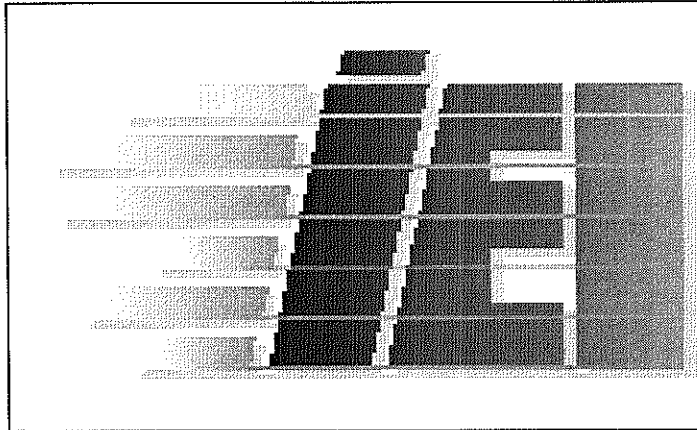


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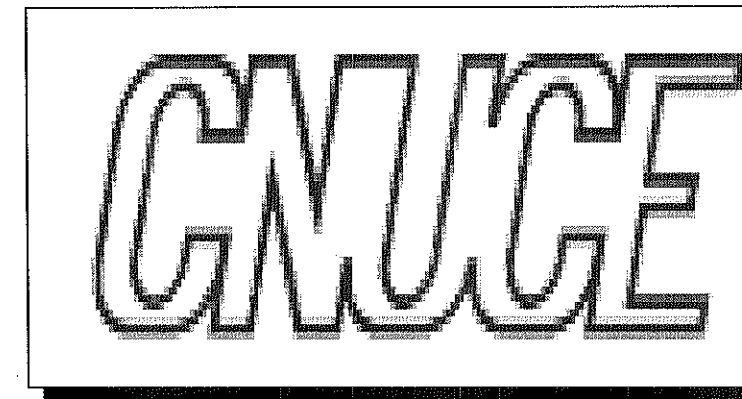
A Geo-Data Server for Antarctic Data



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PNRA

PNRA (National Program for Research in Antarctica) is organised in 5 main sectors:

1. Geological Evolution of the Antarctic Continent and Southern Sea
2. Global Change
 - 2a. Glaciology and Paleoclimate
 - 2b. Antarctic Atmosphere, Sea-Ice-Atmosphere Interaction
 - 2c. Biology, Environmental Contamination and Medicine
3. Observatories and Geographical Information
4. Management Methodologies and Regulations for the Presentation of the Environment.



