

**MAPPING ON THE INTERNET AND THE WORLD WIDE WEB:  
A WEB GIS ON LINE PROTOTYPE FOR THE HISTORICAL CENTRE OF GENOVA**

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**Introduction**

The research here described is the result of the partnership agreement between the CIVIS<sup>1</sup> Observatory (Department of the Municipality of Genova) and the DIIAR.

The paper describes how WEB GIS - based on data coming from the Permanent Urban Observatory of Historical Centre of Genova built up inside the UE projects "CIVIS"- has been set up as *on line prototype* (SW used: Oracle, ArcInfo, ArcIMS, and ArcExplorer).

In the last years it has been collected a great amount of geographic data and databases, relative to the historical center of Genoa dedicated to specific plans.

These data demand of being always better organized in order to support the various levels of participation and in order to improve the activated processes

The new technologies hardware and software in the field of the GIS allow to publish on Internet plans structured with geographic data, with some of the advanced functions: querying, buffering and even editing, without having to use sophisticated and special techniques of programming.

The data collected in Genova during the last years regarding the Historic Center represent in quality and quantity a surprising collection, extraordinary in the Italian state of art. It needs to be better organized in order to guarantee a proper support at different levels of intervention (planning, administration and political decision) and to improve the different developing and control processes activated.

This research has experimented new methodologies of data integration, organization, management and structure in a GIS to allow interoperability between the different system involved.

Meanwhile this research has tried to locate (and experiment) data distribution architectures structured at different levels of access diversified on different user categories.

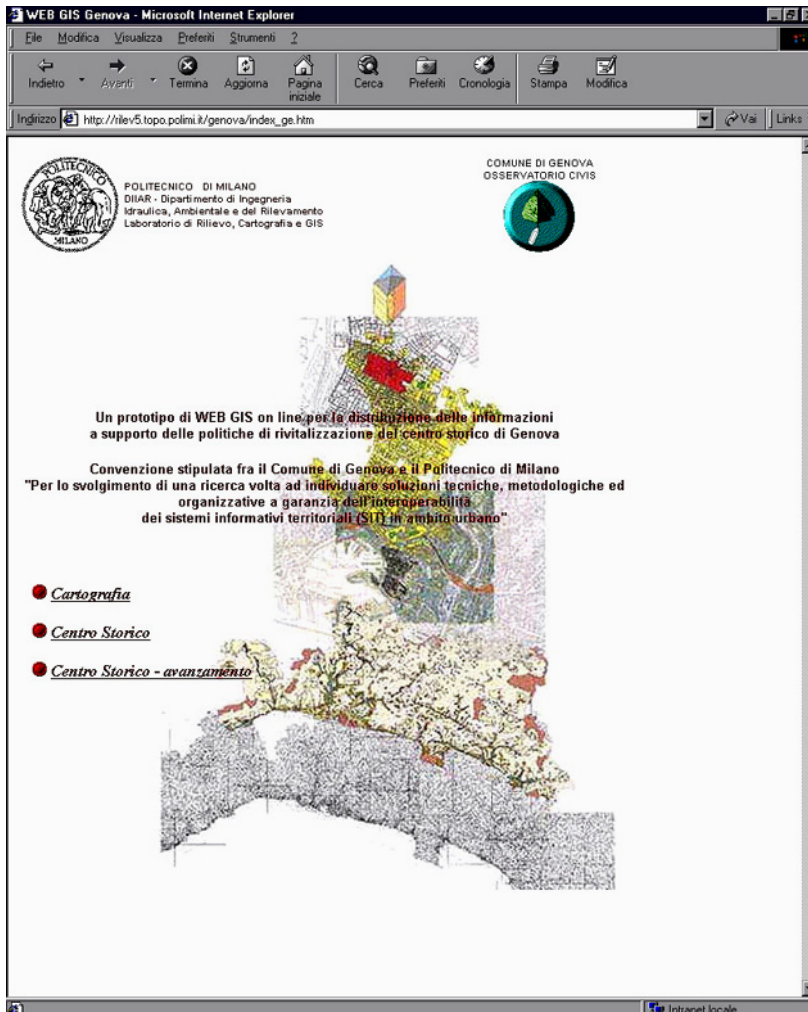
The Web Gis has been spotted has a possible mean of different synergies development between public and private subject. This has been done in order to promote projects of economic and social feasibility and evaluation of intervention in a sustainable way.

