



NetWet 3 Project

"New forms of Territorial governance for the promotion
of landscape policies in the field of water resources management at water territories.



EU Community
Interreg III B A



KEPEMEP-MedRegio
Coordinator of NetWet 3 project



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**Mountain Community
Italo-Arbëreshe of the
PollinoProject Partner no 03**

Index	2
1. Preface	3
2. The GIS	3
2.1. Architecture of the GIS	4
2.2. Informative layers	6
3 Application WEBGIS	8
3.1. Functionality	9
3.2. Results and applications	9
4. The repertory of metadata	10
BIBLIOGRAPHY	11

1.Preface

An *Atlas of the waters* that places in the perspective of one sustainable use of his can assume an exemplary meaning for the importance of the tied up problem connected to waters and for the construction of tools useful technicians to the definition of objectives and programs of job, to the monitoring of the water systems and the management of the services.

Application of the technologies of the Geographical Information System and the WebGIS facilitates the accurate definition of the cognitive pictures of reference, it allows to elaborate complex models of analysis as that of the hydraulic risk and of landslide, it facilitates the planning to staircase of basin and the implementation of operational tools of management.

The correlated problem list to the management of the water resource that assume the hydrographic basin as territorial unity of reference, ask for the elaboration of a big number of geospatial alphanumeric information and. It usually deals with heterogeneous data that originate from manifold sources and introduce different degree of precision and accuracy their manipulation is facilitated by the use of the GIS technologies and of the structuring of DBMS. The available solutions today, also open source, that is to opened rising code, they offer wide possibilities of elaboration of data in formed raster or vector, of ortho imagery, DBT, DTM, DSM, data from aircraft and satellite remote sensing, multispectral imaging, data Laser and radar The consolidated experiences 'nelluso of protocols OGCs have in fact allowed to realize an application WebGIS, in optics of Network Services, on purpose structured for the "NetWet 3 Project" such to allow the sharing of the patrimony of the information related to the basins reverting in the territory of the Comunità Montana Italo-Arbereshe of the Pollino and access to the informations through a Repertory of the Metadata.

The predisposed solution represents an example of application open coherent source to the European Directive Inspire in subject of geographical and environmental data of the founding principles of the same directive is translated:

- ✓ to pick up the data an only time and to manage them with efficiency in the respect of the Principle of Subsidiarity among Public Administrations;
- ✓ to combine the data coming from the different sources and to share them among more consumers and applications;
- ✓ to share online the picked information to different levels;
- ✓ to produce, to adjourn and necessary geographical information to broadly make accessible for the good government of the territory;

✓ to facilitate the search of the available geographical information to allow to appraise utility of it for its own purposes and the conditions according to which it is possible to get her and to use her;

✓ to facilitate the understanding and the interpretation, through tools of visualization, of the geographical data.