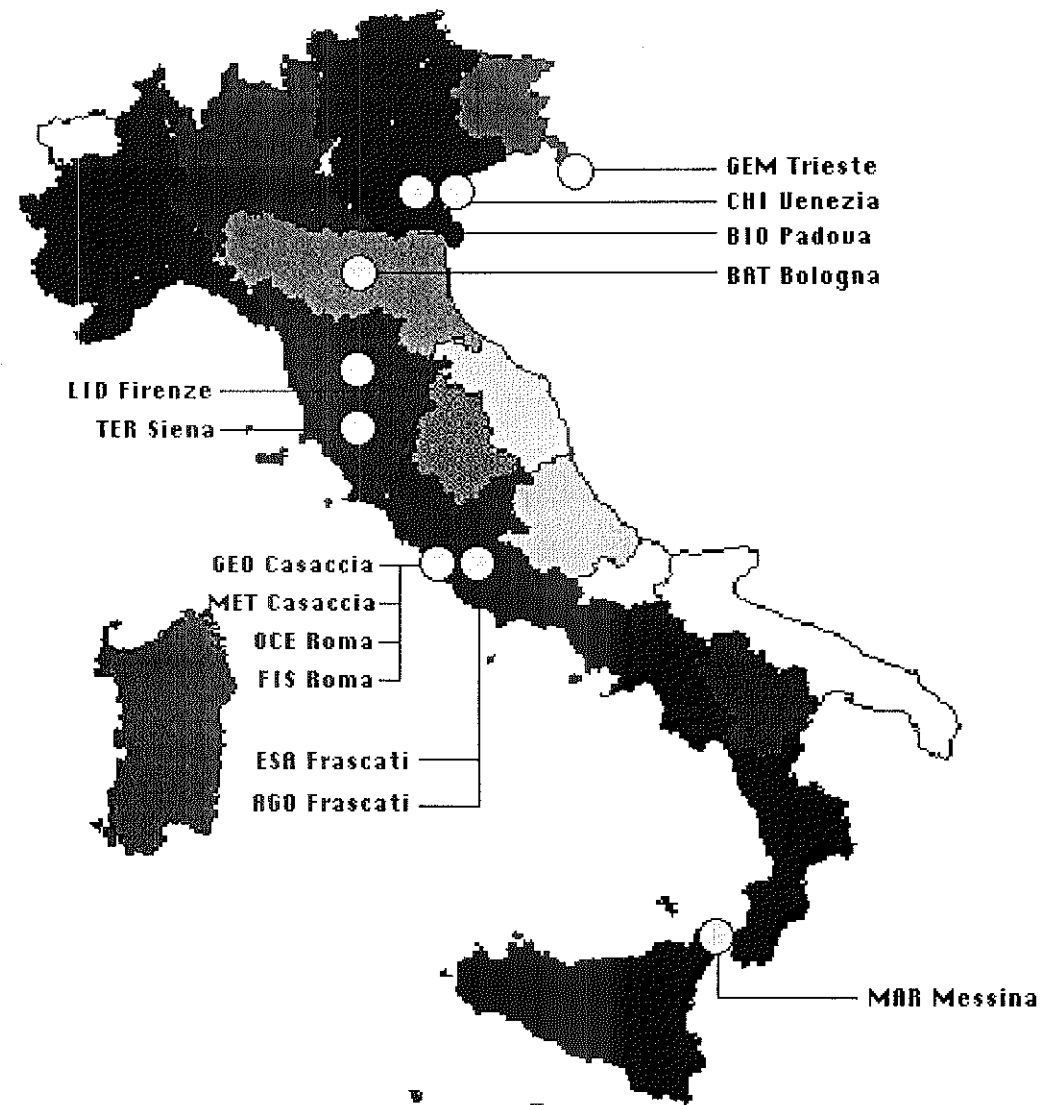
Each sector/subsector is associated with a Working Group of the National Scientific Committee for Antarctica (CSNA).

PNRA Data Centres

Code	Site	Data	URL
AGO	Frascati	Sun-Earth Relationship and Astrophysical Research Data	http://sunserv.ifs.fra.cnr.it/~ago/AGOindex.html
BAT	CNR Bologna	Bathymetric data	http://terra.bo.cnr.it/BAT/index.html
BIO	University of Padua	Land Biology data	http://caos.bio.unipd.it/antartide/
CHI	University of Venice	Environmental Impact data	http://polosud.unive.it/
FIS	ING Rome	Earth Sismology data	http://bounty.ingrm.it/Welcom_fis.html
GEM	OGS Trieste	Marine Sismology data	http://www.ogs.trieste.it/pnra/
GEO	ENEA/Casaccia	Satellite Remote Sensing Data	http://terranova.iei.pi.cnr.it/GEO/geo-cas.html
LID	CNR Firenze	LIDAR Data	http://lid.iroe.fi.cnr.it/
MAR	CNR Messina	Marine Ecology Data	http://aixtalas.ist.me.cnr.it/south-pole
MET	ENEA/Casaccia	Meteo stations data	http://terranova.iei.pi.cnr.it/MET/met-cas.html
OCE	CNR Rome	Oceanographical data	http://terranova.iei.pi.cnr.it/OCE/oce-rm.html
TER	University of Siena	Earth Science and Glaciology data	http://www.dst.unisi.it/PNRA/pnra.html

The Databases: Actual Situation

- The Italian Antarctic scientific community has produced and is producing sector data located in thematic centres specialised for discipline.
- Non co-ordinate evolution of the various databases (different data models, poor integrability, lack of definition of standardised criteria, ...).
- Proprietary use of the databases.
- Integration only limited to meta-information
- Poor documentation of data

