

# eHealth strategy and implementation activities in Spain

Report in the framework of the eHealth ERA project

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**eHealth ERA**

Towards the Establishment of a  
European e-Health Research Area  
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## About eHealth ERA and this report

This report is the outcome of research in the context of the eHealth ERA project (Towards the Establishment of a European Research Area). The project was implemented by empirica GmbH (coordinating partner, Germany), STAKES (Finland), CITTRU (Poland), ISC III (Spain), CNR (Italy) as well as EPSRC and Imperial College (United Kingdom), based on a Coordination Action contract with the European Commission.

The European Commission, Directorate General Information Society and Media, supports this project to contribute towards greater transparency across Member States and other participating countries on eHealth strategies as well as innovation-oriented research and technology development (RTD) initiatives, including the coordination of Member States' eHealth strategy formulation and implementation. Thereby the project aims at fostering the establishment of an effective European Research and innovation Area (ERA) in eHealth. All project results are available on the internet and can be accessed at the *eHealth ERA* website: [www.ehealth-era.org](http://www.ehealth-era.org).

The status of activities described is generally August 2006.

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# Country Report: Spain

## 1. Healthcare System Overview

### 1.1 Basic facts and features of the Spanish healthcare system

#### *Main decision making level for health care policy in Spain*

The Spanish Health System is formed by the National Health Service whose principles and regulations are established in the Constitution (1978), The General Health Law (1986) and the Law of Cohesion and Quality (2003). The basic principles are:

- universal coverage with free access to medical care for nearly everyone
- public financing, mainly through general taxation
- integration of different health services networks within the structure of the National Health system
- decentralization and regional organization based on health areas and basic health zones
- development of primary health care with emphasis on promotion, prevention and rehabilitation activities at this level.

On January 1, 2002, the management of health care benefits was turned over to the 17 Autonomous Communities that make up the regional structure of the Spanish State. The State however maintains a series of basic powers under central government authority.

#### *The role of the Central Government*

In accordance with the current legal framework, the central government controls certain strategic areas, including:

- general coordination and basic health legislation
- financing of the system and the regulation of all the financial aspects of social security
- the definition of the benefits guaranteed by the National Health System
- international health affairs
- pharmaceutical policies
- graduate and post graduate training
- biomedical research
- regulation of biomedical devices

The Ministry of Health and Consumer Affairs is the Ministry Department with the greatest central government responsibilities, although in many matters other departments also exercise authority. This applies to the departments of Science and Education, Justice, Foreign Affairs and Agriculture.

#### *The role of the Ministry of Health and Consumer Affairs*

The Ministry of Health and Consumer Affairs has the basic responsibility of guaranteeing the rights of citizens to health protection. It is in charge of coordinating public health and health services. It is responsible for designing health policies and basic health legislation. One of the competences of the Ministry of Health and Consumer Affairs is to provide to the National Health

System a secure communication network for facilitating the safe interchange of health information among its actors.

The transmission of this information will be based on the electronic certification, encoded and electronic signature as the current legislation reflects.

The patient identifier, alerts, healthcare emergencies, the interchange of clinical information and electronic health record, the e-prescribing, the needed data for the management of the Spanish Cohesion Funds and any other healthcare information needs caused by the National Health System will be transmitted through this network

For a healthcare improvement in any centre of the National Health System to the citizens, the Ministry of Health and Consumer Affairs coordinates the mechanisms of electronic interchange of clinical and health information previously agreed with the Spanish Regions. It will lead the access to the electronic health record both patients and healthcare professionals for a better quality of the service provided and assuring the data confidentiality and integrity in any Spanish Region.

The Ministry of Health and Consumer Affairs establishes a mechanism which allows the telematic interchange of the useful information which will be necessary. The Ministry of Health and Consumer Affairs is the body within the Central Administration which proposes and implements the main government guidelines on health policy, health planning and health care. It lays down the regulations implementing the basic standards for health services and is responsible for establishing systems to facilitate information exchange and standardisation of the techniques used in diagnosis and treatment, ensuring cooperation amongst the various levels of administration. Both the General Directorate for National Health System Cohesion and the Senior Inspectorate and the Agency for Quality play an essential role in these tasks. In addition, the Ministry represents the Spanish State in international organisations.

In today's context of total decentralisation of health matters, with the Autonomous Communities determining how health services should be organised and offered, the Ministry of Health and Consumer Affairs has taken on a more supervisory role and is responsible for drawing up overall strategies for equity, quality and efficiency, acting as a basic tool for cooperation to facilitate regional initiatives. The only health management powers it holds are for Ceuta and Melilla and these are exercised through the National Health Management Institute.

The Ministry of Health and Consumer Affairs is also responsible for pharmaceutical legislation and for the processes of assessment and authorisation of drugs and health products. These tasks are carried out by the General Directorate for Pharmacy and the Spanish Agency for Drugs and Health Products. Other basic functions are public health, food safety and health research. The Directorate General for Public Health leads actions to promote health and prevent illness, including environmental health and health at work. Such preventive actions are done in collaboration with the Government Delegation for the National Drugs Plan. The Spanish Food Safety Agency is responsible for guaranteeing maximum safety and for promoting health in connection with food. The health research policy, which is also considered a top priority, is basically carried out by the Carlos III Health Institute, as well as other Ministry-run centres, such as the National Centre for Transplants and Regenerative Medicine.

Finally, the Ministry plays an important role in applying the policy for consumer protection through the General Directorate for Consumer Affairs and Citizen Information Services.

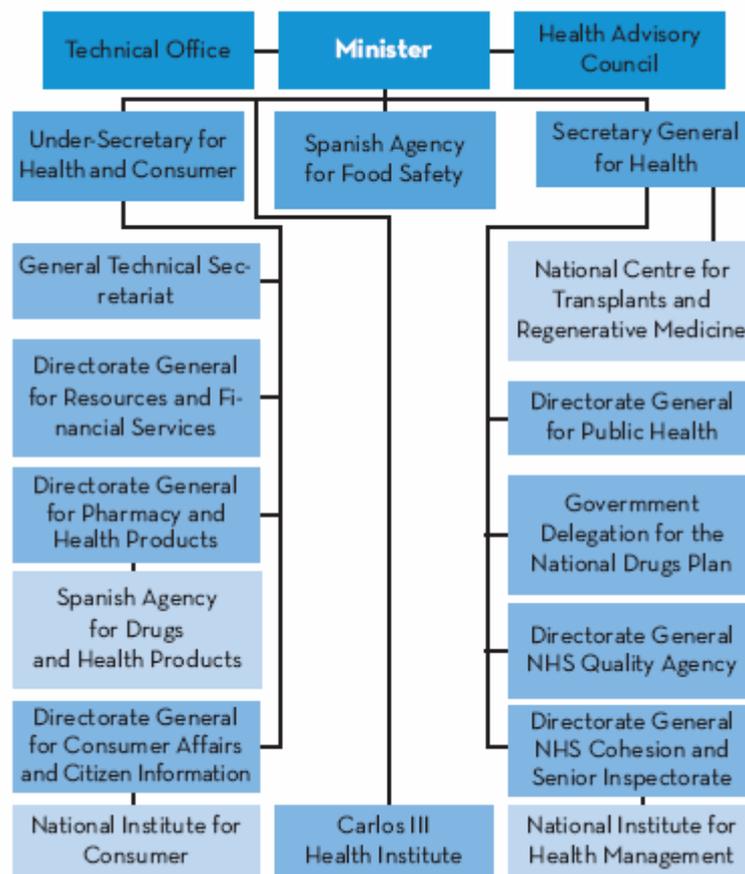
Under the direct authority of this Ministry are:

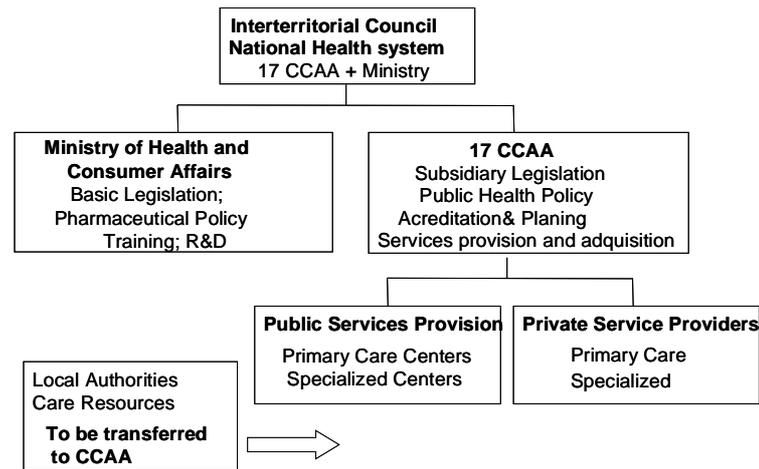
- *The Instituto de Salud Carlos III* (Carlos III Health Institute) ([www.isciii.es](http://www.isciii.es)) - whose mission is to promote and coordinate biomedical research, including health technologies; training in public health and health services management; health information; evaluation

of health technologies; awarding of scientific and technical degrees, and the development of technical functions and assessment.

Included in this Institute are the Health Technologies Evaluation Agency, the National Health School, the Health Research Archive and a number of research centres: (CNIO) National Centre for Oncology Research, (CNIC) Cardiovascular Research Centre, (CIEN) Neurological Diseases Centre and the Foundation for International Cooperation.