2. The GIS

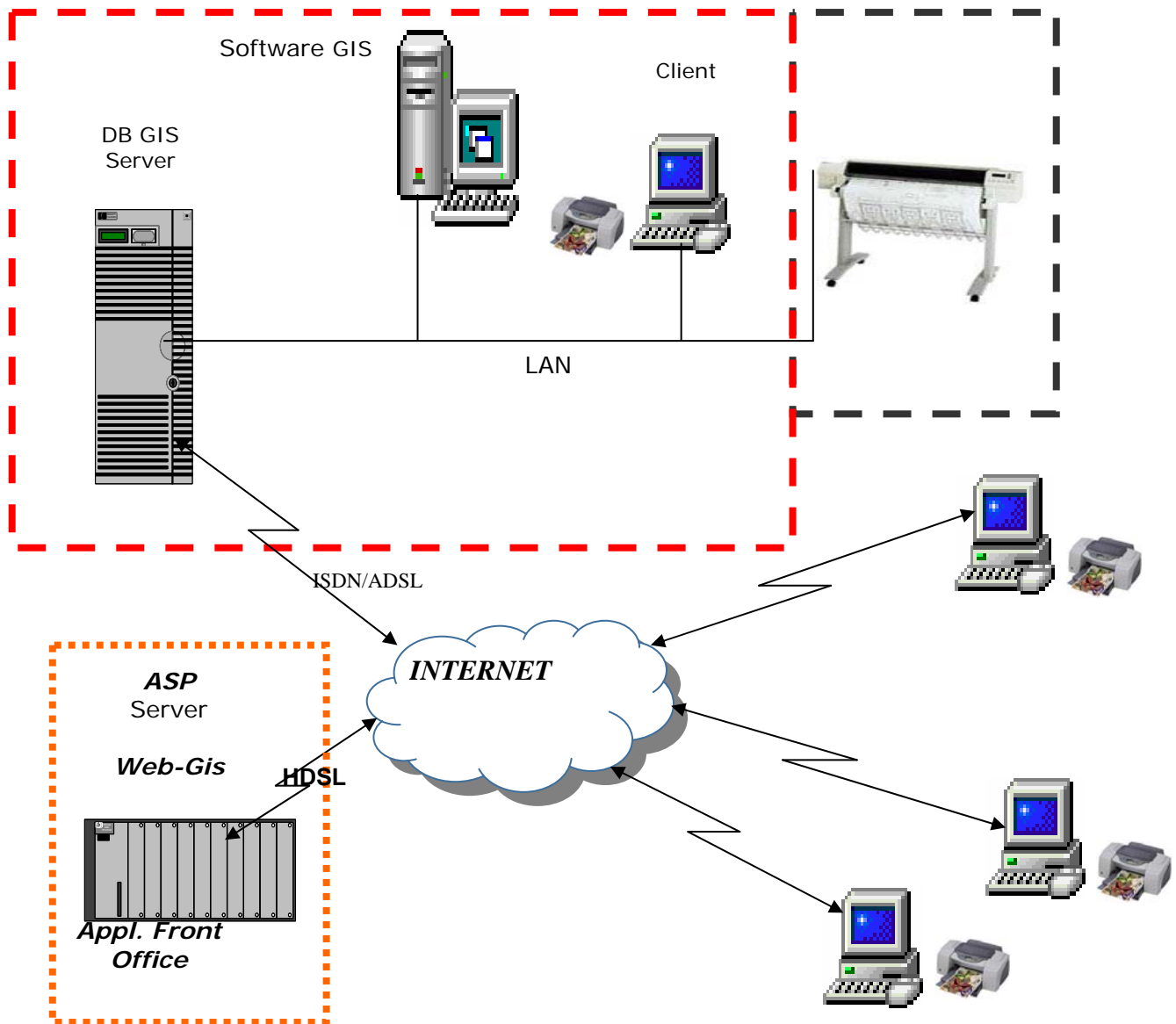
The GIS solution has as principal objective the Global sketch of a Database that assembles him on the entities that describe the territory to guarantee the ability of integration of the functions, the ability of retrieval and correlation of the information and the ability of facilitated navigation in the System. Exploiting the ownerships of the most diffused RDBMSs a model multidatabase can be structured for associating logical/descriptive entity to geographical entity and conversely, to go up again from geographical entity to the in partnership descriptive elements, through alphanumeric keys of direct addressing indirect e/o. In the case of the C.M. of the Pollino has been ready and structured a database that it on purpose enumerates elaborate information for the project with the other available information.

2.1. Architecture of the GIS

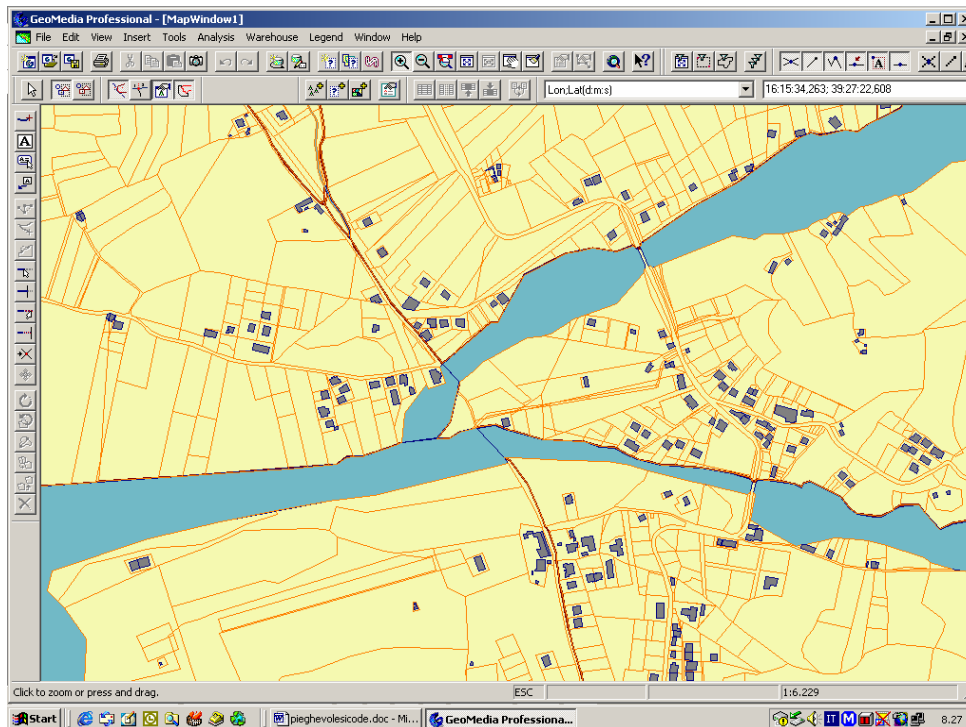
Hypothesized architecture includes two suggested macro areas

