance (addressing limiting factors in the information production process), feasibility, cost and opportunities for shared action.

3.4 Data Requirements

Not applicable

3.5 Analysis - Required Data Harmonisation

Not applicable

4 EDEN-IW

Environment Data Exchange for Inland Water

<http://www.eden-iw.org/contents/home.html>

Project Start Date: 2001-07-01

End Date: 2004-07-01

4.1 Project Consortium

The coordinator of the project is :

Joint Research Centre

Palle Haastrup Ph.D

Via E. Fermi, 1, TP 290

21020 Ispra (VA)

Italy

Phone: +39 332 789083

E-mail: palle.haastrup@cec.eu.int

The other partners are :

- Consiglio Nazionale delle Ricerche (National Research Council) Institute for Atmospheric Pollution, Italy
- European Dynamics S.A, Greece
- NERI, National Environmental Research Institute, Denmark
- OIEau, Office International de l'Eau, France
- QMUL, Queen Mary University of London, United Kingdom

4.2 General Information about the Project

The Environmental Data Exchange Network for Inland Water (EDEN-IW) project aims to develop at European level a service integrating disparate, heterogeneous, government databases on inland water. This will make existing distributed environmental data available to users through an intelligent interface acting as a one-stop shop. The users, who may also be public authorities (for instance environmental regulatory agencies) and the public, will be able to address their needs for Inland Water data through one common interface, independent of physical or logical location of the databases, the database languages used, or of the specific nomenclature used in a specific database, and without knowing which database or databases contain the relevant information, by data mining the most complete set of information sources.

The prototype produced in the project creates a new standard for environmental data exchange and thereby eases environmental reporting and planning.

4.3 Anticipated Services/Products

The project has 5 main thrusts:

1. Development of advanced agent based technology to underpin rich semantic information exchange across Europe with the additional capability of communicating with other agent systems within an European and global framework, for instance the agent system employed by the US EPA in the Environmental Data Exchange Network.
2. Research and development of a specific application on Inland Water data, i.e. connect a number of relevant databases to the system.
3. Enrichment of the possibilities for environmental management by adding new types of intelligent software agents, capable of providing the citizens and decision makers with decision support and knowledge needed to manage complex environmental risk situations related to inland water.
4. Assurance of efficient and effective semantic management, by developing a relevant, specific Inland Water ontology and specific Inland Water glossaries, supported by two external reference multilingual thesauri, allowing easy extension to multi-language situations.
5. Serving the public and the user community, which currently consist of European Environment Agency, United States Environmental Protection Agency, United States Department of Defence, United States Department of Energy, European Topic Centre for Water and the Italian Ministry for the Environment.

This project has implemented use cases and built a prototype.

4.4 Data Requirements

At an overview level the EDEN-IW conceptual data model can be visualised as shown below:

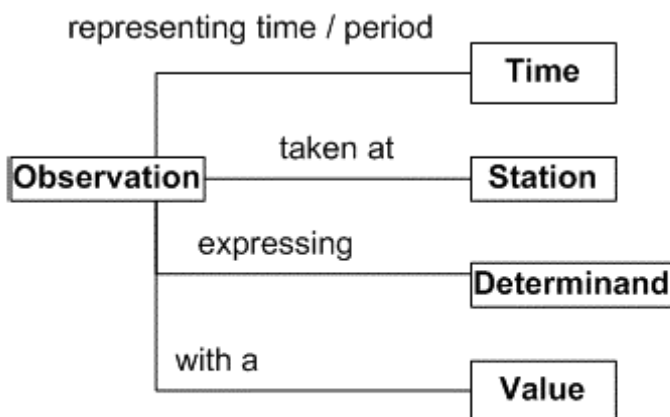


Figure 1 Overview of conceptual data model of an observation

4.5 Analysis - Required Data Harmonisation

Integrating distributed heterogeneous inland water database resource has been challenging for the EDEN-IW project because of the number of possible heterogeneous schema and the difficulty in normalising numerous syntactical mappings between heterogeneous database schemas. The EDEN-IW system integrates distributed heterogeneous inland water databases using semantic (ontological) information model. This has the advantage over pure schema-based approaches such as data warehouses and other approaches that use federated or global schema because it reduces the problem of resolving differences in structure to the problem of understanding the differences in the semantic models of the different databases and then integrating the individual semantic models into a common semantic model.

Use cases has been defined and a prototype has been developed for some of the use cases:

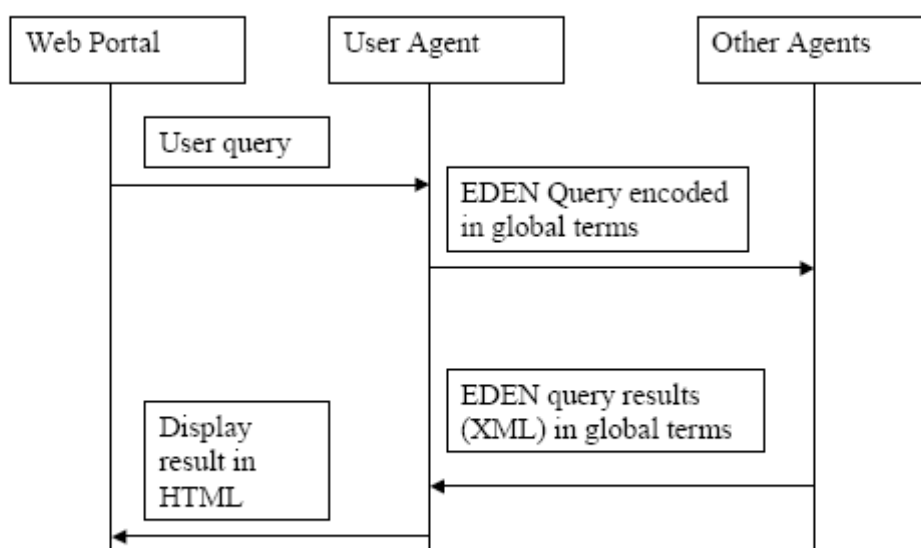


Figure 10: how user-queries are handled by the EDEN-IW system

More information about the use cases can be found in the “Functional requirements specification for IW” document on the EDEN-IW homepage.

5 EFAS

European Flood Alert System

<http://efas.jrc.it/>

Project Start Date: January 2003

End Date: 2006

5.1 Project Consortium

The coordinator of the project is :

Joint Research Centre

Jutta Thielen

Institute for Environment and Sustainability, LMU

I - 21020 Ispra (VA), Via Enrico Fermi, TP 262

Phone: +39-0332-786240

Fax: +39-0332-785230

E-mail: jutta.thielen@jrc.it

EFAS Data Providers:

ECMWF - European Centre for Medium-Range Weather Forecasts, UK

DWD - Deutscher Wetterdienst, Germany

GRDC - Global Runoff Data Centre, Germany

Met Office - Met Office, United Kingdom

5.2 General Information about the Project

Following the disastrous floods in the Elbe and Danube river basins in August 2002, the European Commission announced in the communication (COM(2002)-481) the development of a European Flood Alert System (EFAS). EFAS - developed within the WDNH project - will be capable of providing medium-range flood simulations across Europe with a lead-time between 3 to 10 days.

The benefit of EFAS is two-fold. First, EFAS should provide the European Commission with useful information for the preparation and management of aid during a flood crisis. Second, National Water Authorities should benefit from additional medium-range flood information that might contribute to increased preparedness in an upcoming flood event. EFAS is aimed at complementing national flood forecasting systems, not to replace them. The European Flood Alert System (EFAS) activity is at present in a development and testing phase at the European Commission Joint Research Centre.

Since the beginning of 2003 the European Commission DG Joint Research Centre (JRC) is developing a prototype of EFAS in close collaboration with relevant institutions in the Member States. The JRC benefits from experience gained already during the European Flood Forecasting System (EFFS) project (Reggiani et al, 2004) financed by DG Research..

5.3 Anticipated Services/Products

A prototype of EFAS for the Elbe and Danube catchments is expected to be ready and tested by 2006. A grid-based catchment model that has been developed to simulate floods in large European river basins, LISFLOOD, will be used.

The advantages of EFAS for the European Commission are

- Overview of current flood situation in Europe for European Commission services
- Comparable results across Europe

- Fostering harmonised exchange of hydrological data and information in Europe
- The advantages of EFAS for the National hydrological Institutes could be
- Additional information on possible flood situations more than 3 days in advance based on different weather forecasts
 - Interpretation of flood ensemble prediction system forecasts based on full sets of EPS
 - Increased exchange on flood forecasting issues and EPS research between the different institutes participating in EFAS.

5.4 Data Requirements

The LISFLOOD model is spatially distributed, therefore changes in e.g. land use can be easily included in a LISFLOOD simulation. The typical size of one grid cell is 1 by 1 km, although the model can be run at both much finer and coarser resolutions if needed. LISFLOOD is currently being used and tested for flood forecasting in the EFAS project.

LISFLOOD needs spatially distributed input maps on topography, the river channel network, land cover (CORINE land use classes), and soils (soil depth and texture class). Soil and vegetation parameters are linked to the soil texture and land use classes through look-up tables. The driving meteorological variables that are required are rainfall, potential evaporation (for bare soil, closed canopy and open water reference surfaces), and daily mean air temperature (Figure 3).

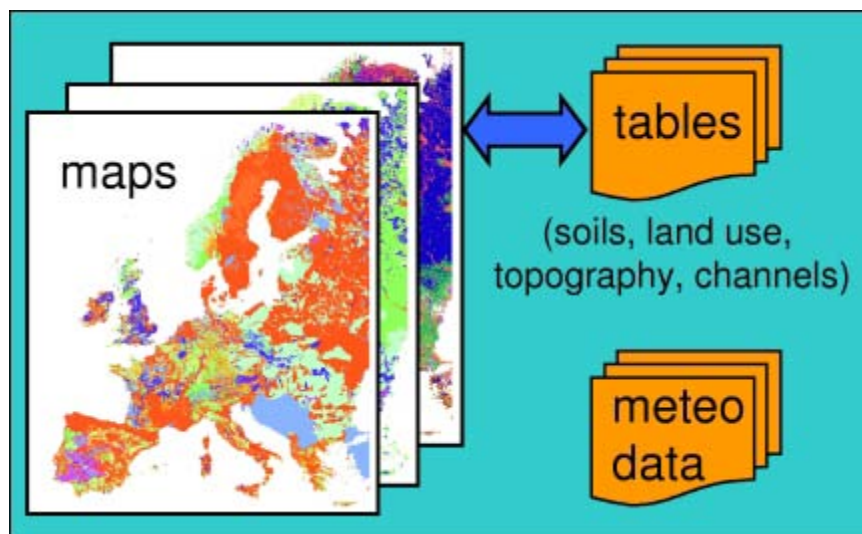


Figure 3: LISFLOOD input

See http://natural-hazards.jrc.it/activities_lisflood.html for more information about the LISFLOOD model.

5.5 Analysis - Required Data Harmonisation

An important problem encountered during the project is the checking and pre-processing of the data. Due to a lack of standardization often even within the same country, different data formats and different reference systems need to be considered and much manual work is involved in the data conversion. Another particular problem addressed during this session is the availability of reservoir information. For a variety of reasons these data are often not even available to the national flood forecasting centres (or only over a very short time range), although the calibration studies show that their availability can improve the flood simulations considerably.

The EFAS project can be seen as an important pilot for Inspire as data collection and harmonisation is an integral part of the EFAS activity. Europeanwide data collection, e.g. within the framework of a EU-Flood-GIS which will contain all essential hydrometeorological data and information, is a necessity for flood forecasting on European scale. It is an Inspire principle to build on existing standards and to expand on those if necessary. Which data should be included in Inspire is being decided at different stages throughout the implementation phase with consultation of experts in the Member States. The hydrometeorological community is invited to participate in this exercise in order to protect their interests.

Due to the fragmented and heterogeneous organisational structure in large river basins across Europe, data collection and harmonisation is a big challenge for anyone working on a trans-national level. For the Danube alone 18 different countries are involved of which many have again sub-divisions on national, federal, regional or local level. As a result much effort has to be put into data collection, checking and pre-processing that takes away much working time. This is true for the EFAS project but also for other Member States activities across Europe.

The JRC represented two upcoming initiatives to collect data on European scale for the EFAS project: One initiative, called IDA LISFLOOD ALERT is aimed to be funded by DG Enterprise. This initiative is still in preparation phase and not finalised yet. It has been proposed to put a system in place capable of collecting and harmonising near real-time discharge data across Europe. The second initiative is the establishment of a EU-Flood- GIS with funds from the European Parliament. The EU-Flood-GIS, not to be confused with the GIS developed for the Water Framework Directive, essentially contains hydrological and meteorological data necessary for calibrating, validating and running flood forecasting system across Europe, e.g. the EFAS system. Together with the EU-Flood-GIS also a catalogue listing information on all available hydrological and meteorological data is going to be established. An open call for tender for this project will be published in autumn 2005.

6 EFFS

A European flood forecasting system

<http://effs.wldelft.nl/>

Project Start Date: 2000-03-01

End Date: 2003-10-01

6.1 Project Consortium

The coordinator of the project is :

Delft Hydraulics

Paolo Reggiani

Postbus 177, 2600 MH, Delft,

The Netherlands

Phone: +31-15-2858882

Fax: +31-15-2858582

E-mail: Paolo.Reggiani@wldelft.nl

The other partners are:

JRC, Italy
Danish Meteorological Institute, Denmark
European Centre For Medium Range Weather Forecasts (ECMWF), UK
German Federal Institute of Hydrology, Germany
Dutch Institute For Inland Water Management and Waste Water Treatment, The Netherlands
Lithuanian Institute of Geology and Geography, Lithuania
Polish Institute Of Meteorological And Water Management, Poland
National Institute Of Meteorology And Hydrology - Bulgarian Academy Of Sciences, Bulgaria
Slovak Hydrometeorological Institute, Slovakia
Slovak University Of Technology, Slovakia
Swedish Meteorological And Hydrological Institute, Sweden
University Of Bologna, Italy
University Of Bristol, UK
University Of Lancaster, UK
Hungarian Water Resources Research Centre, Hungary

6.2 General Information about the Project

National water authorities are normally able to provide flood warnings between one and four days in advance of flood events. These warnings are usually based on weather forecasts in combination with a knowledge of the actual hydrologic conditions in the river basins concerned. However, the emergency civil and water management agencies would benefit from an increase in lead-time, to effectively implement their plans in downstream areas. Therefore there exists a need for improved flood forecasting to extend the flood warning period. Improved flood forecasting should enable more effective evacuation of people from high risk areas or the controlled release of water from reservoirs in upstream areas to create temporary retention basins to reduce flood volumes and peaks.

The main objectives of the project EFFS project (A European flood forecasting system) are:

- To take advantage of currently available Medium-Range Weather Forecasts (4 - 10 days) to produce reliable flood warnings beyond the current flood warning period of approximately 3 days
- To design a Medium-Range Flood Forecasting System for Europe that will produce flood warnings on the basis of the Medium Range Weather Forecasts
- to produce flood forecasts in regions where at present no flood forecasts are made on the basis of the newly developed system.

These main objectives lead to a series of scientific objectives:

- Development and application of downscaling techniques for weather forecasts that can be used in real-time operational flood warning systems over large areas
- Design of a framework that allows for the use of different rainfall-runoff flood models linked to the Medium-Range Weather Forecasts in order to provide Medium Range Flood Forecasts
- Investigate the concept of an overall water balance hydrological model as a basis for regional rainfall-runoff flood modelling.
- Investigate the accuracy of the flood forecasts in space and time starting off from uncertainties in Medium Range Weather Forecasts and assess the error propagation through the system

- Find methods to incorporate uncertainties both from the weather forecasts as well as from the hydrologic models to be used in operational forecasts and use them as a decision factor as part of the actual flood forecast
- Investigation and recommendations concerning methods to disseminate the forecasts to whom they might concern, and to retrieve feedback from the users

6.3 Anticipated Services/Products

The EFFS project aims at developing a prototype of an European flood forecasting system for 4-10 days in advance. This system provides daily information on potential floods for large rivers such as the rivers Rhine and Oder as well as flash floods in small basins. This flood forecasting system can be used as a pre-warning system to water-authorities that already have a 0-3 day forecasting system. The system can also provide flood warnings for catchments that at present do not have a forecasting system (Eastern-European countries). The framework of the system will allow incorporation of both detailed models for specific basins as well as a broad scale model for entire Europe. Once designed, the prototype will be tested and evaluated for several months. Together with end-users, channels to disseminate the forecasts and their uncertainties will be developed.