- *The National Institute of Consumer Affairs* – which carries out inspections, arbitration, research, training and other consumer related activities.
- *The Spanish Agency for Medicine and Pharmaceutical Products* – which includes the Sub-directorate General for Health Products.





**Fig. 2.1.1 Diagram of the structure of the National Health System and the entities that form it.**

The role of the Autonomous Governments

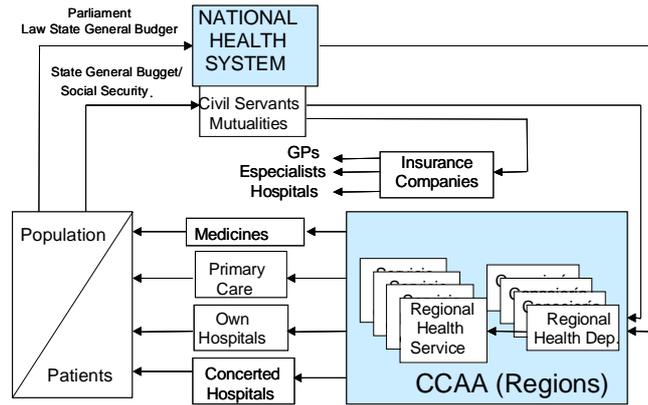
As mentioned above, the responsibility for providing health care was turned over to the 17 Autonomous Governments on Jan. 1, 2002, that have the power to plan and organize their own health services. They develop their health policies through the “Consejerías de Salud” (health departments) that in some cases are combined with the departments of Consumer Affairs, Wellbeing, Work or Social Security. Health benefits are organized through the Regional Health Services.

The inter-territorial Council of the National Health System (CISNS) acts as a coordinating body. It is presided over by the Ministry of Health and its members are the 17 Autonomous Communities. It is only an advisory body but it plays an important role in reaching a consensus on health care activities in Spain.

Health Areas

In accordance with the current legislation in force, “health areas” are the basic structures of the health system. They are defined by geographic, socio/economic, demographic, cultural, transportation and existing health care resources conditions. They cover approximately 200,000 inhabitants, although this amount may vary from one to another. Each “Health Area” is linked to at least one “Reference Hospital”. “Health Areas” are responsible for managing Primary Health Care, providing health care for persons, families and the community, including the development of prevention programs, health promotion activities, and rehabilitation and healing care. This is done through a public network of “Health Centres”.

The “Health Area” also includes Specialized Outpatients’ Care through a network of Area specialties that depend on hospitals and in some cases are supported by the same Outpatient personnel that cover “area” consultations.



**Fig. 2.1.2. Diagram of how the National Health Service operates in relation to financing, insurance and services provisions.**

Basic Health Zones

A “Health Area” can include several “Basic Health Zones”. In general they cover from 5,000 to 25,000 inhabitants. They are in general located around a Health Centre and what is called a “Primary Care Team” (EAP). There are 2,448 “basic health zones”.

Hospitals and “Health Areas” are both managed by a General manager who is designated by the Regional Health Service. In the case of EAPs, the person in charge is the Coordinator who reports to the manager of the “Health Area”.

The Autonomous Communities each have the authority to modify and restructure their management model so that their organization may vary. Nevertheless, there is a great similarity among all the Autonomous Communities.

**Main Healthcare Service Delivery Systems in Spain**

Local Authorities

Local authorities are responsible for basic sanitation and environmental health. Their role in the National Health System has diminished considerably and their resources and powers have been taken over by Regional Governments.

Large municipalities have considerable resources and carry out important health works.

Social/health care rests in large part on city halls, many of which operate tele-assistance services.

On a local level, patient associations and citizen movements are very relevant.

Other health services providers

Other public resources are Military Health Care under the Ministry of Defence and prison health care under the Ministry of Justice, which is currently in the process of being integrated into the National Health System.

The public system provides its health services mainly through its own resources but it subcontracts between 15-20% of hospital provision to private, non-profit hospitals. Catalonia is the clearest exception in the public health system since most public hospital services are supplied by non-profit, private hospitals.

### Mutual Insurance Companies for Civil Servants

In addition, there are three mutual insurance companies for civil servants that have an almost public role. They are MUFACE - General Benefit Society for State Civil Servants, ISFAS – Armed Services Social Institute, and MUGEJO – General Judicial Benefit Society. Together they are responsible for the health care of more than 2,500,000 people. The most important of these is MUFACE (<http://www.map.es/muface/muface.htm>).

The insured can choose either public care or private care based on the companies offering provision and insurance. If one chooses private health care insurance, the insured can choose among those entities that have an Agreement with MUFACE.

The choice between the Public Health System and an Insurance Company can be made each year. Each concerted Insurance Company offer within its list of services the possibility of a choice of doctors and care centres. They must offer at least two doctors for each specialty.

**Fig. 1 Health insurance in Spain 2003**

	<u>%</u>	<u>Population</u>
Social Security	83,3	34.930.500
Mut. Civil Servants (Social Security)	1,2	521.800
Mut. Civil Servants (Private Provision)	3,0	1.275.600
Community Mut. (obliged provision)	0,5	188.600
No insurance (Social Security Provision)	0,3	112.300
<b>Total coverage Social Security</b>	<b>88,3</b>	<b>37.028.900</b>
<b>Individual Private Insurance</b>	<b>0,5</b>	<b>197.700</b>
<b>Mixed coverage (Public + Private)</b>	<b>11,2</b>	<b>4.697.000</b>
<b>Total</b>	<b>100,0%</b>	<b>41.923.600</b>

Source: Ministry of Health and Consumer Affairs. *Encuesta Nacional de Salud de España*

<http://www.msc.es/estadEstudios/estadisticas/encuestaNacional/encuestaNac2003/home.htm>

### Private Sector and Health Insurance Companies

This role is minor but important. Ten percent of the population has voluntary private insurance. Some private services are contracted by the public sector. In Catalonia, as mentioned above, the

situation is special due to historical reasons, with a large number of non-profit, semi-public entities.

### The Pharmaceutical Sector

In Spain there are more than 300 pharmaceutical companies that manufacture medicines, 194 wholesalers and 20.348 pharmacies. This sector is regulated by the Medication and Health Products Agency under the Ministry of Health and Consumer Affairs.

### Public Health Spending

In accordance with the data provided by the OECD, the period between 1997-2002 demonstrates that health spending in Spain has had a lower growth rate than the average rate in other European Union countries and the OECD. While growth has been 4.3% for OECD and 4% for the EU, Spain has remained at 2.6% annually. Therefore, in 2002, health spending per capita was in the amount of 1,646 dollars (1,346 euros) as compared to an average of 2,144 dollars (1,754 euros) in the OECD.

CHANGES IN HEALTH SPENDING GDP %						
Year	1960	1970	1980	1990	2000	2004
% PIB	1,5	3,5	5,3	6,5	7,2	8,1
<b>Source: OECD health data 2006, June 2006</b>						

**Fig 2. Changes in health spending GDP %**

Finally, it should be pointed out that public health spending in Spain increases annually at a rate of only 2.4% in comparison to 4.5% and 4.1% in OECD and the European Union respectively.

The “2004 Report on World Health” by the World Health Organization shows that public health spending in Spain has decreased more than one point from 1997 to 2001, to the benefit of the private sector, which has increased one point. This report indicates that Spain is a part of a minority group of EU countries that have maintained stable or reduced their health spending in respect to their GDP. Specifically, Spanish health spending remained fixed at 7.5% of the GDP during the period under study by the WHO.

### The Hospital Network

The table shows the number of hospitals in the census for dependency and care.

**Fig. 3 Hospital for dependency and care, 2007, Spain**

	Acute Care	Geriatric and long-term care	Psychiatric care	Total
Public civil hospitals	226	36	31	293
Ministry of Defence	8	0	0	8
Industrials Accidents and Occupational Disease Mutal Funds	23			23
Private non-for-profit	71	28	25	124
Private for profit	249	58	33	340
<b>Total</b>	<b>577</b>	<b>122</b>	<b>89</b>	<b>788</b>

Source: Ministry of Health and Consumer Affairs. National Catalogue of Hospitals

<http://www.msc.es/ciudadanos/prestaciones/centrosServiciosSNS/hospitales/home.htm>

### Health Professionals

As stated by the National Statistics Institute (INE), the total number of registered doctors is over 190,000 and the number of nurses is over 220,000. Another important professional group are the pharmacists. The table provides further data

**Fig 4. Registered health professionals in Spain, 2005**

	Total
Physicians	199.123
Odontologists and stomatologists	22.150
Pharmacists	59.251
Veterinarians	25.827
Podologists	4.158
Registered nurses	231.001

Source: INE

<http://www.ine.es/>

## 1.2 National level health goals

### ***Main issues and strategic targets of the national healthcare policy and implementation in Spain***

The "Quality Plan" for the National Health System brought out recently is focused on this action lines:

- Protection, health promotion and prevention
- Promoting the equity
- Supporting healthcare human resources planning
- Promoting the clinical excellent
- Using the information technologies for improving the citizens attendance
- Increasing the transparency

Every area is formed of 12 strategies, 41 objectives and 189 action projects. Strategies:

- a) Protection, health promotion and prevention
  - Health Protection
  - Health and Life habits
- b) Promoting the equity
  - Motivating healthcare policy based on best practices
  - Analyzing the healthcare policies and proposing new actions
- c) Supporting healthcare human resources planning
  - Adapting of the human resources of the NHS to the healthcare services necessity
- d) Promoting the clinical excellent
  - Assess the technologies and clinical procedures as support at clinical and management decisions
  - Accredited and auditing healthcare services and centres
  - Improving the security of the attended patients at NHS Centres
  - Improving the patient care with certain diseases
  - Improving the clinical practice
- e) Using the information technologies for improving the citizens attendance
  - On-line healthcare
- f) Increasing the transparency
  - Design a reliable, appropriate and accessible NHS information system

The plan started on 2006 and it's a medium-long term plan. The funds for the year 2006 are € 50 M€.