1. that of the **back-office** that concerns the debugging of the territorial database that puts to disposition of the Community Montana a data base up to date and it allows an optimized management of it.
2. the development of an application **WEBGIS**, with technology Open Source (MapServer) for the navigation of the present themes in the GIS.

In the attached scheme an exemplification 'of the architecture is furnished.



The data base constitute a useful point of departure for the realization of a procedural subset finalized to the management and the cataloguing of all the information to watercourses



The contained information in the geographic database integrated with the Managerial and Administrative information in the event of further developments, could form the backbone infrastructure for the application front office that can be used to manage:

- Information on the general characteristics from the river
- Information on the accesses river
- Information on the presence of present unusual elements river
- Influences on the outflow of water
- Influences on the course and verification of the vital least outflow;
- Influences on the water outflow on the solid transport and on the coastal equilibriums;
- Pollution; it influences on the water outflow;
- Pollution; it influences on the solid transport on the coastal equilibriums and on the water outflow;
- Pollution;
- Pollution and influence on the water outflow and on the geomorphologic conditions of slope;
- Verification of hydraulic and structural features, major works and influence on the flow of water
- Relief section of water and works; verification and structural influence on the flow of water;
- Concessions and occupations in bed rivers

2.2. Informative layers

The application WEBGIS finds him on a structure of database integrated cartographic and alphanumeric composed by manifold informative layers gathered in themes and understanding the layers of every of which it is furnished, in the chart that follows, the format, the origin and the staircase:

Themes	Formato	Origine	Scale
Colored satellite image	Landsat Raster (geotiff)		
Orthoimage	IT2000 Raster (ecw)	CGR in Parma	1:10.000
Grey scale Orthoimage AGEA	2003 Raster (ecw)	AGEAs	1:10.000
Quadro unione ortofoto paper 1:10.000 Regional Cartographic	vectorial (shp) Raster (geotiff)	CGR in Parma Centro	1:10.000 Regional Technical 1:10.000
Limiti dei Bacini Idrografici	regionaliVettoriales (shp)	PAI	1:10.000
Bacini della Comunità del Pollino	vectorial (shp)	PAI	1:10.000
Sottobacini della Comunità del Pollino	vectorial (shp)	Center	1:10.000
Quadro unione CTR 1:10.000	Regional Cartographic vectorial (shp)	Center	1:10.000
Limiti amministrativi provinciali	Regional Cartographic vectorial (shp)	Center -	DBPrior10k1:10 Regional Cartographic
Limiti amministrativi comunali	.000Vettoriale (shp)	Center -	DBPrior10k1:10 Regional Cartographic
Limiti amministrativi delle Comunità montane	.000Vettoriale (shp)	Center	
Limite amministrativo Comunità montana del Pollino	Vectorial (shp) Cartographic	Center	
Limiti amministrativi dei Consorzi di Bonifica	RegionaleVettoriale (shp)	Centro Cartographic Regional Project-	SIBICAL1:10
Acqua			
Aree Programma	.000Vettoriale (shp)		
Fiumi principali	PAIVettoriale (shp)	I Center Cartographic Regional -	DBPrior10k1:10
.000Reticolo idrografico	Vectorial (shp) Regional Cartographic	Center -	DBPrior10k1:10
Aree a rischio idraulico	.000Vettoriale (shp)		PAI1:25
.000Sorgenti	Vectorial (shp) Cartographic	Center	Regionale1:10 Cartographic
Isopiezometriche	.000Vettoriale (shp)	Center Cartographic	
Isoreattività	RegionaleVettoriale (shp)	Centro Regional Cartographic	
Linea di riva	RegionaleVettoriale (shp)	Centro -	DBPrior10k1:10
Aree in erosione	.000Vettoriale (shp)		PAI1:10
Aree in ripascimento	.000Vettoriale (shp)		PAI1:10
Suolo			
.000Geologia (raster)	Raster (geotiff)	I Center Cartographic	Regionale1:25
.000Geologia (vectorial)	Vectorial (shp) Cartographic	Center	Regionale1:25
.000Quadro union geologic paper	Vectorial (shp) Cartographic	Center	Regionale1:25 Vectorial (shp)
Permeabilità	.000Vettoriale (shp)		Vectorial (shp)
Clivometria			
Esposizione dei versanti			
Curve di livello (ogni 100)	Vectorial (shp)		