A preliminary recommendation is that if a European Flood Forecasting Centre is created, it should publish the results of the forecasting system on a password protect Internet site. It could be supported by an alert via email/SMS/WAP to staff on duty in positions/organisations responsible for national or regional hydrological forecasting. Information of a general and overall character may be open to the public.

The higher the grade of details, the more restricted the access should be in order to avoid miss-interpretations of non-experts. Especially the interpretation of the ensemble-forecasts is not easy and an explanation text should be disseminated together with the graphs or maps. It should be clear for every user that there are uncertainties in the forecast. The access to the forecasts and warnings should be restricted to authorities and organisations that are responsible for the flood forecasting in their countries - only here there are experts with the necessary level of experience in the forecasting subject field.

6.4 Data Requirements

Medium-Range Weather Forecasts are available for periods between 4 and 10 days ahead. These forecasts, which are still hardly used for practical purposes, should be taken advantage of by investigating the improvements that can be obtained in the present knowledge that is available to decision makers in flood-risk areas.

Since a few years weather models have been developed that provide on a small resolution grid weather forecasts for more than 4 days in advance. Currently these forecasts can be provided for entire Europe. It is possible to couple these weather forecasts to hydrologic/flood routing models to allow for Medium-Range Flood Forecasting.

A novel feature of the present project is the application of a three-tiered meteorological forecast strategy to the problem of hydrological forecasting. The three types are:

1. short range forecasts that provide very detailed forecasts
2. a deterministic hydrological forecast, that provides more accurate risk assessments at lead times in the range of 3-6 days, and
3. ensemble hydrological forecasts, that will provide useful warnings, at 5-10 day lead-times, of the probability of extreme events

The system is coupled to a spatially distributed water balance model (LISFLOOD) that forms the backbone for more detailed modelling practices in different regions within Europe. The overall water balance model provides the initial soil moisture, groundwater, and snow depth conditions that may be used for more detailed modelling.

6.5 Analysis - Required Data Harmonisation

An output of the project is to ensemble hydrological forecasts, that will provide useful warnings, at 5-10 day lead-times. In general longer forecast lead-time was considered useful. However longer forecast lead-time will result in increased forecast uncertainty and forecast errors.

- The expected uncertainty of the forecast is important in many aspects e.g. the credibility of forecasters may be questioned, the risk of “Crying for the wolf” (too many false alarms is harming credibility)
- Economical or other losses may occur as a result of decisions taken based on an erroneous forecast => who takes responsibility?

The readiness to provide on-line access to near real-time information of hydrological variables, such as water levels and stream-flows, varies between countries. Any restrictions are presumably to a certain degree dependant on “political/economical” circumstances, rather than technical limitations. Some countries are governed by determined price-policies applicable to distribution of hydro-meteorological data. The same policies may in some cases apply to stream-flow or reservoir inflow/reservoir content and discharge forecasts under normal hydrological conditions, whereas information is free of charge in situations where flooding is imminent or ongoing.

7 GEOLAND

European forum on earth observation use for environment and security

<http://www.gmes-geoland.info/index.php>

Project Start Date: 2004-01-01

End Date: 2007-01-02

7.1 Project Consortium

The coordinator of the project is :

Infoterra GmbH

Communications

Mareike Doepke

88039 Friedrichshafen

Germany

Phone:+49 (0)7545 8 3924

Fax: +49 (0)7545 8 1337

E-mail: mareike.doepke@infoterra-global.com

User Organisations:

Agenzia per la Protezione dell'ambiente e per i Servizi Tecnici (consortium member), Italy

Aid & Cooperation, Directorate-General, Belgium

BETURE CEREC (consortium member), France

Bundesamt für Naturschutz (BfN), Germany
Country Administration of Dalarna (consortium member), Sweden
Czech Ministry of Environment, Czech Republic
Department for Environment, Food & Rural Affairs, UK
Directorate for Nature Management, Norway
Environmental Agency for England and Wales, UK
EUROCITIES, Belgium
European Commission, Regional Policy, Directorate General, Belgium
European Topic Centre on Terrestrial Environment (consortium member), Spain
Food and Agriculture Organisation of the United Nations (FAO), Italy
Institut Francais de l' Environnement (consortium member), France
Integrated Global Observing Strategy-Partnership, France
International Geosphere Biosphere Programme, Sweden
Land Oberösterreich, Austria
Landesamt für Natur und Umwelt des Landes Schleswig-Holstein (consortium member), Germany
Landesvermessungsamt Vorarlberg (consortium member), Austria
National Agricultural Research Foundation (consortium member), Greece
Norwegian Institute of Land Inventory, Norway
Norwegian Water Resources and Energy Directorate, Norway
Oesterreichisches Institut für Raumplanung (consortium member), Austria
Potsdam Institute for Climate Impact Research, Germany
PUMA Task Team, c/o EUMETSAT Secretariat of the PUMA Task Team (consortium member), Germany
Scottish Natural Heritage, Scotland UK
Statkraft, Norway
Swedish Environmental Protection Agency (consortium member), Sweden
The Network of European Metropolitan Regions and Areas, Scotland UK
Thüringer Landesanstalt für Wald, Jagd und Fischerei, Germany
Tor Vergata - CEIS, Lead partner of ESPON 3.3 (European Spatial Planning Observation Network) project, Italy
Umweltbundesamt GmbH (consortium member), Austria
United Nations Environment Programme (UNEP) (consortium member), Switzerland

Research partners:

Albert-Ludwigs-Universität Freiburg (consortium member), Germany
Alterra bv (consortium member), The Netherlands
ARC Seibersdorf research GmbH (consortium member), Austria
ARC systems research GmbH (consortium member), Austria
Centre National de la Recherche Scientifique (consortium member), France
Commissariat a l'Energie Atomique (consortium member), France
Consiglio Nazionale delle Ricerche (consortium member), Italy
Deutsches Zentrum für Luft- und Raumfahrt e.V. Deutsches Fernerkundungsdatenzentrum (consortium member), Germany
European Commission - Directorate General Joint Research Centre (consortium member), Italy
Institut für Photogrammetrie und Fernerkundung, Technische Universität Wien (consortium member), Austria
Institut National de la Recherche Agronomique (consortium member), France
Instituto de Investigação Científica Tropical (consortium member), Portugal

Instytut Geodezji i Kartografii (consortium member), Poland
 JOANNEUM RESEARCH Forschungsgesellschaft mbH (consortium member), Austria
 Leeds Metropolitan University (consortium member), UK
 Mediterranean Agronomic Institute of Chania (consortium member), Greece
 Natural Environment Research Council (consortium member), UK
 Noveltis (consortium member), France
 Rheinische Friedrich-Wilhelms-Universität Bonn (consortium member), Germany
 Royal Netherlands Meteorological Institute (consortium member), The Netherlands
 Space Research Institute of Russian Academy of Sciences (consortium member), Russia
 Sveriges Lantbruksuniversitet (consortium member), Sweden
 Università di Trieste (consortium member), Italy
 Université catholique de Louvain (consortium member), Belgium
 Universität Karlsruhe (TH) (consortium member), Germany
 Veterinärmedizinische Universität Wien, Institut für Medizinische Physik und Biostatistik (consortium member), Austria

Service Providers:

Centre National de Recherches Météorologiques (CNRM) (consortium member), France
 Delphi Informations Muster Management GmbH (consortium member), Germany
 EADS Astrium SAS (consortium member), France
 European Centre for Medium-Range Weather Forecasts (consortium member), UK
 GeoVille Informationssysteme und Datenverarbeitung GmbH (consortium member), Austria
 Hugin GmbH (consortium member), Germany
 Infoterra GmbH (consortium member), Germany
 Infoterra Ltd. (consortium member), UK
 Ingenieursbureau voor Environmental Analysis and Remote Sensing bv (consortium member), The Netherlands
 Institut Cartogràfic de Catalunya (consortium member), Spain
 Instituto de Meteorologia Portugal (consortium member), Portugal
 Joint Research Centre (consortium member), Italy
 MEDIAS-France (consortium member), France
 Metria (consortium member), Sweden
 Netherlands Geomatics & Earth Observation B.V. (NEO) (consortium member), The Netherlands
 Norsk Regnesentral (consortium member), Norway
 Remote Sensing Solutions GmbH (consortium member), Germany
 Spot Image SA (consortium member), France
 Tecnologías y Servicios Agrarios, S.A. (consortium member), Spain
 Vlaamse Instelling voor Technologisch Onderzoek (consortium member), Belgium

7.2 General Information about the Project

Geoland is co-funded by the EC and it is designed to fundamentally support the GMES initiative, focusing on the GMES priorities “Land Cover Change in Europe”, “Environmental Stress in Europe”, and “Global Vegetation Monitoring”. Geoland particularly addresses environmentally relevant issues such as water quality, nature protection, spatial planning, the Kyoto process, and food security. The project is structured into three regional and three global observatories, each of them supported by a core service providing basic geo-information inputs. An Operational Scenario is being established to define the geo-information infrastructure and satellite technology requirements to achieve a fully operational service in the future. (Figure 1)

Figure 1: geoland Organisational Structure



The geoland service development and demonstration logic is closely linked to user organisations. They are driving and reviewing each step and will finally approve results for integration into their own working environment

7.3 Anticipated Services/Products

The geoland products and services provide geo-information to support monitoring, management and decision making. Service providers may be private or public, including technical departments of the user organisations. Their service integration varies per observatory, ranging from mapping and change detection, through model assimilation, to integration into scenario tools and performing environmental assessments.

A joint portfolio has been defined, featuring joint core services for land use/land cover and bio-geophysical parameters as the basis for interoperable downstream applications of the observatories. A common operational scenario approach is evolving. So far, none of the products and services developed has failed during the review and user acceptance process. Early recommendations and requests for change made by user organisations have already been incorporated into the next developmental phase of the service- and product definition. A range of products & services has been tested and accepted by user organisations . (Figure 4)

Figure 4: Products and Services Demonstrated and Tested by geoland Users

OBS/CS	Products	Sites	Area Mapped	Scales / Resolution	Users served
CSL	5 land cover maps	Germany, Greece, Sweden, Austria, France	80.000 sq km	1:100'	15
ONP	6 product types (multi-temporal)	Germany (2), Norway, Austria	280.000 sq km	1:10' - 1:100'	4
OWS-W	Water quality & water shortage	Sweden, France, Germany, Spain	200.000 sq km	1:25' - 1:100'	6
OWS-S	- methods benchmarking & testing -	Greece	150.000 sq km	1:100'	3
OSP	12 indicators, 4 typologies	Austria, Czech Republic, Germany, Hungary, Ireland, Italy, Portugal, Slovenia, UK	400.000 sq km	1:25' - 1:100'	7
CSP	LAI, fAPAR, Albedo, fcover, surface reflectance	Global, Continental		1 km – 8 km	3
OFM	3 time-series products (1992-2003)	Poland, Spain, Belgium		NUTS 3	5
OLF	Seasonal Changes, Surface waters	Africa	The African continent	1 km – 8 km 1° x 1°	4
ONC	LAI, soil moisture, CO2 fluxes	Global	The Globe ...	1° x 1°	3

geoland sub-task short names used: CSL - Core Service Land Cover, ONP - Observatory Nature Protection, OWS - Observatory Water (W) and Soil (S), OSP - Observatory Spatial Planning, CSP - Core Service Bio-physical parameters, OFM - Observatory Crop Monitoring and Food Security, OLF - Observatory Global Land Cover and Forest Change, ONC - Observatory Natural Carbon Fluxes.

7.4 Data Requirements

The 59 geoland partners develop products and services within eight sub-projects (6 observatories and 2 core services). They utilize the available Earth Observation resources in combination with in-situ measurements, by integrating them with existing models into pre-operational geographical information services. These services will support international, European, national and regional authorities and institutions helping them to better manage natural resources and in fulfilling their increasing monitoring and reporting obligations.

7.5 Analysis - Required Data Harmonisation

The main objectives of the Core Service Land Cover (CSL) are to develop preoperational services for the efficient production of generic Land Cover over large areas. CSL users request that to a certain extent the thematic content of the land cover classes is consistent with the CLC nomenclature, the only European standard on EO based Land Cover data bases. This assures that overall consistency and comparability are maintained as far as possible, and relevant information is delivered in a harmonized way. As CLC is far from optimal for many end users working at regional / local level CSL offers:

1. identification of smaller land cover features by maintaining the thematic content,
2. better geometric correctness of border lines between classes For this reason, a hierarchical approach is applied, following CLC nomenclature, as far as possible. Land Cover information is overall CLC nomenclature as required from the CORINE program.

8 GSE LAND

GMES Services Element (GSE) on Land Information

Project Start Date: 2005-10-01

End Date:

<http://www.gmes-gseland.info/>

8.1 Project Consortium

The coordinator of the project is :

Infoterra GmbH

Alexander Kaptein

Claude-Dornier Strasse

D-88090 Friedrichschhafen

Phone: +49 7545 8 4377

Email: Alexander.Kaptein@infoterra-global.com

The other partners are:

Delphi IMM, Germany

EADS Astrium SAS, France

Finnish Environment Institute, Finland

Geoville Informationssysteme und Datenverarbeitung GmbH, Austria

gim geographic informations management, Belgium

Indra Espacio, Spain

Metria, Sweden

Planetek Italia S.r.l., Italy

Tecnologías y Servicios Agrarios, S.A., Spain

8.2 General Information about the Project

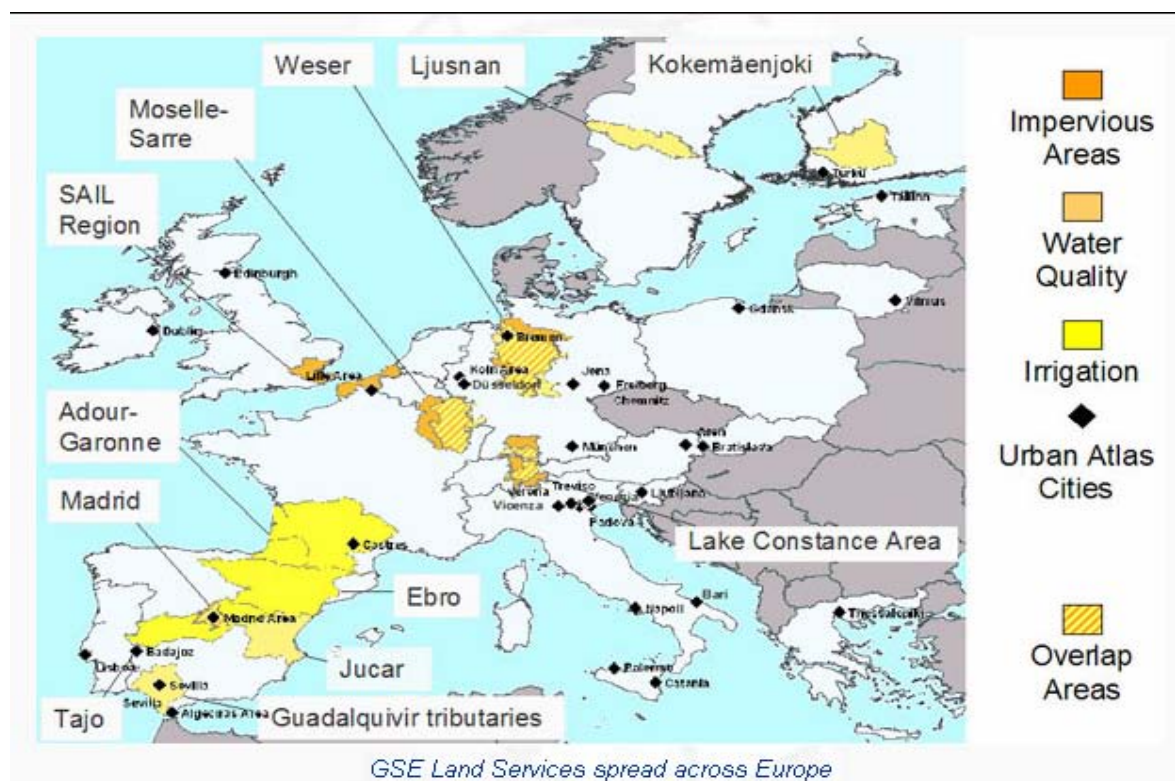
The overall goal is to implement a European service network to responding to the demand of international, national, regional and local user organisations.

