

Using OLAP and the Web for Information about local governments in Lombardy

Antonio Lentini – *Statistics and Research Manager, Regione Lombardia*

M. Grazia Petrin – Regione Lombardia

Monica Ludergnani - Lombardia Informatica SpA

Cosmo Iodice – IDS Information Delivery Systems Srl

Andrea Stefanini - Sistemi Territoriali Srl

Abstract

The Lombardy Region, considered one of the four most dynamic economic areas in continental Europe, together with Baden Wuttemberg, Cataluña and Rhone Alpes, has for some years been concentrating on the quality of its services. Lombardy is the fourth largest region in Italy, with an area of 23,860 square kilometres, which is 7.9 per cent of the whole country; as far as population is concerned, however, it is the first region, with about 9 million inhabitants.

Among all the twenty Italian regions, Lombardy has the highest concentration of population, business and wealth; its agriculture conforms to European standards, its industry developed well ahead of the rest of Italy, commerce, crafts and tourism are well consolidated, and Lombardy finances support much of the business in the rest of the country. These elements have combined to create Lombardy's economic leadership; its GDP (gross domestic product), for example, is about one fifth of the national GDP.

It is the top region for the development and quality of services, the modernisation of which is consistent with projects to increase their value. One of these projects is the "Community File" on the Web, through which operators and citizens can obtain Information for programmes of Statistics, Personal Data, Economy and Finance, and Forecasting.

On the basis of data supplied by public organisations and institutions, Information becomes uniform and consistent, which then permits utilisation of the same in an organised way both within and outside the Region.

The choice made in the past has been to integrate different technological solutions for the several "media" used for the communication and exploitation of the Information: Intranet, Internet and CD-ROM. The Statistics Management for the Region has decided to unify technology for all the media utilised and to increase the data surfing options and functions.

The project was created as a pilot and constitutes the first step towards the future adoption of this technological System for all the Region's yearly statistics. It has been developed with SAS System technology and an original GIs tool (IMS Cube) totally integrated with SAS/MDDDB. This solution shares the same meta information in terms of variables, hierarchies, filters and so on.

Users can perform both classical OLAP operations as drill down, down, expand, and geographical operations as zoom in, zoom out, pan, identify, but also OLAP Geographical operations as geo-drill down and geo-roll up.

The SIS.EL - (sito web del Sistema Informativo statistico Enti Locali) The Web Site of Local Governments Information Statistics

The Statistics structure, research&observatory of the Region improved this site with the issue to supply useful informations to the operative people of local governments and to the citizens; in adding to that it may give a valid support for decision makers (managers of local governments and councils). The multidimensional analysis allows to non-expert users to see and drill down data for 1546 local councils and other local body (ASL, Districts, Provinces, and the whole Region) using statistics indicators.

Data are collected into 4 areas:

1. Local councils identification & Territory's data

Address, telephone number, fax, other codes, e-mail, web URL;

Data regarding the territory (surface, resident people, % of non-resident people), industry&commerce geographical structure;

2. Institutional data and appurtenance

Major, local council secretary, province, law Superintendent, School Government, Mountain Community, etc.

Infrastructure data: Public Relation Office, ombudsman, local police, IPAB (address,

telephone number, fax), feminine politics (equal opportunities).

3. Statistics data of local council

This describes the main indicators of population also related to a forecast until 2016; data about foreign people resident, tourist plans, Industry structure (Census of '96 and ASPO database), data of Manufacturing, political elections (local Council, Central Government, European and the elected people).

4. Local Finance

This describes the main indicators Budgets and final balances : Financial autonomy, taxation autonomy, financial pressure, taxation pressure, revenue intervention, rigidity of current expenditure, taxation pressure of family units, pro-capite ICI (local Council Property Tax), local Council tax on tax revenue, current expenses over total expenses, expenses in capital account over total expenses, financial autonomy on investments, etc.

With regard to the benefits of the database, the most up-to-date SAS technology, will be employed (Multidimensional Database, SAS Intranet, which enables WEB access to a SAS System) with exploration through the WEB, which is in fact already available in the Lombardy Region, and this, together with the standards under definition and a "lightweight" subscribers interface, facilitate and accelerate consultation and analysis of data regarding local Councils in Lombardy. To accede to the Information, the subscriber has only to connect to the Internet address, or to the Homepage of the Lombardy Region.

One of the strong points is the multidimensional analysis and the navigation of data; for example in the reports which compare financial and economic indicators, it is possible to move from the total revenue to the details (revenue intervention, Regional intervention, financial autonomy) and obtain new aggregations.

Source of Data

For Registry data: ISTAT, Lombardy Region, Ancitel(WEB and Oracle Technology)
 For statistics data: Statistics and research on ISTAT data (Oracle and SAS technology)
 For economics and finance data: Statistics and research on data from the Treasury Department and the Ministry of the Interior (SAS technology).