m)				
Rischio frana	IGMVettoriale (shp)			PAI1:10
.000Corine Land Cover 2000 - level	3Vettoriale (shp)	Office 'dellAmbiente -		APAT1:50
Attività antropiche				
Reti irrigue	.000Vettoriale (shp)	Center Cartographic Regional Project–		SIBICAL1:10
.000Bocchette	irrigueVettoriale (shp)	Center Cartographic Regional Project–		
Canali di scolo	SIBICALVettoriale (shp)	Centro Cartographic Regional Project–		SIBICAL1:10
Reti Idropotabili	.000Vettoriale (shp)	Project		
Invasi artificiali	SIGRIAVettoriale (shp)	I Center Cartographic Regional -		DBPrior10k1:10
Invaso Centrale Idroelettrica	.000Vettoriale (shp)	Digitization from ortofoto		IT20001:10
Condotta Forzata Centrale Idroelettrica	.000Vettoriale (shp)	Digitization from ortofoto		IT20001:10
Depuratori	.000Vettoriale (shp)			
Scarichi	Vectorial (shp)			
Aree estrattive	Vectorial (shp)	Center		
Cave in alveo	RegionaleVettoriale (shp)	Digitalizzazione from ortofoto		IT20001:10 Regional Cartographic
Strade	.000Vettoriale (shp)	Center -		DBPrior10k1:10 Regional Cartographic
Autostrada A3	.000Vettoriale (shp)	Center -		DBPrior10k1:10 Regional Cartographic
Ferrovie	.000Vettoriale (shp)	Center -		DBPrior10k1:10
Elaborazioni derivate				
Aree urbane 1998	.000Vettoriale (shp)			DBPrior10k1:10
.000Atlante of the Rizzi up Zannonis	Cartographic Raster (ecw)	Centro		
Mulini ad acqua Rizzi Zannoni	RegionaleVettoriale (shp)	Digitalizzazione from Atlas		
Aree urbane 1955	ZannoniVettoriale (shp)	Digitalizzazione Lifts up from Paper Technical Regional Center hydraulic		1:10.0001:10.000
Paper Idrografica IGM RegionaleOpifici 1887	1887Raster (geotiff) Cartographic Vectorial (shp) Paper	Digitization Idrografica IGM		
Terreni irrigabili 1887	1887Vettoriale (shp) Paper	Digitization Idrografica IGM		
Terreni irrigati 1887	1887Vettoriale (shp) Paper	Digitization Idrografica IGM		
Corsi d'acqua 1956	1887Vettoriale (shp) Paper	Digitization Technical Regional		1:10.0001:10.000
Viabilità principale 1956	Vectorial (shp) Paper	Digitization Technical Regional		1:10.0001:10.000
Viabilità principale 1998	Vectorial (shp) ortofoto	Digitization		IT20001:10
Viabilità secondaria 1956	.000Vettoriale (shp)	Digitization from Paper Technical Regional		1:10.0001:10.000
Viabilità secondaria 1998	Vectorial (shp) ortofoto	Digitization		IT20001:10
Uso del suolo 1956	.000Vettoriale (shp)	Digitization from Regional Technical Paper		1:10.0001:10.000
Uso del suolo 2000	Vectorial (shp)			
Toponimi Acqua	Vectorial (shp)			