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<sup>1</sup> The Municipality of Genova has built up two projects named "CIVIS Sistema" (City System) and "CIVIS Ambiente" (City Environment) co-financed for 50% by UE in may 1991 (project CIVIS – Criteria to Improve and Vitalise Inner Cities Settlements). From this project it has been set up a Permanent Urban Observatory "CIVIS" provided with its own hardware and software, born to support orient and govern the process of conservation, re-use and revitalisation of the famous and ancient Historical Centre of Genova.

It is within the province of the Observatory to carry out a programme of information, research and service activities in order to build different synergies between public subjects and private one, to promote feasible economic and social projects, to support the municipalities action sharing services in order to evaluate the intervention in function of a sustainable development and of the degree of compatibility with the heritage state of the art.

## Urban cartographic level access



Logical organisation of all different cartographic level: strict relation between single building and urban context.

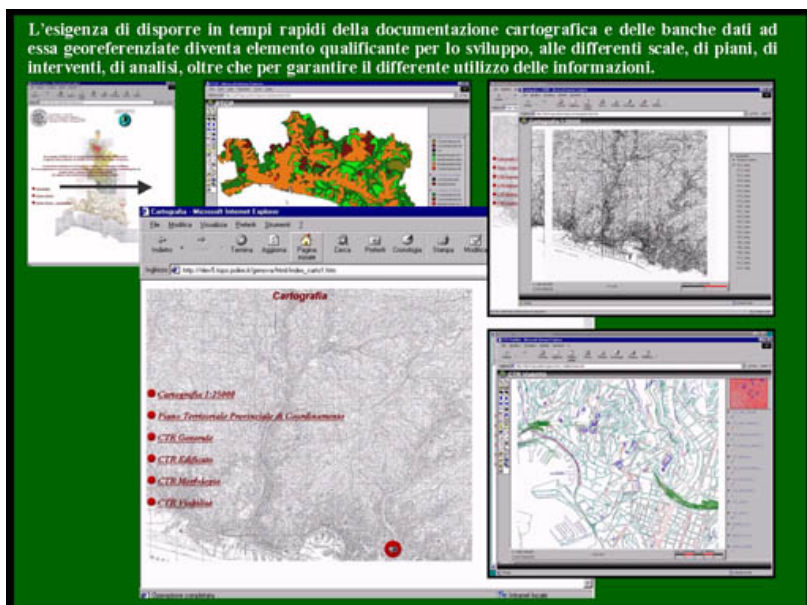
It's developed the implementation of Geographic Information Systems on line, to distribute georeferenced information, to guarantee network access, consultation, and transfer from remote to local different geographic data.

Structuring the GIS it has been addressed towards:

- GIS planning to relate the Historical Centre to the City and the Region: from the territorial context, to the streets and road system, from the registry to the historic data and the state of art of each building (Fig. 1);
- production of the GIS and the preparation of a Web site for the consultation and the transfer all the geographic data, optimised for the use by offices and sectors of the Architectonic Works and Environmental heritage, providing an agile system of access, consulting and local sharing;
- implementation of all different cartographic level georeferenced once to the other in order to best support the urban government and orientation decision process inside the Historical Centre strictly related to urban and regional context:

1. map vector data at the scale 1:25000
2. raster CTR (Technical Regional Map) of the Regione Liguria;
3. numeric cartography of the Municipality as base for the PRG (General Plan of the Municipalities in Italy) at the scale 1:2000

- implementation of the PTCP (Territorial Plan of landscape and environment co-ordination) on the map 1:25000 with own database of plan observation, orientation and notes related to the topological geographic homogeneous areas



## Different level of access for various users

The previewed levels of user are:

- tourist
- citizen
- intermediate technician (public and private)

**I LEVEL.** The *first level*, the lowest as available data quantity, allows to visualize a map containing the main services that can be useful to visit the Historical Center. For each services signed on the map, is also easily seen and consulted a series of useful information, like the position, phone number, the time schedules, etc... An easy consulting map, very useful not only for tourist but also for people who live the center and want to have information about times and phone number of public services.

