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## CSI-Piemonte and SAS: a Successful Partnership

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### ABSTRACT

Since 1977, CSI-Piemonte has promoted innovation in local public administration through the use of the most modern information technology and Internet tools. Thanks to its contributions, the Piedmont Region operates on the Italian and international scene as an integrated administrative system equipped with the necessary technological infrastructure. With nine offices operating in the region and 54 consortium members, CSI is one of the largest Italian ICT operators in the public sector. This presence on the territory simplifies the communications with organizations, citizens and enterprises and enables it to offer simple, efficient services contributing to re-launch the regional economy.

In 2003, CSI-Piemonte decided to implement a Business Intelligence Competency Centre in SAS® 9. The BICC grew over the years and today consists of 78 people operating in different areas:

- Metadata management, data re-usage standards (1542 databases managed)
- Decision support systems design and development
- Decision support systems for HR management, strategic control management
- Catalogues, cross-area data, production activities observatories
- Health care decision support systems
- Data quality and data, Text Miner

The aim of CSI-Piemonte is to capitalize the strong and longstanding experience in SAS on new international projects and to offer it to support the developments of new applications for the Public Administration in foreign countries.

CSI-Piemonte was awarded the SAS “Enterprise Intelligence Award” in Stockholm during the SAS Forum 2007 for decades of experience gained in the field of business intelligence.

### THE COMPANY

**CSI-Piemonte (Consortium for Information Systems)** was founded by the Piedmont Region, the University of Turin and the Polytechnic of Turin in 1977 with the aim of promoting the modernization of local administration by using the most advanced information and IT-based tools to create **information services** and **systems**.

As a common meeting point for research bodies, local Public Administration (PA) and private business, CSI-Piemonte looks to spread the benefits of the Information Society throughout the territory and encourage socio-economic growth in the Piedmont region. Thanks to the consortium, Piedmont has become an integrated administration “system”, able to face the **e-government** challenge, simplify administrative processes and meet the expectations of citizens and companies alike.

Well-known both at national and international level, CSI-Piemonte represents a unique player in terms of it being a **‘public’ consortium organized along ‘private’ lines**. Nowadays, it is one of the largest Italian ICT operators in the public sector.

Furthermore, the company abides to **“socially-responsible”** standards of behaviour, maintaining close contact with other key bodies and institutions in Piedmont and meeting the demand for innovation by taking into consideration the natural, social and human resources within the territory.

Specific **strategic objectives** guide the consortium’s actions: encourage the development of the Piedmont System (*SistemaPiemonte*); promote PA employee training and development; reorganize the range of services available to the Piedmont health department; develop the Piedmont Broadband Network Plan; favour research and innovation in order to support the economic-productive system in Piedmont; carry out the second phase of e-government, encouraging dialogue between local administrations and central government, and, finally, develop its skills and ability to act internationally by working alongside developing countries and being actively involved in European research and development projects.

CSI-Piemonte operates in several different **fields of activity**, which can be summarized as follows: agriculture and forestry, the environment and territory, demography, land registry and taxation, production activities, vocational training and work, education and the cultural heritage, healthcare and social welfare services, administration, accounting and personnel systems.

In addition, in order to encourage cultural debate on topics of interest to public administration, the consortium is

increasing its involvement in **congress events and activities**, including the organizing of multidisciplinary international conferences such as; "E-learning: state-of-the-art and future perspectives" (2002); "Knowledge as shared public property: software, data, know-how" (2003) and "The future of memory: preservation of cultural heritage in the digital world" (2004); "The dominion over space: science, technology and representation" (2005).

#### KEY FIGURES

Consortium members: **54** (including municipalities, municipality associations, local health bodies, hospitals, etc.)  
 Annual turnover: **€179 million** (in 2005)  
 Number of office locations in Piedmont: **8**  
 Number of personnel: over **1,200** employees

#### INTRODUCTION

**CSI-Piemonte** is the regional Public Consortium with public right legal entity status (art. 3 of the Charter), that operates in the Piedmont Region to:

- design, develop and manage the regional Information System, as well as the information system of the Members of the Consortium, and for this purpose it is the recipient of the powers of the Authority for IT in Public Administration;
- promote and create continuous collaboration modes between territorial Institutions and Universities in the fields of:
  - a. research and development of new IT technologies;
  - b. their transfer to services both in the PA and production structures;
  - c. training aimed at these technologies or mediated through them;
- set up an organization and technical pole of the Public Administrations located in the region, to interconnect them on a provincial, local or municipal basis, in compliance with the directives of the Authority for IT in Public Administration.