3 WEBGIS Application

The WebGIS application which was produced within the project NetWet 3 summarizes methodologies, protocols, standards and technology conform to the principles of Inspire

Directive and allows the dissemination of geographic data of river basins through exploitation features GIS through the Web (Internet/Intranet). The choice of WebGIS involves several advantages. The user has the ability to access the available maps and data associated with it, without having to install on your PC any specific software. It is an internet connection and a browser for viewing the map on cartographic data access. The WebGIS is also equipped with user-friendly interface that requires no knowledge of GIS software can connect and appreciate databases and heterogeneous difficult relationship through their properties and topological space, and textual data relate to items space, allowing a better reading and comprehension. The proposed system is based primarily on technology "Open Source" in accordance with the standards required the Open Geospatial Consortium (OGC) for the management of geographic data. For publishing maps on the Internet (WebMapping) was used as a development environment "Open Source" MapServer platform, originally developed by Minnesota in cooperation with NASA. The development platform is based on the framework p.mapper ver. 2.00 based on the PHP language and form Mapscript, as well as on Mapserver.

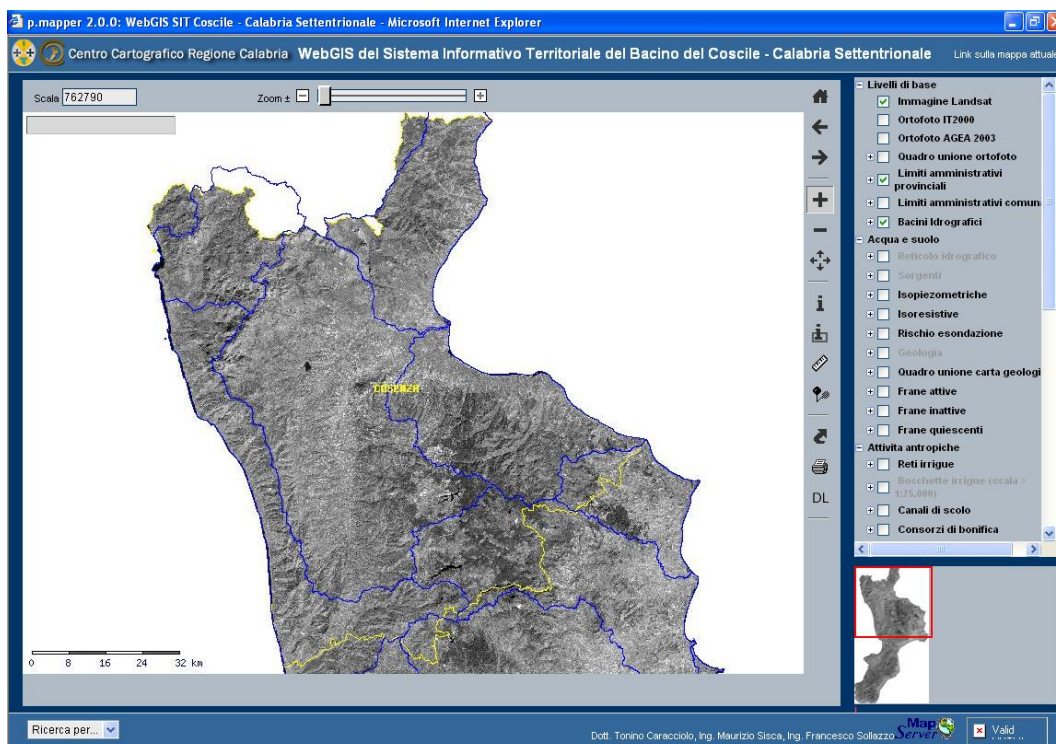


Fig1. WebGIS of the SIT

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3.1. Functionality

The cover features implemented the usual tools of navigation maps: pan and zooming. You can take measurements of distances and areas, you can view the coordinates of a generic point and alphanumeric information associated with geographic elements, should be printed layout, scale, the current view of the map (html / pdf) and its download format GeoTiff. Finally, it is possible to integrate data sets residing on different servers and different format using the standard WMS

(Web Map Service) of 'OGC (Open GIS Consortium) and avoid unnecessary duplication of data, which would also involve issues of congruence in the case of update.