**Livello del 'Turista':**

- i numeri di telefono e gli indirizzi utili
- l'ubicazione e gli orari di luoghi e di servizi (musei, punti panoramici, stazioni, edicole, farmacie, ecc...)
- il calendario delle iniziative, mostre, convegni, ecc...

Legend on the left:

- Museum
- Hotel
- Station
- Panoramic View
- Restaurant
- Pharmacy
- Newsstand
- Palace of 'Rolli'
- Activity ground floor
- Toponymy

Tourist's level:

- phone numbers and useful addresses
- location and time table (museum, panoramic view, station, etc...)
- planning calendar of shows, exposition, meeting, etc...

**II LEVEL.** The *second level* is the one for the citizen. From its Web page is possible to consult the same services offered to the tourist and all the information about the items of the Historical Center useful for citizens themselves. As an example it has been chosen the 'daily theme' of the humidity. On the map are visualized the buildings of the center and clicking an anyone is possible to know if the selected buildings is affected to humidity and in which way (the reason and - if present- the typology of the intervention).

**Cittadino - il 'tema del giorno'**

Il tema scelto, quello dell'umidità, è di grande interesse per il Centro Storico. La presenza o meno di questo dato viene relazionata in particolare con le cause e, dove presente, con il tipo di intervento effettuato o in corso. Informazioni di grande interesse per chi vive nel Centro storico e prevede lavori di ristrutturazione generali o localizzati ...

The selected theme is "Humidity" and it is very important for the Historical Center of Genova.

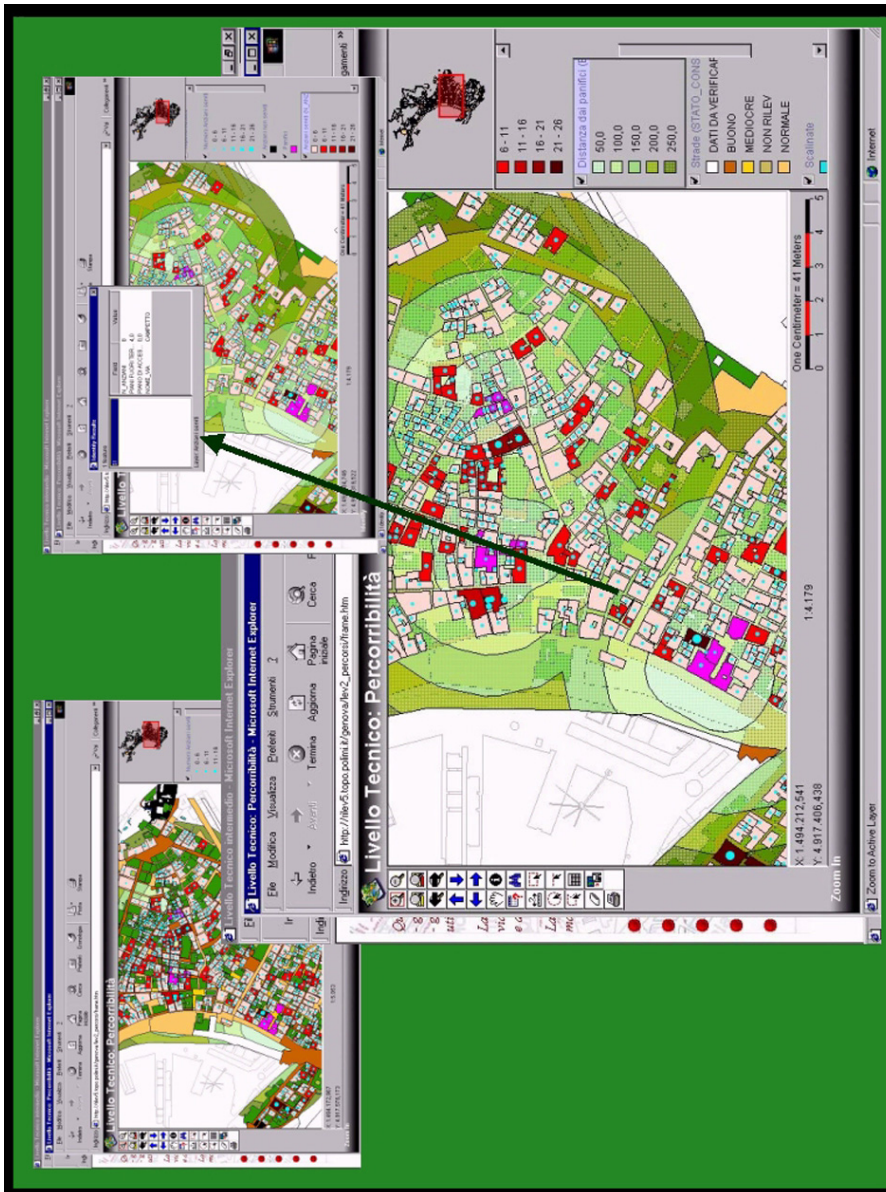
The presence of this data is related to the causes and to the kind of intervention (done or in processing). This is a type of information of great interest for people leaving in these houses. In order to make general or local renovations and to guarantee the conservation through the ordinary maintenance instead of special intervention.