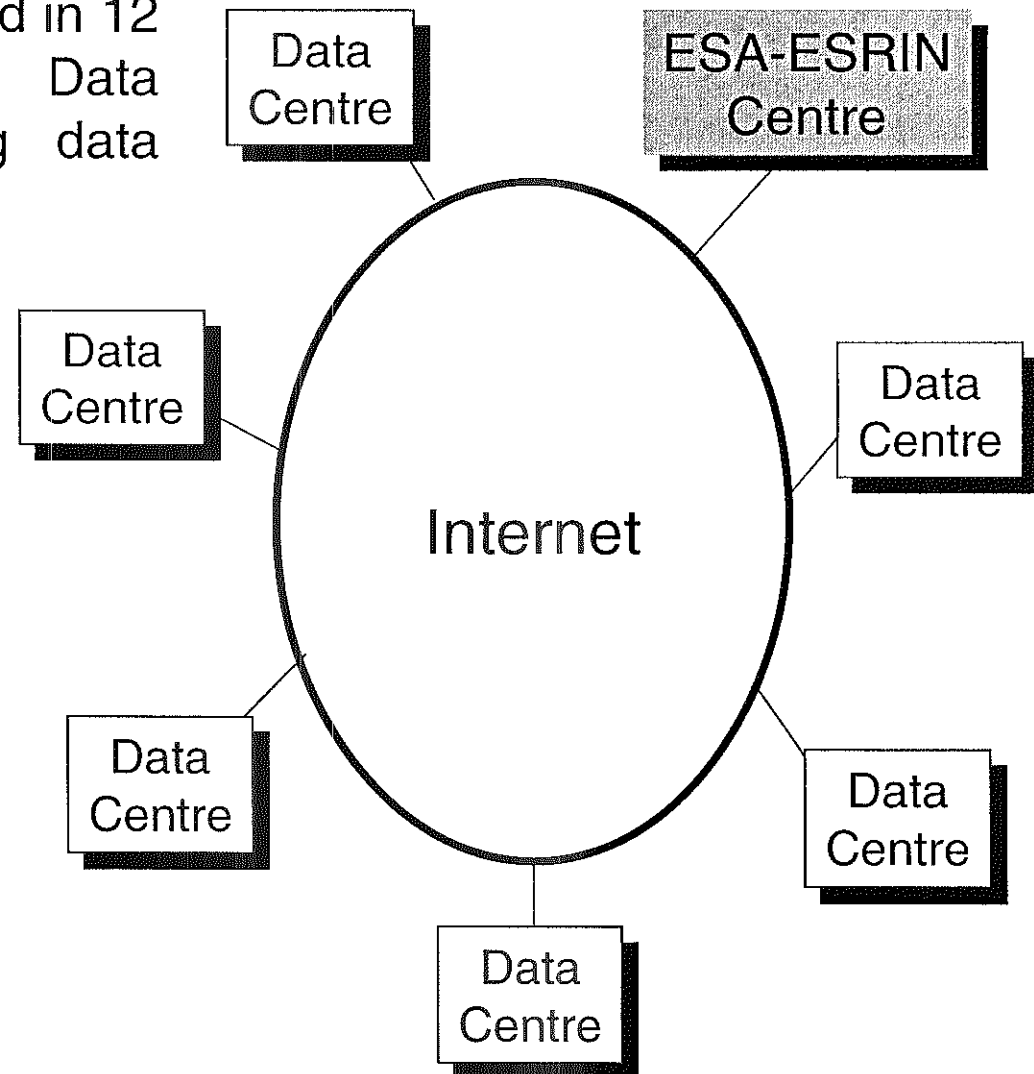


The Actual Information System: Overall Schema

- The system consists of a set of heterogeneous databases located in 12 geographically distributed Data Centres, each one containing data specific for discipline.

- The ESA-ESRIN Centre contains the metadata, structured as a subset of CEOS IDN (DIF format). Its content constitutes the South-Pole Directory.

- All the Data Centres and the ESA-ESRIN Centre are accessible via Internet.

