

# “CAMPANIA SALUTE”: A REGIONAL BASED NETWORK FOR HIGH-RISK POPULATION MONITORING

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**Abstract:** The “Campania Salute” project, led by the Faculty of Medicine of “Federico II” University in Naples, involving TSD-Projects and Telecom Italia, is aimed to create an integrated system using microprocessor cards, Internet/Intranet networks and the electronic medical record “Wincare”, to connect primary and secondary care in order to share information about high risk populations, particularly patient suffering hypertension and cardiac diseases.



Figure 1: The Project Logo

## Introduction

The main goal is to improve diagnosis and follow up of Patients by efficient link between primary care and secondary care. This approach eases the identification of Patient needs, improving also the exchange of information about therapy and relevant clinical events. In this approach, Hospitals (through specialized Hypertension Center) support the activities of General Practitioners (GP), that is the primary responsible for patient's care.

Additional objective of the project, through the creation of a common database, is the support to creation and validation of common clinical guidelines (protocols) in the field of hypertension, towards a creation of standards at the regional and national level and the optimization of specialistic exams request and management.

## Background

Campania Region is located in the South of Italy, 5.6 million of people inhabit, most of them near the coast. There are 166 Hospitals and 4100 GPs. At the time being, Campania does not have Regional Electronic

Patient Record System or Regional Administrative or Clinical System, making it difficult to get and track Patient history.

This is creating an increase demand of specialistic exams, due to unavailability or unaccessibility of previous medical history.

Moreover, as a general remark, having universal validity in Italy, there is still a high and inappropriate access to secondary care services, bypassing the natural entry point represented by the GP.

The lack of communication between GP and Hospital doesn't allow a tight collaboration to efficiently follow the Patient.

Finally, new healthcare policies and constrains to healthcare expenditure oblige to optimize delivery of treatments, reducing access to hospital and focusing the care processes around a better defined role of GP, through efficient support of specialistic services.

Campania Salute system is designed to overcome these obstacles in order to reach an efficient health status.

## Architecture

Campania Salute system is based on a shared electronic medical record with protected access.

Data Sharing Process can be achieved by network and smartcard jointly. Using the network, users can access remote databases online, while using smartcard, a lighter version of database circulates with Patient.

From an operational point of view, the smart card has two functions:

- Access key
- Portable Database

Professional users can access clinical data using Patient smart card as access key. Clinical data are stored in central remote database on a Intranet built by a virtual private network based on Arcipelago service of Telecom Italia. Secret Keys stored on smart card allow users to connect on-line to remote database.

Connecting to remote database by patient smart card, user can browse all clinical data, even images acquired during ecocardiography exams.

Besides, users could also read clinical data stored directly on smart card, such as personal data, emergency clinical data and the last specific exams (instrumental exams, generic visit, laboratory exams).

Users could execute different operations (read, read/write, system operation) based on different types of access profile.

As a planned extension, equipping a first aid room with a PC and smart card reader, all emergency clinical data could be read immediately.

GP can access data via Web browser on the Intranet. Each GP is related to the nearest Hospital. GP can access only his own Patient data and can book exams, simply using a Web Browser and a particular access key.

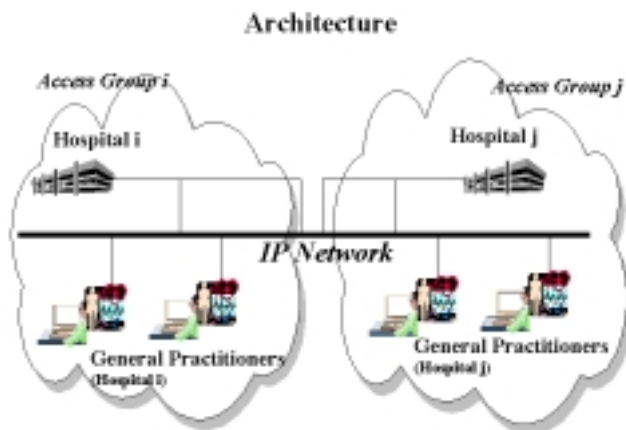


Figure 2: The Architecture

### Technical components

Network is based on "Arcipelago", that is a dial-up service for IP connections on Telecom Italia Points of Presence distributed in many Italian cities. There is the possibility to connect by PSTN or ISDN line. The authentication is provided by the service "Village Export" on a dedicated workstation that Telecom Italia manages.

When a member of the "Arcipelago" service dial-up to a POP and is authenticated by a "Server Radius", he/she can use the services installed in the LAN of the center with servers, that is University of Naples - Internal Medicine Department. From this center to Telecom network there is a leased line at the 2 Mbps speed.

This is the structure of the Intranet, on which clinical data are stored.

Moreover, Telecom Italia configures also the "Interbusiness" service for Internet connectivity and is realized with leased line. In this project there is a direct connection from the university to Telecom Italia network at the speed of 512 Kbps. This connection guarantees a CIR of 128Kbps.