Architecture

- The SAS platform is composed of the various base modules and of:
- SAS/Multidimensional Database and SAS/Intranet for the realisation of the multidimensional analyses.
- IMS-cube (knowledge Solution developed by SAS Institute and Territorial Systems) for geographic navigation
- SAS/AF and SAS/EIS for more thematic analyses

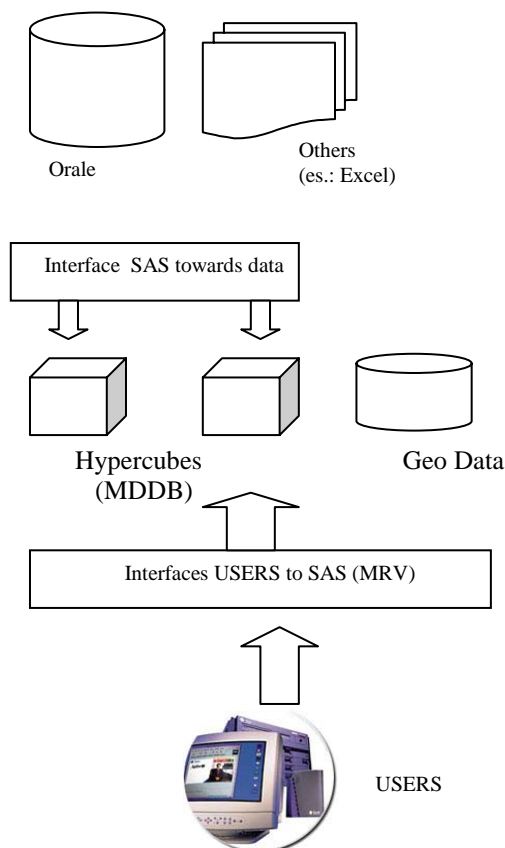
IMS-cube (Internet Map Statistical Server) represents an original solution because it utilises SAS System for multidimensional navigation and a specific product developed by territorial Systems, and known as Sister IMS (Internet Map Server) to carry out geographic analyses.

The technological architecture is on four levels:

- Data Base Server (thematic data)
- Geo Data Server (geographic data)
- Application Server, (SAS programmes and applications, based on SAS/Intranet technology and MDDB)

WEB Server for interchanges with the net

Graphically, the scheme will be as follow:



The subscriber will have available a WEB interface with which he can navigate among the dimensions defined in the Hypercubes.

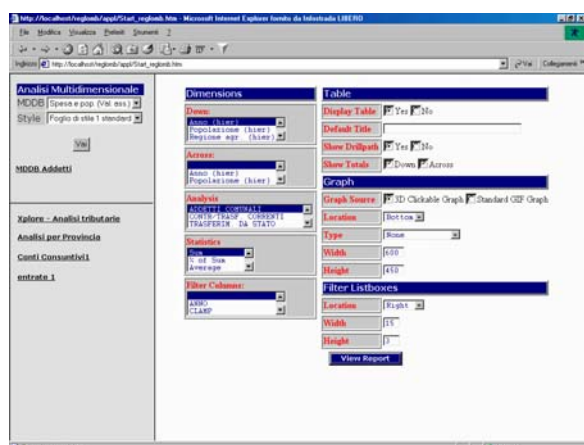
When the subscriber has located the multidimensional file on which to navigate, he then makes his second selection, i.e. the location of the Dimensions, of Filters, of Class Variables and analyses variables with which to construct the navigational paths.

The MDDB views class has been specially modified in order to permit the subscriber to add a geographic navigation since he has available exactly the same dimensions, filters, hierarchies and analyses variables defined during the multidimensional navigation. This is possible because the two environments are perfectly integrated since they utilise not only the same data but also the same metainformation.

During the geographic navigation zoom in and zoom out, panning and geographical query operations can be carried out, and also “Geo-drilldown” and “Geo-rollup” operations, which make it possible to modify the granulation of the thematic map (for example, passing from the level of the local Councils to that of the provinces, and vice versa). Various filters can also be set up and different thematic algorithms applied.

Let us consider an example of the above. In this case the processing refers to a cube with several variables:

.....



The subscriber has only to select the dimension on which he intends to operate, which layout he requires (Down or Across), which analysis variables to consider, which filters to position, and then proceed with the multidimensional analysis of the

data.

The result of the processing will be a multidimensional report, which can be navigated in an unlimited number of directions according to the dimensional paths pinpointed by the subscriber.

