

TITLE:**Province of Brescia - Italy
Shared Service Centre Geographic Datawarehouse**

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Abstract

Shared Service Center (SSC) is an initiative of the Province of Brescia supporting local governments in developing change management projects based on introduction of ICT solutions and on-line services. SSC dedicates human, financial and instrumental resources to develop e-Government in small municipalities, enable common on-line services for citizens & companies in widespread territory and re-use tested experiences and solutions. This is a pilot initiative in Italy supported by Lombardia Region and Innovation Ministry (CNIPA). SSC offers associated agencies geographic datawarehouse services based on Web technology integrating information from many data providers at different levels: cadastral, from central government; environmental and emergency management, from region; general planning and transportation, from province; local planning, geo-coding and cartography from municipalities. SSC solves data conversion problems connected with information coming from a wide variety of providers and defines data interchange standards to be used.

SSC GIS system is based on an enterprise ESRI architecture.

Introduction

Local Authorities cannot act alone in delivering qualitative public services and in assuring a good local governance aimed at sustain economic and social development. For successfully facing these issues, a strict cooperation among different actors, both public and private, is required. Amin and Thrift (1995) have used the concept of “institutional thickness” to argue that a greater number of institutions and agents help a local economy to develop. Fostering economic and social development needs a network approach according to which different entities with diversified skills and resources come in and play their role in pursuing common goals. Local level seems to be more able to build up partnerships creating commitment and obtaining the convinced involvement of local actors. The evident vulnerability of local economies to global flows of capital and commodities can be the basis for constructing new local cultures of cooperation. All sections of capital, labour and residents need to set aside their differences in order to improve the competitiveness of the local economy (Cox, 1998¹).

In the definition of the scale at which conducting economic development initiatives, two main pressures must be undertaken (Bennett, 1997). A first tension pushes towards bigger dimensions in order to search for economies of scale, greater resources, increased technical skills among administrative staff and new administrative practice to be in tune with the business environment. On the other hand there is also a tension towards smaller dimensions for better meeting local needs and more easily create local networks supporting a Taylor-made development strategy.

Many Authors (Kirby, 1993², Magnusson, 1996³, Bennett 1997, Keil 1998) argue that local level, and in particular municipal one, seems to be more able to play an active role in promoting economic development. In fact, local authorities occupy a crucial place in the relations between the state, economy and civil society: they are “at the boundary between the state and the civil society”

¹ Cox K. (1998), Spaces of dependence, Spaces of engagement and the politics of scale; or, looking for local politics, Political Geography, Vol. 17

² Kirby A. (1993), Power/Resistance: local politics and the chaotic state, Indiana University Press, Bloomington and Indianapolis

³ Magnusson W., (1996), The search for political space, University of Toronto Press, Toronto

(Magnusson, 1996). From this position they can better manage Public Private Partnerships involving local actors; but, also, they can easily understand the priority needs of each local area. Indeed, apart from bigger cities, municipalities are in many cases too small for reaching a sufficient “critical mass” for answering to the first tension discussed above: they cannot dispose of enough resources and technical skills and they are not able to exploit economies of scale. In order to respond to the problems of “under bounding”, a way could consist in offering it to an upper tier of government. But this solution tends to undermine trust with the lower level units because they feel their specific needs are being subsumed within a more general set of objectives. At its worst, the upper tier can reinforce alienation as a result of a sense of top-down controls.

A second way for managing these problems could consist in building up a partnership that embrace more than one local government. These groups of municipalities can assure a higher degree of flexibility because they can link together different entities for limited periods of time and on defined issues. They allow a cooperation at “variable geometry”, strictly coherent with the specific need which have to be faced. Different kind of partnerships among municipalities and province can be recognized, someone more formal and stable, others lighter and spot.

Bearing in mind all these considerations, Province of Brescia has decided to play a different role in its partnership with local municipalities. Instead of depriving local municipalities of their institutional competencies, it has decided to support them offering a series of services which can be useful for overcoming small dimensions.

Specifically, it has been decided to focus attention on circulation and treatment of information and data. Through innovative ICT solutions, Province of Brescia has been supporting local municipalities in the use of information for decision making and enhance public action efficiency and effectiveness. In particular, a new integrated GIS has been developed in order to offer the opportunity of delivering better services to citizens and improving decision-making processes.