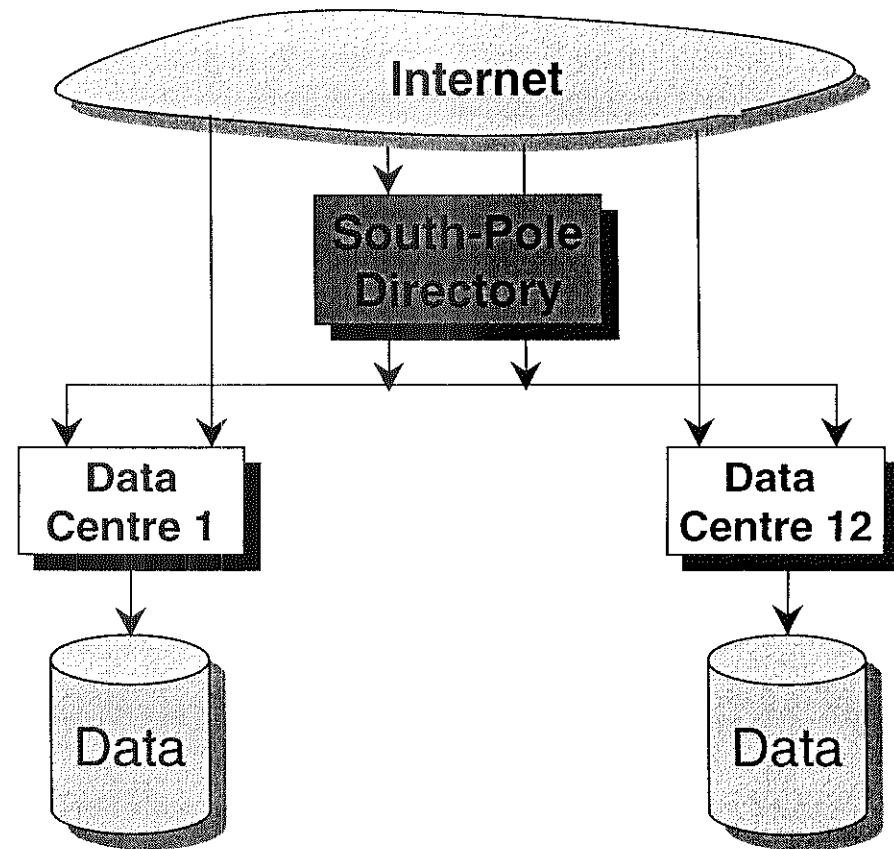


The South-Pole Directory: Dataflow schema

The South-Pole Directory is part of the Italian System for Antarctic Data Exchange. It is planned to contain, on- or offline, all the main scientific results collected during the Italian Antarctic expeditions sponsored by PNRA.

It is a multidisciplinary directory that provides the user with the research and available data description as well as the procedures for data releasing.

The Directory adopted the Directory Interchange Format (DIF) of the National Space Science Data Centre (NSSCD).



The South-Pole Directory: Post-testing observations

Present faults of the system

- Each Data Centre can modify the layout of its site.
- Each Data Centre can self-define keywords for search operations by creating conflicts.
- The Data Centres can insert data in the databases without creating the associated DIF files.

The fundamental properties of the system are not satisfied.

In fact, the user finds:

- Inconsistency of the interface among the various centres or total absence of the sites of some centres.
- Deep difference for accessing the different local databases.
- Poor efficiency and incapability of exploiting the research instruments.
- Lack of available data and of information about them.

Why
A Geo-Data Server
for Antarctic Data ?

A Geo-Data Server for Antarctic Data: General Goals

- To allow the multi-disciplinary analysis of the data collected within the Italian campaigns in Antarctica and of the subsequent elaboration carried out.
- To dispose of a consultation and help tool having a specific functionality for an integrated use of the data provided by the different research groups.
- To allow data integration on spatial basis.

A Geo-Data Server for Antarctic Data: Advantages

- Scientific information, rightly structured and standardised, can be diffused into various scientific contexts to produce synergy in the study of interdisciplinary problems.
- Strategic interest consisting both in the valorisation of previous scientific experiences and in the aggregation of multiple specialist competencies.
- Harmonisation with the international context, through the participation in international research activities.
- A research sector having worked traditionally on its data could access the data produced by other sectors in order to define an interdisciplinary research activity context.
- The Geo-Data Server has not the goal to replace any already existing disciplinary database; it aims to implement a spatial-based integration of the consolidated data contained, giving an additional value to the current information power.