More detailed information about the Quality Plan, its strategies, objectives and action projects is found at <http://www.msc.es/organizacion/sns/planCalidadSNS/home.htm> (Only available in Spanish).

## 2. Strategic eHealth Plans/Policy Measures

### 2.1 National eHealth policy

#### *Main actors*

The main actors are the Ministry of Health and Consumer Affairs (<http://www.msc.es>) and the Ministry of Industry, Tourism and Trade (<http://www.mityc.es>) but being a wide e-Health Plan other Ministries (as the Education and Science, for Public Administration, etc.) are involved in its application besides of Health Regional Governments.

#### *e-Health Roadmap*

The Regional Health Systems being part of the National Health System have focused in ICTs in the last 15 years, taking into account a lot of aspects as the opportunity, feasibility or economic issues. There are a diversity in the action lines at any Region but there are five common and great action lines:

- A reliable patient identification system (Patient Identification Card)
- The digitalisation of the patient health record (Electronic Health Record)
- A system that supports and relates the whole of the process involved in the patient and user pharmaceutical provision (prescription, visa and dispensation).
- Mechanisms for facilitating the user appointment for GPs, paediatrician and doctors (e-Appointment) and diagnostic and long distance treatment devices avoiding medical visits (Telemedicine)

#### Regulatory framework

- Law 16/2003 about Cohesion and Quality of the NHS (Ley 16/2003 de Cohesión y Calidad del SNS) establishes the regulatory framework at the National Health System on:
  - a) - Unique user and patient identification (Health Card)
  - b) - Information interchange among bodies, institutions and services.
  - c) - e-Prescribing
  - d) - Communication Network (Healthcare Intranet of the NHS)

The development of these resolutions and technical functionalities for their implementation is the Ministry of Health and Consumer Affairs competence.

The "Plan Avanza" (Avanza Plan) is a national Plan which includes several action lines and a lot of subjects some of them interconnected themselves.

The main players expected to participate are the Ministry of Health, Interterritorial Council, other Ministries, the whole Government Agencies dependent on these involved Ministries and the Regional Health Authorities.

The Avanza Plan is an initiative to bring the various regions of Spain into compliance with i2010, the European Union's initiative to ensure that Europe's governments, businesses, and citizens make the best use of Information and Communication Technology (ICT). In the effort to improve industrial competitiveness, to support growth and the creation of jobs, and to address key societal challenges—all cornerstones of i2010, promoting the social and regional equality and improving the citizens quality of life. Avanza will ensure that Spain's communications standards evolve with the rest of the European Union.

It has started different actions included within Avanza Plan during the 2005 year, as the framework agreements related with Internet at School, at Healthcare and Justice. These Framework Agreements will have developed in specific agreements mainly during the 2006.

The Avanza Plan will be developed in accordance with a carrying out strategy:

- Dynamic: The measures which the plan consists will be subject to a continuous process of feedbacks depending on monitoring of the outcomes achieved. In a dynamic way, it is assumed that for achieving the expected impact some measures could be removed, modified or added. The Plan will be revised once a year at least.
- Cooperation with the Regional and Local Authorities: The Plan proposes a carrying out model in cooperation with these Authorities. It will be formalized individual agreements with them depending on their particular priorities. The aim is to guarantee the territorial and social cohesion, furthermore a better efficiency and effectiveness in carrying out the Plan and the achievement the goals

There are some documents about the Avanza Plan located at Plan Avanza web site (<http://www.planavanza.es/>) but all of them are in Spanish. The information was made public in 2005.

### ***Targets of the national eHealth roadmap***

There are five great actions lines in the Plan:

- Home and Citizen inclusion – Developing measures to guarantee the use of ICT at home widely, encouraging the inclusion and extending the citizens participation at public life.
- Innovation and Competitivity – with measures for motivating the Spanish ICT sector development.
- Training at Digital Times – incorporating the ICT at educational and training process
- Digital Public Services – with measures and initiatives which make possible improving the services provided by the Public Administrations, increasing the quality of life of citizens and the company efficiency.  
This action line is directly relevant for eHealth. In particular healthcare professionals are specifically targeted in the dissemination activities for five projects: health identification card database, digital clinical record, e-prescription, telemedicine, tele-appointment and interoperability
- Digital Context – Deploying broadband infrastructures all over the country. Promoting the new technologies for generating confidence among citizens and companies, providing advanced security tools for carrying out new digital contents.

Furthermore, this Plan is enclosed of new rules or laws when they are necessary.

### ***Progress the implementation of the national eHealth roadmap***

As it is mentioned previously, within the national health system framework, the regional health authorities are developing the most important initiatives for improving their healthcare services based on use of new ICT. eHealth services such as electronic health records, medical appointments through the internet, ePrescribing, telemedicine systems and the patient health card are therefore being implemented – to differing extents – in all Spanish Regions.

Several initiatives to ensure nationwide interoperability of health systems are being developed by the Ministry of Health. For instance, web services were introduced for the National Health System in 2003, enabling the exchange of information and the integration of the various systems of the 17 Autonomous Communities (AC) health service organisations. These web services allow the exchange of information from the database of Electronic Health Card users, programmed derivation of the amounts required to compensate for patient flows between different ACs (via a compensation system defined by the Ministry of Health and Consumption called the “Fund of Cohesion”). They will also allow the exchange of electronic prescriptions and Electronic Health Records which ultimately support increased patient mobility. The web services exchange information by XML messages, enabling independence of platforms and applications.

The Ministry of Health is also seeking a consensus among health professionals about the content of various kinds of clinical reports and clinical record summaries.

These initiatives have been complemented with the contributions of the Avanza Plan

The Plan has started at January of 2006 but some pre initiatives have been developed since last years for setting the bases.

Red.es, Spain's government-owned agency for Information Society Development, has announced the completion of the first phase in bringing wireless broadband to the entire country. A wireless technology company has deployed the network in rural public schools, libraries and internet access centres, and now the Red.es network is expanding to areas with higher population density.

The nationwide wireless network is central to the Spanish government's Avanza Plan.

#### Future activities

Plan Avanza runs until 2010. Accordingly, the current eHealth activities outlined above are expected to be continued and expanded to other provinces and regions. Throughout this period, applications, data fields, and functionalities will be dynamically adapted and further improved to ensure continued focus on achieving and maintaining interoperability across the services of different Autonomous Communities.

### ***Preliminary plans or experiences in extending eHealth implementation to social care***

There are some preliminary initiatives, as projects, among different healthcare institutions, companies and universities related to e-health implementation to social care. But all these projects are at small environments and the initiatives are due to the partner interest for solving

some kind of own trouble or inconvenient but not due to a National Plan or Strategy by the Government.

### ***Dissemination and co-ordination activities***

The organisation responsible of these dissemination is the Ministry of Industry, Tourism and Trade, the Ministry of Health and the rest of Ministries involved but there is not more information about the coordination of these activities

The roadmap for implementing the eHealth Plan has been published in <http://www.msc.es/organizacion/sns/planCalidadSNS/tic00.htm>.

The roadmap for implementing Avanza Plan has been published by various means as Workshops, journal articles and online information (<http://www.planavanza.es/> -Spanish language-, <http://www.mityc.es/dgdsi/> -Spanish language-).

There are no particular means for the general public for expressing their opinions about eHealth policies and initiatives (except Internet forums at some Ministries websites).

## **2.2 Investment and reimbursement framework**

### ***Investments for the implementation of eHealth systems and applications supported or funded***

The investment is funded by the national government. Another important funding source are from regional government and the private sector. For National Level the Avanza Plan has a budget of € 5700 M up 2010

## 3. eHealth deployment status

### 3.1 eHealth infrastructure

#### 3.1.1 Information on Physical networks

***Physical networks available for supporting the provision of eHealth services. Technologies are these eHealth networks based. Which types of eHealth services are delivered through these regional or national networks?. Plans for future development and expansion of these eHealth networks***

<http://www.msc.es/en/organizacion/sns/servWebSNS/EsqInterope/home.htm>.

The National System of Health in Spain has been formed by the administrative decentralization as a result of the competencies of management to all the Autonomous Communities.

Within the framework of the initiatives of the Plans of Action for Ehealth in Europe, the Ministry of Health and Consumption has been developing systems of inter-operability that will foment the network between organizations, extend the areas of access to information and will permit future exchange of information inside the European Union.

In 2003, the Web Services of the National Health System began to operate enabling the exchange of information and the integration of systems for the 17 Regional Health Services. These web services enable the exchange of information from the Data Base of Information of Users of the Electronic Health Card, programmed Derivation of patients (Fund of Cohesion) and they will permit the exchange of information of Electronic Recipe and Electronic Health Record in order to make a patients' mobility possible.