The project

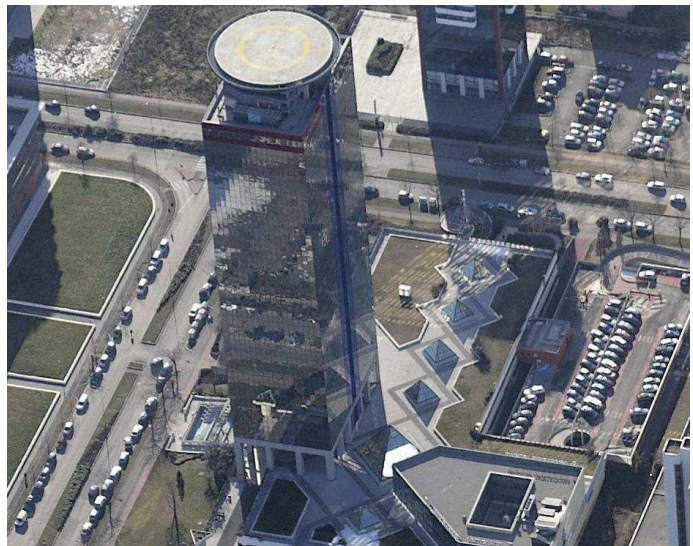
Foreword

The initiative of building a geographic Datawarehouse is integrated in a wide development plan of IT diffusion in local government which was started some time ago by the “Innovation and Technology Centre of Provincia di Brescia”.

In its role of coordinating the Local Agencies in the Province, the SSC has rapidly become a reference point for e-government services development, mainly for medium-small sized Municipalities that are the main part of the 206 composing the Province.

Organizing information and communication technologies processes, permits the sustainable management of roles and procedures of local government. Using digital systems, local Agencies enhance their work and offer services to citizens and companies.

The goal of the Project is to create a federate Geographic Information System, where each Municipality manages its data locally having the ownership and the responsibility of its own geographic databases. The Province organizes a centralised IT infrastructure to host Provincial level geographic data and local level data of general interest.



Crystal Palace - SSC Headquarters
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The Geographic Datawarehouse also hosts data coming from third party agencies which, due to their characteristics, need to be treated at a higher level than the Municipality level (like cadastral information).

In this particular service context, the Province plays a fundamental role in the relationships between Municipalities and Cadastral Agency (Agenzia del Territorio) by managing, on behalf of Municipalities, the Cadastral Geographic Information System.

The databases are periodically synchronized with the information coming from the Cadastre.

The main goals of SSC are:

From the technical point of view:

- Province inter-departmental GIS management and development;
- Interoperability between the Province and Municipality Geographic Information Systems
- Integration with data coming from other agencies, mainly Cadastral Agency.
- Creation of a geographic portal to publish the shareable contents of the Datawarehouse.

From an organizational point of view:

- The constitution of a technical-strategic board to develop the integrated GIS
- The writing of interoperability specifications to allow an open communication among different agencies
- Giving technical and project management support to local Municipalities to build GIS and collecting cartographic data
- Coordinating initiatives to participate in regional and national calls for project financing.

The Province GIS: a perfect example of GIS methodology

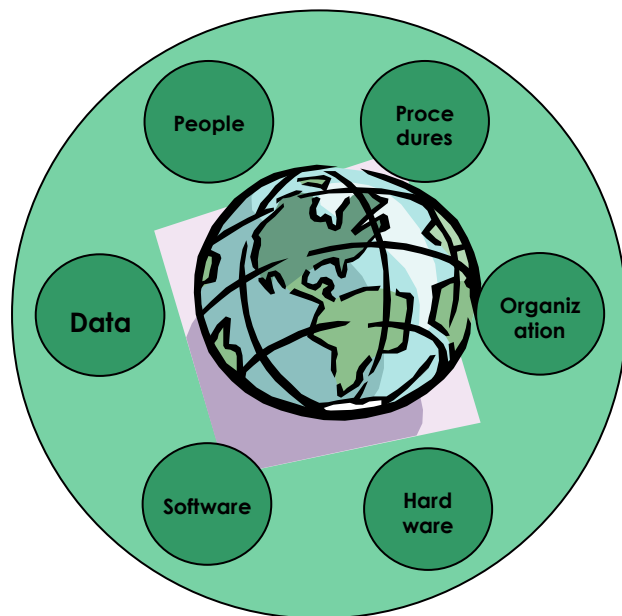
It is possible to examine the Provincial GIS as a synergic system of data, human resources, procedures, organization, software, hardware, following the traditional definition of GIS.

Data

The GIS of the Province was founded in 1986 and, since then, has collected an extremely significant amount of geographic data: technical cartography, historical cartography, thematic cartography.

