




	<b>GETIS Deliverable 2.6.2</b>	
File name: deliverable 2.6.2_r10.doc	Created on 04 February 2002 08:13	Page 1 of 1

<b>Project Title:</b>	Geo-Processing Networks in a European Territorial Interoperability Study
<b>Project N°:</b>	IST-1999-14146
<b>Document Title:</b>	Report on the User Demanded Data Domains
<b>Compiled by:</b>	Martin Klopfer
<b>Partner's Name:</b>	SICAD
<b>Position:</b>	Co-ordinator
<b>Contribution of:</b>	GEOBASE, GeoSwiss, ITC, PCI
<b>Deliverable number:</b>	D 2.6.2
<b>Action requested:</b>	<input checked="" type="checkbox"/> for comment <input checked="" type="checkbox"/> for approval for information other _____

	<b>GETIS Deliverable 2.6.2</b>	
File name: deliverable 2.6.2_r10.doc	Created on 04 February 2002 08:13	Page 2 of 2

### Table of Contents

1	Scope .....	3
2	User Demanded Data Domains.....	4
2.1	Data Domains, Features & Coverages .....	4
2.1.1	Application Domains .....	5
2.1.2	Data Semantics .....	5
2.2	List of User Demanded Data Domains .....	5
3	Relation of DM Stages to GIS Process .....	6
3.1	Geographic scope of datasets .....	7
3.2	Data Modeling & Interoperability.....	8
4	References and Resources .....	9

	<b>GETIS Deliverable 2.6.2</b>	
File name: deliverable 2.6.2_r10.doc	Created on 04 February 2002 08:13	Page 3 of 3

## 1 Scope

This report is based on the Work Package 2 (WP2) activities and results as described in deliverable 2.6.1 'Report on the Evaluation of the key user requirements'. It basically provides a starting point for the definition and description of the data domains, which are demanded by users at various stages of disaster management processes. Based on information collected from surveys and interviews (see 2.6.1 for details) the project team analysed the results to date of the user requirements definition process and specifically tried to address the following objectives of WP2:

- 2.1 Development of data domains covering land applications, integrated transport and mobility applications.
- 2.2 Accommodating data semantics in five languages while delivering key results in at least three languages.

The report outlines the data domains, which match the information requirements of the users, and provides a first classification of spatial objects into features and coverages. The key question is about trying to understand the information requirements for defined application domains, how to match these against the most suitable data domains and to single out a smallest common denominator in terms of data domains which would form part of almost all information requirements.

Based on a priori partner expertise, it is likely that the largest portion of data required already exists in one form or another. However, defining the relevant base information across system, format and data model boundaries poses the real problem along with locating the appropriate sources at all. Therefore an analysis of which data domains are of priority provides the key to understand where interoperability interfaces need to be implemented to enable a widespread and efficient use of relevant data and metadata. This layer is conceptualised in the introduction to deliverable 2.6.1, data layer. The results of this analysis, in conjunction with effective Use Case Analysis, may also lead to the identification of additional data sources to be established to better support disaster management processes for the common good.

In addition, validation and refinement of the results will occur through interaction with the working group, comprised of a cross section of experts (see 2.6.1 for details). The logical next step would then lead to the modelling of data domains based on use case scenarios, which will provide a proper representation of information and interoperability requirements to be accommodated by the data domains, which effectively will be the key activity in Work Package 3.

## **2 User Demanded Data Domains**

### **2.1 Data Domains, Features & Coverages**

In the context of GETIS, a data domain is defined as the representation of spatial objects with common thematic attributes. Examples of data domains thus could be topography, transport infrastructure etc. The data domains can typically be further divided into groups of coverages, such as topography, hydrology, satellite imagery etc. and features, such as roads, buildings, gas lines etc.:

<b>Transport Infrastructure = Data Domain</b>
Airports = Feature in a Data Domain
Roads
Railway Lines
Rivers / Canals
<b>Supply Infrastructure</b>
Gas
Electricity
Water
Heating
Telecom
<b>Topography</b>
1:25k Raster Map = Coverage in a Data Domain

The aforementioned data domains and feature / coverage classes were derived from the initial survey and discussions as outlined in 2.6.1. Due to the limitations of the initial information gathering approach it is anticipated to further refine this information based on Use Case modeling in WP3

### 2.1.1 Application Domains

Discussion with WG members have shown that disaster management requirements cross almost all application fields as outlined in the project proposal, including National, Regional and Local Government, Utilities and Telecom Companies etc.

### 2.1.2 Data Semantics

Since data-modeling apparently requires proper semantics, the data semantics will be developed through the working group as well as in the data modeling definition phase in WP3 in close co-operation with WP4.

## 2.2 List of User Demanded Data Domains

The entire list of user required data domains has been compiled into table below:

<b>Data Domain</b>
<b>Transport Infrastructure</b>
Airports
Roads
Railway Lines
Rivers / Canals
<b>Supply Infrastructure</b>
Gas
Electricity
Water
Heating
Telecom
<b>Buildings</b>
Public Shelters
Residential
<b>Response Infrastructure</b>
Disaster Area
Real-Time Location of Response Resources
Public Shelters
Hazardous Objects
Flood Models
<b>Coverages</b>
Topography

Hydrology
Geology
Land Use
Aerial Photographs
Satellite Images >5m Resolution
Satellite Images <5m Resolution
Soil Types
DEM



For each of the defined process stages in a disaster management scenario it is expected that this data domain list can be further refined and that e.g. a priority rating can be derived from the uses case scenarios, which will be modeled with the WG in WP3. This will most likely reveal requirements for additional data domains and help the prioritization of specific elements. So far it seems that only data domains were stated which are currently used or accessible and that existing limitations and boundaries reflect on the stated requirements.