The Web Services of the National Health system are based on a scheme of inter-operability that permits the integration of the different systems of the Autonomous Communities by using standard exchange of information by means of XML messages (standards of market of widespread acceptance) and enabling the independence of the platforms and applications.

There are a great variety of physical networks across all the country, to support e-Health Services. Every Regional Healthcare System has his own healthcare Network. Every network is an Intranet and is independent from other regional Intranets.

In the best of the cases, some regions have their hospitals and healthcare centres inteconected among them. In other regions every hospital has its own networks independently of other networks of regional hospitals.

The types of e-Health services delivered through these regional networks are Electronic Health Records, e-Prescribing, Telemedicine, Appointment, etc.. Some of them could belong to one region and other regions doesn't have any of these services.

Andalucia and Castilla La Mancha Regions are successs stories where progress was achieved with regard to the implementation and use of networks for e-Health purposes([http://www.juntadeandalucia.es/servicioandaluzdesalud/principal/default\\_en.asp?version=En](http://www.juntadeandalucia.es/servicioandaluzdesalud/principal/default_en.asp?version=En)), (<http://sescam.jccm.es/web/home.do>)

### 3.1.2 Legal and regulatory framework

**National legislation addressing data protection, telecommunications, digital signatures, eHealth service provision and health-IT product liability. When was legislation introduced or updated?. The relevant regional/national bodies and authorities that have the responsibility of overseeing and/or co-ordinating the legal and regulatory requirements?**

Spanish legislation addresses issues of data protection (1999) and telecommunications (2003), but does not yet cover digital signatures and telemedicine or eHealth service provision. Relevant European directives have been taken into account. The legal authorities charged with legal oversight are the Spanish Data Protection Authority (AEPD) -a government agency and all Ministries related with data protection and Digital Signature have connections with it-, the Ministry of Industry, Tourism and Trade, the Interior Ministry and the Ministry for Public Administration.

<http://www.mir.es/4>

<http://www9.map.es/>

<https://www.agpd.es/index.php?idSeccion=82>

<http://www.mityc.es/en-US/index.htm>

**Has regional or national legislation on the targeted areas been harmonized to the EU-level regulations listed below?**

- **Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 "on the protection of individuals with regard to the processing of personal data and on the free movement of such data". (Data Protection Directive)**
- **Recommendation No. R (97) 5 of the Committee of Ministers to Member States on the Protection of Medical Data and Explanatory Memorandum to Recommendation No. R (97) 5.**
- **Directive 1999/93/EC of the European Parliament and of the Council of 13 December 1999 on a Community framework for electronic signatures".**
- **Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 "concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communication)**
- **Directive 2000/31/EC of the European Parliament and of the Council of 8 June 2000 "on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market ("e-commerce Directive").**

Directive 95/46/EC - Organic Law 15/1999 of 13 December on the Protection of Personal Data. This Organic Law is intended to guarantee and protect the public liberties and fundamental rights of natural persons, and in particular their personal and family privacy, with regard to the processing of personal data.

Recommendation No. R (97) - Law 41/2002, of 14 november, basic law regulates the patient autonomy and his rights and obligations about health information and documentation and the Protection of Medical Data.

Directive 1999/93/EC - Law 59/2003, of 19 of December, Legal rules governing electronic signatures

Directive 2002/58/EC – Act 32/2003 of 3 November (State Telecommunications Act). The object of this Act is to regulate telecommunications, which include the running of electronic

communications networks and the delivery of electronic communications services and associated facilities.

Directive 2000/31/EC - Law 34/2002, of 11 of julio. Transposing into the Spanish legal system Directive 2000/31/EC of the European Parliament and of the Council of 8 June 2000 on certain legal aspects of information society services, in particular electronic commerce, in the internal market

[https://212.170.242.148/upload/Ley\\_32-2003\\_LGT.pdf](https://212.170.242.148/upload/Ley_32-2003_LGT.pdf)  
[https://212.170.242.148/upload/Ley%20Org%E1nica%2015-99\\_ingles.pdf](https://212.170.242.148/upload/Ley%20Org%E1nica%2015-99_ingles.pdf)  
<http://www.dnielectronico.es/>  
[http://www.dnielectronico.es/marco\\_legal/ley\\_59\\_2003.html](http://www.dnielectronico.es/marco_legal/ley_59_2003.html)  
<http://www.igsap.map.es/cia/dispo/24453.htm7>  
<http://www.mityc.es/NR/rdonlyres/BA9127B3-CB4E-4B9F-A0C6-C91332020384/0/LSSICE.pdf>  
<http://www.msc.es/en/normativa/home.htm>

### 3.1.3 Education and training on ICT

#### ***Education programmes on the national level to promote the acquisition of general or eHealth-specific) ICT skills by the general population***

There are some education programs related to the acquisition of ICT skills which are one of the action lines of the "Plan Avanza" (Avanza Plan) is to change the educational pattern set to an education system on the basis of/and based on ICT intensively. Objectives:

- Increasing the confidence of the training/educational community with Internet and Internet use
- Training and permanent advising to teachers and families.
- Increasing the number of high quality and useful educational materials and services.
- Stepping up the equipment in training centres, including broadband connections where it be necessary
- Promoting and energizing the ICT use at educational and family environment

<http://www.planavanza.es/> (Spanish language)

#### ***Education programmes on the national level to promote the acquisition of general or eHealth-specific ICT skills by health care professionals***

The Avanza Plan. Furthermore, there are regional initiatives for promoting this, specially the more ICT/e-Health developed ones as Andalucia, Castilla La Mancha, Galicia, etc....

<http://www.planavanza.es/> (Spanish language)  
<http://www.juntadeandalucia.es/servicioandaluzdesalud/profesionales/default.asp>  
<http://sescam.jccm.es/web/home.do>  
<http://www.sergas.es/>

## Education programmes on the national level to promote the acquisition of general or eHealth-specific ICT skills by health care administrative and support staff at all levels

The Avanza Plan. Every region has its own initiatives.

<http://www.msc.es/en/organizacion/ccaa/directorio/home.htm>

<http://www.planavanza.es/> (Spanish language)

### 3.2 eHealth applications & services

There are numerous examples of these applications within all Spanish Regions but for summarising only one example of each section is described.

#### ***Electronic Health Records***

It is necessary to mention that all Spanish Regions have the Electronic Health Record. Below there is an example of one Region but, as it is mentioned, it is not the only one.

Title of Project or Programme: JARA

Type of application: Regional health data network: patient identification; e-prescribing, EHRs and patient management

Start Date: 01/01/2004

End Date: 2008

Main partners and actors: SES (Extremadura Healthcare Service)

Status: Ongoing

A regional data network featuring patient identification, ePrescription, EHRs and patient management

<http://www.msc.es/en/organizacion/ccaa/directorio/home.htm>

#### ***e-Prescription***

The majority of Spanish Regions have project pilots of e-prescription. Below there is an example of another region.

Title of Project or Programme: Receta XXI

Type of application: e-Prescription system and drugs supply at Andalusian Pharmacies

Start Date: 01/01/2003

End Date: 31/12/2005

Main partners and actors: Andalusian Healthcare Service (SAS)

Status: Completed - It's being implemented in some provinces within the region

<http://www.msc.es/en/organizacion/ccaa/directorio/home.htm>

### **Health Cards**

All Spanish Regions have available health cards. As another example:

Title of Programme: Galician Plan of Research, Development and Technological Development and Innovation

Type of application: National Insurance card, patient (citizen) identification card

Start Date: 01/01/2004

End Date: 31/12/2005

Main partners and actors: General Secretary of RTD in Galicia and SERGAS (Galician Healthcare Services)

Status: Ongoing

<http://www.msc.es/en/organizacion/ccaa/directorio/home.htm>

### **Health Portals**

Public health service institutions give broad information on prevention and health promotion also using the Internet as one communication channel. These portals mainly aim to inform the Spanish population. Every Spanish Regions have their own portals.

There are several Internet portals which provide useful health information for the citizens and health professionals both public service institutions web portals and private ones.

As an example the Andalusian Health Portal is one of them.

<http://www.msc.es/en/organizacion/ccaa/directorio/home.htm>

### **Risk Management and Patient Safety**

The Quality Plan for the National Health System which includes initiatives as the inclusion of safe and effective innovations, and orienting the systems towards the anticipation and effective solution of health problems. The benefit of clinical actions should be evaluated, so that only those actions that improve health are taken, involving all agents in the system.