The following is an example of such a report:

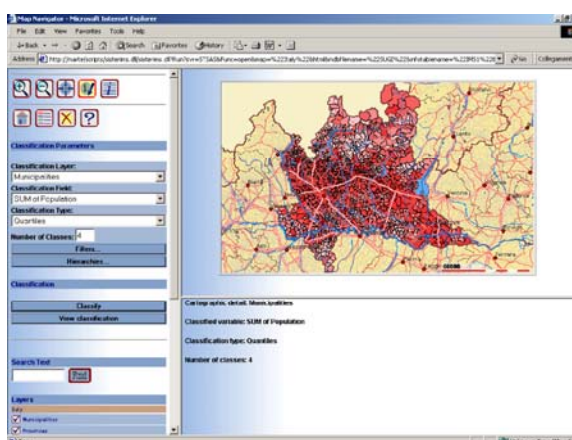
ANNO	TOTAL			
	1994	1995	1996	TOTAL
	ADDETTI COMUNALI	ADDETTI COMUNALI	ADDETTI COMUNALI	ADDETTI COMUNALI
CODICE_ISTAT_COMUNE	Sum	Sum	Sum	Sum
ALAGNA	2	2	2	6
ALBAREDO ARNABOLDI	2	2	2	6
ALBOVENE	2	2	2	6
ALBUZZANO	10	9	9	27
ARENA PO	6	7	6	19
BADIA PAVESE	3	3	3	9
BAGNARIA	7	7	7	21
BARBANELLO	5	4	5	14
BARCAPPE	8	11	8	24
BASTIDA DE' DOSSI	1	1	1	3
BASTIDA PANCARANA	5	3	4	14
BATTUDA	3	2	3	9
BELGHIOSO	28	25	22	80
BEREGUARDO	11	12	15	45
BORGARELLO	6	5	5	16
BORGHI FIOLO	10	10	10	30
BORGORATTO MORMOLO	4	4	4	12
BORGHI SAN BIRO	4	2	5	15
BORNASCO	7	7	7	21
BORNASCO	4	4	4	12

At this stage the subscriber decides to navigate geographically with the same data. He has to set the level of geographic granulation (local councils for example) and the statistic to be visualised (the total in the example). Then he selects Geo-view.

The following map results as follows and the User can navigate selecting in according to:

- The level of granularity (local Councils)
- The statistics to visualise (i.e. SUM);
- The key GeoView.

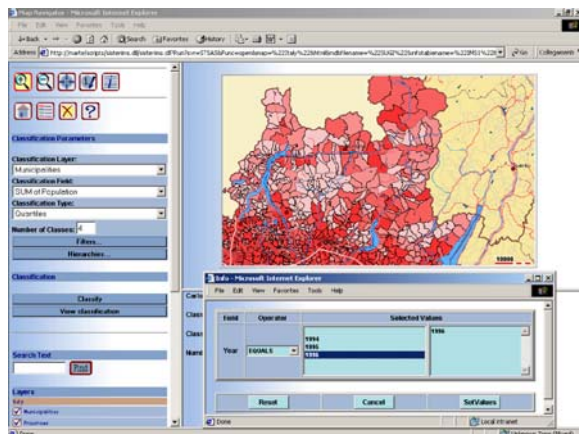
So appears the thematic map:



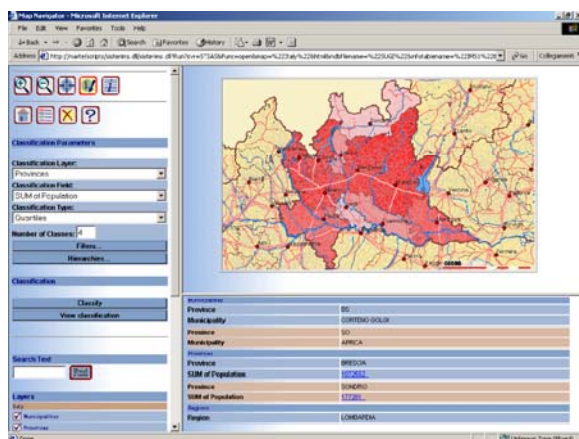
The navigation has multi-way so that you can apply filters, zoom in, zoom out, identify, panel etc.). The

next picture shows an operational Zoom in with filter on year 1996.

The availability on Internet of these benefits make the number of potential users grows up, that rightly take advantages from the Datawarehouse building.



A "Geo-rollup" shown in next picture is a thematic jump from local Councils to Province. By mouse movement and key press "INFO" you can request Information about population (the example show Brescia and Sondrio).



Conclusions

The use of a geographical Dimension in additional to the traditional tools used in multidimensional navigation for phenomena with territorial valence has the same effect on subscribers as that obtained years ago when graphics were added to traditional reports. Then it was said that a graphic contained the same amount of information as 10 reports". Now we can paraphrase this slogan and say that "a thematic map is worth 10 graphs".

The phenomena are much easier to understand, and value is given to phenomena such as for example to "nearness" of areas, which would otherwise be lost in a list, or even in a histogram.