The role of the Consortium is that of a key instrument for Piedmont PA reform, through the interaction between the public information systems on RUPARPIEMONTE and its mission is the setting up of the "Piedmont System" for the implementation of administrative decentralisation using ICTs.

The Data Banks, Decision-Making Systems and Relationship with Universities Directorate of the Consortium focuses on **data**, and in particular it has the following objectives:

- designing and setting up **Data Warehouse and Business Intelligence services**;
- favouring the **normalization of existing data banks**, favouring **design** and **production of new integrated data banks and the reuse**, with particular attention to their **availability and usability in a network**;
- contributing to the identification of **reference technologies** on these topics.

The catalogue of the data and services provided for the members of the consortium makes it possible to draw a picture of the existing data bases.

PA CUSTOMER	COLLECTIONS	TABLES	DB
Piedmont Region	361	74.400	682
Province of Turin	78	12.900	160
Municipality of Turin	144	37.100	259
Others	30	2.600	40
<b>TOTAL</b>	<b>613</b>	<b>127.000</b>	<b>1.141</b>

Collections = data bases grouped according to the same project topic

Data bases = tables grouped according to a topic

Tables = single physical tables storing the information

(data updated in November 2006)

Many of these data bases contain set of information that can be used for analyses and consultations (that is Data Warehouse or Data Mart).

These data bases provided the foundations for different types of analysis and access tools, that can for the greater part be accessed in web mode. The following table summarises the number of services set up according to typology:

PA CUSTOMER	Front-end							Infrastructure services	Back-end		Total
	Q&R BO	Q&R SAS	OLAP (only SAS)	Dashboard SAS	Dashboard BO	Text e Data Mining (SAS)	Catalogue		traditional ETL	DQ	
Piedmont Region	40	54	18	2	1	1	1		77	10	
Municipality of Turin	13	30	9	1		1	1		32	5	
Province of Turin	2	4	1	1		1	1		6		
Heath (Piedmont Regione)	3	6	2				1		10		
Local Health Agencies/Hospitals	8	3	1	1			1		3		
Cross customers	1		0					1	1		
CSI	0	10	0	1			1		9		
<b>TOTAL</b>	<b>67</b>	<b>107</b>	<b>31</b>	<b>6</b>	<b>1</b>	<b>3</b>	<b>6</b>	<b>1</b>	<b>138</b>	<b>15</b>	<b>375</b>

Key:

*BO Query and Reporting* = system that makes it possible to produce reports, set up with Business Objects technology

*SAS Query and Reporting* = system that makes it possible to produce reports, set up with SAS technology

*OLAP SAS* = system that makes it possible to carry out multidimensional analyses, set up with SAS technology

*SAS Data mining* = advanced statistical analysis experiences through the application of data mining (extraction of useful information, carried out in automatic or semiautomatic mode, from large quantities of data) or text mining (extraction of useful information from large quantities of written text), set up with SAS technology

*Data Quality* = applications that use data cleansing technologies (in massive mode and with direct interaction on operational systems)

*Directional dashboards* = system that makes it possible to represent in short (through a dashboard) a series of summary indicators for a specific phenomenon

*Other* = other typologies of access and analysis applications

*ETL SAS* = periodic update processes for data bases, that apply integration techniques

## DECISIONAL SYSTEMS

After a feasibility study carried out in 1996, in 1997 CSI-Piemonte began the set up of the information – decisional layer (Data Warehouse) of the Regional Information System (SIRe) on behalf of the **Piedmont Region**. The initiative was connected to the need of the Region to have a component of the information system that is transversal to the whole institution, to comply with needs to support the decisional processes of the institution, and information needs for external subjects.