The GSE Land Information Services is based on the main results related to land issues of the three projects SAGE, GMES Urban Services (GUS) and CoastWatch from the GSE consolidation phase and provides guidelines to establishing a set of priority information service centres responding to the main information needs of European institutions. SAGE was concentrating on water pollution, water abstraction, agro-environmental indicators and soil sealing indicators, GMES Urban Services put emphasis on Urban mapping and monitoring services, where as the land, oriented part of CoastWatch addressed integrated coastal zone management. This specifies the main focus of the service provision with respect to mainly European policies (with priority on Water Framework Directive, Soil Thematic Strategy, Integrated Coastal Zone Management, Urban Environment Thematic Strategy, European Spatial Development Perspective), users (national ministries of environment, regional authorities, etc.) and information demand. Coordination with complementary ongoing activities e.g. IP geoland will be ensured by the GSE Land Information Services Consortium.

The philosophy of Land Information services are:

- Demonstrate progress towards long-term sustainability for a set of GMES services
- Deliver services and benefits to users on progressively larger scales
- Establish a durable, open, distributed GMES Service Provision Network
- Establish standards and working practices for GMES services

8.3 Anticipated Services/Products



The GSE Land Information Services portfolio has been structured into a common mapping services (core service) approach on three levels of scale; and a portfolio of geo-information services. The following services will be produced in GSE Land:

Mapping Services

- Very high resolution mapping (M1)
- High resolution mapping (M2)
- Seasonal Vegetation Parameters (M3)

Nature Protection Services

- Indicator Service (NP1)
- Management Database (NP2)

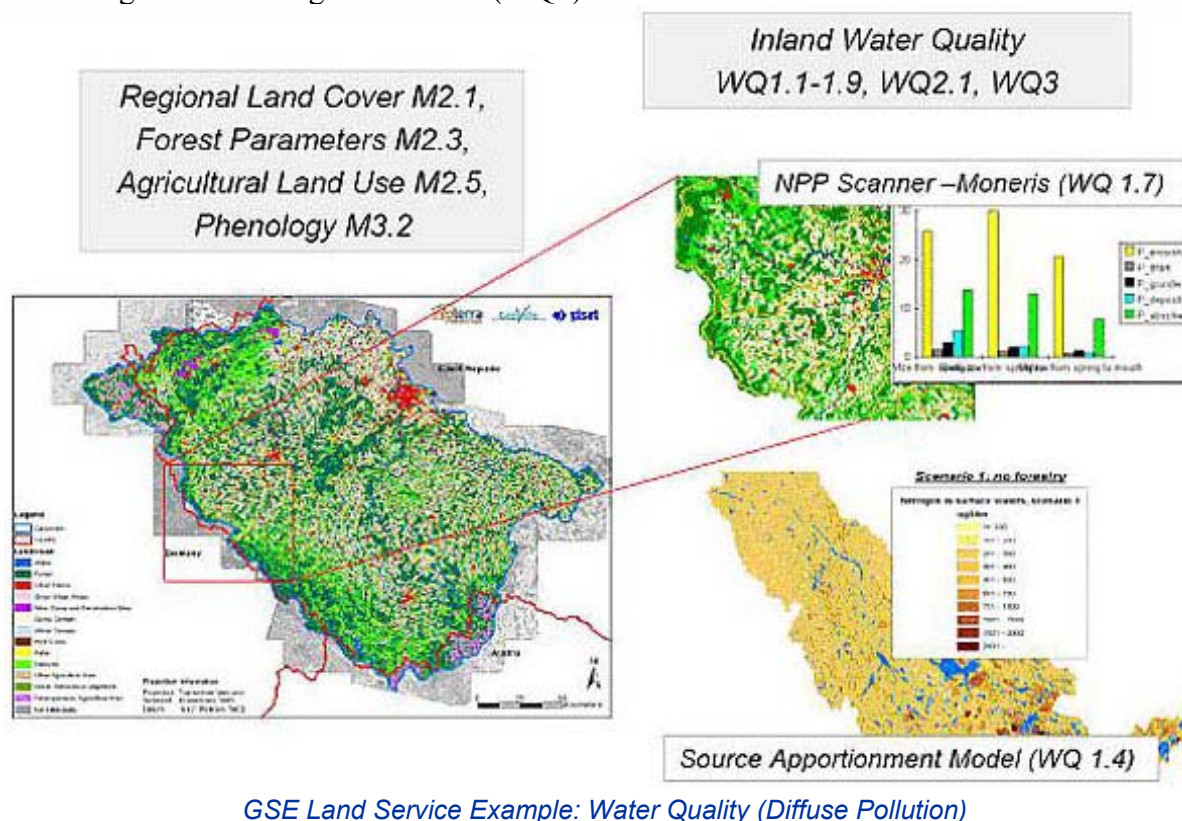
Planning Services

- Socio-economic analysis (PR1)
- Indicator Services (PR2)
- Policy scenario tool (PR3)
- Sealing Index (PU1)
- Indicators (PU2)
- Urban Management Tools (PU3)

Water Resources and Monitoring Services

- Irrigated Volumes (WA1)
- Nutrient Loss (WQ1)
- Pesticides (WQ2)

- Lake Water Quality (WQ3)
- Agri.-env. Management Tools (WQ4)



The overall goal is to implement a European service network to responding to the demand of international, national, regional and local user organisations.

8.4 Data Requirements

The Land Information Services is based on the main results related to land issues of the three projects SAGE, GMES Urban Services (GUS) and CoastWatch.

The GSE Land monitoring services based on space-borne and in-situ monitoring.

8.5 Analysis - Required Data Harmonisation

GSE Land Information Services are aimed to deliver geo-information services, which are harmonised and standardised for cross-border applications. They are based on general space borne geo-information on Land Cover and Vegetation (LC&V). By integrating this information into existing infrastructure, models and management tools international and national public institutions should be enabled to fulfil their reporting and management obligations in an improved way.

9 HALO

Harmonised coordination of the Atmosphere, Land and Ocean integrated projects of the GMES backbone

http://www.ecmwf.int/research/EU_projects/HALO/

Project Start Date: 2004-02-01

End Date: 2007-02-01

9.1 Project Consortium

The coordinator of the project is :

European Centre for Medium-Range Weather Forecasts (ECMWF)

Johannes Flemming

E C M W F

Shinfield Park

Reading

RG2 9AX

United Kingdom

Phone: + 44 118 949 9837

E-mail: Johannes.Flemming@ecmwf.int

The other partners are:

Infoterra, UK

IFREMER, France

Alcatel, France

Astrium, France

9.2 General Information about the Project

The challenging ambition of the GMES Ocean, Land and Atmosphere integrated projects (IP) is to deliver by end 2007 a validated pre-operational system across a wide range of scientific disciplines, thus demanding a wide range of scientific and technical skills.

There are strong cross- dependencies between the Atmosphere, Ocean and Land IPs. Key elements of the Land and Ocean IPs will be dependent on the outputs of the Atmosphere IP. The Atmosphere IP will be dependent on outputs of the Land and Ocean IPs. The Land and Ocean atmospheric requirements should be addressed in a uniform way by the Atmosphere IP.

The HALO SSA will prepare the architecture and system integration for the interacting part of all 3 IPs into the GMES framework, and prepare their joint transition to operational status.

9.3 Anticipated Services/Products

HALO will optimise the interactions of the segments of the GMES Backbone by formulating agreed recommendations to the 3 IPs, and to the GMES Steering Group in the areas of:

- Scientific thematic analysis and coordination of observational, modelling and data-assimilation requirements for the interacting parts of the IPs;
- Cross fertilization of scientific thematic leading to an improvement of knowledge, and definition of the overall scientific architecture;
- Identification of shared issues in the areas of data policy implementation, data acquisition, data sharing and data dissemination, leading to proposed candidate solutions; analysis of the candidate solutions, and
- Coordinated transition to operations of the interacting part of the pre-operational systems developed in the 3 IPs.

The work programme for the build-up of the GMES pre-operational capabilities includes:

- Data delivery processes of observation systems
- Interoperability and interconnection of the data processing and delivery systems
- Organisation and system architecture

9.4 Data Requirements

HALO will support the joint transition of the following IPs to operational status within the GMES framework.

- MERSEA - the integrated project of the GMES Ocean theme.
- GEOLAND - the integrated project of the GMES Land Cover & Vegetation theme.
- GEMS - the integrated project of the GMES Atmosphere theme.

9.5 Analysis - Required Data Harmonisation

The Atmosphere Ocean and Land IPs will define the internal interfaces and data standards most appropriate for their work. HALO will seek to achieve common data standards for the traffic between the IPs; the volume of data traffic between the IPs will be dominated by meteorological information, where economics will almost require the adoption of common standards. The second type of datasets with large data volumes will be those satellite datasets required by two or more IPs, but for different purposes. Again the economics of the data acquisition and archiving will almost require the adoption of common standards between these elements of the GMES Backbone and the satellite data producers. Internationally agreed data representation standards will be adopted wherever possible.

The choice of standards will be discussed at the HALO workshops, which will have a wide participation from interested parties including representatives of data providers (including space agencies), GMES IPs and users, ESA's GMES service elements, and national EU stakeholders. In this way, the needs of interested parties will help shape the final HALO recommendations.

10 MARCOAST

MARine & COASTal environmental information services

Project Start Date: 2005

End Date: 2008

10.1 Project Consortium

The coordinator of the project is :

Alcatel Alenia Space

Jérôme Bruniquel

26, avenue Jean-François Champollion,

BP 33787,

31037 Toulouse Cedex 1

France

Phone: +33 5 3435 4710

E-mail: jerome.bruniquel@alcatelaleniastpace.com

The other partners are:

AGI

AAS

BfG, Germany
Brockmann Consult, Germany
CEDRE, France
CLS
DNV
ETC-TE, Spain
GTD
RIKZ, The Netherlands
SOS, UK
STARLAB
TPZ
ACRI-ST, France
BMT
BOOST Technologies, France
BSH, Germany
DLR, Germany
FIMR
HCMR
IFREMER, France
INGV
IVM
JRC, Italy
KSAT
MERCATOR OCEAN
Météo-France, France
MUMM, Belgium
NERSC
PLANETEK
SYKE
Telespazio, Italy
UK Met Office, UK

10.2 General Information about the Project

MarCoast aims at scaling up services which have been consolidated in the frame of ROSES and COASTWATCH ESA projects. MarCoast is a GMES service network funded by ESA in the frame of the GSE Stage 2 programme.

MarCoast is a user-driven project. The involvement of the users is strongly encouraged and MarCoast will establish a strong link to the users.

10.3 Anticipated Services/Products

MarCoast proposes a set of six core services, which are:

- Oil spill surveillance and customised information,
- Oil spill drift forecast,
- Water quality monitoring and alert,
- Algae Bloom monitoring, evolution and forecasting,
- Water quality assessment service,
- Met-Ocean data.

In stage two of the project, MarCoast will move on from the MarCoast project to the MarCoast network. That work will involve:

- Setting-up of boards
 - Service board, UEB, Service Strategy Group
- Principles and rules to establish
 - Service Partnership Protocol
- Consolidation of the service provision network
 - Harmonisation of service chains, infrastructure etc.

10.4 Data Requirements

The MarCoast project will provide an oil spill monitoring service based on satellite data (SAR). In the baseline activities KSAT is the service provider for the North Sea and Telespazio for the Mediterranean Sea.

10.5 Analysis - Required Data Harmonisation

This is a newly started project and there is not yet any information available about data harmonisation requirements.

11 MOTIIVE

Marine Overlays on Topography for Annex II Valuation and Exploitation

<https://www.seegrid.csiro.au/twiki/bin/view/Marineweb/MOTIIVE>

Project Start Date: 2005-02-01

End Date: 2007-02-01

11.1 Project Consortium

The coordinator of the project is :

HR Wallingford Ltd

Keiran Millard

Howbery Park

Wallingford

OX10 8BA

United Kingdom

Phone: +44-1491-822398

E-mail: k.millard@hrwallingford.co.uk

The other partners are:

University College Cork - National University of Ireland, Ireland

United Kingdom Hydrographic Office, United Kingdom

Environment Agency of England and Wales, United Kingdom

The University of Edinburgh, United Kingdom

11.2 General Information about the Project

The objective of MOTIIVE is to examine the cost benefit of using non-proprietary data standards. MOTIIVE addresses the harmonisation requirements between the INSPIRE core data component 'elevation' (terrestrial, bathymetric and coastal) and INSPIRE marine thematic data for 'sea regions', 'oceanic spatial features' and 'coastal zone management

areas'. The proposal stresses analysis of the cost-benefit implied by strong harmonisation between 'core' and 'thematic' INSPIRE data, while fulfilling the infrastructure requirements of the GMES 'Ocean and Marine Applications' theme, already being determined by GMES Service Element (GSE) pilot projects.

The aims of the project are to produce application instances of a series of OpenGIS specifications and use this to support a fully qualified business case for creating a formal OGC Working Group for Marine Data.

The existence of Open GIS Consortium (OGC) and International Organization for Standardisation (ISO) TC 211 nonproprietary spatial data standards and interoperability tools is expected to help foster data integration at lower cost than previously experienced when using multiple data sources in integrated data projects. A key objective is to examine this expectation for a selected set of core and thematic data, while fully documenting the processes, procedures, barriers and resource requirements involved in creating, then using, non-proprietary spatial data geographic information standards and new interoperability tools to aid such data harmonisation. The cost-benefit analysis included in MOTIIVE explores the implications of harmonisation across core and thematic data areas as well as within thematic data groups

11.3 Anticipated Services/Products

Measurable objectives of MOTIIVE include:

- Providing a documented methodology for implementing and monitoring data harmonisation activities between INSPIRE 'Annex I' (core - elevation) and 'Annex II' (thematic - marine/coastal) datasets. This follows the steps required in the Open GIS Consortium (OGC) Reference Model for interoperability, application of ISO 19xxx series of spatial standards and CEN/TC 287 standards profiles for ISO 19xxx, with associated Feature Type Catalogues and marine ontologies.
- Using the open standards and tools developed in early stages of the project, demonstrate this methodology applied to the data integration requirements of those GMES (Global Monitoring for Environment and Security) Service Element (GSE) pilot projects. These projects have a marine/coastal focus in which MOTIIVE partners already participate, underpinned by INSPIRE core (elevation) and thematic data.
- Providing a cost-benefit assessment for using OGC interoperability specifications to harmonise INSPIRE Annex I (elevation) and Annex II (marine, coastal management) spatial data. This assessment includes analysis of two existing marine information services created without using open source standards (proprietary code, no GML schema, no agreed ontology, no standard feature catalogues, etc.) and one or two 'poststandardisation' marine information services created using the tools developed in the early stages of the project.
- Building on the pre-standardisation work of the EC MarineXML project, establish a marine data standards registry under the auspices of the Intergovernmental Oceanographic Commission (IOC and International Hydrographic Organization (IHO).
- Producing a fully qualified business case for the establishment of an official OGC Working Group on Marine Data, based on marine data related deliverables from the project, i.e. a marine ontology, a UML marine data model, review and recommendation of marine terminology thesauri, OGC feature type catalogue and GML application schema.

12 OASIS

Open Advanced System for crisis management

<http://www.oasis-fp6.org/index.htm>

Project Start Date: 2004-09-01

End Date: 2008-09-01

12.1 Project Consortium

The coordinator of the project is:

EADS Defence and Security Systems SA

Defence and Communications Systems

Martine Couturier

6 rue Dewoitine, BP 14

F-78142 Vélizy Villacoublay Cedex FRANCE

Phone: +33 (0)1 34 63 73 51

E-mail: martine.couturier@sysde.eads.net

The other partners are:

EADS Deutschland GmbH, Germany

BAE Systems (Operations) Limited, UK

Ericsson Microwave Systems AB, Sweden

Fraunhofer Gesellschaft zur Foerderung der Angewandten Forschung E.V., Germany

Datamat S.P.A., Italy

Cranfield University, UK

Thales Norway AS, Norway

EDISOFT - Empresa De Servicos E Desenvolvimento De Software S.A., Portugal

Medium Soft A.S., Czech Republic

Russian Academy Of Sciences, Russia

EADS Astrium S.A.S., France

SINTEF - Stiftelsen for industriell og teknisk forskning ved Norges Tekniske Høgskole, Norway

12.2 General Information about the Project

The objective of OASIS is to define and develop an Information Technology framework based on an open and flexible architecture and using standards, existing or proposed by OASIS, that will be the basis of a European Disaster and Emergency Management system.

OASIS is intended to facilitate the cooperation between the information systems used by civil protection organisations, in a local, regional, national or international environment.

This Disaster and Emergency Management system aims to support the response operations in the case of large scale as well as local emergencies.