<http://www.msc.es/en/organizacion/sns/planCalidadSNS/ec03.htm> (in Spanish)

### **Patient Identifiers**

As mentioned in the Health Cards applications, all Spanish Regions have available Patient Identification as health cards. As another example:

Title of Programme: Personal Identification

Type of application: Implementation Project of Regional Patient Identification System

Start Date: 01/01/2004

Main partners and actors: SESCAM (Health Service of Castilla la Mancha)

Status: Completed

<http://www.msc.es/en/organizacion/ccaa/directorio/home.htm>

***Personal Wearable and portable communicable systems***

Title of Programme: AIRMED

Type of application: Research Programme on medical applications of mobile telecommunications

Start Date: 01/01/1999

End Date: 31/12/2005

Main partners and actors: Institute of Health Carlos III -Ministry of Health- and Vodafone Foundation

Status: Ongoing

<http://www.isciii.es>

***Other ICT tools assisting prevention, diagnosis, treatment, health monitoring, lifestyle management***

All the Regions have some kind of ICT tools. As an example:

Title of Programme: CASUS

Type of application: System for on-line user support services

Start Date: 01/01/2003

Main partners and actors: SESCAM (Health Service of Castilla la Mancha)

Status: Ongoing

<http://www.msc.es/en/organizacion/ccaa/directorio/home.htm>

***Telemedicine services***

All the Regions have some kind of ICT tools. As an example:

Title of Programme: YKONOS

Type of application: Implementation of Regional Teleradiology System covering all public healthcare installations

Start Date: 01/01/2002

End Date: 31/12/2007

Main partners and actors: SESCAM (Health Service of Castilla la Mancha)

Status: Ongoing

<http://www.msc.es/en/organizacion/ccaa/directorio/home.htm>

### 3.3 Interoperability and standards

#### 3.3.1 Technical Interoperability

##### ***Current status and future plans concerning the adoption and implementation of technical health ICT standards***

The Ministry of Health and Consumer Affairs has the legal competences concerning the adoption and implementation of technical health ICT standards depend on the e-health service, each region uses international technical standards. The Plan Avanza will set the basis for the future implementation of new health ICT services at Spain

DICOM, HL7, IHE is required by several Regions (as Galicia, Andalucia, Extremadura...).

#### 3.3.2 Semantic Interoperability

##### ***Decision-making bodies concerning the use of healthcare coding and classification systems***

The relevant decision making-bodies concerning the use of healthcare coding and classification systems are the Ministry competences.

There are some forums of standardization (as the Standardization Forum of the Health Telematics Society -[www.seis.es](http://www.seis.es)-), or the National Congress of Health Informatics) which are a yearly specific initiatives concerned with semantic interoperability which involve national and regional representatives, the Spanish Society of Health Informatics and healthcare professionals.

##### ***Use of classifications and reference terminologies***

ICD9 and ICD10

#### 3.3.3 Interoperability of Electronic Patient/Health Records

There is not a "National" Electronic Patient Record architecture in place in Spain yet. It is currently under discusión. There is not an unique scheme. The same applies to a common structure for EPRs and interoperability standards. Almost all Regions have their own architectures and interoperability. Every region is beginning to implement their own initiatives and systems due to each regional healthcare authorities has its own strategies about what kind of services and applications are necessary at regional level

#### 3.3.4 Certification procedures for eHealth systems

##### ***Conformity testing of accreditation scheme for e-health systems and application***

In 2003, the Web Services of the National Health System began to operate enabling the exchange of information and the integration of systems for the 17 Regional Health Services. These web services enable the exchange of information from the Data Base of Information of Users of the Electronic Health Card, programmed Derivation of patients (Fund of Cohesion)

and they will permit the exchange of information of Electronic Recipe and Electronic Health Record in order to make a patients' mobility possible.

The Web Services of the National Health system are based on a scheme of inter-operability that permits the integration of the different systems of the Autonomous Communities by using standard exchange of information by means of XML messages (standards of market of widespread acceptance) and enabling the independence of the platforms and applications.

Some characteristics of the plan of inter-operability are described below in detail:

#### 1. Central nucleus of services

The server of the NHS is made up of a central nucleus to deal with messages, and by specific services, which provide the necessary function. Today, the NHS implements the service of users Health card identification and the service of the patient derivation programmed assistance.

The nucleus of the NHS is a central server, accessible today throughout a SANITARY INTRANET (Health NET), which enables access to the NHS throughout an exclusive and dedicated network. The access of the client systems to the NHS throughout the above mentioned network, guarantees the level of service with regard to the bandwidth, time of response, etc., and in addition, increases the security of the system.

#### 2. No registered users

The private users, agents, or professionals, do not access the information and services of the central nucleus, but rather, to the services offered in the Regional Health Service. The applications officially installed in the Regional Health Services are the ones responsible for generating the corresponding XML messages .

#### 3. Exchange of coded and electronically signed messages

To guarantee the safety and the communication between the client systems and the nucleus of the NHS, code is used by means of the protocol SSL v3. This guarantees the privacy of the information and any exposure to un-authorized third parties.

#### 4. Independence of the platforms

When standard technologies are being used, the integration of a system with the base of information of the NHS does not need a specific software and hardware platform for the systems that try to join. The base of information of the NHS can operate with any system that is capable of generating, sending, receiving and processing XML messages.

As XML is the standard of exchange, the system is prepared for a rapid integration by other applications or systems that use the above mentioned standard, not only on a national level, but also a European one.

#### 5. Incorporating new services

The nucleus of the HNS is based on a joint nucleus of exchange, capable of processing any XML message. The incorporation of new services is carried out by means of definition of new XML messages, which enables the presentation of new functions re-using the existing platform. The operation mode does not change.

The definition of new services in the NHS client involves developing modules of treatment for the information in the systems: The generation of the XML from the information contained in the systems, and the treatment of the XML messages received. It's important to note that the whole nucleus of exchange, messages and queue handling, the locating procedure and of security, all form part of the nucleus of the NHS, therefore, it is not necessary to implement anything else to the new services.

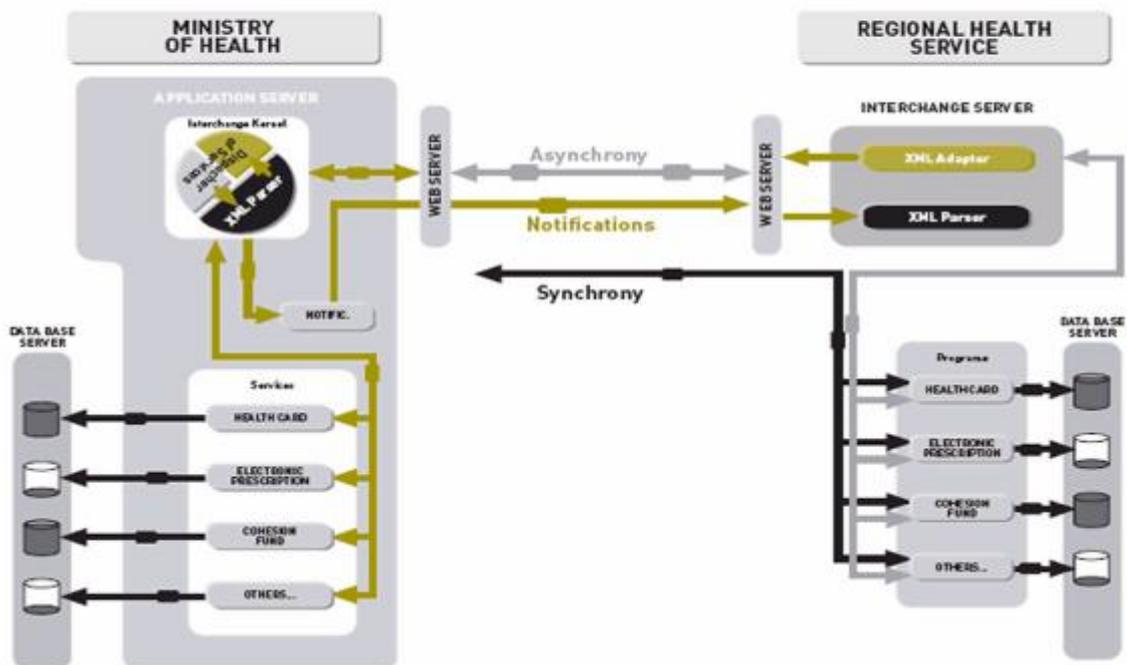
#### 6. Implementation of quality procedures

Being a centralized server and having all the information available, procedures of quality are established of precise information. In this way, unique standard codes are assigned, for all

the Regional Health Services. In the case of the Health Card service, the NHS generates a unique code of identification for every protected person which is accessible from any Regional Health Service and, in addition, will permit the inter-operability of the different electronic health cards maintaining the existing information of each one.

## Server of Exchanges of the SNS

### Global plan of operation



## 4. eHealth RTD status

### 4.1 General information on RTD structure

#### *Main actors in RTD policy setting in Spain*

- The national government: (Ministries, Agencies, Research Centres, etc..).
- The regional government of the 17 Spanish Regions (Galicia, Asturias, Cantabria, Pais Vasco, Navarra, La Rioja, Castilla y León, Aragón, Calaluña, Comunidad Valenciana, Baleares, Madrid, Castilla La Mancha, Extremadura, Andalucía, Murcia, Canarias).