The Data Warehouse of the Piedmont Region began as a technological and application infrastructure transversal to different Directorate Data Marts that in the meantime were set up as a re-design of already existing systems. Some reporting and statistical applications in mainframe environment had already been created from 1980 using SAS technology. The activity to set up Data Marts based on the new Open environment architecture consisted in the conversion of the BI previous systems and in the adjustment of a more flexible data base onto which the access and analysis tools can be applied. The applications have been set up in a first phase in client/server environment, and secondly, with the set up of a centralised server farm at CSI-Piemonte, applications have been set up in web mode to be used with ASP logic by the different Piedmont PA levels that interact with the Piedmont Region.

## BUSINESS INTELLIGENCE PLATFORM

The architecture framework at logical level in Figure 1 displays all the components involved in the Business Intelligence platform for the different decisional process phases. SAS and BO are the two main BI technologies

involved in the set up and use of decisional services, while the use of Open Source technology in BI is still in its initial phase.

The different steps in the DW process are:

modelling: analysis and design are supported by enterprise tools (Uml methodology) such as ERwin that make it possible to display graphically, through the Entity-Relations model, the data base structure

feeding: it is managed by Data Integration tool available with the SAS platform that is based on metadata centralisation through the SAS Metadata Server logic server

metadata semantic layer: to translate the structures and definitions of models given in business terminology, it is managed through the new Info Map Studio tool for the SAS component, while the Designer BO client is used for BO

access: both the SAS and BO components offer a complete suite of programmes per query and reporting, pre-set and developed ad hoc, in web and client-server technology

The InformationDirectory catalogue collect, from the various sources identified in the table, the descriptive metadata of the decisional services in running environment and the metadata that describe the basis of the OS and ODS data.

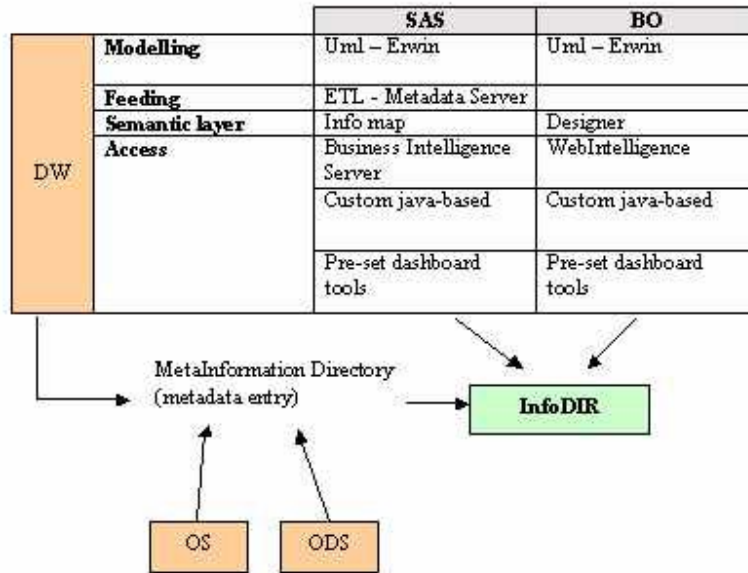


Figure 1 – Architecture framework at logical level

Figure 1 – Architecture framework at logical level

The reference architectural framework at logical level is displayed in Figure 2.

The basic layer, relating to the area called “Production” (operating level), includes all the “operating” components of the sub-systems of the Information System of a certain Public Administration and the external data sources, that create as a whole, the original data sources.

The sub-systems of the Information System of a PA are supported by department production data bases, centralized or located on department machines, distributed over various offices; these data bases contain data of sectorial importance.

In addition to sources from without the Information System, often other information sources, from various levels of the local and central public administration are considered interesting as well.

The decisional and information level, that creates the central part of the Data Warehouse, is divided into two parts that reflect the data flow:

- *from external sources to the Data Warehouse* ('integration' part)
 

The decisional data feeding flow is organised so that the interesting data are extracted, transferred, integrated and transformed to guarantee their congruence to the other components that are already present in the Data Warehouse, simultaneously saving the descriptive metadata
- *from the Data Warehouse to the users* ('user' part)
 

The users, through access and analysis applications can consult the data bases of the Data Warehouse. The users may be different (hence apposite differentiated access rules must be defined) and they may be of different types:

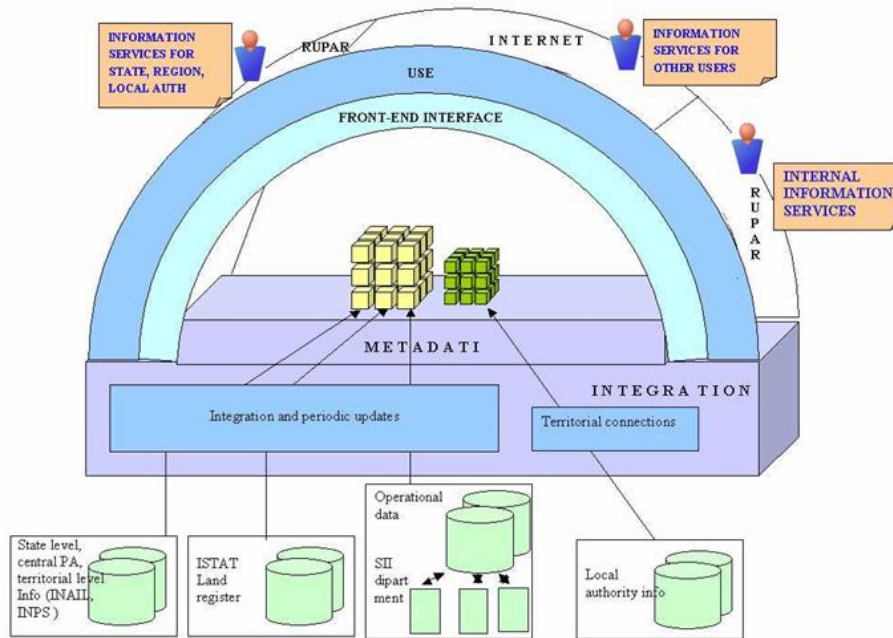
  - internal to the institution;
  - external to the institution, but belonging to other public administrations;
  - wide public.

The Law by former Minister Bassanini introduced in the legal system significant innovations from the point of view of simplification of administrative documents, and in the decision-making and control activity: they introduce the indication to delegate part of the regional competences at lower territorial levels while maintaining the functions to monitor and control the effectiveness of the intervention at central level.

Moreover, the Public Administration Single Network project offers, both at national level for the central PA and at regional level for the local PA, the reference infrastructure to convey the inter-exchange within the PA (the so called G2G, Government-to-Government).

This led to the following differences in the architecture reference scheme:

- the information flows that feed the Data Warehouse are still for the greater part consisting of the operating components deriving from the different sub-systems; however the laws on proxies connected to the Law by former Minister Bassanini lay down that many information flows are decentralised to other institutions; for example the Region "relinquishes" to local institutions the management of many operating components, while maintaining the collection of such flows in ad hoc data warehouses that are periodically updated (technically called «operational data store»)
- the exploitation of services connected to the information and decisional component is not only internal to the institutions or through the Internet, as when RUPAR became fully operative (Regional Public Administration Single Network) it identifies the other classes of exploiters connected to the RUPAR Intranet; as RUPAR is inter-connected to the national RUPA, these users will be both different Piedmont local institutions and subject from outside of Piedmont, that is Central State and other Regions.



**Figure 2 – Reference logical architecture**

The logical scheme described above leads to the following definition of the different application typologies in the decisional framework displayed in:



**Figure 3 – Decisional Service Pyramid**

The Business Intelligence platform is completely integrated in the CSI Server Farm and it was designed to provide a single and centralised platform for all the possible customers of the company.

Figure 4 highlights the interaction and cooperation mechanisms of the decisional systems towards the management systems through the so-called “intelligent agents” (Enfine/alert engine layer), that is on the basis of information located in the data warehouse it is possible to set off mechanisms that interact directly on the operating systems.

The evolution does not consider the decisional systems as isolated from the operating systems, but rather as closely integrated with continuous interaction operations. In addition to the data warehouse (container labelled as DW) there is a data container labelled as RealTime DataStore (RTS container): it is a sub-set of operating data duly fed according to the needs and updated quite frequently. This container is used for all the reporting activities that do not require a denormalised structure and that involve a de-normalised structure and that involve limited data quantities and a very frequent update. A first example of such interaction is the use of Data Quality techniques, on-demand, by the same operating environments.