A Geo-Data Server for Antarctic Data: Advantages

- The knowledge that some data exist and are available, together with their exact and detailed documentation, has a remarkable value, especially considering that data production is quite expensive.
- In a national context, the actual South-Pole System will be increased in value, being the information kernel of the current PNRA knowledge.
- In an international context, the PNRA connection with other countries by sharing research data and results should be considered a strategic and relevant factor (see Art III of the Antarctic Treaty and the several recommendations of SCAR on Antarctic data and information availability).
- The alignment and/or the adaptation to standards of data models resident into international databases allows the PNRA information to be shared with international research groups, and vice versa.

A Geo-Data Server for Antarctic Data: Main objectives

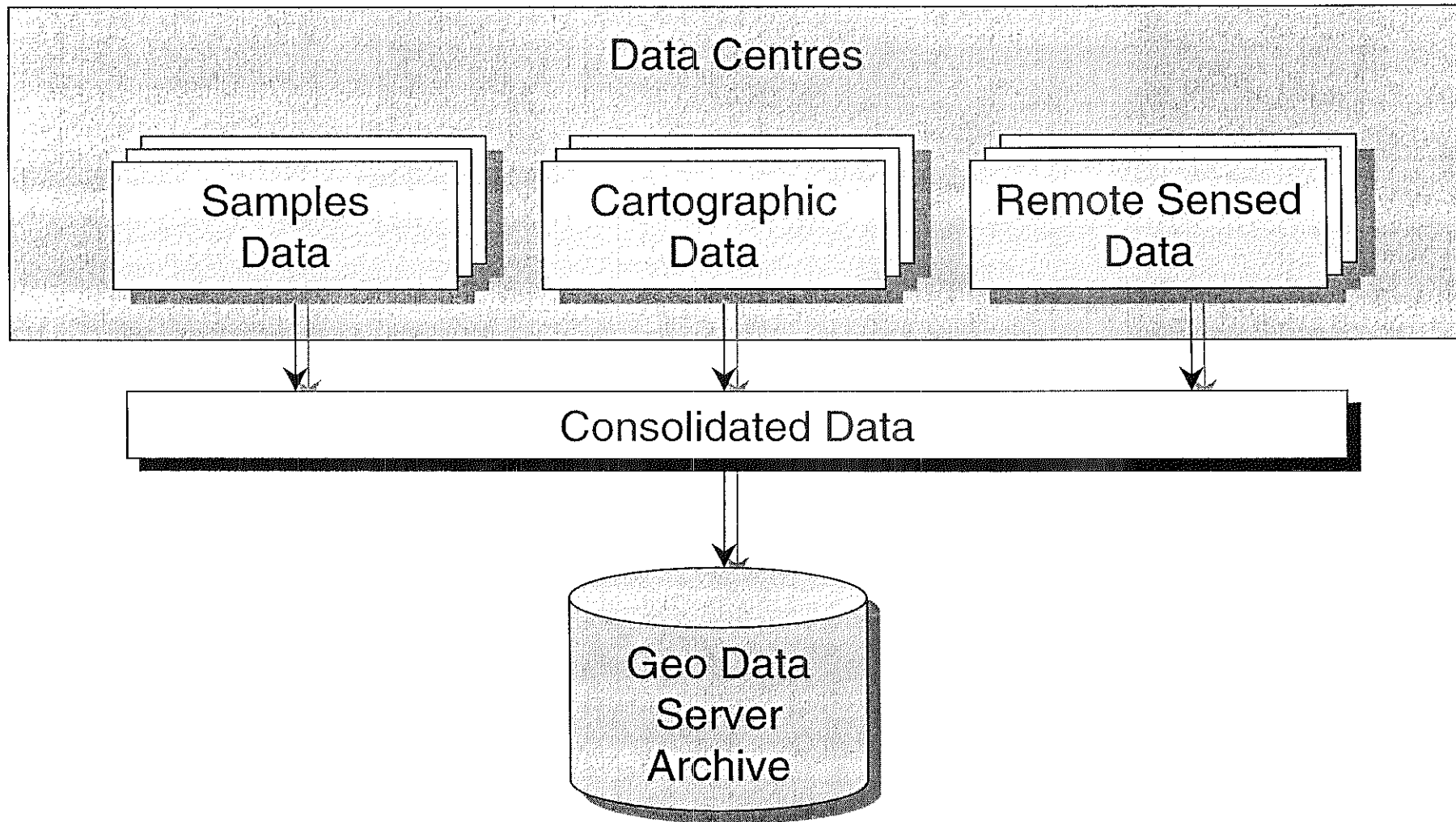
- definition of a reference data-model usable and extensible for local GIS needs
- activation of a network data server based on existing network facilities (Internet)
- organisation of a catalog of the available data with relative characteristics
- adoption of a standard cartographic base (area of interest, scale, themes, ...)