Another provided Service is "BusinessWeb", that allows users to connect also to the Internet network, even with an E-Mail Service, provided and managed by Telecom Italia.

Then, at the University, two servers are installed:

-Server TSD, that stores clinical data and it's reachable only into Intranet Arcipelago network.

-Web Server, that is the gateway from our Intranet to the Internet. It also provides web site for the project, reachable to the address:

[www.campaniasalute.interbusiness.it](http://www.campaniasalute.interbusiness.it)

The *Smart Cards* used in this project are microprocessor cards MPCOS 3DES (32/64 kbits of memory), provided by Gemplus. They are compliant with ISO 7816-4 specifications and with Data Link Protocol T=0 and T=1.

Smart Card Readers are provided by Gemplus (model GCR400 and GCR410). They are connected to the PC by serial port (RS232 interface).

*Electronic Medical Record*, used to manage clinical data and to interface the system, is based on software tools Wincare, provided by TSD-Projects.

Wincare is an Electronic Medical Record Manager. The Wincare engine is able to manage clinical data in a local or remote database using SQL (Structured Query Language) in a Windows Environment. Oracle is the Database Engine used in this project.

Wincare allows to:

- Define data structure
- Read data
- Update data
- Print data
- Import/export data
- Search data by simple queries

Wincare engine takes in care all the operations with other modules (smart card, network, image acquisition system).

For each point the user can be access to an on line help. Wincare software can acquire and manipulate data by ECG and by SVHS films. With Wincare is also possible to have statistics about the number and the kinds of the patients.

Hospital can also acquire and manage images then its equipment is composed also by:

-Scanner

Frame grabber Figure 3: The Network

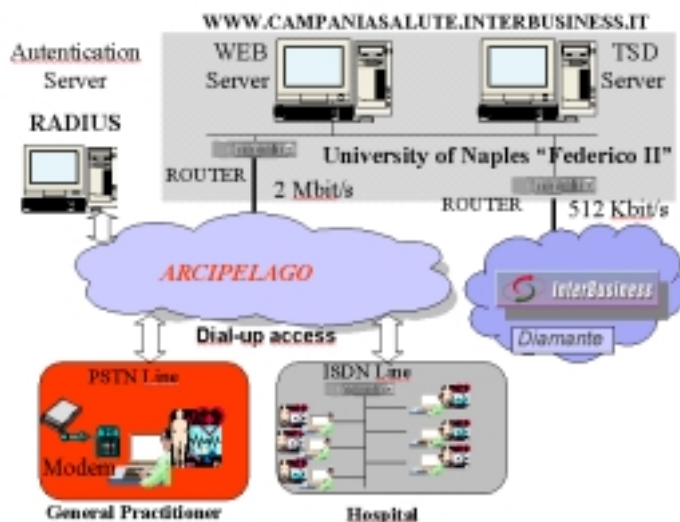


Figure 3: The Network

Also the Web module, installed on Server TSD to publish the clinical data, is based on software tools Wincare.

### Clinical Data Treatment

Clinical data structure is defined according to the Italian Society of Hypertension guidelines.

Data are stored on smart card based on latest european and italian guidelines (UNI 10706). Then, smart card stores data in several files: personal data, emergency data and a set of files specific for this system, such as visit, exam laboratory, instrumental examination.

Data are encrypted before transmission and Intranet provide a strong access control: this approach ensures confidentiality of clinical data.

### Results

The system allows to reduce social costs, from different points of view:

- Reduction of number of access in emergency for patients with different degree of cardiovascular risks
- Reduction of number of uncorrect clinical hospitalization
- Reduction of the number of visit in the same patient
- Reduction of the duration period for a first diagnosis
- Reduction of the number of consultations requested to the Specialist for the same patient

Indeed, the system has demonstrated to act as a new approach to improve the quality of care because:

- The number of controlled high-risk Patients has been increased
- The number of Patients over the pressure values threshold has been drastically reduced (about 40% of Patients maintained under pressure values of 140-90)
- More compliance to the therapy it has been documented
- Collecting local epimediological data makes possible to plan a more effective cardiovascular prevention

The following table shows the number of hospitalization and of first aid intervention before and after the introduction of Campania Salute System, in one of the project Hospitals:

Table 1: Comparison before and after the system

WHO/ISH Patient Class	First Aid		Hospitalization	
	Before	After	Before	After
<b>Low</b>	0	0	0	0
<b>Medium</b>	27 %	13 %	0	0
<b>High</b>	38 %	6 %	12 %	5 %
<b>Very High</b>	32 %	5 %	11 %	4 %

### Current status and future developments

Up to now, Campania Salute project involves 26 Hospitals and 120 GP and 10.000 citizens spread all over Campania Region.

This project was also part of the European Project “TEMETEN”, partly funded by DGXVI in the frame of “Regional Cohesion Initiatives”.

Management and elaboration of actual clinical database point out that this system is really a good support to application of common clinical guidelines (protocols) in the field of hypertension.

The system is easily exportable also in other regions, to create an interregional network.