OASIS will provide within this framework an initial set of applications which will cover the main needs that are identified by the end-users.

On the one hand, OASIS could be used as a whole set in areas where there are no Disaster and Emergency system or where the existing system has collapsed. On the other hand, OASIS could complement existing systems with additional applications or services.

12.3 Anticipated Services/Products

The OASIS Consortium

- has analysed the user requirements to extract European generic system requirements,
- is specifying and designing a generic, interoperable and open system architecture which will allow easy deployment at every level of the action chain (local, regional, national and European). This generic architecture is relying on the integration of mature state-of-the-art technologies.

The project will provide the definition of:

- the system backbone (databases, common operating environment and fully interoperable message handling system), supported by a reliable and secure communication network,
- the deployable communication network,
- the command and control functions,
- the decision support software modules

12.4 Data Requirements

Tools that are used are still very basic: voice, emails, texts and Short Message Services, faxes, telephones and paper maps. So the initial requirements focus on a simple system that will allow tracking of the vehicles and the teams in the field, access to external databases, having consistent and real-time display of the situation, exchanging information with the people in the field, managing the resources and their planning, storing information on their activities and the emergency operation and retrieving information from internal and external databases.

12.5 Analysis - Required Data Harmonisation

The knowledge of the situation is one of the most important factor in order to increase the efficiency and the safety during the emergency operations. This knowledge should be shared by the management of the different teams of responders who are participating to the operations otherwise each team have a partial knowledge of the global situation.

Thus, despite the security issues, the exchange of information related to the tactical situation is extremely important. In order to facilitate these exchanges, the definition of a "common language" which describes this tactical situation is needed. This is what is called in OASIS project the "emergency Tactical Situation Object" (TSO). A draft version of the TSO will be public at the end of September 2005.

13 ORCHESTRA

Open Architecture and Spatial Data Infrastructure for Risk Management

<http://www.eu-orchestra.org/>

Project Start Date: 2004-09-01

End Date: 2007-08-31

13.1 Project Consortium

The coordinator of the project is:

José Esteban

Atos Origin Spain
Albarracín 25
28037 Madrid
Spain
Phone: +34 91 214 8613
E-mail: jfernando.esteban@atosorigin.com

The other partners are:

Joint Research Centre (EC) , Italy
Hochschule fuer Technik und Wirtschaft des Saarlandes, Germany
Open Geospatial Consortium (Europe) Limited, UK
BRGM, France
Ordnance Survey, UK
Fraunhofer IITB, Germany
ARC Seibersdorf research GmbH, Austria
Eidgenoessische Technische Hochschule Zuerich, Switzerland
Intecs, Italy
DATAMAT S.p.A, Italy
TYPASA, Spain
BMT Cordah Limited, UK
The Alliance of Maritime Regional Interests in Europe, Belgium

13.2 General Information about the Project

Recent events have underscored the need to be able to consolidate information from disparate systems to support citizen protection and security, disaster management, criminal justice, and other missions, crossing pan-European agency boundaries and extending into National, State and local government areas.

One of the most urgent and important challenges currently facing governments is to get these systems to interoperate and share information. ORCHESTRA is responding to this challenge.

The overall goal of ORCHESTRA is to design and implement an open service oriented software architecture that will improve the interoperability among actors involved in Multi-Risk Management.

Some of the results of ORCHESTRA will be used as input to the INSPIRE and GMES initiatives.

13.3 Anticipated Services/Products

The project will:

- Design an open service-oriented architecture for risk management. Special attention will be paid to an integrated service and data approach including both their spatial, temporal and thematic characteristics.
- Develop the software infrastructure for enabling risk management services.
- Develop services that are useful for different thematic risk management applications (for instance forest fires or floods, man-made risks).
- Validate the ORCHESTRA results in a scenario that involves different risks, both natural and man-made, in a cross-border situation.
- Provide software standards for risk management applications, and to provide additional information about these standards in the form of a book. In particular, the

de facto standard of OGC and the de jure standards of ISO and CEN are envisaged to be influenced.

13.4 Data Requirements

Risk Management has many requirements for geospatial information :

- **Reference data:** Orthoimagery, transportation, elevation, political boundaries, property ownership, hydrography and industrial installation
- **Critical infrastructure:** telecommunications; electrical power systems; gas and oil production, storage and distribution; banking and finance; water supply systems;
- emergency services
- **Residence and employment data tied to specific locations:** schools, government facilities, hospitals, population density

13.5 Analysis - Required Data Harmonisation

Risk Management activities involve a range of different organisations at various administrative levels with their own systems and services. The sharing of relevant information that is required when dealing with trans boundary risks is often too limited preventing a truly efficient handling of the problems. Even when data is exchanged the formats and systems used are so different that it hampers proper data analysis and resource management, all critical elements of Risk Management.

ORCHESTRA will not only deliver technical results but will also aim to bring together and consolidate the risk management community. It will do this by integrating the results and recommendations of previous and current European and National projects and initiatives thus harmonising the technical underpinning of Risk Management.

14 PREVIEW

PREvention, Information and Early Warning pre-operational services to support the management of risks

Project Start Date: 2005

End Date: 2008

14.1 Project Consortium

The coordinator of the project is:

EADS ASTRIUM SAS

François COPIN

31 av des Cosmonautes

31402 Toulouse Cedex 4

France

Phone: +33-(0)5 62 19 63 84

E-mail: Francois.copin@astrium.eads.net

The other partners are:

Direction de la Défense et de la Sécurité Civile Ministère de l'Intérieur, France

Meteo France, France

TELESPAZIO, Italy

Swedish Rescue Services Agency, Sweden

Presidenza del Consiglio dei Ministri Dipartimento della Protezione Civile, Italy
Swedish Meteorological and Hydrological Institute, Sweden
Met Office, UK
European Centre for Medium range Weather Forecast, UK
Istituto Nazionale di Geofisica e Vulcanologia, Italy
Università di Firenze- Dipartimento di Scienze della Terra, Italy
Joint Research Center, Italy:

- Institute for the Protection and Security of the Citizens
- Institute of Environment and Sustainability

Centre National d'Études Spatiales, France
Ingeniería y Servicios Aeroespaciales, S.A., Spain
Infoterra GmbH, German
Istituto di Ricerca per la Protezione Idrogeologica, Italy
Advanced Computers Systems, Italy
Agenzia Regionale Prevenzione e Ambiente dell'Emilia Romagna, Italy
Agenzia regionale Prevenzione e Ambiente Liguria Italy
Bundesanstalt für Gewässerkunde, Germany
Bayerisches Landesamt für Wasserwirtschaft, Germany
Centro di Ricerca Interuniversitario in Monitoraggio Ambientale, Italy
Critical Software, Portugal
Stichting Waterloopkundig Laboratorium, Netherlands
DEIMOS Engenharia, Portugal
EADS Defence and Security Systems SA, France
Deutscher Wetter Dienst, Germany
European Mediterranean Seismological Center, EU
Finnish Meteorological Institute, Finland
Universidad de Valladolid - Remote Sensing Laboratory, Spain
Geoapikonisis, Greece
Geomer GmbH, Germany
GMV S.A, Spain
GeoSciences Consultants, France
Consiglio Nazionale delle Ricerche - Istituto di Metodologie per l'Analisi Ambientale, Italy
Universität Karlsruhe (TH), Germany
Leibnitz Institute für Oekologische Raumentwicklung e.V, Germany
Consiglio Nazionale delle Ricerche :
Istituto per il Rilevamento Elettromagnetico dell'Ambiente, Italy
Universität Stuttgart : Institut für Wasserbau / Lehrstuhl für Hydrologie und Geohydrologie, Germany
BOGAZICI UNIVERSITY - Kandilli Observatory and Earthquake Research Institute, Turkey
Université Joseph Fourier Grenoble 1 : Laboratoire d'étude des Transferts en Hydrologie et Environnement, France
Federal Office for Meteorology and Climatology, Switzerland
LANTMATERIET METRIA (Metria Miljöanalys projektledare är Michael Ledwith), Sweden
METEOROLOGISK INSTITUTT, Norway
National Observatory of Athens, Greece
Noveltis, France
Planetek, Italy
REGIONE LOMBARDIA Direzione Territorio e Urbanistica, Italy

Service Régional de Traitement d'Image et de Télédétection - Université Louis Pasteur, France
SWEDEN GEOTECHNICAL INSTITUTE, Sweden
REGIONE LOMBARDIA Dg Agricoltura, Italy
TECHNOSYLVA, SL, Spain
Universidad de ALCALA de HENARES, Spain
Universidad Complutense de Madrid, Spain
Environmental Protection and Water Management Research Institute, Hungary
Agenzia Regionale per la Protezione Ambientale del Piemonte, Italy
United Nations Office for Project Services, Switzerland
Centre National de la Recherche Scientifique - Laboratoire d'Energétique de Mécanique Théorique et Appliquée, France

14.2 General Information about the Project

PREVIEW address the definition, the development and the validation in pre-operational conditions of information services to support the management in all phases (Prevention, Preparedness, Response and Recovery) of: Windstorms, Forest fires, Plain floods and Flash floods, Earthquake & Volcanic risks, Landslides and Industrial accidents.

Based on the review of the operational needs and of the existing research assets, a Portfolio of Services is defined in close cooperation with end-users. Research developments are performed to transfer the most promising available results and blocks to operational use.

The information services are developed, tested and validated at European scale with operational users on pilot test sites. A long term deployment plan of these services is established, proposing the best scenarios and programmatic for their European operational deployment and organization.

PREVIEW is organised in "hazard service platforms", each platform being managed with flexibility as a sub-project dedicated to the development of methodologies and services related to a given type of hazard. For best project efficiency, these platforms are further grouped into "clusters" depending on the possible teaming synergies.

PREVIEW is led by the EURORISK Consortium, a multi-disciplinary European Team of committing Actors of the domain: Civil Protections and Environmental Bodies; Scientific communities and Service operators, at national and regional level, for Meteorology, Hydrology, Seismology, Vulcanology and GIS services based on Space data; and Industry. The project is organised around a core team of partners coming from 6 countries and from European organisations, leading all the project activities according to a common methodology and performing the necessary transverse actions to ensure the harmonisation, the standardisation and the global and long term view of the resulting services. Additional local partners are also associated to the project to bring their unique or recognized expertises on specific methodologies and technologies, to involve the necessary national and regional actors able to adapt the developed services to local specificities or to interface with on-going projects of interest for PREVIEW.

14.3 Anticipated Services/Products

PREVIEW has the objective to set up an end to end operational systems in 2008. It aims to provide the facilities to exchange the building blocks constituting the coupled systems (i.e.,

atmospheric models, land surface scheme and hydrological components) for fitting specific regional model practice. This intends to make possible the inter-operability of the various, regional or national existing components, depending on the user preferences or the national regulations, into one single distributed – and cooperative - forecasting network:

- This includes using a specific data processing architecture with an externalized Soil-Vegetation-Atmosphere Transfer (SVAT) scheme (build on a code independent from the atmospheric model) and a coupler to ensure standardized data exchanges between the various computation modules (SVAT scheme, atmospheric model, hydrologic models), possibly distributed on different computational platforms (meteorological service mainframe, water management or hydrological office platform, ...).
- There already exist some initiatives for NWP systems to externalise the land-surface processes outside the atmospheric models, i.e. the SVAT scheme becomes a SVAT model two-way coupled with the atmospheric model. For instance, this is currently undertaken for the ISBA SVAT scheme that is used in the ALADIN, ALADIN-LACE and HIRLAM consortia. In this framework, provided the definition of data exchange standards, various atmospheric models may be coupled to the SVAT model and vice-versa. Such model interchangeability must be promoted and pursued for the hydrological models.

14.4 Data Requirements

Input to the various computation modules i.e. Surface-Vegetation-Atmosphere Transfer (SVAT) scheme, atmospheric model and hydrologic models.

14.5 Analysis - Required Data Harmonisation

The PREVIEW project will have to define some data exchange standards, such as the ALMA (Assistance for Land-surface Modelling activities) data exchange convention. The project must also take account for hydrological models, this is will be done reengineering the ALMA norm of the WMO (World Meteorological Organization) and developing a “universal” coupler for the exchange of data between the computation modules.

For more information about the ALMA data exchange standars, see <http://www.lmd.jussieu.fr/ALMA/>

15 RAMFLOOD

Decision Support System for Risk Assessment and Management of Floods

<http://www.cimne.com/ramflood/>

Project Start Date: 2003-01-01
End Date: 2005-01-01

15.1 Project Consortium

The coordinator of the project is:
CIMNE
Eugenio ONATE
Gran Capità s/n
08034 Barcelona

Spain

Phone: +34-93-2057016

E-mail: onate@cimne.upc.es

The other partners are:

EUROMAP, Germany

Department of Hydraulics, Universitat Politecnica de Catalunya (UPC), Spain

Agricultural University of Athens (AUA), Greece

Catalan Water Agency (ACA), Spain

SPAP, Greece

15.2 General Information about the Project

Management of water resources in Europe is now under pressure, and these pressures are likely to be increased by climate change as flood hazard is likely to increase across much of Europe. The objective of the Ramflood project is to develop and validate a new decision support system (DSS) for hazard assessment and management of emergency scenarios due to severe floods.

The Ramflood DSS will combine environmental and geo-physical data from earth observation, satellite positioning systems, in-situ sensors and geo-referenced information with advanced computer simulation and graphical visualization methods in order to provide comprehensive support so as to improve the process and outcome of decision making in flood management and risk assessment during the different stages of planning, flood fighting and post flood recovery.

15.3 Anticipated Services/Products

The system to be developed is a Web based decision support system, that is, the final user will work with it through a Web browser. This system will be called Ramflood DSS. In particular, it must provide the following utilities:

- Flood hazard analysis on a study area in real time.
- Access to flood related information.
- Users' communication tools.
- New projects development tools.
- Users' management.

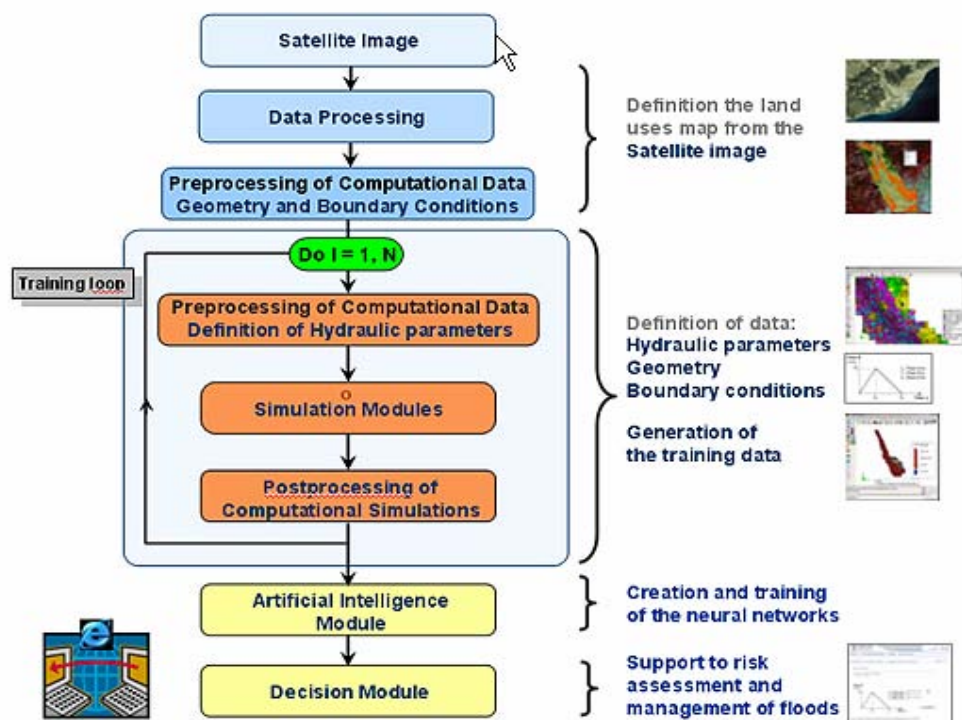
The main goal of the Ramflood Decision Support System is to provide functions directly related to hazard assessment of floods and management of possible emergency scenarios.

Therefore, the main functions of the system are:

- To provide flood analysis in form of hydrological maps on a study area and in real time.
- To provide hazard analysis in form of hazard maps from the results obtained in flood analysis.
- To provide access to useful flood management information, such as land use, on the study area.
- To provide communication tools among system users in order to facilitate hazard management.