The contents of the database have progressively increased while different departments of the province started using GIS technology:

- The Provincial planning department
- Public works department managing road cadastre;
- Environment department, managing sector plan;
- “Protezione civile” department, managing emergency plans;
- Water department, managing water and waste water plans.



The Traditional GIS model

Integrating this information with that coming from central level (like cadastre, from Agenzia del Territorio) and from regional level creates a common base to integrate data coming from the municipalities participating in SSC:

- Detailed technical cartography
- Roadmaps and house numbering
- Local planning

Human resources

At SSC, the group of professionals in the “cartography & GIS” office has significant experience in a wide variety of technical activities related to cartography, topography, GIS database design and management, archiving and documentation.

Apart from their normal work, they also provide strategic consultancy for other Province departments to:

- identify specific geographic information requirements;
- coordinate the people in charge of departmental GIS;
- define the GIS training plans
- define the Agency standards mainly about metadata following ISO

The GIS office also provides consultancy to the Agencies participating in SSC activating specific boards to:

- manage data gathering projects
- design the database model for specific themes;
- give technical and organizational support to local Agencies to integrate their GIS with the geographic datawarehouse
- give consultancy to the municipalities technical offices

The procedures

Standards definition

The SSC organization pays great attention to the definition of standard for data transfer: SSC needs to deliver high quality services irrespective of the GIS software used by the participating local Agencies.

Data transfer standard have been designed to transfer local planning data, roads and house numbering, to the datawarehouse.

The output of the standardization process is a specification document distributed to all the professionals involved in database design and data gathering.

The specification document is published with several example datasets on the SSC Web portal.

The specification document defining the data transfer standard, takes into consideration:

- the datawarehouse data model;
- the standards defined by the national body for GIS standardization.

Large scale cartography specifications

SSC also support municipalities in geographic databases production, managing the data gathering and validation processes for single municipalities or municipalities networks.

The management activity refers to the standardisation documents of Regione Lombardia for scale 1:1K, 1:2K, 1:5K, 1:10K geographic databases describing technical and content specifications.

The standardisation process output is a SSC specification document used to call competitive tenders for cartography production.

The standardisation process not only certifies the data quality for the local agencies, it also assures the possibility to insert local data into a centralized datawarehouse avoiding complex data conversion processes.

Metadata

In the described organizational model, metadata management covers a strategic role to:

- disseminate knowledge about available geographical information;
- improve data sharing between different agencies;
- reduce costs related to duplication of data gathering processes;
- facilitate integration between different distributed information systems.

To achieve this result, the ISO 19115, *Geographic Information – Metadata* has been adopted, following the CNIPA (National Centre for Information technology in Public Administration)

guidelines describing core metadata. Data not completed with core metadata cannot be hosted in the SSC datawarehouse.

Metadata are compiled using the metadata tools available in ArcGIS and can be searched and consulted through the SSC geographic portal.

Organization

Acting on behalf of the participating agencies SSC relates with third parties agencies (like the National Cadastre or the Regional administration) collecting a uniform and integrated set of geographic databases.

In this context is very important the role covered by SSC in the cadastral devolution process.

The strategic agreement with Cadastre Agency and Polytechnic of Milano

SSC has signed a strategic agreement with Cadastre Agency and Polytechnic of Milano to support and simplify the devolution process of cadastral functions from the State to the Municipalities.

The goal is to improve the planning, fiscal management and administrative management capabilities of local government and to support citizens and companies with geographic integrated services.

The agreement will support the Agencies in two crucial processes:

- activation of an interchange system between central and local government through the provincial level;
- taking part in the technical board in charge of defining the specifications of the unique process for building and cadastral registration.

The Cadastre Agency has developed a Web portal for Municipalities to open a communication channel based on the integration of central and local information systems.

Using the so called *Interchange System* (Sistema di Interscambio) the local Agencies will be able to integrate cadastral information in their GIS. On behalf of participating Agencies, SSC is developing the infrastructural services to synchronise the cadastral databases with the datawarehouse.

The technical board for specifications' goal is to integrate into a unique process two different processes:

- the local building technical and administrative procedures (today in charge of the municipalities)
- the cadastral process (today in charge of the governmental Cadastre Agency).

Because of its knowledge of local processes, SSC is the most indicated subject to participate in the board on behalf of its municipalities.

Hardware

The Provincia di Brescia offices, are connected via optical fibre cables and WiFi with the server farm located at the *Crystal Palace* (location of the IT department).

All the servers and the networking infrastructure are located in the IT department offices.