#### *Main groups directly involved in or undertaking RTD activities in Spain*

The main groups are:

- University
- Research units at Hospitals
- Research Public Organizations (National Council of Scientific Research, Institute of Health Carlos III)
- Public and private companies (Pharmaceuticals, Mutual Insurance, Telemcommunications)

#### *Main focus areas and targets of RTD activities in Spain*

The Spanish National Plan for Scientific Research Development and Technological for the period 2004-2007 has several thematic areas. A summary of the main action lines of the whole Plan with a brief explanation of some important targets of the areas in RTD Plan:

- Life Sciences Area
  - National Biomedicine Programme:
    - Priorities: cancer, cardiovascular disease, nervous system and disorders, infectious diseases and AIDS, genetic diseases, disease models and therapy, respiratory diseases, other chronic illnesses, pharmaceutical research, public health, investigation in health services.
  - National Programme on Health and Welfare Technology
    - National Subprogramme supporting technologies for the disabled and the elderly
    - National Subprogramme for health technologies and research on healthcare products
    - National Subprogramme on occupational safety and health
  - National Biotechnology Programme
    - Priorities: biotechnology of microorganisms and bioprocesses, plant biotechnology, human and animal biotechnology, horizontal technological developments

- National Programme on Fundamental Biology
  - National subprogramme on molecular and cellular biology
  - National subprogramme on integrative biology and physiology
  - Strategy action on technology platforms
- Agro-Food and Environmental Sciences and Technologies Area
  - National Programme on Agro-food Resources and Technologies
  - National Programme on Environmental Sciences and Technologies
  - National Programme on biodiversity, Earth Sciences and Global Warming
- Outer Space, Mathematics and physics Area
  - National Space Programme
  - National Astronomy and Astrophysics Programme
  - National Particle Physics Programme
  - National Mathematics Programme
  - National Physics Programme
- Energy Area
  - National Energy Programme
- Chemistry, Materials and Industrial Design and Production Area
  - National Programme on Chemical Sciences Technologies
  - National Materials Programme
    - Priorities: new materials and study of their physics and chemistry, development and processing of materials, application-oriented developments, support technologies.
    - Strategic action in biomaterials
  - National Programme on Industrial Design and Production
    - Priorities: research and development of basic technologies, industrial design technologies, conceptualisation and development of products and services; processes, components, means and systems of production; sustainability of products and manufacturing systems throughout their entire life cycle, information management and production organisation
- Security and Defence Area
  - National Security Programme
    - Priorities: biosecurity, biometric identification systems; communications security, cryptography; surveillance and control systems; nanotechnologies for reconstruction of evidence; processing of earth observation data, security in transportation systems
  - National Defence Programme
- Information Society Technologies Area
  - Strategic Action for Security and Reliability of Information Systems
  - National Programme for Electronic and Communication Technologies
    - National subprogramme on communications technologies
    - National subprogramme on electronics
    - Strategic action on digital television and radio
  - National Programme for Computer Technology
    - Priorities: software engineering, software support and development technologies; intelligent systems; information management; advanced interfaces, distributed and

open systems; advanced computing and storage features; complex intelligent infrastructures; software system reliability and quality  
 - Strategic action on human language engineering adapted to Castilian Spanish and Spain's other official languages

- National Programme for Information Society Services Technology
  - Priorities: e-business; e-SME; e-training; e-administration; e-home
  - National subprogramme on e-content
  - Strategic action for e-inclusion and e-care
- Transportation and Construction Area
  - National Transportation Programme
  - National Construction Programme
- Humanities, Social Sciences and Economics
  - National Programme on Humanities
  - National Programme on Social, Economic and Legal Sciences
    - Priorities: institutions, development and sustainability; economic, social and territorial cohesion, personal and collective identity; public and private decisions, contracts and organisations and governance; the internationalisation of societies, economies and political and legal systems; cognition, cerebral function, behaviour and education; business competitiveness and sustainability and efficiency in services of public interest
- Transversal Strategic Actions
  - Strategic action in Technologies for the tourist industry
  - Strategic Action on Nanoscience and nanotechnology
  - Strategic action on e-science

[http://www.mec.es/ciencia/plan\\_idi/files/ResumenPlan\\_Ingles.pdf](http://www.mec.es/ciencia/plan_idi/files/ResumenPlan_Ingles.pdf)

## 4.2 Research Programmes

### *Major research programmes Spain e-Health RTD programmes*

Some of these are: ICT applications, Telemedicine, Health informatics/eHealth, Bioinformatics, Genomics, Proteomics, Nanotechnologies, Microdevices, New materials (incl. biomaterials).

[http://www.mec.es/ciencia/plan\\_idi/files/ResumenPlan\\_Ingles.pdf](http://www.mec.es/ciencia/plan_idi/files/ResumenPlan_Ingles.pdf)

**eHealth RTD programmes**

<b>Research Program Overview</b>	
Official name or title of the programme	Plan Avanza
Programme web site (if available)	<a href="http://www.planavanza.es/">http://www.planavanza.es/</a> (Spanish language)
Main participant organisation(s) and their roles	- Ministry of Industry, Tourism and Trade, the Ministry of Health, other Ministries and the whole Government Agencies dependent on these Ministries  - Regional Governments
Area(s) targeted by the programme	ICT Applications Telemedicine Health Informatics/e-Health
Main objectives set forward in each area	- Home and Citizen inclusion - Innovation and Competitivy (Companies) - Training at Digital Times - Digital Public Services (e-Administration) - Digital Context
Timetable for implementation of the programme	Start Date: 2006 End Date: 2010
Current progress status of the programme	Ongoing
Implementation progress with regard to the targets and milestones set in the project plan	Spain's government-owned agency for Information Society Development, has announced the completion of the first phase in bringing wireless broadband to the entire country.  The nationwide wireless network is central to the Spanish government's Avanza Plan.
Funding through the ICT-for Health, eTEN programme or other EU-research funding (if possible, indicate the actual amount and/or percentage of total funds)	The total amount of the Programme is € 5700 M

**References:**

1. <http://www.planavanza.es/> (Spanish language)
2. [http://www.csic.es/documentos/PROGRAMA\\_INGENIO\\_2010.pdf](http://www.csic.es/documentos/PROGRAMA_INGENIO_2010.pdf)

<b>Research Program Overview</b>	
Official name or title of the programme	CENIT PROGRAMME
Programme web site (if available)	<a href="http://www.la-">http://www.la-</a>

	moncloa.es/PROGRAMAS/PNR/Eje4.htm
Main participant organisation(s) and their roles	<ul style="list-style-type: none"> <li>- Ministry of Industry, Tourism and Trade</li> <li>- Regional Government</li> <li>- Companies</li> <li>- Universities</li> <li>- Public Research Institutions</li> <li>- Private Research Institutions</li> <li>- Technological Centers</li> </ul>
Area(s) targeted by the programme	ICT application, Telemedicine, Health informatics/e-Health, Bioinformatics, Nanotechnologies, Microdevices, New Materials, Biomaterials
Main objectives set forward in each area	<p>Promoting the collaboration in RTD among the participant organisations. It consists of the next action lines:</p> <ul style="list-style-type: none"> <li>- CENIT Project: Co-financing of large public and private research initiatives</li> <li>- Fondo de Fondos (“Fund of Funds”) – Investment in Private companies which invests in new technological companies</li> <li>- Torres Quevedo Programme – Finance the contracting of doctors and researchers at the private companies.</li> </ul>
Timetable for implementation of the programme	Start Date: 2006 End Date: 2010
Current progress status of the programme	Ongoing
Implementation progress with regard to the targets and milestones set in the project plan	The evaluation of the projects which presented at the 2 <sup>nd</sup> CENIT Projects Call notifications is on progress
Funding through the ICT-for Health, eTEN programme or other EU-research funding (if possible, indicate the actual amount and/or percentage of total funds)	The total Funds are € >1200 M

### References:

1. [http://www.csic.es/documentos/PROGRAMA\\_INGENIO\\_2010.pdf](http://www.csic.es/documentos/PROGRAMA_INGENIO_2010.pdf)
2. <http://www.cdti.es/webCDTI/esp/docs/informacion/ingenio%202010.pdf>
3. <http://www.la-moncloa.es/PROGRAMAS/PNR/Eje4.htm>

<b>Research Program Overview</b>	
Official name or title of the programme	CONSOLIDER Programme
Programme web site (if available)	<a href="http://www.mec.es/ciencia/jsp/plantilla.jsp?area=consolider&amp;id=3">http://www.mec.es/ciencia/jsp/plantilla.jsp?area=consolider&amp;id=3</a>
Main participant organisation(s) and their roles	<ul style="list-style-type: none"> <li>- Ministry of Education and Science</li> <li>- Other Ministries</li> <li>- Regional Government</li> <li>- Universities</li> <li>- Public Research Institutions</li> <li>- Private Research Institutions</li> <li>- Technological Centers</li> </ul>
Area(s) targeted by the programme	ICT application, Telemedicine, Health informatics/e-Health, Bioinformatics, Nanotechnologies, GRIDs, Genomics, Microdevices, New Materials, Biomaterials
Main objectives set forward in each area	<p>For increasing the quality and number of researchers. Its main areas are:</p> <ul style="list-style-type: none"> <li>- CONSOLIDER Projects – Long length financing for researching groups and networks</li> <li>- CIBER Projects – Motivating the research on Biomedicine and Health Sciences which is carried out at National Health System and the Science and Technology National System</li> <li>- I3 Programme – Give an incentive to the Science and Technology National System for the researchers-lecturers-professors incorporation</li> <li>- Strategic Fund of Scientific and Technological infrastructure – For the availability and the updating of equipments and scientific and technological facilities for the research on the Science and Technology National System</li> </ul>
Timetable for implementation of the programme	Start Date: 2006 End Date: 2010

Current progress status of the programme	Ongoing
Funding through the ICT-for Health, eTEN programme or other EU-research funding (if possible, indicate the actual amount and/or percentage of total funds)	The total Funds are € 1630 M

#### References:

1. <http://www.mec.es/ciencia/jsp/plantilla.jsp?area=consolider&id=3>
2. <http://www.cdti.es/webCDTI/esp/fgenerales/030601033.html>
3. [http://www.la-moncloa.es/NR/rdoonlyres/31E7351B-C6CB-4810-A5AA-DC5FF097F590/74695/Eje\\_4.PDF](http://www.la-moncloa.es/NR/rdoonlyres/31E7351B-C6CB-4810-A5AA-DC5FF097F590/74695/Eje_4.PDF)
4. [http://www.csic.es/documentos/PROGRAMA\\_INGENIO\\_2010.pdf](http://www.csic.es/documentos/PROGRAMA_INGENIO_2010.pdf)

### 4.3 RTD Funding - National

#### ***R&D Funding by Ministries. Amount of annual funding available for R&D related activities on the regional and national level in Spain***

##### Overview of the Spanish system of Research and Innovation

- Science and Technology Policy

The National 2004-2007 Research, Development and Innovation Plan, following the achievements of the National 2000-2003 R+D+I Plan, is a new step forward in the planning effort for action financed by the National Budget. This effort is designed to optimise the existing resources through the strengthening of cooperation and coordination with the Autonomous Communities, the conceptualisation on the international scene and the design of the financial elements and ways of participation necessary to stimulate and promote these activities.