15.4 Data Requirements

The flowchart of the Ramflood DSS is described in the figure below:



15.5 Analysis - Required Data Harmonisation

To prepare and handle data input (topographic information, boundary and initial condition, Manning coefficient) and meshes for this kind of simulation is very hard, and results interpretation is also complicated. A powerful tool is obtained customizing GiD. Besides writing the GiD standard files required to create a new problem type, additional features were implemented to import data from a digital terrain model and automatically assign properties using external data base files from satellite image classification to mesh elements. Post process code was written in FORTRAN using Gidpost library.

(GiD has been designed, by CIMNE, as a universal, adaptive and user-friendly graphical user interface for geometrical modelling, data input and visualisation of results for all types of numerical simulation programs. Typical problems that can be successfully tackled with GiD include most situations in solid and structural mechanics, fluid dynamics, electromagnetics, heat transfer, geomechanics, etc. using finite element, finite volume, boundary element, finite difference or point based (meshless) numerical procedures.)

16 RISK_FORCE

Accompanying Measure on Natural Risks Management

Project Start Date: 2002-09-01

End Date: 2003-12-01

16.1 Project Consortium

The coordinator of the project is:

Astrium Sas

Francois MARTIN-DUPONT

France

E-mail: francois.martindupont@astrium.eads.net

The other partners are:

DATAMAT S.P.A., Italy

EUROPEAN COMMISSION - JOINT RESEARCH CENTRE, Belgium

Schlumbergersema, Sociedad Anonima Espanola, Spain

Serco Spa, Italy

Societe Grenobloise d' Etudes et d' Applications Hydrauliques Ingenierie Snc, France

TECHNICAL RESEARCH CENTRE OF FINLAND, Finland

TELESPAZIO S.P.A. , Italy

16.2 General Information about the Project

RISK_FORCE is an accompanying measure focused on the management of natural risks: fires, floods and landslides. To serve the GMES objectives, it uses the results and assures the continuity of EC projects and studies together with national operational achievements, associating in 4 workshops the end users, the scientific entities, institutions, services and data providers, and industries. Within 15 months, RISK_FORCE will produce a shared European protocol for natural risks management, a service specification, and an implementation plan. RISK_FORCE is a decisive step towards the design of a generic European platform for natural risks management, fostering cooperation between European entities dealing with prevention, early warning, crisis management and post crisis assessment, and providing a significant contribution to both the GMES feasibility assessment, and to the preparation of a Risk integrated project as part of the 6th FP.

16.3 Anticipated Services/Products

RISK_FORCE will associate a wide community of European actors of the natural risks management domain in order to improve data, products and service quality, according to EU orientations and policies. RISK_FORCE objective is to build upon and enrich the scope of EU funded RTD projects (such as CLIFF), and to converge towards:

1. a shared vision of a Natural Risks management protocol for structuring adequate systems and services in Europe;
2. services and application requirements and specifications for a common platform;
3. a strategy for the next steps, compliant with the 6th FP working logic and with the principles of the first phase of the GMES action plan.

16.4 Data Requirements

The data requirements to this project are information from on-going high quality studies, results and lessons learned in significant operational projects and existing means and practices.

16.5 Analysis - Required Data Harmonisation

There will be a comparison between the outcomes of several on-going high quality studies on natural risks management and the results and lessons learned in significant operational projects and with existing means and practices. One outcome of this would be to find services and application requirements and specifications for a common platform.

17 RISK-EOS

Earth Observation based Services for flood and fire risks management

<http://www.risk-eos.com/>

<http://www.maprojects.se/risk-eos/> (old)

Project Start Date: 2003

End Date: 2007

17.1 Project Consortium

The coordinator of the project is:

ASTRIUM

Arnaud de Saint Vincent

31, rue des Cosmonautes

ZI du Palays

31402 Toulouse Cedex 4

France

Phone: +33 (0)5 62 19 62 19

E-mail: arnaud.robertdesaintvincent@astrium.eads.net

The other partners are:

French Interior Ministry, France

LE Pont, France

Räddningsverket, Sweden

Met Office, UK

Meteo France, France

INFOTERRA, UK

TELESPAZIO, Italy

DATMAT, Italy

INSA, Spain

Lantmäteriet, Metria Miljöanalys (Michael Ledwith), Sweden

SMIH, Sweden

CEMAGREF, France

JRC, EU

JHL Conseil, France

17.2 General Information about the Project

All European countries are subject to natural hazards of many different types : forest fires, floods, avalanches, landslides, mudslides, earthquakes, volcanic eruptions, storms, etc. The analyses, such as those carried out by reinsurance companies, show an increase of the number of flood and fire events, and a very important impact in terms of human, economic and environmental losses.

The Civil Protections Units from several Member States, National Meteorological Services from EUMETNET, and EADS Astrium have decided and undertaken with industrial and scientific partners a common initiative in the frame of GMES, in order to provide End-Users bodies (Civil Protections, Forecasting organisations, Environment Agencies) with a coherent set of operational Services for the Management of Natural Risks, covering all main phases of the Risks management cycle. This overall ambition is supported by several projects and

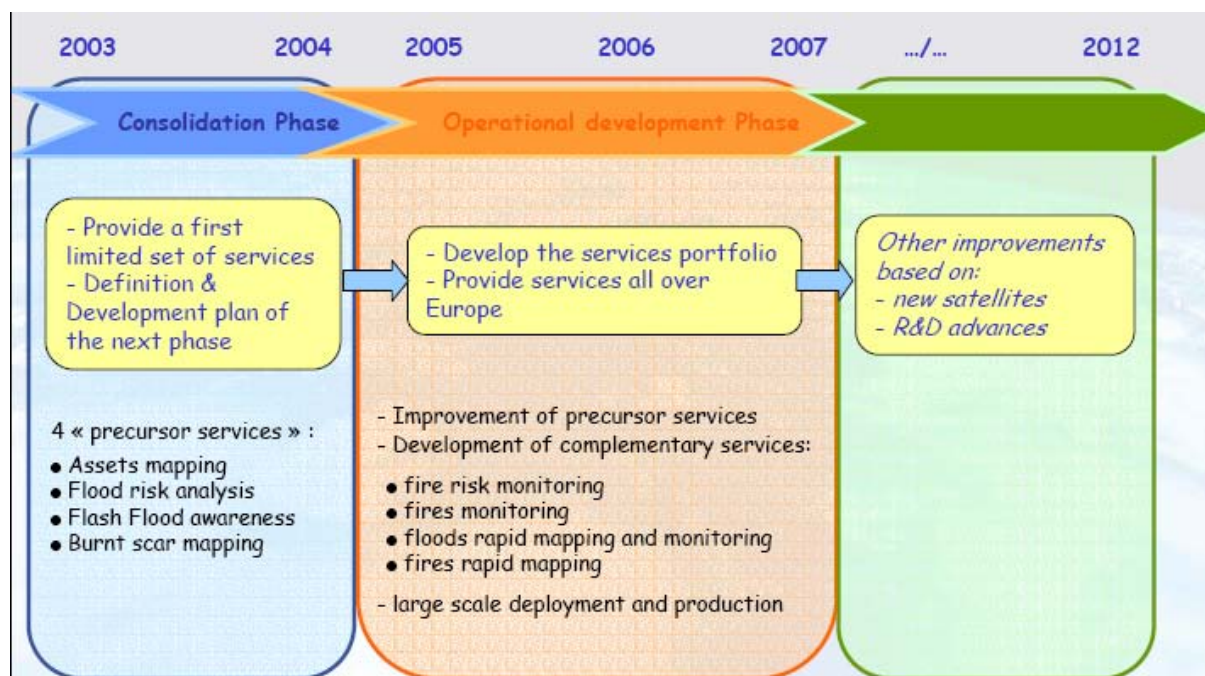
initiatives in relation with the European Space Agency (ESA) and the European Commission (EC).

In this context, RISK-EOS was launched within the GMES Service Elements programme of the European Space Agency. The objective of RISK-EOS is:

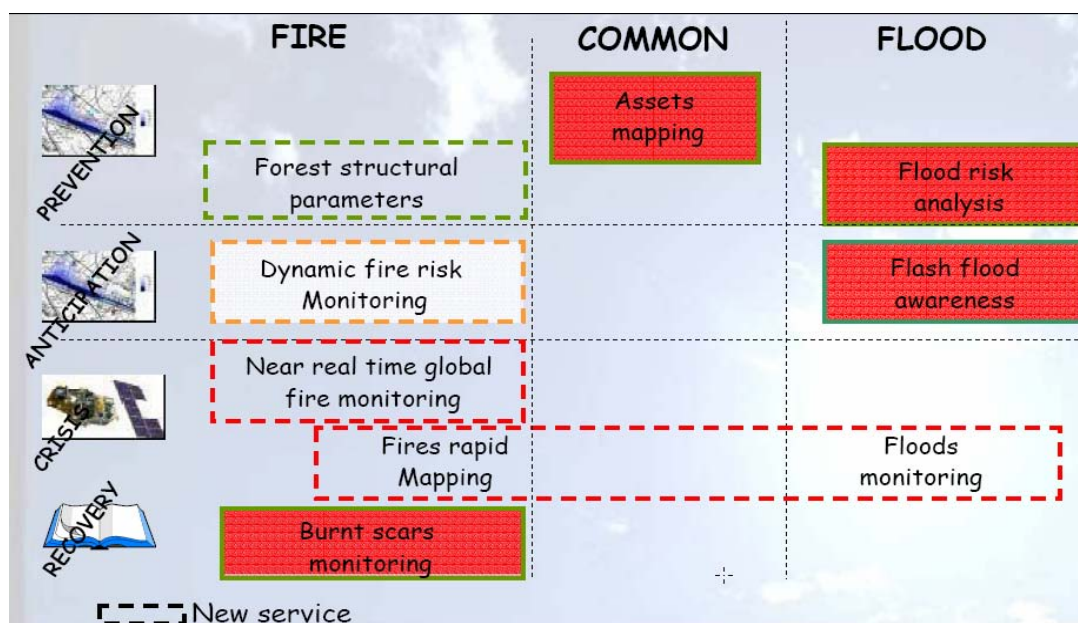
- to set-up a European operational servicing capacity, taking benefit of Earth Observation capabilities in combination with other data sources and models,
- to support the organisations and institutions mandated for the management of Natural Hazards, throughout the prevention, anticipation, response and post-response phases.

17.3 Anticipated Services/Products

The RISK-EOS project will have a progressive development approach. The Service delivery will start with a batch of four “precursor services”. The portfolio of services will then be extended progressively:



The “precursor services” will consist of the following:



In stage two, the precursor services will be extended with new regions and countries and new services will be developed:

- Fire risk monitoring (South Europe)
- Fire monitoring at middle resolution (Spain, Portugal, Greece, Finland, Sweden)

17.4 Data Requirements

The following table summarises the space systems Earth imaging characteristics as required by the Risk-EOS services:

For each type of service, three levels of ground images resolutions have been identified:

- Very High resolution (VHR) : less than 10m
- High Resolution (HR) : 10 to 100m
- Medium Resolution (MR) : more than 100m
-

Each of them can be served by instruments of the following three categories:

- Passive Optical : from visible up to Thermal Infrared (TIR) wavelengths,
- Active μ wave : in X, C or L band.
- Passive μ wave : from a few GHz up to several hundreds of GHz at medium resolution only

The tables is used as the reference to assess how data can be reused by the different RISK-EOS services and thus, minimize the data costs.

RISK-EOS Service(s)	Final products	Frequency of acquisition	Images Resolution	Very High Resolution		High Resolution		Medium Resolution	
				(1m-10m) VHR		(10m-100m) HR		(> 100m) MR	
				Optical	SAR	Optical multispectral	SAR	Optical multispectral	ATSR
FLOOD & FIRE prevention									
Assets mapping	Decametric (Land Cover & Land Cover Change, Intra-urban changes)	Year	10-20 m			X			
	Metric maps (Isolated habitat detection, land use, Enhanced cartography)	Year	2,5 m or better	X					
FIRE-prevention									
Forest Structural parameters Long-term fire risk mapping	Vegetation type, fuel load, canopy cover, fuel type	Year	10-30 m			X	X (L-band)		
FIRE-Anticipation									
Dynamic fire risk mapping	Fire risk mapping at European Scale	Daily	1 km (ideal 250 m)					X	

	Fire Ignition risk at Regional scale, Fire prop. Risk, vegetation moisture content maps	Daily	1 km					X	
FIRE-Response									
Fires monitoring at middle resolution	Fire alarm (update: 15', delay: 30'), Real-time fire event inventory (update: 15'), Real-time fire event evolution (update: 15')	15 minutes	1000-250 m (TBC)					X (revisit 15')	
	Hot spot map (update: 12'), Fire event map at mid resolution (update: 12h)	2/day	150-250 m					X (revisit 12h)	
	Fire damage assessment at middle-resolution	Upon fire event	250m					X(2 acquisitions, before and after the fire)	
Rapid fire mapping	HR map of fire event	On request. Rapid delivery (< 1 day)	10-30m	X		X			
FIRE -post-crisis									
Burnt scar monitoring	Burnt scar maps (HR)	Year	20-30 m	X		X			

FLOODS- early warning									
Flash flood awareness(early warning)	Real-time flash flood risk map	Daily	1 Km					X	
FLOODS-Crisis/Post-crisis/Prevention									
Floods risk analysis	Flood database, mapping of past flood events, Flood mapping derived products, Flood risk map	Upon new events	10-30m	X		X	X		X
Floods monitoring/Rapid flood mapping	Flood extent Rapid mapping, Flood extent mapping, ...	On request. Rapid delivery (< 1 day)	10-30m	X		X	X (revisit = 1/2 day)		X

17.5 Analysis - Required Data Harmonisation

Current methods of recording fire damage vary greatly by country or region. The purpose of this new service is to develop a standardised burn scar mapping methodology for use throughout Europe, along with enabling more accurate post-fire damage assessment and analysis of vegetation re-growth and manmade changes within affected areas.

18 SAGE

Service for the Provision of Advanced Geo-Information on Environmental Pressure and State

Source: Documents available on ESA –Living Planet
http://www.esa.int/esaLP/SEMSQU5DIAE_LPgmes_0.html

and project website: <http://www.gmes-sage.info/index.php>

Project Start Date:

End Date: 2004

18.1 Project Consortium

Co-ordinator

InfoTerra GmbH

Steffen Kuntz, :+49 (0)7545 8 3924

Mareike.Doecke@infoterra-global.com

The activities of the users are co-ordinated by the European Topic Centre – Terrestrial Environment (ETC-TE) in Spain.

Service Providers

National Land Survey, (Lantmäteriet) Metria Miljöanalys, Sweden

GAF AG, Germany

Infoterra GmbH, Germany

Geoville Informationssysteme und Datenverarbeitung GmbH, Austria

EADS Astrium SAS, France

TRAGSATEC, Spain

User Groups

Amt der Vorarlberger Landesregierung, Austria

Austrian Federal Environment Agency, Austria

Swedish Environmental Protection Agency, Sweden

Institut Francais de l'Environnement Department des Milieux et des Territoires (IFEN), France

County Administration of Dalarna (Länsstyrelsen i Dalarnas län), Sweden

Umweltbundesamt, Germany

European Topic Centre Terrestrial Environment, Spain

Landesanstalt für Wald u. Forstwirtschaft, Germany

Confederación Hidrográfica del Ebro (Ebro Bassin Water Authority) (Spanish Ministry of Environment Management of Hydraulic Public Dominion), Spain

18.2 General Information about the Project

The SAGE project ended in 2004, but the work has been carried on in the Geoland project and will partly continue to do so in the GSE land project.

SAGE was financed through the ESA GSE Stage 1 activity and aimed at providing harmonised geo-information for European member states serving the implementation and control of European policies, e.g. the Water Framework Directive (WFD) and Thematic Strategy for Soil Protection (STS).

This is achieved by the provision of standardised general and specific Land Cover/Land Use data which can be used not only for the targeted policies but can contribute to better environmental planning in many other application areas as well. This geoinformation is based on the nomenclature adopted in the Corine Land Cover project but with a higher level of detail and should be integrated with existing in-situ and/or statistical data.

18.3 Anticipated Services/Products

SAGE aims at the provision of standardised general and specific Land Cover/Land Use data which can be used not only for the targeted policies but can contribute to better environmental planning in many other application areas as well. Based on EO-data, the geo information is integrated with existing in-situ and / or statistical data.