**III LEVEL.** The third level, called 'technical' is for the workers inside the public administration and outside (professional and technician). This level is distinguished from the two others because in this level is possible to query the interrelated database and to share different data, in order to support government orientation process and decisions about the intervention in the Historical Centre. In this level are involved both the public technicians and the private professionals which can access to more structured informations. The map contains quality and technical informations about the buildings and the streets of the Historic Center. More in detail they have been remarked main items which are the priorities for the city.

- *Obstructed mobility*
- *Security - safety program to locate the risk areas*
- *Cultural mapping*

For example the people safety is evaluated on different parameters, such as the morphology and shows the buildings with closed activities on the ground floor, the degradation level of the streets and the insufficient street lighting. In order to guarantee the free access and mobility inside all the Centre, to improve the mobility of disable people and of old people, and to plan economic investment to suppress the architectural barriers, it has been related different DataBases such as: typologies of the network system of the streets; roads, presence of steps, flight of steps, ancient and historical gradine; different paving typologies and materials; state of degrading of the paving; the slope of the roads; limiting gradient admitted by law; public and private parking; places and stop area; registry data to locate disable people and old people (structured on different range age); map of the public transport service system.



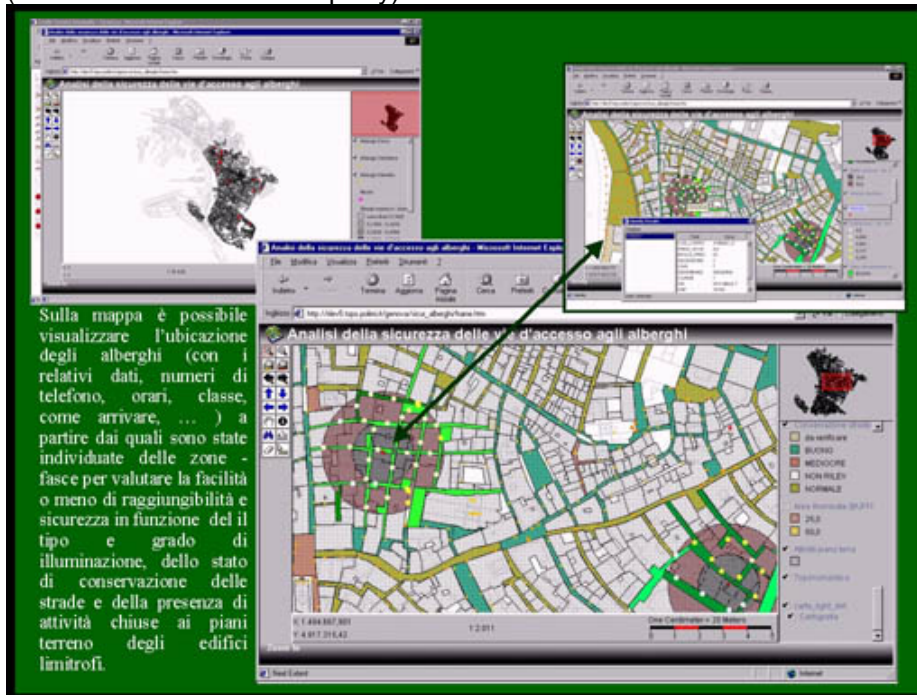
*Once the services has been selected, it has been possible to build a sequence of buffer, in this case it has been choose a 50 m step measure. With the available anagraphic data (>70 years) it has been quantified the density and the location of the older people. The overlap of these elaborations allows a quick view of the actual situation of the Historic Center.*

*It can be used different kind of services, perhaps the primary necessary shop, such as bakery, chemistry and pharmacy, hospital and so on.*

## Safety programme

To build a system able to support a safety program inside the historical centre and to locate the risk areas, the Archives related are:

1. information about closed retail shops;
2. different state of the art of the lighting network system (power, the different typologies and light position);
3. physical degrading level and state of conservation related to the code building
4. abandoned or obsolete building with the related destination (living, trading, commercial...) of the PRG (General Plan of the Municipality).