This marked the beginning of a new stage in the government's science and technology policy. For the first time the needs of the Spanish innovation system are being addressed from the perspective of an integrated system of technological innovation, in which research and development activities play a basic—though not unique— role.

These priorities take various criteria into account. On the one hand, the general framework of globalisation of science, technology and the economy. At the other, European integration, since the National Plan must complement or reinforce the actions of the European Union (in particular the Fifth and Sixth research and development Framework Programs and the actions financed with structural funds). Finally, the initiatives of the regional authorities (through their corresponding regional plans) with which specific mechanisms of cooperation are established.

In relation to the National 2000-2003 R+D+I Plan, it can be said that it has constituted a global strategy that includes public action in this area, from basic research to technological innovation, managed by the different ministerial departments involved in R&D that are financed by the National Budget or through other sources such as financing from European Union structural funds (FEDER and FSE).

The National Scientific Research, Development and Technological Innovation Plan is the instrument through which the public sector of the state promotes and reinforces scientific and technological activities, acting as an essential reference for scientific and technological innovation policies developed by the Spanish General State Administration.

The funds for science, technology and innovation activities in the National Budget have increased significantly to more than 4 billion euros for 2004. This increase is found fundamentally in the credits that amount to 2 billion euros. Of the remaining amount, 600 million euros correspond to current expenditures in R&D public spending, 400 million in investment and 1 billion in transfers. These transfers finance participation in international programs (CERN, ESA...), and State foundations and associations, leaving only about 500 million for National R&D Programs, an amount for which specific programs and public research centres and companies compete.

- The National Scientific Research, Development and Technological Innovation Plan 2004-2007

The National Scientific Research, Development and Technological Innovation Plan 2004-2007 currently in force constitutes the strategic axis of Spanish R&D&I policy during the period of its application.

The Plan defines a series of objectives on which different actions will be built up. Some of the most noteworthy elements of the strategic plan are:

- Increasing human resources for R+D+I in both the public and private sectors.
- Reinforcing the rights and guarantees for researchers
- Strengthening the international dimension of Spanish science and technology, particularly in the European research world
- New action in larger installations
- Promoting the role of basic research and improving the communication of advances made to the general public

*Strategic Objectives:*

There are three basic pillars to the national Research and Development Plan:

- A.** Strategic objectives related to the Spanish System for Science Technology and Business:
  1. To increase the Spanish level of Science and Technology, both in size as in quality.
  2. To increase the number and level of qualified human resources, both in the public and private sectors.
  3. Strengthening the international dimension of Spanish Science and Technology, with special reference to European Research and Innovation.
  4. Reinforcing the role of the public system in generating basic knowledge.
  5. Improving the knowledge of the general public in regard to scientific and technological advances.
- B.** Strategic objectives related to the coordination of the Spanish CTE System:
  6. Reinforcing cooperation between the State Administration and the Autonomous Communities and, in particular, improving the coordination between the NP for R+D+I and the Autonomous Communities.
  7. Improving the coordination between the management bodies of the NP, as well as perfecting the evaluation and management procedures of this same Plan.
  8. Promoting cooperation and coordination among the different R&D institutions in the public sector.
- C.** Strategic objectives related to competition in the business world.

9. To enhance competitiveness and innovation in business
10. To promote the creation of an innovative business fabric
11. To contribute to the creation of favourable surroundings for R+D+I investments.
12. Improving interaction, collaboration and association between the R&D public sector and the business sector.

The new NP for R+D+I for 2004-2007 forecasts reaching an R&D expenditure of 1.4% of the GDP in the final year of the plan.

In addition, the expenditure in innovation in respect to the GDP must exceed 2.1% in 2005 and 2.5% in 2007.

<b>National indicators of the science and technology system</b>			
<b>Concept</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>
% I+D / GDP	1,03	1,10	1,22
% Innovation /GDP	1,84	1,90	2,10
% I+D industry	55,70	56,40	57,60
% on PGE	1,55	1,66	1,70
% National scientific production / total world	2,73	2,75	2,77
% Innovative companies / total companies	25,20	27,00	28,00
Increase rate new technology based firms	100*	40	60
% Patents EPO residents Spain / total	0,8	1,0	1,3
% Returns UE- RDT Framework Programme	6,1	6,4	6,5
*Data period 2000-2003 (PN I+D+I 2000-2003) EPO: European Patent Office			

Fig.- National Science and Technology System Indicators

- Participation of the business sector in the National R+D+I Plan.

Business participation is one of the points stressed in the Plan since it is estimated that in 2005, the private sector will contribute more than 56% of the total investment, an amount which will have reached 60% as the plan comes to an end. According to the last estimates for this year, the contribution by the private sector for R+D+I will be approximately 54.5%.

This plan will attempt, not only to increase the technological and innovative capacity of business companies but also to promote an innovative business fabric and create favourable investment conditions in R+D+I while keeping in view the need for increased interaction between the public and private sectors. The goal is to reach 29 innovative companies per 100 instead of the 23.5 actually in existence now in Spain.

The Plan sets out various lines of action. First it establishes sector agreements with the different productive segments. In addition, and in order to motivate the necessary R&D investment, the National Plan foresees fiscal improvements in R&D through increased, direct deductions; increasing the deduction for research personnel expenditures; increasing the deductible base for the acquisition of patents, licenses and designs, as well as raising the limit applicable in deductions for R+D+I in ICT technologies. A fiscal certificate that will guarantee the R&D investments that will be binding as regards the Treasury Department will authorize all these deductions.

In addition to a fiscal framework the Plan also stipulates support for the creation of new technological companies through Incubators y risk capital, as well as an increased coordination of the public/private interaction through the support of scientific-technological parks; support for

Offices for the Transfer of Research Results (OTRIS) and support for Technological Centres or the creation of Technological Platforms. It will also give special attention to financial support for the creation of R&D units and intellectual and industrial protection rights.

<b>RDT Total internal investment and % distribution by funding and execution sectors (1990-2002)</b>													
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Investment R&D (MEur.)	2.559,0	2.881,0	3.245,0	3.350,0	3.294,0	3.550,0	3.853,0	4.039,0	4.715,0	4.995,0	5.719,0	6.227,0	7.194,0
Investment R&D/researcher (keuros)	67,9	70,9	77,9	77,3	68,8	75,0	74,6	75,0	78,2	81,1	74,6	77,8	86,3
<b>% Funding</b>													
Public Adm.	45,0	45,7	50,2	51,6	52,4	48,0	48,0	47,8	42,7	44,7	43,4	44,3	43,6
Firms & IPSFL	48,2	48,7	44,3	42,0	41,3	45,3	46,5	45,4	50,6	49,7	51,7	48,0	49,6
Foreign	6,8	5,6	5,5	6,4	6,3	6,7	5,5	6,8	6,7	5,6	4,9	7,7	6,8
<b>% Execution</b>													
Public Adm.	21,3	21,3	20,0	20,0	20,7	18,6	18,3	17,4	16,3	16,9	15,8	15,9	15,4
High Education	20,4	22,2	28,9	31,3	31,6	32,0	32,3	32,7	30,5	30,1	29,6	30,9	29,8
Firms	57,8	56,0	50,5	47,7	46,8	48,3	48,3	48,8	52,1	52,0	53,7	52,4	54,6
IPSFL	0,5	0,5	0,6	1,0	1,0	1,1	1,1	1,1	1,1	1,0	0,9	0,8	0,2

Source: INE

Fig.- Internal R&D expenditure and its distribution by the financing and executing sectors 1990-2002

According to the R+D+I Activities Report for 2002, by the Inter-ministerial Science and Technology Commission, in 2002, companies received 40 million euros in subsidies in the amount of 60,000 euros on an average.

There are various discouraging elements for the participation of companies in R&D programs. In Spain there are management complexities in the funding for science, technology and innovation. Bureaucracy and an a priori control make it a cumbersome process. In addition companies have to face administrative and financial obstacles as well as audits and bank guarantees. The new instrument for financing innovation is also coming up against bureaucratic obstacles.

- R+D+I Activities related to KISA-Health. Plan 1999-2003

The R&D activities in KISA areas related to the KISA-health study have been financed during the past few years within the National R+D+I Plan 1999-2003.

The most relevant programs to this end have been:

- § The National Information Society Program (general)
- § The Information Society Program. Specific action on Telemedicine
- § The National Socio/Health Program

The executing data of the National R+D+I Plan gives us information on the structure of the most important KISA-Health (R&D) providers on a national level. As can be seen in the following Tables, concerning projects funded within the social/health area, the most important actors are the University research groups and those of the National Health System. There is only a very

slight presence of business firms in obtaining R&D funds from the National Plan in the social/health field.