To serve the needs of the many different end user-segments that have been identified during the preparation of the SAGE proposal and the first phase of the project, SAGE reflects:

- hot spot mapping or sampling approaches at local / regional level
- complete coverage in significantly reduced scales at international level
- different end user infrastructures; (e.g. an agency which has an information service already installed and which strives to improve this service may only request better landcover information, while other customers may ask for a complete service on agri-environmental risk maps or indicators for planning, control and response actions).
- SAGE services comprise
 - *AquaSAGE* with Water Quality (assessment of diffuse pollution sources from agriculture and forestry practice), Water Abstraction by Irrigation in southern Europe to assure appropriate management of the water resources) and Environmental Indicators (pressure & state indicators) for national and European policies.
 - *SoilSAGE* with pressure, state and impact indicators (e.g. degree of sealing, land consumption by urban sprawl, trends and scenarios), regarding soil sealing on national and local scales.

AquaSAGE - General and Special Land Cover

The basic service generates standardised land cover information as a common basis of any further environmental planning. Customers are on the one hand SAGE service providers which will use it for final SAGE products within models as described below and on the other hand European and national entities (“active users”) with a mandate to use such data for a variety of reporting or modelling obligations.

More specifically AquaSAGE offers:

1. Mapping scales 1:100,000 (national) and 1:25.000 (local)
2. Identification of smaller land cover features (e.g. 1-5 ha resolution cells in the landscape and 0.25 ha in urban areas)
3. Creation of higher level of detail of the thematic content; i.e. CLC level I – III (general land cover) plus special land cover: agriculture classes (e.g. root crops, winter and spring crops, cereals, pasture), forestry classes (species, age, density, etc.), and urban classes (3 density classes)
4. Improving the thematic accuracy of key land cover classes (built up area) to over 95%.

AquaSAGE – Boreal Forests

The SAGE service “*AquaSAGE – boreal forests*” focuses on nitrogen leakage in the boreal zone. The forest indicators biomass, productivity and clear cuttings and the aquatic indicator nitrogen leakage are addressed. The service has been successfully applied to the river Dalälven drainage basin (29 000 km²) in central Sweden.

The products provided by the service AquaSAGE for boreal forests are

1. 1. Wall-to-wall datasets of forest indicators productivity, biomass and clear cuttings covering the river Dalälven drainage basin, as input to an
2. 2. Improved source apportionment for nitrogen in the river basin, using specific models with the possibility of scenario studies.

The intermediate products (forest indicators) are primarily used as improved input to a refined source apportionment model for nitrogen in the drainage basin, i.e. the final product, but they may also be used for other purposes (e.g. terrestrial monitoring). The final products from the service are the source apportionment for the river basin based on the source apportionment model (FYRIS model) and water quality maps.

AquaSAGE Central Europe

The AquaSage service for Central Europe consists of maps and statistics quantifying nutrient inputs into river basins. Today the basis of the service is the model MONERIS (MODelling Nutrient Emissions in River Systems) which was recommended by our core users. However, EO based input parameters can be modified in a way that other pollution models can be served as well. The catchment based analysis allows either summary or differentiated catchment quantification of the main nutrient pathways. This analysis serves for identifying of regional focal points of nutrient pollution, which are prominently to be considered for the installation of measures for reducing inputs.

The MONERIS model approach is scientifically sound and can easily be transferred to other regions and river catchments. It delivers standardized outputs of catchments at risk, which are important for national and regional WFD reporting. The integration of all important pathways into the modelling approach guarantees a holistic consideration of all possible nutrient inputs into river systems. As catchments are the basis for MONERIS instead of legislative borders this leads to easy integration into WFD reporting schemes required from the European Commission..

18.4 Data Requirements

The *AquaSAGE* and *SoilSAGE* service portfolio integrates EO-based Land Cover / Land Use (LC/LU) information and data from a wide range of other sources (e.g. terrestrial measurement networks, statistics, etc.) within quantitative models (pollution risk, water abstraction by irrigation) on water basin level, and for environmental and planning issues related to soil sealing. Improved geo-information in terms of thematic content and resolution is combined and analysed at various levels and scales, e.g. using models for risk assessment or for the creation of environmental indicators.

Compared to other European information sources (such as CORINE Land Cover - CLC), SAGE geo-information products will be improved with respect to

- the thematic content (dedicated land cover features; i.e. agricultural classes),
- higher update rates (i.e. 2-3 years), and

- a higher spatial resolution (wherever necessary).

18.5 Analysis - Required Data Harmonisation

The technical realisation of SAGE is based on an open concept for both the infrastructure (space, ground and services) and the partner network. As an overall principle, the design first of all reflects the user needs translated into SAGE's product portfolio.

Core users have agreed on a harmonised approach adapted to their individual requirements. Although the portfolio description addresses specific policy requirements, the concept can easily be adapted to a wide range of environmental and planning applications. SAGE products follow quality assurance means defined jointly by service providers and users. SAGE partners have committed themselves to follow European standards and recommendations on harmonisation of data formats and thematic contents to assure comparability of information over national borders. The SAGE product portfolio, and the geo-information production, are open for late customising in order to adopt generic geo-information products to specific local or national needs.

For the basic service it is mandatory to be consistent with CLC nomenclature. This will assure the capability of up-scaling results to national and international level and the possibility of integration into European LU/LC approaches. Hence, a hierarchical method is applied, following CLC nomenclature, as far as possible. LU/LC information is provided down to CLC level 3 according to EU definitions. Today the production relies on production chains for high-resolution (up to 1:25.000) and general and special (urban, forestry, agriculture) land cover maps.

19 SISCAL

Satellite-based information System on Coastal areas and lakes

<http://www.siscal.net:8080/siscal/Welcome.do>

Project Start Date: 2001-09-01

End Date: 2004-09-01

19.1 Project Consortium

The coordinator of the project is:

ULCO - Labo interdisciplinaire en science de l'environnement

Maison de la Recherche en Environnement Naturel

Richard SANTER

32, avenue du Maréchal Foch

62 930 Wimereux

France

Phone: +33-3-21996426

Email: santer@mren2.univ-littoral.fr

The other partners are:

Universite du Littoral, France

Freie Universitaet Berlin, Germany

Fylkesmannen i Sor-Trondelag, Norway

ISRAEL OCEANOGRAPHIC & LIMNOLOGICAL RESEARCH INSTITUTE, Israel
 Informus Gmbh I.G., Germany
 Institut fuer Lebensmittel, Arzneimittel und Tierseuchen Berlin, Germany
 Koebenhavns Universitet, Denmark
 Israelian Ministry of Environment, Israel
 Norges Teknisk-Naturvitenskapelige Universitet NTNU , Norway
 Soenderjyllands Amt, Denmark

19.2 General Information about the Project

Project SISCAL aims to create a software processor providing Near-Real-Time data products derived from satellite data and ancillary GIS-based information with a focus on water-related products for end users monitoring coastal areas or lakes.

The objective of SISCAL is to create a software processor providing Near-Real-Time data products derived from satellite data and ancillary GIS-based information. During the development phase of this project, the focus will be on water-related products for end users monitoring coastal areas or lakes. The data products shall be tailored to individual needs of each end user so that the latter does not require specialised in-house knowledge on remote sensing or image processing. This way, SISCAL aims at closing the gap between satellite data providers and end users. Data transport will entirely take place over the internet, both download of satellite data from the receiving stations as well as dissemination of the finalised data products to end users. An user-friendly interface will allow the end user to interactively explore and display data products on the internet. Commercialisation prospects of the processor will be analysed, and a business model be prepared.

19.3 Anticipated Services/Products

The SISCAL service integrates Earth observation data, state-of-the-art evaluation algorithms and ancillary digital databases in order to derive water-quality related information products on the open ocean, coastal areas and larger lakes, customised to specific end user needs, on an operational basis in near-real-time.

The SISCAL technology is not limited to data products on aquatic ecosystems. In fact, SISCAL is a tool for comfortably distributing geospatial data of various origin, such as digital elevation models (GTOPO30 or SRTM) or land cover / land use information (GLCC).

The SISCAL project has finished and has now become an operational remote sensing service. The SISCAL service provides maps on environmentally relevant parameters, and has the following products :

SEC	Secchi depth
SST	Sea surface temperature
TAI	Top-of-atmosphere image
TSM	Total suspended matter
CHL	Chlorophyll-a concentration
KDD	Diffuse attenuation coefficient at 490nm
MAR	Marine reflectance at 550nm

Formats:

PNG	Portable Network Graphics
BIL	Band Interleaved by Line, binary data product, required for SISCAL EU-GIS or other systems capable of BIL import

TFW TIFF + World File**19.4 Data Requirements**

SISCAL has no data requirements as it is a data provider.

19.5 Analysis - Required Data Harmonisation

Not applicable.

20 WIN

Wide Information Network For Risk Management Integrated Project

<http://www.win-eu.org/>

Project Start Date: 2004-09-01

End Date: 2007-09-01

20.1 Project Consortium

The coordinator of the project is:

Alcatel Space

Christian Alegre

12 Rue de la Baume

75008 Paris 08

France

Phone: +33 492 92 32 02

Email: christian.alegre@space.alcatel.fr

The other partners are:

Telespazio S.P.A., Italy

Nansen Senter For Miljoe og Fjernmaeling, Norway

ESYS Plc, United Kingdom

Centre National D'etudes Spatiales, France

Globaware International Sarl, France

Starlab Barcelona Sl, Spain

Cronos Nv, Belgium

Universite Marc Bloch, France

KELL - S.R.L, Italy

Gtd Sistemas De Informacion Sa, Spain

Generale D'infographie Sa, France

Collecte Localisation Satellites Sa, France

GMV Sa, Spain

European Commission - Joint Research Centre, Belgium

20.2 General Information about the Project

The Wide Information Network (WIN) Integrated Project has the objective of integrating all existing reference results or initiatives to contribute to the design, the development, and the validation of what could be referred to as a "European Risk Management information infrastructure". This information infrastructure will be a major element of the future overall European Spatial Data Infrastructure (ESDI).

The goals of the WIN project are:

- To define, in relation with other GMES projects, an open and flexible service oriented architecture which can be deployed at several levels (European, national, regional)
- To propose an organizational model facilitating the deployment of WIN
- To study on the selected thematic domains how a first version of this generic solution can be effectively deployed and customized in line with thematic domain practices
- To develop and release this initial set of services and tools in line with the priorities identified on thematic domains involved in WIN definition
- To demonstrate the added value of WIN, on the first real-size deployment involving end users and key actors in order to achieved a shared vision of an organizational model and implementation strategy

It is proposed to have a full synergy between WIN project and two other main projects: ORCHESTRA project, in order to converge towards a common GMES architecture, The Marine and Coastal Environment Information Services implementation Project which would be the first real case experience for WIN deployment.

20.3 Anticipated Services/Products

The main outputs or contributions of WIN for the Risk Management community are:

- The definition of an open architecture based on open standards
- The development of a set of tools and services ready to be deployed as a first version of the open architecture
- The definition, in coordination with other GMES projects, and with the involvement of key actors from a few thematic domains of the effective deployment of the first version of the architecture
- The results of experimentation and evaluation on the first real-size scenario

20.4 Data Requirements

WIN is based on an open architecture which unifies the information systems. This new created structure will be the node where the applications and services deployed for the Risk management will be integrated. This makes this project efficient since these integrations are not complicated through the use of the latest technologies like XML or Web services.

WIN organizes the input data in a unique format and simultaneously allows all the risk actors involved (end users, operational actors, valuable data added and services providers) to acquire the reliable pertinent and certified information in the shortest time according to the user profile.

WIN offers architecture based on sub networks, which implies that communities of actors who deal with the same kind of data, and services, will benefit from common resources.

20.5 Analysis - Required Data Harmonisation

Current gaps in risk management:

- Lack of integration of spatial and non-spatial information.
- Ineffective co-operative work between actors, levels of administration and different countries.
- Lack of agreement on a set of common general risk management services.
- There are no standard methods to help risk management end users to find and access data.
- Multi-lingual and multi-terminology problem.

APPENDIX 5 - Other Relevant Projects

Below is description over some additional projects that can be of interest for the RISE project in the implementation of the use cases. Most of these projects participate in the Catchmod cluster project, see below:

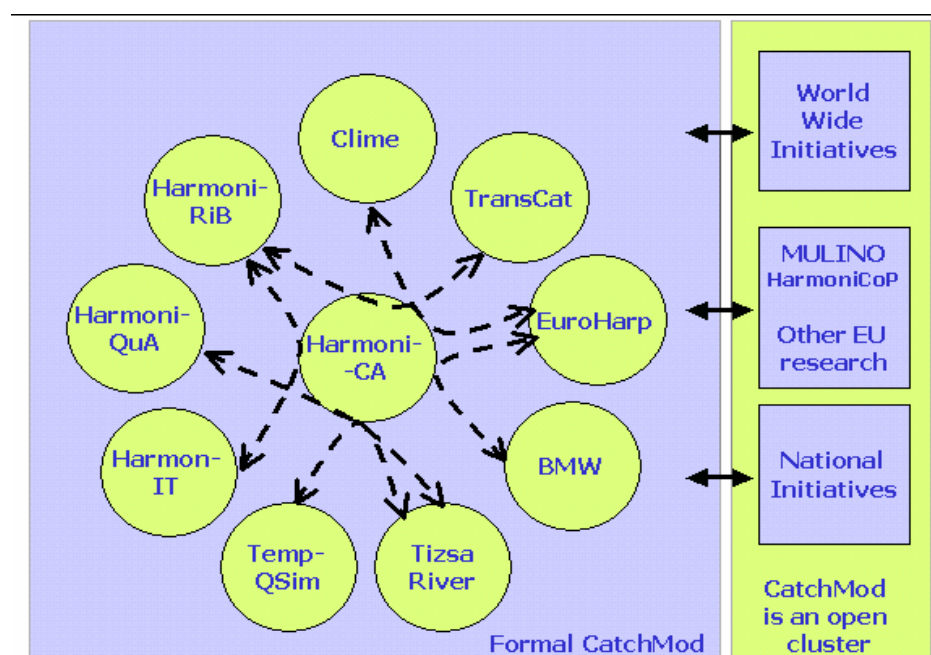
1 Catchmod Cluster Project

Within the EU's 5th Framework Programme a variety of RTD projects have been funded which are clustered in the "Catchment Modelling" cluster. The projects cover a wide range of subjects, dealing with specific issues in water management, in international co-operation and collaborative planning, modelling methodologies and ICT tools.

The objectives of clustering are to exchange information, discuss and solve common problems, make use of each others intermediate products and expertise: reach beyond the limited possibilities of isolated projects. Besides obvious collaboration on specific water and modelling issues, exchange of experience and approaches to end-user involvement, stakeholder participation and socio-economic issues are crosscutting themes for many of the CatchMod projects.

The concerted action Harmonised Modelling Tools for Integrated Basin Management "Harmoni-CA" will fulfil a central role within the CatchMod Cluster. The objective is to create a forum for unambiguous communication, information exchange and harmonisation of the use and development of ICT-tools relevant to integrated river basin management, and the implementation of the WFD. The communication, information exchange and harmonisation is geared towards the development of a widely accepted, flexible, harmonised modelling toolbox, including ICT-tools, guidance and methodologies, which can be applied by the various stakeholders in river basins. Amongst these stakeholders are end-users of models and tools as well as basin planners, policy developers, the public etc.

The CatchMod cluster projects are:



Additional projects could also be considered by the European Commission at a later stage.

Actions in support of the cluster are detailed below:

1. A steering committee, composed of the five project co-ordinators, will manage and oversee the implementation of the common tasks. The chair of the committee will be agreed at its first meeting and will rotate on an annual basis. The Commission will be invited to attend meetings of the committee. The committee will provide a report to the Commission on progress on the common tasks every 12 months. The first meeting of this steering committee will take place after 6 months of the starting date of the latest signed contract.
2. A web site to support the clustering activity will be established. This will hold information about the projects and provide updates on research progress, dissemination events etc.
3. Where there are clear overlaps between the projects' workpackages in terms of methodology or research objectives, more involved forms of collaboration will be explored. This is particularly relevant to the work being undertaken on various model domains (e.g. diffuse pollution, ecology, socio-economic issues, etc.) software tools for linking models, proof of concept, database design and harmonisation of terminology, evaluation of models performance, common sites for model and tools evaluation and testing.
4. Each of the above projects will extend an open invitation to the members of the other consortia to attend their project meetings and they will try where appropriate to arrange common meeting to discuss complementary issues.
5. Where appropriate the above projects will work to identify and exploit common dissemination and exploitation opportunities (e.g. publications).

The terms of reference of the steering committee, including a description of how the common tasks will be implemented, will be finalised and delivered to the Commission in draft form, after the first meeting of the steering committee. The final version will take account of any comments of the Commission.