Information System: Benefits

The system thus provides:

- Local and remote access to all the information
- The possibility to perform comparative and interdisciplinary search
- Compatibility with international standards
- Efficient organisation of the data and the operational flows
- Homogeneous user-friendly interfaces

The Geo-Data Server content: Overall Schema

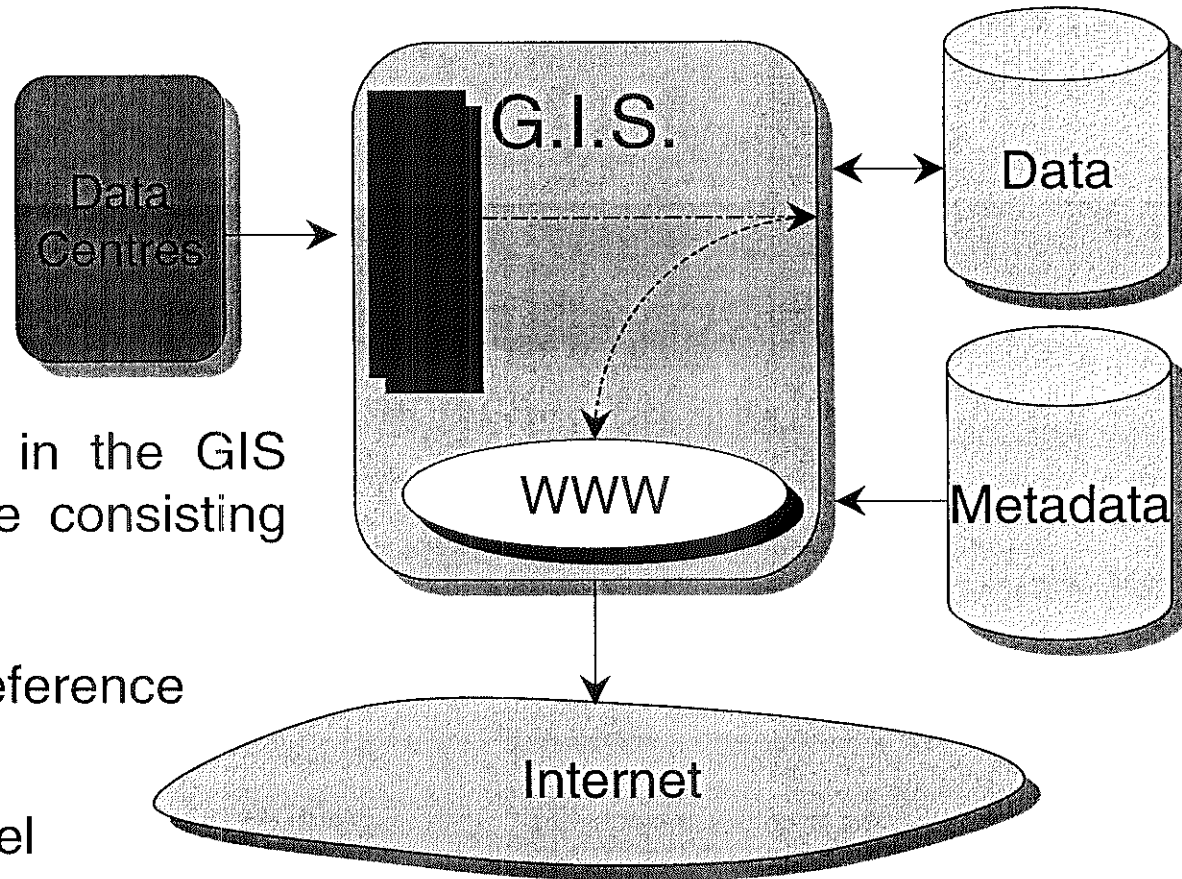


The Geo-Data Server: the data

- The Data Centres are data providers and users.
- What here stored are exclusively consolidated data.
- All data and their descriptions are stored in a unique centralised system, the Geo-Data Server Archive.
- The Geo-Data Server provides the interface for searching and accessing all available data.