National Social/Health Program. R&D Projects funded according to 2002 execution project area and type of organization						
Organization Type	General		Aging		Health tech.	
	n°	Subvention	n°	Subvention	n°	Subvention
University	5	153,4	20	369,2	16	943,4
Other Organisms and Public RDT	1	13,2	1	11,4	4	115,0
National Health System	9	192,2	7	249,4	19	791,2
SMEs			3	120,3	3	317,5
Non Profit Organizations			13	423,3	13	790,0
<b>TOTAL</b>	<b>15</b>	<b>358,8</b>	<b>44</b>	<b>1.173,7</b>	<b>55</b>	<b>2.957,1</b>

Fuente: Report of National RDT Plan 2003

Fig. National Social/Health Program. R&D Projects financed according to 2002 execution project area and type of organization.

In the Special Action Program of the Information Society, Telemedicine is the area with the fewest financed projects, although the amount assigned is significantly higher per project.

Funding of RDT Projects on Information Society applications (2002)								
Institution	General		e-Commerce		e-Government		e-Health	
	N°	Subvention	N°	Subvention	N°	Subvention	N°	Subvention
SMEs	51	1.231,7	11	206,7	4	48,5		
Firms (no SME)	64	1.337,1	46	695,7	17	630,4		
Non Profit private	28	1.918,3	6	401,7				
Universities							5	346,5
Other Organizations / Public Res. Centres	7	412,6			3	197,2	1	104,7
National Health System							9	435,5
Other	17	499,9	6	0,0	5	359,0	1	120,8
<b>Total</b>	<b>167</b>	<b>5.396,6</b>	<b>69</b>	<b>1.304,1</b>	<b>29</b>	<b>1.235,1</b>	<b>16</b>	<b>1.007,4</b>

Source: Instituto de Salud Carlos III, e Instituto de Migraciones y Servicios Sociales.

Fig.- Funding R&D Projects on Information Society applications according to subject area and institution carrying out research (2002)

Figure below shows the progress of the budgetary allocations for Telemedicine Strategic Action for the 2000-2003 period, in Euros, and shows the inter-annual variation. For this period 74 projects have been granted with an amount of **2.088.547,12€**. The budgetary allocation for this strategic action has experienced an important growth, which reached 951.666,61€ in the year 2001 (45,5% out of the total available for 2000-2003 period).

Budget (€)	n° Proj.	Hospitals	Research Agencies	Technical Schools	Faculties	Foundatio n/public business	Admon.	Other
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<b>Budgetary Allocation 1999 (1999-2001)</b>	292.386,38	11	6	3	1	1		
<b>Budgetary Allocation 2000 (2000-2002)</b>	844.494,13	27	16		6	4		1
<b>Budgetary Allocation 2001 (2001-2003)</b>	951.666,61	36	14	3	6	7	3	3
<b>TOTAL (2000-2003)</b>	<b>2.088.547,12</b>	<b>74</b>	<b>36</b>	<b>6</b>	<b>12</b>	<b>12</b>	<b>3</b>	<b>3</b>

Source INSTITUTO DE SALUD CARLOS III

Fig.- National Plan for Research, Technological Development and Innovation 2000-2003. (FIS) Telemedicine Strategic Action

The budget approved in 1999 relative to the Telemedicine Program was 292.386,4€ for 11 projects to be developed in the triennium 1999-2001. This quantity corresponds to 1,21% out of total FIS financed activity lines.

The most participative entities for the 1999-2000 period, related to the number of projects and total budget approved, were the Hospitals with 6 projects out of 11 (55%) and an economic endowment of 219.290 € (75% out of the total). The average amount per project for the 1999-2000 period was 26.581 €.

The main thematic areas developed during this period were: telematic resources webs, telematic communication systems, telecare, tele-diagnostic as well as expert systems for treatment and diagnosis.

During the 2000-2002 period, there have been 27 telemedicine projects funded by NP, in the amount 844.494,13€. In relation with all other activity areas funded by the FIS, it represents 3.51%.

The hospitals have been the most participative entities within this period, related to the number of projects (16 projects out of 27, 60%) and total budget approved 483.895€ (57,3%). The average amount per project for this period has been 31.277 €.

The Key actions during this period focused on Expert Systems development to assist diagnosis, robotic assistants, sensors, and virtual models to assist diagnosis, telecare and teleradiology. In 2001 call for proposals, to be implemented in 2001-2003 period, the total amount of money available to Telemedicine action reaches 951.666,61€, this figure represents 3,8% out of the total available to FIS financed activity lines.

Funding distribution by applicant entities for the 2001-2003 period is hugely diverse, however hospitals are still appearing as significant in relation to the total budget approved 637.617€ (67%). Concerning the number of projects, Hospitals appear as the most active entities with 14 projects out of 36 (39%), followed by Universities (7 projects, 20% out of the total) and technical schools (6 projects of the total, 16,6%). The average amount by project for this period reaches the amount of 26.435 €. Nevertheless, as related to the last period, there is less money available per project.

The Key actions during this triennium have focused on radiotherapy, bioengineering, Health Information Systems, artificial intelligence, treatment images and Telemedicine.

As we can perceive in figure Y, Hospitals appear with almost half of the approved projects (49% out of 74 for the 2000-2003 period).

**(FIS) Telemedicine Strategic Action by number of projects according to participative entities. 2000-2003.**

	Budget (€)	n° Proj.	Hospitals	Research agencies	Technical Schools	Faculties	Foundations/public business	Admon.	Other
<b>TOTAL (2000-2003)</b>	<b>2.088.547,12</b>	<b>74</b>	<b>49%</b>	<b>8%</b>	<b>16%</b>	<b>16%</b>	<b>4%</b>	<b>4%</b>	<b>3%</b>

Source : INSTITUTO DE SALUD CARLOS III

Fig.- National Plan for Research, Technological Development and Innovation 2000-2003. (FIS) Telemedicine Strategic Action

- Telemedicine Research. Spanish participation in the V EU R&D Framework Program

The number of Telemedicine Research Projects in which Spain participated during the V European Union R&D+I Framework Program (32 projects) increased in comparison to those projects carried out during the IV R&D Framework and Demonstration Program (22 projects).

The analysis of the distribution of financing granted to actions 1.1 and 1.2 during the V Framework Program in the ICT area for key actions, allows us to observe how the dynamics surrounding ICT lead to already existing infrastructures that receive the highest percentage of Structural funds.

In the KA1 action, with 18% of the funding, several action lines are proposed: health (1.1), persons with special needs (1.2), administrations (1.3) and transportation and tourism (1.4). Financing for Telemedicine Projects in the V European Union R&D+I Framework Program, is found within the Action Lines (1.1) and (1.2), whose priorities are to achieve an intelligent management of health services, implement the expert systems applied to health care and the development of action for improvements in the field of e-health.

If we analyse the number of projects in which Spain has participated in proportion to the number of projects for each action, Spanish participation is noteworthy in projects concerning Persons with Special Needs (1.2). Spain is present in 52.48% of the total of approved projects. On the other hand, taken in an absolute manner, the greatest number of projects (21) were obtained in the K.1.1 action, of which six were headed by Spain.

Spain heads 28.1% of the total number of projects in which it participates and the returns obtained by Spanish participants are equivalent to 8.98% of the total (122,636 Meuros).

## 4.4 Technology transfer & Innovation Support

### ***Support actions employed to promote eHealth-related innovation on the regional or national level***

One of the main areas of the Avanza Plan is the Competitiveness and Innovation action line:

- Promoting the innovation in the collaboration, encouraging the process of technology transfer, the cooperation between university-companies and the creation of regional, national and international networks.
- Promoting the innovation activity in the Company-Technology-Science system.
- Improving the use of the ICT innovation outcomes, increasing the number of patents
- Strengthen the role of the Civil Services (at National and Regional level) in the innovation system.
- Promoting the cooperation among the different Administrations.
- Increasing the personnel resources qualified in ICTs.
- Increasing the ICT adoption at small and medium sized companies (SMEs).
- Promoting the ICT adoption in the business process.
- Motivating the e-invoice implementation

<http://www.planavanza.es>

### ***Structures and mechanisms to promote eHealth-oriented innovation***

There are several initiatives for promoting eHealth innovation as conferences, seminars, working/expert groups and information and communication activities (this include regional events as well). Maybe the most important national events about this topic are the activities organised by the Spanish Society of Health Informatics which include, standardisation events, telemedicine events and the National Health Informatics Congress but some initiatives are promoted by the Ministries as well.

## **4.5 Industry Strategies and Programmes**

### ***National-ownership companies active in the area of eHealth and related RTD***

Various large Spanish enterprises are involved in producing and selling eHealth technology as well as in related research. Among the best-known examples are Telefónica, INDRA, Telvent. They are involved in a large variety of eHealth products.

There are some small and medium-sized software and ICT companies are actively pursuing the development of more advanced eHealth office and hospital systems or of systems supporting local or regional networks.

### ***Companies of multi-national ownership active in the area of eHealth and related RTD***

There are also various global companies conducting eHealth RTD in Spain. Among them are General Electric, Vodafone, IBM, Philips Medical System, Carbueros Medica, HP and others.