The Province hardware architecture consists of about 80 servers (Linux Debian, Linux Red Hat, Windows 2000 and 2003), Windows clients (2000, NT e XP - in dominio Windows 2003), three VMWARE ESX systems, two IBM Blade Center and a SAN EMC storage system.

The GIS is installed on a redundant server architecture, the RO clients are based on standard network connectivity and the RW clients are moving to Citrix metaframe.

Software

Being part of SSC represents a significant cost reduction for the Agencies, in terms of licensing costs, but above all, in terms of human resources, and costs related with the maintenance of a complex system.

The GIS software is based on the ESRI enterprise architecture. Geographic data are stored in a ESRI ArcSDE database using Oracle as RDBMS. Data access is scaled on user requirements and is based on standard ArcGIS desktop applications. Web mapping applications are based on ESRI ArcIMS 9.2. Specific Web applications, developed by the ESRI Business Partner Globo srl, are available to distribute cadastral and planning information. The technical management of CST is looking at the ESRI ArcGIS Server technology as an important opportunity to improve the quality of the services and has already started to work on significant use cases.

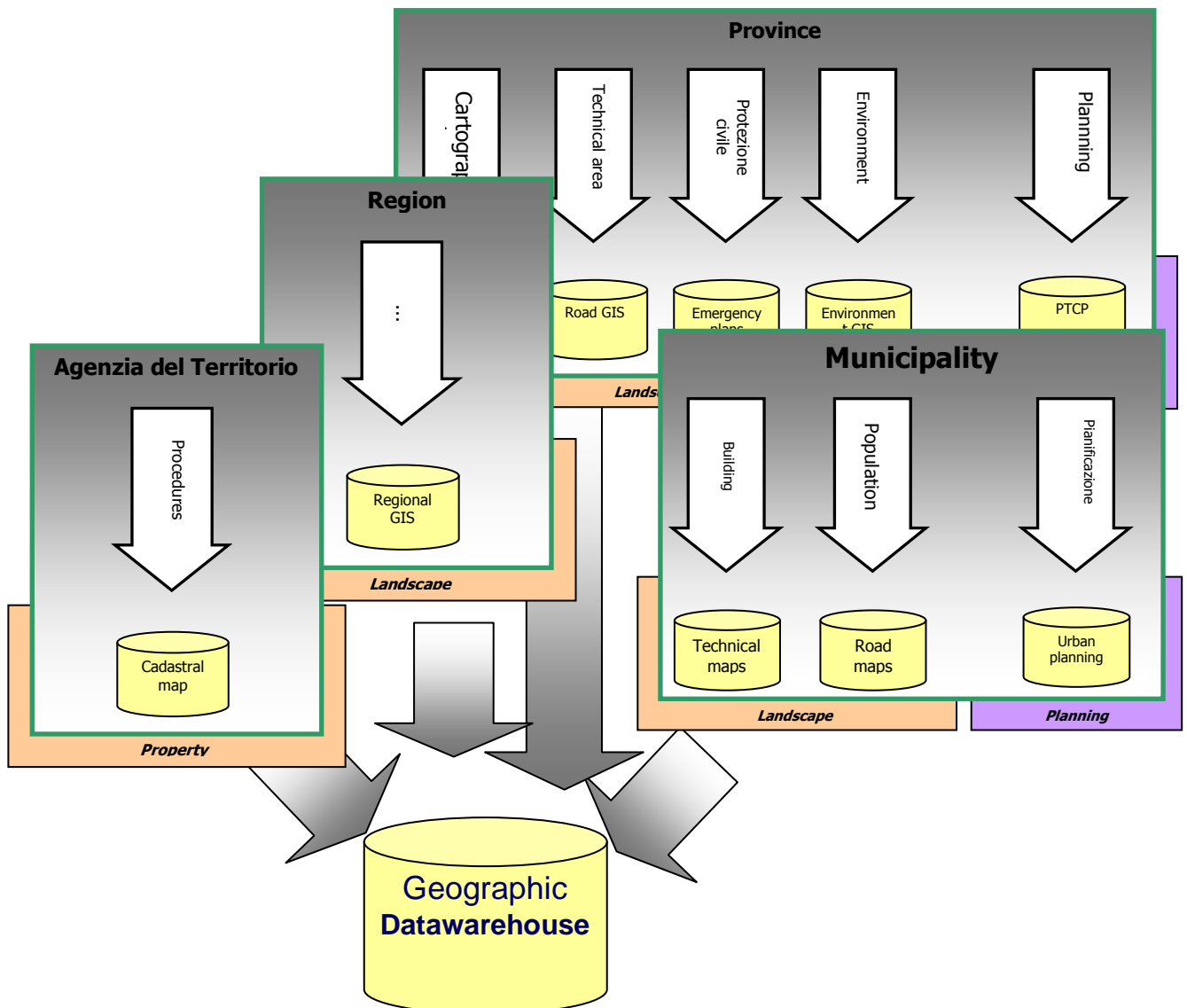
Geographic Datawarehousing services

The Geographic Datawarehouse is based on a federated GIS system where all the shared information, coming from the participating Agencies, is stored and maintained in a unique integrated Database.