### 3 Relation of DM Stages to GIS Process

The following table shows the relationship of the steps in the Disaster Management process with respect to the GIS processes indicated in 2.6.1. The five phases in management may or may not be required for certain processes. If the phase also requires Real Time data, it is indicated below.

Disaster Phase	Typical Operations	Surveying/location/data acquisition	Routing/Navigation	Spatial analysis	Spatial data visualization	Spatial data dissemination
Prevention	Risk assessment					
Preparedness	Emergency plans					
Relief	Emergency centre	RT		RT		
Rehabilitation	Damage assessment					
Reconstruction	Aid operations					

The table above shows that the GIS processes in disaster management mainly fall into two categories, namely real-time and non real-time processes. Real-time processes put different demands on the data

	<b>GETIS Deliverable 2.6.2</b>	
File name: deliverable 2.6.2_r10.doc	Created on 04 February 2002 08:13	Page 7 of 7

domains as compared to non real-time processes. In real-time GIS processes in disaster management there is a need for:

- Address co-ordinates of building front doors
- Routing/navigation information such as street names and addresses
- Exact location and boundaries of the disaster area
- Evacuation information such as shelter locations
- Exact location of potential hazardous objects

During the actual disaster the emergency centre has an important function of acquiring, combining and analysing spatial information. This newly produced information has to be available quickly and has to be easily interpretable by the different users. This information should be available at different levels of detail and contents and should be compatible with the systems that they provide input to. A fast inquiry of the location of people in a specific disaster area requires the overlay of existing spatial data with new data and can only be achieved if the data acquisition method does provide the data in the appropriate format and quality. However for some actions, such as navigation to disaster areas, it is sufficient to transfer spatial information in the form of a rough sketch or by voice.

### 3.1 Geographic scope of datasets



Complete coverage is required, but there are priorities: e.g. spatial data for industry areas near cities.

Geo referencing of *addresses* is recognized to be of great importance, here a relation with persons could be established. Maps with details of underground utility infrastructures are also important in certain circumstances.

Most relevant is the access to data domains in the form of:

- real-time monitoring of vehicles / workforce
- real-time remote sensing data for large scale disasters
- access to large scale vector maps, property / address / occupants information
- access to contaminated land registers, risk areas, etc.

The base line data sets have to be available at a nominal cost, with additional data layers or value added information being available at a reasonable price. However, the best value of the data is more important than lowest price when working in the public interest.

	<b>GETIS Deliverable 2.6.2</b>	
File name: deliverable 2.6.2_r10.doc	Created on 04 February 2002 08:13	Page 8 of 8

### 3.2 Data Modeling & Interoperability

Many responsible people do not know which spatial data are available. During disaster management *new* spatial data are created (location of the disaster, blocked roads, flooded areas, etc.). Those new data have to be available for many persons involved.

Important information for data management is available, however, it is often unknown where the information can be found and how it can be accessed. An accurate and accessible (what and where) description of data in the form of metadata is extremely important as is a clear and useful definition of interoperable technology architecture that takes into account traditional spatial analysis tools as well as the emerging Location Based Service (LBS) methods. Finally the data model also plays a role at the time of exchanging data (how is data available).



The survey has shown that the data has to fulfil different requirements according to the following topics (for details see deliverable 2.6.1):

- Content
- Scale
- Data format
- Costs
- Metadata
- Update frequency

In order to fulfil these different requirements, Work package 3 (WP3) will take the results so far and expand based on the following steps.

#### Step 1: Domain Modelling with the Working Group

The relevant persons for a specific application domain have to form a working group over a longer time period. It is necessary to form a group where experts and stakeholders from different areas and with different interests are working together. For example, we need one or more experts representing knowledge about the application domain itself, about data modelling technology, about GIS applications and about organisational issues for the application domain. These experts, as defined in 2.6.1, will provide information on the various processes that deliver required information of interest. From these processes, one or more generalised flows will be developed which will become the base of the modelling exercise. In this manner, the domain model will be both modified and validated by the expert input

	<b>GETIS Deliverable 2.6.2</b>	
File name: deliverable 2.6.2_r10.doc	Created on 04 February 2002 08:13	Page 9 of 9

Step 2: Formulation of common semantics

The terms and relations should be defined in collective discussions. Common semantics about objects, their attributes and respective methods as well as functionality have to be defined and documented. This will be defined as a result of the analysis of process during the Use Case scenario work items in WP3.

Step 3: Creation of a data model

According to the concept of independent levels (conceptual, logic and physical level), a conceptual data model has to be formulated independent of any software or hardware basis. Experts should create a formal description of the data model based, for example on UML (Unified Modelling Language). Commercial tools are available to check the quality of the model and to transform it into common XML-based interchange formats.

Step 4: Data acquisition

After defining the data model, the intrinsic data can be collected and saved as the respective entities.

Step 5: Offering services

With the inclusion of the users in these five steps it is easy now to provide user orientated services and or data or software applications. User needs requirements will be more fully refined through the Working Group efforts.

#### **4 References and Resources**

For the complete list of resources and references, please refer to Annex 6 in deliverable 2.6.1.

D 2.6.1 Report on the Evaluation of the key user requirements.

D 2.6.3 Report on the user demanded data domains

IST programme ETeMII: White Paper on Reference Data, Metadata and Interoperability standards

International Standards for Geographic Information / Geomatics: ISO/TC211 series 19100

Antti Rainio, Location Based Services, FIG Working Week Seoul, Korea, April 2001

Groot, McLaughlin, GeoSpatial Data Infrastructures, Oxford University Press, UK, 2000