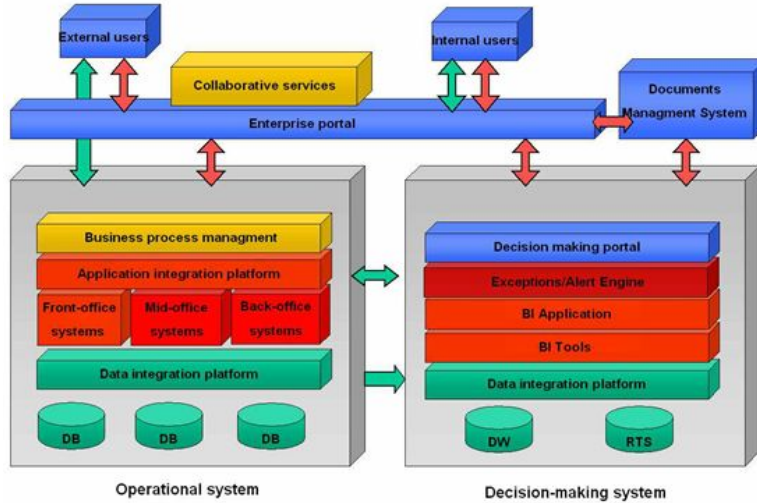


Figure 4 Enterprise Business Integration framework

Hereafter is a display of the physical implementation of the two main macro-environments used in CSI: SAS and Business Objects. It highlights the possibility to enforce a physical implementation that complies with the guidelines defined in the framework of Figure 4.

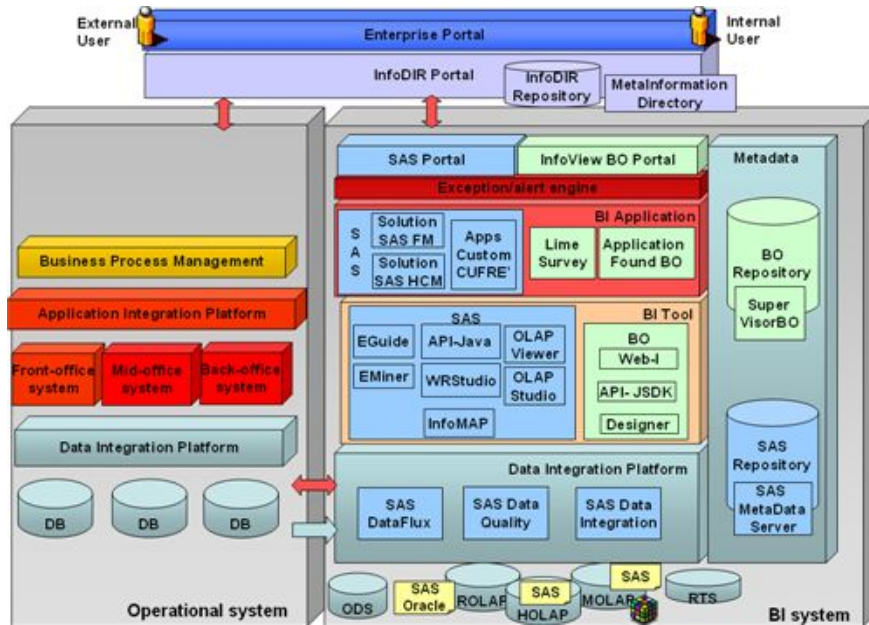


Figure 5 – Physical architecture of the BI platform

The SAS 9 architecture is based on three different logical servers:

- **SAS Enterprise Data Integration Server**, that deals with the integration and the quality of considerable volumes of data that, through a graphic environment, makes it possible to have complex transformations and a complete meta data management;
- **SAS Intelligence Storage Server**, to design, manage and maintain the Data Warehouse;
- **SAS Enterprise BI Server**, dedicated to the distribution of Business Intelligence to the different typology of users present in the company; interfaces that can be customised according to the needs and skill levels of the single users.

These three servers are connected to a common centralised metadata base, the backbone of the platform as highlighted in Figure 5 – Physical architecture of the BI platform.

The **SAS Human Capital Management** and **Financial Management** solutions are available to face the vertical issues relating to Human Resources and Management Control.

### CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the author at:

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