Each project commits to contribute at least 1% of their respective EC contribution towards the common tasks of the cluster. Opportunities for additional funding to support further collaborative activities will be explored.

1.1 Envisaged Catchment Projects Interactions

All Research Projects

- all projects would like a meeting on pilot river basins, data & metadata organized by Harmoni-CA
- all projects would like to have access to national WFD pilot documents, which should be picked up by Harmoni-CA
- all projects are interested in a common list of definitions. This issue should be a task of Harmoni-CA
- all projects need a group to keep products 'alive' after projects end. This is considered to be a task of Harmoni-CA
- all projects experience problems with data and model availability and would like such problems to be addressed and solved by Harmoni-CA
- all projects would like to see all projects use a common meta-data catalogue which is maintained by Harmoni-CA

- all projects invite each other explicitly to open meetings
- HarmonIT offers the model linkage mechanisms and support to all projects
- TempQSim would like exchange of experience on Mediterranean study sites with all projects
- TempQSim offers its test cases for: validation of outcomes / guidelines from to all projects
- TempQSim offers specific experience from Mediterranean catchments to all projects
- Mulino offers Mulino-DSS and Mulino case studies to all projects
- HarmoniQuA is interested in experiences with knowledge base and tools from all projects

BMW - Benchmark Models for the Water Framework Directive

- HarmoniQuA is interested in information on model selection criteria (model description & selection rules) from BMW
- HarmoniRiB would like to co-ordinate with respect to methodology and terminology on uncertainty with BMW
- HarmoniCoP could translate information about tools and criteria into understandable language for end-users prepared by BMW
- Euroharp is interested in screening models with criteria of BMW
- Harmoni-CA task 2 would like discussions on criteria for model selection with BMW

EUROHARP - Towards Harmonised Procedures for Quantification of Catchment Scale Nutrient Losses from European Catchments

- Euroharp is interested in screening models with criteria of BMW
- HarmoniQuA is interested in results of screening Euroharp models with BMW criteria (model description & selection rules) from Euroharp
- TempQSim would like to discuss N,P problems with partners from mediterranean study site in Euroharp
- HarmoniRiB should make use of the knowledge on the Vecht River Basin prepared by Euroharp

Harmoni-CA - Harmonised modelling tools for integrated basin management

- all projects would like to have access to national WFD pilot documents, which should be picked up by Harmoni-CA
- all projects would like to see all projects use a common meta-data catalogue which is maintained by Harmoni-CA
- all projects need a group to keep products 'alive' after projects end. This is considered to be a task of Harmoni-CA
- all projects experience problems with data and model availability and would like such problems to be addressed and solved by Harmoni-CA
- TempQSim would like the discussion on WFD implementation with Harmoni-CA
- HarmoniRiB would like a 2-3 days technical meeting with all CatchMod technical people, organized by Harmoni-CA
- all projects are interested in a common list of definitions. This issue should be a task of Harmoni-CA
- TempQSim asks for clear definition and description of existing knowledge, lead by Harmoni-CA general
- TempQSim would like the discussion on scaling issues picked up by Harmoni-CA general

HarmoniCoP - Harmonizing Collaborative Planning

- HarmoniCoP may find use in its collaborative processes of tools of HarmoniQuA
- HarmoniCoP could translate information about tools and criteria into understandable language for end-users prepared by BMW
- HarmoniCoP is interested in communicating uncertainties as researched by HarmoniRiB

HarmoniQuA - Harmonising Quality Assurance in model based catchment and river basin management

- HarmoniQuA is interested in information on model selection criteria (model description & selection rules) from BMW
- HarmoniQuA is interested in discussing the acceptance of model results with HarmoniCoP
- HarmoniQuA would like to discuss several issues with Harmoni-CA task 3
- HarmoniQuA could make use of methodology relating to uncertainty and data structures/handling developed in HarmoniRiB
- HarmoniQuA is interested in experiences with knowledge base and tools from all projects
- HarmoniQuA is interested in information on handling uncertainty researched in HarmoniRiB
- HarmoniQuA is interested in aspects of data-handling, raw data and meta-data discussed in HarmoniRiB
- HarmoniQuA would like to see monitoring & logging included in the OpenMI implementation prepared by HarmonIT
- HarmoniQuA is interested in results of screening Euroharp models with BMW criteria (model description & selection rules) from Euroharp

HarmoniRiB - Harmonised techniques and representative river basin data for assessment and use of uncertainty information in integrated water management

- HarmoniRiB is interested in perception of knowledge, as researched by HarmoniCoP
- HarmoniRiB should make use of the knowledge on the Vecht River Basin prepared by Euroharp
- HarmoniRiB is interested in knowledge about the perception of uncertainty from HarmoniCoP
- HarmoniRiB would like to see model linking to databases included in the OpenMI prepared by HarmonIT
- HarmoniRiB would like a workshop organized on experience with River Basin Networks, organized by Harmoni-CA task 4
- HarmoniRiB would like to co-ordinate with respect to methodology and terminology on uncertainty with BMW
- HarmoniRiB would like a 2-3 days technical meeting with all CatchMod technical people, organized by Harmoni-CA

HarmonIT - IT Frameworks

- HarmonIT offers the model linkage mechanisms and support to all projects

MULINO - MULti-sectoral, INtegrated and Operational decision support system for sustainable use of water resources at the catchment scale

- Mulino offers Mulino-DSS and Mulino case studies to all projects
- Mulino would like MDSS to be linked up to (and by) HarmonIT

TempQSim - Evaluation and improvement of water quality models for application to temporary waters in southern European catchments

- TempQSim offers its testcases for: validation of outcomes / guidelines from to all projects
- TempQSim would like exchange of experience on mediterranean study sites with all projects
- TempQSim would like the discussion on scaling issues picked up by Harmoni-CA general
- TempQSim offers specific experience from Mediterranean catchments to all projects
- TempQSim would like to receive preliminary guidance documents and actual gaps Harmoni-CA task 3
- TempQSim asks for clear definition and description of existing knowledge, lead by Harmoni-CA general
- TempQSim would like to exchange information on uncertainty with HarmoniRiB
- TempQSim would like to receive an overview on coupling strategies and formal aspects from HarmonIT
- TempQSim would like to receive more overview on mutual interfaces between Mulino-DSS and TempQSim modules from Mulino
- TempQSim would like to exchange experience on water quality dynamics with Tisza River Project
- TempQSim would like to exchange information on monitoring concepts with Harmoni-CA task 4
- TempQSim would like to discuss N,P problems with partners from mediterranean study site in Euroharp
- TempQSim would like the discussion on WFD implementation with Harmoni-CA

TISZA RIVER PROJECT - Real-life scale integrated catchment models for supporting water- and environmental management decisions

- Tisza River Project could be a valuable test case for HarmoniQuA

2 BMW

Benchmark Models for the Water Framework Directive

<http://www.ymparisto.fi/default.asp?node=11687&lan=en>

Project Start Date: 2002-01-01

End Date: 2005-01-01

2.1 Project Consortium

The coordinator of the project is :

Finnish Environment Institute (SYKE), Finland

2.2 General Information about the Project

BMW is a research project within the 5th Framework Programme and belongs to the CATCHMOD cluster.

EU Water Framework Directive (WFD) mandates Member States to develop river basin management plans for each river basin district. To achieve this the responsible authorities need proper tools to assess alternative management options.

The objective of BMW project is to establish a set of criteria to assess the appropriateness of integrated models for the use in the implementation of WFD. Moreover, the project aims at testing and demonstrating the use of integrated models applied to selected intensively studied river basins.

A River Basin Manager's Toolbox has been developed to provide information about models and other tools that are needed in the implementation of the Water Framework Directive. In different steps of the implementation, such as assessment of pressures and impacts, classification, calculating the target loads, designing the programme of measures, and economical analysis, different kind of models are needed.

To proceed appropriate use of models and reduce uncertainties as much as possible, special attention should be paid on selection of an appropriate model for a specific purpose. The RBM Toolbox will not only provide information of the available models, but also facilitates the user to compare model characteristics to the 'benchmark' criteria, which have been developed in order to evaluate models and their use under site-specific circumstances and problems.

The RBM Toolbox will also serve as a platform for model developers to enter information of their models, and bring this information easily available for model users. It will be the largest model catalogue specifically designed for models, which has a potential to be used in the implementation of the Water Framework Directive.

2.3 Potential Relevance to the RISE Project

The RBM Toolbox provides information of models and other tools needed in the implementation of the Water Framework Directive (WFD) and will help model users to select appropriate tools for their specific needs and management tasks. One can screen existing models in the model catalogue, enter new models into it, and evaluate models against the benchmark criteria.

This Toolbox is open to anyone. It is particularly targeting river basin authorities, model users and other experts. The RISE project could try to use it when implementing one of the use cases.

3 EUROHARP

Towards European Harmonised Procedures for Quantification of Nutrient Losses from Diffuse Sources

<http://euroharp.org/index.htm>

Project Start Date: 2002-01-01

End Date: 2005-12-31

3.1 Project Consortium

The coordinator of the project is :

Stig A. Borgvang

Phone: +47 22185107 or +47 41686121

E-mail: co-ordinator@euroharp.org

The other partners are:

Federal Environmental Agency Ltd. (FEA Ltd), Austria

<http://www.hbu.cas.cz>/Hydrobiological Institute (HBI-AS CR), Czech Republic

National Environmental Research Institute (NERI), Denmark

<http://www.vyh.fi/eng/fei/fei.html>Finnish Environment Institute (FEI), Finland

<http://www.ifen.fr>/Institut français de l'environnement (IFEN), France

BETURE-CEREC Company (BETURE-CEREC), France

<http://www.igb-berlin.de>/Institute of Freshwater Ecology and Inland Fisheries (FV-IGB), Germany

<http://www.chi.civil.ntua.gr>/National Technical University of Athens (NTUA), Greece

VITUKI Consult Rt. (VITUKI), Hungary

<http://www.kirkmcluremorton.com>/Kirk McClure Morton (KMM), Ireland

<http://www.irsa.rm.cnr.it>/Water Research Institute - National Research Council (IRSA-CNR), Italy

<http://www.jrc.it>/Joint Research Center (EC-JRC), Italy

Lithuanian Institute of Water Management, Lithuania

<http://www.crppl.lu>/Centre de Recherche Public - Gabriel Lippmann (CRP-GL, Luxembourg

<http://www.alterra.nl>/Alterra, Green World Research (ALTERRA), the Netherlands

<http://www.jordforsk.no>/Center for Soil & Environmental Research (JORDFORSK), Norway

<http://www.niva.no>/Norwegian Institute for Water Research (NIVA), Norway

<http://www.nibr.no>/The Norwegian Institute for Urban and Regional Research (NIBR), Norway

<http://www.juntadeandalucia.es/medioambiente/>Andalusian Regional Ministry for Environment, Spain

<http://www.smhi.se>/Swedish Meteorological and Hydrological Institute, (SMHI), Sweden

<http://www.slu.se>/Swedish University of Agricultural Sciences (SLU), Sweden

<http://www.adas.co.uk/NewIndex/INDEX.HTM>ADAS Consulting Ltd. (ADAS), United Kingdom

3.2 General Information about the Project

EUROHARP is a research project supported by the EC under the Fifth Framework Programme contributing to the implementation of the Key Action “Sustainable Management and Quality of Water” within the Energy, environment and Sustainable Development.

EUROHARP includes nine different contemporary methodologies for quantifying diffuse losses of N and P, and a total of 17 study catchments across gradients in European climate, soils, topography, hydrology and land use. These methodologies have been selected to include those approaches - applicable at catchments scale - that are currently used by European research institutes to inform policy makers at national and international levels.

The first primary objective of EUROHARP is to provide end-users (national and international European environmental policy-makers) with a thorough scientific evaluation of the nine contemporary quantification tools and their ability to estimate diffuse nutrient (N, P) losses to surface freshwater systems and coastal waters. Thereby facilitate the implementation of the EC Water Framework Directive.

The second primary objective is to develop an electronic decision support system (tool-box) for the identification of benchmarking methodologies with respect to both costs and benefits, for the quantification of diffuse nutrient losses under different environmental conditions across Europe.

3.3 Potential Relevance to the RISE Project

EUROHARP is to develop an electronic decision support system (tool-box) for the identification of benchmarking methodologies with respect to both costs and benefits, for the quantification of diffuse nutrient losses under different environmental conditions across Europe. This toolbox could be of use for the RISE project when implementing the use cases.

4 HARMONI-CA

Harmonised Modelling Tools for Integrated Basin Management

<http://www.harmoni-ca.info>

Project Start Date: 2002-10-01

End Date: 2007-09-30

4.1 Project Consortium

5 partners form the core-group are overall responsible for running Harmoni-CA.:
 RIZA - Institute for Inland Water Management and Waste Water Treatment, Head-department Watersystems, The Netherlands
 Ghent University, Biomath Department, Belgium
 Potsdam Institute for Climate Impact Research on Global Change & Natural Systems, Germany
 Geological Survey of Denmark and Greenland, Department of Hydrology, Denmark
 University of Osnabrück, Institute of Environmental Systems Research, Germany
 Institute for Inland Water Management and Waste Water Treatment, Head-department Watersystems, The Netherlands

4.2 General Information about the Project

Harmoni-CA is a research project supported by the European Commission under the Fifth Framework Programme and contributing to the implementation of the Key Action "Sustainable Management and Quality of Water" within the Energy, Environment and Sustainable Development.

The variety in physical properties, socio-economics, management etc. throughout Europe results that each basin has its own unique characteristics and makes the development of river basin management plans all but straightforward. Due to these factors an increasing need is felt for guided use and methodologies of harmonised high quality computer based tools (ICT-

tools) supporting the design or river basin management plans and implementation of the WFD.

Harmoni-CA's strategy is first of all based on the fact that much expertise relevant to the objectives of Harmoni-CA is already available or will be developed in ongoing projects. To achieve the main objectives this expertise needs to be elaborated and harmonised.

To achieve the broad participation and the involvement of the scientific and policy worlds, users and other stakeholders in integrated basin management a variety of methods is applied: workshops, conferences, newsletters, web-publishing and web-based discussion forums. Involvement is stimulated through organisations throughout Europe that bring together a large amount of expertise on the various issues in integrated river basin planning and the use of ICT-tools.

The overall objective of Harmoni-CA is to create a forum for unambiguous communication, information exchange and harmonisation of the use and development of ICT-tools relevant to integrated river basin management, and the implementation of the WFD.

4.3 Potential Relevance to the RISE Project

Though much of the work involves ICT-tools, Harmoni-CA is not about ICT-tools as such: Harmoni-CA is about harmonisation and guidance on development and use of ICT-tools.

Harmoni-CA will synthesise available knowledge with the help of knowledge providers such as researchers. Typical actions of Harmoni-CA will be meetings and workshops, leading to synthesis reports and guidances.

As the RISE project will address the GMES data harmonisation action line, and is going to develop guidelines for the creation of geospatial data implementation specifications, with a focus on water and elevation data themes, the reports and guidelines from Harmon-CA can be of use for the RISE project when implementing use cases.

5 HarmoniQuA

Harmonising Quality Assurance in model based catchments and river basin management

<http://www.harmoniqua.org/>

Project Start Date: January 2002

End Date: December 2005.

5.1 Project Consortium

The coordinator of the project is :

Wageningen University, Information Technology Group (WU), The Netherlands

The other partners are:

Geological Survey of Denmark and Greenland (GEUS), Denmark

National Technical University of Athens (NTUA), Greece

Centre for Ecology & Hydrology (CEH), UK,

WL | Delft Hydraulics (WL | DH), The Netherlands

Cemagref, France
Bundesanstalt für Gewässerkunde (BfG), Germany
Swedish Meteorological and Hydrological Institute (SMHI), Sweden
VITUKI Plc, Hungary
University of Dortmund, Institute of Environmental Research (INFU), Germany
Laboratório Nacional de Engenharia Civil Hidráulica (LNEC), Portugal
DHI Hydroinform a.s. (DHI-H), Czech Republic

5.2 General Information about the Project

HarmoniQuA is a research project supported by the European Commission under the Fifth Framework Programme and contributing to the implementation of the Key Action "Sustainable Management and Quality of Water" within the Energy, Environment and Sustainable Development Programme.

HarmoniQuA aims to provide a user friendly computer based guidance and QA (Quality Assurance) framework for use in model based river management. It will prompt users with the appropriate 'next step' in the modelling process and provide an audit trail to check previous decisions. The approach targets management at catchments and river basin scales with the overall goal of improving the quality of modelling and therefore enhancing the confidence of all stakeholders in them. HarmoniQuA attempts to serve several types of users in a series of water management domains, in jobs of varying complexity. Users working on a specific job will only be confronted with guidance relevant to them in their present context.