Legend map:

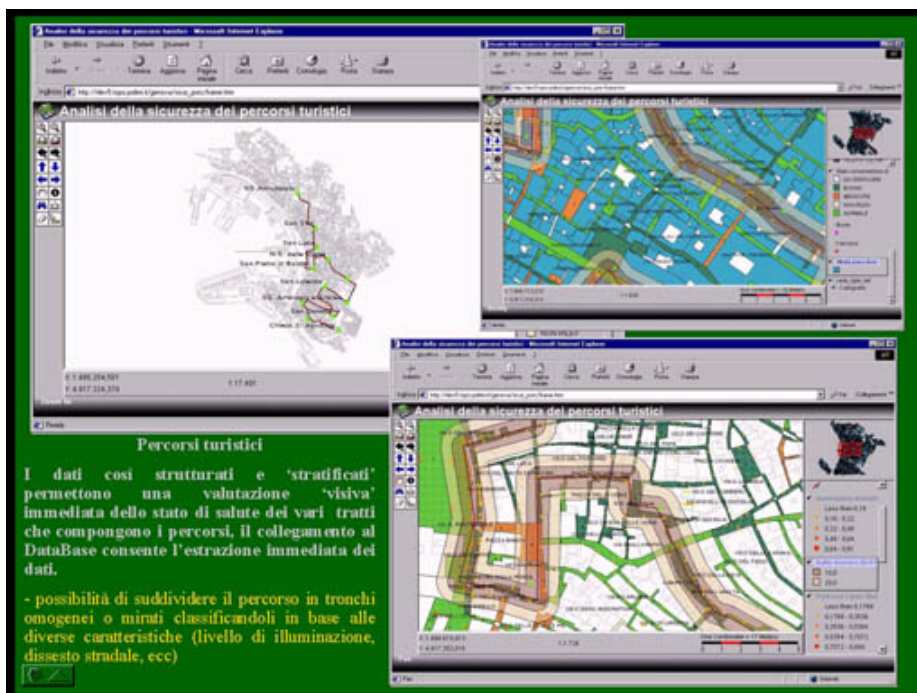
People safety evaluated on the morphology

- street
- lighting
- ground floor activity

Economic and social political activation of re-use

Two example for the Historic Center.

- The Hotel position and the safety of the surroundings;
- Tourist ways evaluated on a lighting and state of conservation of streets



On the map it is possible to visualize the hotels location (with relative data, phone number, times, classes, etc...) which define different zones.

These zones are differentiated by reaches, safety based on the lighting, street conservation state, ground floor closed activities.







**The following steps of the research programme are:**

- experimentation and implementation of integrated models of the environment and the architecture;
- processing three-dimensional models: DSM (Digital Surface Models) of the terrain and of the sea coast set up by the contribution of the modern technology, such as the laser scanning by air: researches developed by different Universities in this year are giving good promises and result;
- processing automatic 3D city model by the numeric information obtained by digital photogrammetry and topographic methodologies of survey;
- to import in the Web GIS the 3D MODEL with related data: altimetric data, presence of lift inside the building, number of floors;
- WEB GIS access to the 3D model to support the Valuation of the Impact of the project (low and high scale, from building project to the urban scale one) through an agile system of sharing the different model views inside which to insert the projected intervention;
- processing digital orthophoto 3D of the terrain for landscape and environmental impact studies (coastline and urban territory) and 3D orthophoto of urban centres, in order to share metric images to the professionals but also to citizens which generally better recognize images instead of maps;
- interactive navigation within the historic cartography and current maps for understanding, historic and evolution purposes in the territory;
- stereoscopic navigation to updating and analysing the transformations of the anthropic territory;
- to improve the level of the free access to different and remote located database;
- to improve the level of interrelation between different database in order to support an individual effort to use the data.