The Database is accessed through Web Mapping applications available both in the Web portals of the participating agencies and in the SSC Web portal.

The access to the system is based on user profiles, and each Agency can activate Geographic services based on different users groups and on specific privacy requirements.

Authentication is based on standard username/password access or on digital ID card (National Card of Services).



The cooperative model of the Geographic Datawarehouse

Opportunities offered by the system

The IT solutions offered by SSC allow municipalities to improve their own activities in two main ways.

First of all, new and better services can be offered to local people. Information available in the data warehouse can be offered to citizens in order to simplify administrative burden. For example, cadastral data can be managed directly by single municipalities. In this way procedures required for buying or selling a house or a real estate property can be easier and more rapid thought they can be supported by ICT solutions.

Local technical offices can also improve their own work. They can dispose of a series of information useful for urban planning and administrative activities. They can check the status of water supply, they can control building activities and verify more sharply if they are coherent with authorizations delivered.

Tax offices can also improve their actions especially in managing the construction tax and the property tax: available data can help them to recognize people who don't pay these taxes or don't pay them in the right amount. Considering that property tax represents the main revenue for municipalities budget, it is clear how important the GIS instrument can be.

GIS instrument not only help local municipalities to better manage their activities and deliver more effective services, but it can be a great support in defining local policies. Urban and territorial policies can be defined in a more coherent and detailed way. As an example, on the same representation you can find different set of data, also coming from different tiers of government. When defining the municipal urban plan, you can connect it with urban dispositions determined by upper institutional level (national, regional and provincial). You can also compare the plan with the others of different municipalities. So information sharing can be particularly useful in facilitating cooperation between different institutional levels and between local authorities at the same levels. In this way decisions about wider infrastructures (for example streets, railways, industrial areas, ...) can be better connected with choices at the local level regarding areas for new buildings, infrastructures of local interest and so on.

Given the data warehouse, also some simulations can be done. Different sets of data can be matched in order to monitor and foresight reciprocal influence. So, the development of a new real estate initiative can be assessed also on the basis of possible effects on the transport network and services.

The connection between different data can allow to calculate possible effects of urban planning decisions on public revenues, on the needs of water supply, of transport services, on effects on traffic flows, on waste collection service, on energy supply. These simulations can be useful not only for local authorities, but also for public or private firms in charge of different public services, for real estate firms interested in property management, for individual citizens who wants to better understand what happens in their community.

Conclusions

The goal of constituting a federated GIS for the Province of Brescia can be achieved only being well supplied with technological and human resources. Without these, also big investments are in vain.

The dimension of the organization can be critical when trying to coordinate many different interests at many different levels.

Establishing a constructive dialogue between more than 120 different Agencies, requires a strategic view based on the value of the involved human resources.

SSC is, first of all, a community of professionals passionately working for the success of the project, sharing knowledge and methodologies.

Individuating reliable partners is the second fundamental point of the project. We would like to thank them and ESRI for contributing to the constitution of the federated GIS as a paradigm of a modern cooperation between Agencies.

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Timetable

The project will last for three years (2005/2008) with the following phases:

- July-December 2005: start-up of the agreements between Municipalities, Province and Regione Lombardia
- January-July 2006: definition of operational programs and conventions between Agencies
- January-September 2006: pilot project, prototyping some provincial departments and one Municipality.
- March-December 2006: constitution of the Province inter-departmental GIS.
- October 2006-March 2007: Hardware/Software infrastructure.
- January - December 2007: Start-up of services in Beta mode.
- January - June 2008: Dissemination of the system.

Software

Type	Software	Producer
GIS Client	ArcGIS 9(ArcInfo, Arcview)	ESRI inc
Web GIS	ArcIMS	ESRI inc
Gestione Database GIS	ArcSDE	ESRI inc
Database	Oracle	Oracle inc
App. GIS Catastale	CatView	Globo
App. GIS Toponomastica	Geostreets	Globo
App. GIS Urbanistica	Urbanplanner	Globo