3.2. Results and applications

The WebGIS proposed, as well as allowing access to geographical data raster and vector for the river basin allows the display of layers on server WMS (Web Map Service) default remote that will integrate the allocation of data on the local server.

The WMS dell'OGC is, as noted, a standard protocol interchange / interoperability for GIS Web-based display that allows the dynamic overlay maps georiferite from sources of geographic data distributed. The interesting aspect of this technology lies in the ability of MapServer to integrate on the fly local data (from files and / or geographic RDBMS) with data obtained from a remote server compatible with the standard WMS obtain the full interoperability of data. This leads to some important advantages for end users of geographic data: useless duplication of data locally; certainty to consult / use a certified version of the requested data because the information comes directly from those who produce or certify the reliability ; Sharing geographical independently in the manner used to produce it (formats capture and storage, GIS software etc.) Enrichment and integration of geographic content available on the same standard. Indeed, the Web Map Service enables the creation of a network of MapServer distributed by which individual clients can create customized maps, configuring it as a system of cooperation Application for geo-data-topo map and to implement an infrastructure for the spread of the repertoire of geographic data and use of spatial webservices as already experienced in the infrastructure of geographic data of the Calabria region.

In conclusion, the use of technologies and standards WebGIS OGC permit, including through reuse of the solutions implemented, achieve the following objectives:

- sharing and access to geographical data through the Internet via easy-to-use interfaces, designed to offer analysis synthetic not to require complex interactions;
- integration of geographical data from disparate sources and in whatever format they are available, allowing the development in an integrated to produce real-time information required by the end;
- the creation of a database with geographical virtual automatic updating and validation, which does not require intervention by third parties.

These objectives, as mentioned above, are in conformity with the key points of the INSPIRE directive for the development of a European Spatial Data Infrastructure (SDI, Spatial Data Infrastrucure).

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4. The repertory of the metadata

One of the conditions for creating a spatial data infrastructure, including the development of solutions for interoperability space for the adoption of methods for classifying data and use the results to the entire universe of users through the repertoire of metadata.

The implementation of a repertoire of spatial metadata is the means by which you can check the availability of spatial data for the entire area that feeds and share, their characteristics and how to use and acquisition. The classical definition of metadata is "data about data" or meta, as standardized documentation intended to provide useful information to the user to understand, compare, share the contents of the data set.

On the one hand those who produce the data has a clear idea of its resources and organize and manage adequately, on the other side of the user data is facilitated in the discovery, in assessing the usefulness for its purpose and possibly when of the data.

The metadata have been prepared according to the standard ISO 19115 (ISO-TC211), which outlines the minimum set of metadata (Core Metadata) required to document the spatial data in the National Directory of Article. 59 of Legislative Decree No 82, March 7 2005-Digital Administration Code. The National Core Metadata defines the guidelines for the implementation of the Standard ISO 19115:2003 Geographic Information - Metadata (implemented in Europe as EN ISO 19115:2005 and Italy as UNI EN ISO 19115:2005) to the National Directory of spatial data, art. 59 of the Code of the Digital, as the prerequisite technical regulatory rules therein. The regional repertory has been implemented using the software Open Source FAO GeoNetwork (<http://www.fao.org/geonetwork>) as a repository of web meta-environment and consultation. The repertoire lends itself to be fueled by those authorized by creating user profiles appropriate for the inclusion of metadata regional, provincial and municipal.

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OpenGIS - "Geography Markup Language (GML) Implementation Specification"

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OpenGIS - "Filter Encoding Implementation Specification"

OpenGIS - "Styled Layer Descriptor Implementation Specification"

OpenGIS - "Web Map Server Cookbook",

www.gsd.org - "GDSI Cookbook vers.2.0",

www.ec-gis.org/inspire/ - INSPIRE: The INfrastructure for SPatial InfoRmation in Europe

Software open source:

<http://pmapper.sourceforge.net/index.shtml>

<http://mapserver.gis.umn.edu/>

<http://postgis.refractory.net/>

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<http://www.regione.calabria.it> (link Cartografia – sezione Servizi)

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