Geo-Data Server: Dataflow schema

Any Data Center feeds the Geo-Data Server with consolidated data only.



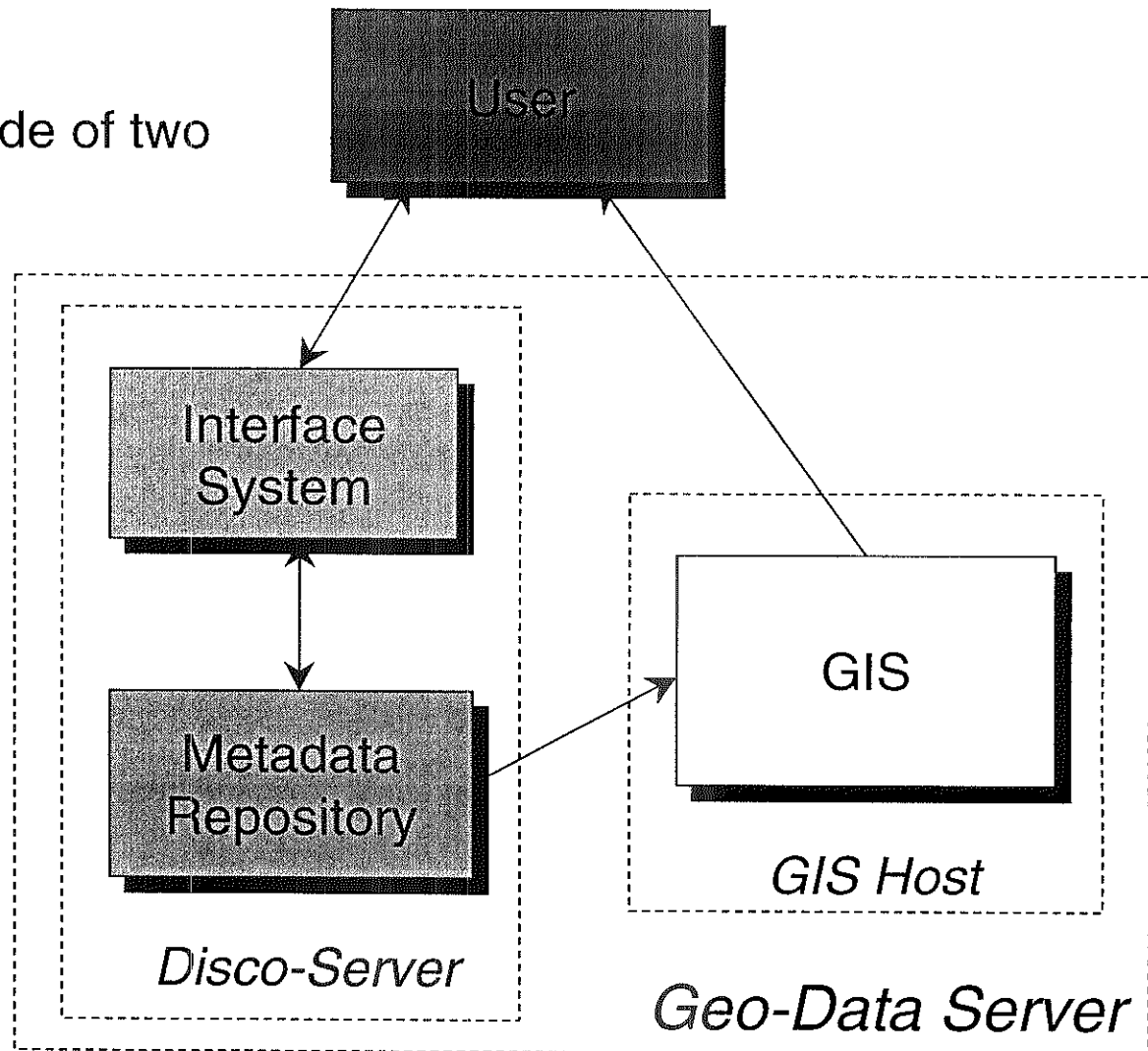
These data are inserted in the GIS after an integration phase consisting mainly of the adoption of:

- a common geographic reference system;
- homogeneous data model
- Definition of metadata standards and creation of a data Catalog. Data availability can be enquired on geographical area and for a predefined set of attributes.