HarmoniQuA will organize knowledge in a structured database. The knowledge database will be both generic and specific to 7 domains (groundwater, precipitation-runoff, river hydrodynamics, flood forecasting, water quality, ecology, and socio-economics). It will include consistent glossaries of terms and concepts, accepted methodologies, sensitivities and pitfalls and a consideration of software specific aspects.

The knowledge database will be linked to the toolbox called MoST, with the functionality to:

1. Guide: to ensure a model has been properly applied;
2. Monitor: to record decisions, methods and data used in these tasks; and
3. Report: to provide reports suitable for water managers/clients, modellers, auditors, stakeholders and the general public.

It is expected these novel outputs can contribute significantly towards improving the quality of modelling and harmonisation of river basin management practices throughout Europe. Such harmonisation of modelling procedures in relation to the Water Framework Directive will stimulate the compatibility and the consistency of modelling and will therefore effectively support the development of a consistent water management policy across Europe. The HarmoniQuA System will make the concept of Quality Assured modelling accessible to any interested stakeholder including planners, policy-makers and concerned members of the public.

5.3 Potential Relevance to the RISE Project

The knowledge database and the MoST toolbox can be of use for the RISE project when implementing use cases.

6 HarmoniRiB

Harmonised Techniques and Representative River Basin Data for Assessment and Use of Uncertainty Info in Integrated Water Management

<http://www.harmonirib.com/>

Project Start Date: 2002-10-01

End Date: 2006-03-31

6.1 Project Consortium

The coordinator of the project is :

Geological Survey of Denmark and Greenland, Denmark

The other partners are:

Institute of Inland Water Management and Waste Water Treatment, The Netherlands

Water Research Institute, Italy

Centre for Environmental Research, Germany

Centre for Ecology and Hydrology, UK

University of Amsterdam, The Netherlands

DHI Water & Environment, Germany

Technical University of Crete, Greece

University of Castilla-La Mancha, Spain

Morava River Basin, Czech Republic

6.2 General Information about the Project

The HarmoniRiB project is an European Project under the European Commission's "Energy, Environment and Sustainable Development (EESD)" Programme. EESD is one of the four thematic programmes of the Fifth (EC) RTD Framework Programme (1998-2002).

The Water Framework Directive (WFD) provides a European policy basis at the river basin scale. The river basin management and planning process prescribed in the WFD focuses on integrated management, involving all physical domains in water management, sectors of water use, socio-economics and stakeholder participation. Decisions have to be made under the auspicious of the available information. Nevertheless, sometimes this information is deficient, incomplete and uncertain. How should this affect the decision making? In order to solve it, HarmoniRiB will develop new methodologies and tools that can be used to assist in implementing the WFD.

The objectives of the project is to:

- To establish a practical methodology and a set of tools for assessing and describing uncertainty originating from data and models used in decision making processes for the production of integrated water management plans.
- To provide a conceptual model for data management that can handle uncertain data and implement it for a network of representative river basins.
- To provide well documented datasets suitable for studying the influence of uncertainty on management decisions and provide examples of their use.
- To disseminate results among researchers and end-users across Europe and obtain and incorporate feedback on the methodologies tools and the datasets.

6.3 Potential Relevance to the RISE Project

RISE should follow HarmoniRiB's progress on the practical methodology and tools for describing uncertainty and the implementation of the conceptual model that handles uncertain data

7 HarmoniT

Project Start Date: 2002-01-01

End Date: 2005-12-31

7.1 Project Consortium

The coordinator of the project is :

CEH - CENTRE FOR ECOLOGY AND HYDROLOGY

Keith RODGERS

Maclean Building, Crowmarsh Gifford

OX10 8BB WALLINGFORD

United Kingdom

Phone:

E-mail: cit@ceh.ac.uk

rvm@ceh.ac.uk

The other partners are:

RIZA - Rijksinstituut voor Integraal Zoetwaterbeheer en Afvalwaterbehandeling, The Netherlands

DHI - DHI Water and Environment, Denmark

WL| Delft Hydraulics, The Netherlands

WSL - Wallingford Software Ltd, United Kingdom

Uni Do - University of Dortmund, Germany

IRSA - Istituto di Ricerca Sulle Acque, Italy

NTUA - National Technical University of Athens, Greece

WRc - WRc plc, United Kingdom

DHI HIF - DHI Hydroinform a.s., Czech Republic

PL - Povodi Labe, s.p., Czech Republic

HDP - Hydroprojekt CZ a.s., Czech Republic

Alterra - Alterra B.V., The Netherlands

Cemagref - Centre National du Machinisme Agricole, du Genie Rural, des Eaux et des Forets, France

7.2 General Information about the Project

The trend in Europe is towards integrated catchment management, a philosophy that involves taking a wider view of rivers and their environs, rather than managing each catchment process in isolation. The principle is sound, but the processes involved are complex and managers need to understand all of the possible impacts before pursuing a given policy.

Models can help to predict the likely outcome of following particular policies and can be used to explore best options, but no *single* model can adequately represent every aspect of the catchment environment. A method is therefore needed to link and unify the models and tools available, in order that the interactions between processes can be understood. HarmoniT aims to provide this ability. The project, which involves water and IT experts from 14 European

organizations, is developing an interface that will allow new and existing models to interact with each other, with sources of data such as databases and instruments and tools for the display or analysis of data.

The objective of this project, therefore, is to develop, implement and prove a European Open Modelling Interface and Environment, the OpenMI, that will simplify the linking of models and hence allow water managers to anticipate the likely outcomes of different policies.

Europe has a huge number of existing models which it is neither feasible nor desirable to rewrite. Therefore, a primary design objective of the OpenMI is that the cost, skill and time required to migrate an existing model to the standard should not be a deterrent to its use.

The ambition of the project is to create a software architecture, which, by its high quality and high support level will become the European standard for linking models from the water domain and, later, any environmental models.

The tangible benefits that the project seeks to deliver are:

- The simplification of the model linking process leading to an improved ability to model process interactions, the ability to use appropriate model combinations and the ability to swap in and out different models of the same process and hence facilitate sensitivity analyses and benchmarking
- The ability to represent feed back loops and process interactions which will key to implementing integrated management and finding of sustainable policies
- An increased choice for model users in that they will be able to ‘mix n’ match’ models from different sources, an increased market for suppliers and increased opportunities for the creation of Small Medium Enterprises (SME)
- A reduction in development time for decision support systems
- A contribution to the implementation and evolution of EU policies

In order to check that the requirements were correctly expressed and to facilitate the development of an architecture for the OpenMI, a range of scenarios or ‘use cases’ were identified. Please refer to http://www.harmonit.org/docs/parta_openmiarchitecture_scope_modified_version_0.9.doc for more information.

7.3 Potential Relevance to the RISE Project

The OpenMI can be of use for the RISE project when implementing use cases.

8 HMA

Heterogeneous Missions Accessibility

Project Start Date: 2005-09-01

End Date: 2007

8.1 Project Consortium

The coordinator of the project is :

ESA/ESRIN

Pier Giorgio Marchetti

The other partners are:

ASI/Alenia Spazio

CNES

CSA/MDA

DLR

EUSC

8.2 General Information about the Project

The high level objectives of HMA are to:

- Consolidate scenarios and interoperability requirements
- Define the EO DAIL architecture
- Define and prototype an interoperable protocol for catalogue, order, mission planning
- Define approach for User Management
- Define approach for online data access
- Address interoperability requirements arising from:
 - data quality and formats
 - data policy, SLA, etc.
 - security

A high level requirement is to make easy to:

- search for available products
- request for future acquisitions
- order products

across multiple missions

The proposed approach is to:

- Select protocols based on current industrial technology standards (W3C/OASIS) e.g. XML/SOAP/WSDL.
- Discussion Paper to OGC for “Minimal Profile for EO products using WSDL and SOAP” of the current OpenGeospatialCatalogue Services CSW2.0
- Seek alignment with INSPIRE
- Propose adoption within the Implementing Rules
- ISO adoption / standardisation of specifications -long term goal

The protocols and standards to be used are:

- From W3C and OASIS
- Web services
 - WSDL file describes operation e.g. search, present, order,...
 - XML schema to describe metadata (ISO 19115)
 - document-style SOAP
- ws-addressing (W3C) for asynchronous communication
- UDDI service registry
- BPEL (OASIS) for service orchestration

8.3 Potential Relevance to the RISE Project

Follow HMA’s work on interoperability requirements etc.

9 SDIGER

A cross-border inter-administration Spatial Data Infrastructure to support WFD information access for Adour-Garonne and Ebro River Basins

<http://sdiger.unizar.es>

Project Start Date: January 2005

End Date: December 2006

9.1 Project Consortium

SDIGER is a pilot project on the implementation of the Infrastructure for Spatial Information in Europe (INSPIRE), funded by the European Commission through the Statistical Office of the European Communities (Eurostat).

This project is being developed by a consortium consisting of the following entities:

- IGN France International (Institut Géographique National France International),
- France National Geographic Institute (Institut Géographique National),
- Spain National Geographic Information Centre (Centro Nacional de Información Geográfica),
- University of Zaragoza (Universidad de Zaragoza), together with experts from University Jaume I.

Additionally, this consortium counts on the help of the following collaboration entities:

- Spain National Geographic Institute (*Instituto Geográfico Nacional*),
- Water Agency of Adour-Garonne (*Agence de l'Eau Adour Garonne*),
- Ebro River Basin Authority (*Confederación Hidrográfica del Ebro*),
- Regional Direction of the Ministry of Environment for the Midi-Pyrénées region
- GIS-ECOBAG association

9.2 General Information about the Project

SDIGER is a pilot project on the implementation of the Infrastructure for Spatial Information in Europe (INSPIRE), funded by the European Commission through the Statistical Office of the European Communities (Eurostat).

Eurostat's objectives for the project are to test and demonstrate the feasibility and advantages of solutions for sharing spatial data and services, observing the principles and standards proposed by the INSPIRE position papers in 2002 and their interoperability-based approach; to acquire experience in implementing interoperable solutions and develop processes able to be reused when INSPIRE is put into operation; and to estimate the costs of implementing interoperability-based solutions on the basis of real cases, together with the problems, obstacles which might be encountered during the subsequent large-scale implementation of INSPIRE.

The SDIGER project consists in the development of a Spatial Data Infrastructure (SDI) to support access to geographic information resources concerned with the Water Framework Directive (WFD) within an inter-administration and cross-border scenario that involves: two countries, France and Spain; and, the two main river basin districts at both sides of the border, the Adour-Garonne basin district, managed by the Water Agency for the Adour-Garonne River Basins (*L'Agence de l'Eau Adour-Garonne*) and the Ebro river basin district, managed by the Ebro River Basin Authority (*Confederación Hidrográfica del Ebro*).

9.3 Potential Relevance to the RISE Project

The SDIGER project are going to develop two use cases:

- **Water Abstraction Application:** The objective of this use case is not to replace any part of the administrative process, but to provide users with some guidance, data and documentation needed for it and improve some steps of the internal process for water abstraction request requires
- **WFD Reporting Application:** The WFD introduces a new approach to data and information collection and reporting. This use case proposes to use INSPIRE principles for fulfilling reporting requirements of the member states to the Commission.

There has been some discussions between the RISE and SDIGER projects to develop one of these use cases as a shared use case between the two projects.

10 SSE

Service Support Environment

<http://services.eoportal.org/>

SSE is an ongoing service

10.1 Project Consortium

The project that developed SSE included the following partners:

ESA ESRIN, Italy

Spacebel, Belgium

Intecs, Italy

GIM, Belgium

Spot Image, France

K.U. Leuven, Belgium

10.2 General Information about the Project

The ESA has embarked on a strategic initiative to create a network of service providers based entirely on open standards. This network, referred to as Service Support Environment (SSE) network, combines Earth Observation (EO) and Geographic Information System (GIS) services from third parties to provide value-added composite services. SSE is a growing network currently including 20+ partners spread across nine different countries.

The main objectives for SSE is to:

- Orchestrate synchronous and asynchronous Web Services for online and offline processes
- Provide an overarching infrastructure, neutrally managed by ESA
- Empower service providers through a business process management platform
- Easily deploy and deliver services to users from own infrastructure without additional expenditures
- Minimize service providers' upfront investments
- Have open standards to facilitate adoption and evolution

10.3 Potential Relevance to the RISE Project

Follow SSE's work in the set up of open operational services for Earth Observation in Europe.

11 WISE

Water Information System for Europe

Project Start Date: 2003

End Date: 2010

11.1 Project Consortium

The partners are:

DG Environment,

The European Environment Agency (EEA),

Eurostat (ESTAT)

Joint Research Centre (JRC)

11.2 General Information about the Project

A concept - Water Information System for Europe - WISE. was agreed upon on the water directors meeting in November 2003 on the development of a new, comprehensive and shared European data and information management system for water.

There are three main distinct, but overlapping, requirements for information to be gathered from Member States to EU and International Organisations which will need to be fulfilled by a new integrated system. These are :

1. Checking compliance and implementation of EU legislation at a national level.
2. Assessing and comparing state and trends for the environment and the associated pressures, impacts and socio-economic driving forces that either cause or result from changes.
3. Use information on implementation and trends to assess the effects and effectiveness (including cost-efficiency) of policy, both before and after measures have been introduced.

WISE – the water information system for Europe is currently being developed and should be fully operational by 2010. Its main objective is to streamline the reporting requirements for the different report needs and thus reduce the burden of reporting on Member States.

WISE is a shared information system, not a single “mega” database where all information is held centrally, but consists of the building blocks and will have to be in line with other EC initiatives such as INSPIRE and EIONET and WISE-RTD.

The specific data requirements (i.e which data is needed for compliance checking and which information is requested for state of the environment reporting, what GIS information is needed, etc.) is being defined through working groups operating under the common implementation strategy for the implementation of the WFD and in close collaboration of the different relevant EC organisations and Member States.

The work to be carried out, should lead to a common GIS data set, to be used by all European Institutions for the collection, display, comparison and analysis of data on the EU level aiming at both compliance reporting for the purposes of the directive as well as for SOE assessment. The CCM dataset, that is the backbone of that system, will be freely available to all users, without charge, and will be free of copyright issues.

The objective of the envisaged short term activities is to prepare the CCM dataset as geographic reference for the European water information system. As a consequence the GIS based on the CCM has to include all geographic layers that are required:

1. for the reporting within the Water Framework Directive and
2. for environmental assessment related to water issues.

In detail this GIS dataset has to include river basins and sub-basins, the rivers that correspond to these basins and sub-basins, the lakes, the artificial water bodies (canals and artificial lakes, reservoirs), the dams that create the reservoirs, transitional waters, coastal waters and groundwater bodies. River basin districts and the area of competent authorities can be defined in relation to the basins, sub-basins and elementary catchments.

Additional geographic data have to be added from other sources, e.g. monitoring stations, inlets, outlets, characteristics of small rivers not represented with their own geography, specific hydraulic works, inundation areas, protected areas, administrative boundaries, settlements, transport networks, etc. The relation between these data and the hydrographical data has to be established via spatial relationships or by means of the coding system when this approach is required.

On the long term the WISE system should follow the principles as they are laid out by the INSPIRE initiative. This will ideally lead to a distributed architecture where data are stored locally and information is retrieved on demand. The prerequisites for establishing such a system of data sharing are the development of common and best compatible, data models, the development and implementation of technical specifications on interoperability and agreements between public organisations on access to the data. A practical implementation for applying this principle as well as for information transfer from the national to the European information systems is the definition of a common coding system and the application of this system to the national and European datasets.

WISE is a set of tools listed below:

- A single web portal: A web based data entry prototype and an output tool; and
- GIS tools (visualisation tool, geographic reference data set, comprehensive coding system for hydrological features (rivers, lakes, river basins, coastal waters, groundwater, etc).

WISE is consists of different components to respond to the different needs of data users:

- WISE RTD web
- WISE compliance
- WISE EIONET Water

There are still several elements of the practical implementation of such system which need to be further discussed, developed and agreed such as which organisation will be hosting the server, etc.

11.3 Potential Relevance to the RISE Project

The implementation of the WISE project will be guided by the INSPIRE principles. Services will be defined that are based on Member States' information systems and data. Initiatives on common data modelling would contribute to solve the issue of data harmonisation without expensive manual data integration work.

It is obvious that a close co-operation between WISE and RISE is of mutual benefit.

Blank page.