Geo-Data Server: Query & Download

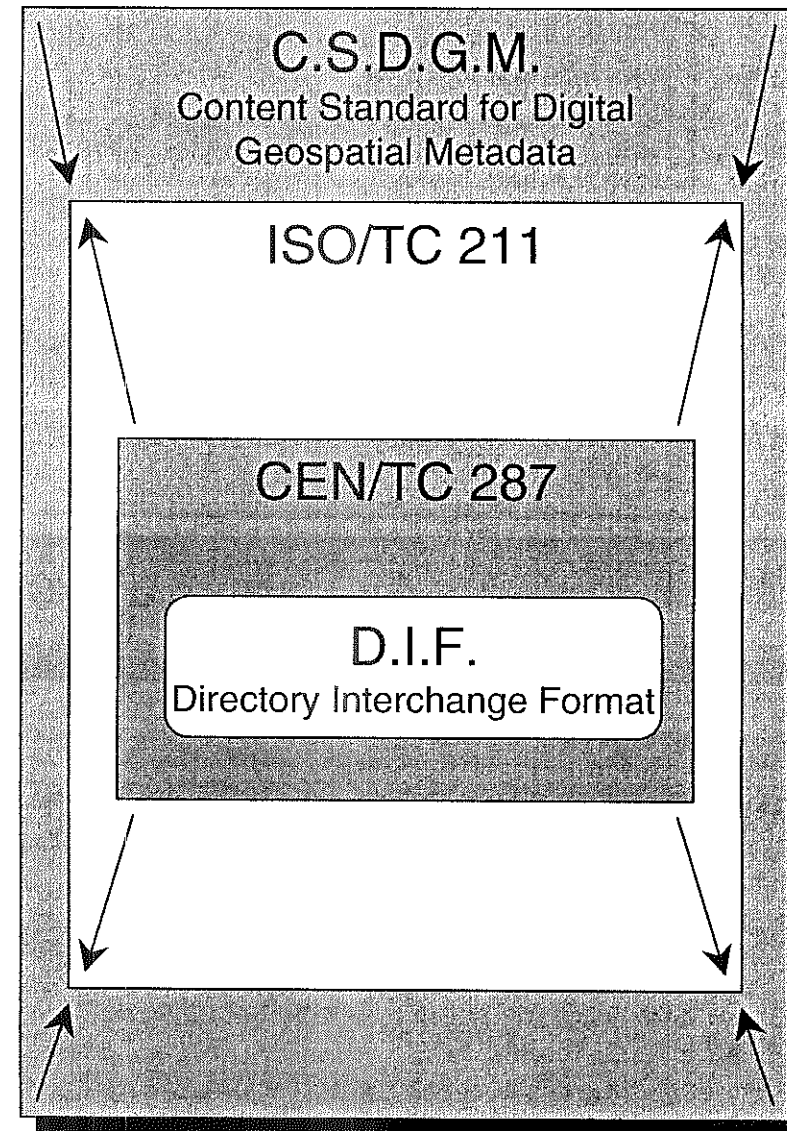
The Geo-Data Server is made of two parts:

- GIS, for data processing and accessing
- Disco-Server, for metadata storing and classification, discovery tools



Metadata Standards: State-of-the-art

- ISO/TC 211, the world standard
- C.S.D.G.M., the US metadata standard
- CEN/TC 287, the European standard
- D.I.F., a very simple US metadata standard



Standards for Data Exchange: State-of-the-art

- International standards
(DIGEST, ISO8211, CEN287, OGIS, ...)
- National standards
- Proprietary (commercial) standards
(E00, Shapefile, DGN ISFF, DXF, GIF, GEOTIFF, TIGER, ...)

Disco-Server Query flow

User inserts search parameters →

Interface receives parameters and performs the catalogue query →

Catalog returns to interface the result of the query →

Interface translates this result (a set of metadata) in HMTL page and returns it to user →

User can make a new catalog query → or choose to make a download query → executable directly from the HTML page

GIS database answers the query returning proper data →

