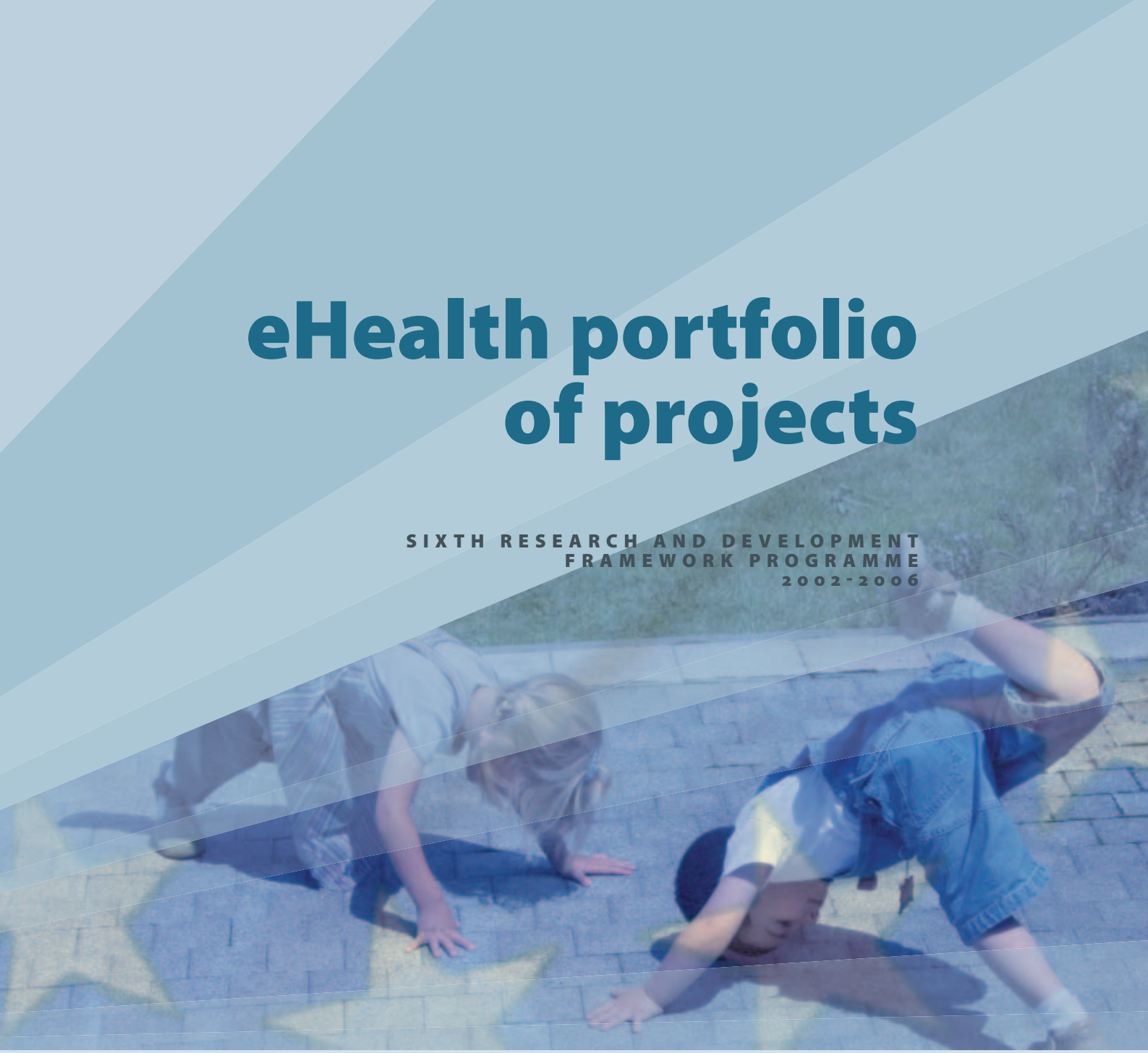
eHealth portfolio of projects

SIXTH RESEARCH AND DEVELOPMENT FRAMEWORK PROGRAMME 2002-2006



September 2007

European Commission
Information Society and Media

ICT for Health

Portfolio of the eHealth Projects in the FP6

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Project coordinators

The projects kindly provided the material needed for the intention of this portfolio. Every project contains detailed information on each project consortia and the project coordinators. The list of projects as well as the list of participants can be found in the annexes (page 151).

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Introduction

The aim of Information and Communication Technologies (ICT) for Health (also known as eHealth) is to significantly improve the quality, access and efficacy of healthcare. ICT for Health describes the application of information and communication technologies across the whole range of functions that affect the health sector. The European Commission has been supporting research activities in ICT for Health for almost two decades. This has placed Europe in a leading position in the use of regional health networks, electronic health records in primary care and deployment of health cards. These developments have contributed to the emergence of an eHealth industry.

This booklet presents a compilation of the research projects managed by the ICT for Health Unit of the Information Society and Media Directorate General. The projects are funded under the Sixth Framework Programme for Research Development and Demonstration (FP6). It also explores in brief detail the proposed and potential future directions of the ICT for Health Unit, particularly under the umbrella of the Seventh Framework Programme (FP7).

The projects are grouped in three broad thematic areas, Personal health management systems and services based on biosensors, Tools for health professionals and Biomedical Informatics. The projects are listed in alphabetical order and each thematic area is identifiable by a colour.

The Information Society and Media Directorate General

The Information Society and Media Directorate General (DG) of the European Commission is playing a key role in implementing the vision outlined by Europe's heads of state in Lisbon, 2000: to make Europe the world's most competitive and dynamic economy, characterised by sustainable growth, more and better jobs and greater social cohesion, by 2010.

For the period 2003-2006, policy initiatives undertaken by Information Society and Media DG were underpinned by the eEurope 2005[1] Action Plan. The Action Plan is a high-level policy accelerator that focused attention on and pushed forward progress in seven eEurope policy priorities: Broadband services, eBusiness, eGovernment, eHealth, eInclusion, eLearning, and Security provision for information systems and services.

It aimed to develop modern public services and a dynamic environment for electronic business through widespread availability of broadband access at competitive prices and a secure information infrastructure.

eEurope 2005 Action Plan was replaced by the i2010 initiative, announced by the Commission on June 1, 2005. It was the first Commission initiative to be adopted under the renewed Lisbon strategy following the mid term review. i2010 is a comprehensive strategy for modernising and deploying all European Union (EU) policy instruments to encourage the development of the digital economy including regulatory instruments, research and partnerships with industry.

i2010 provides an integrated approach to information society and audio-visual policies in the EU, covering regulation, research, and deployment and promoting cultural diversity. It will look for fast and visible results, building on an optimistic outlook for ICT industries and markets. It encourages fast growth around convergence of networks, services and devices. Its objective is to ensure that Europe's citizens, businesses and governments make the most effective use of ICT to improve industrial competitiveness, support growth and the creation of jobs and to help address key societal challenges. Under i2010, the Commission outlines three policy priorities:

- to create an open and competitive single market for information society and media services within the EU.

[1] The eEurope 2005 Action Plan was launched at the Seville European Council in June 2002 and endorsed by the Council of Ministers in the eEurope Resolution of January 2003

To support technological convergence with "policy convergence", the Commission will propose: an efficient spectrum management policy in Europe (2005); a modernisation of the rules on audiovisual media services (end 2005); an updating of the regulatory framework for electronic communications (2006); a strategy for a secure information society (2006); and a comprehensive approach for effective and interoperable digital rights management (2006/2007).

- to increase EU investment in research on ICT by 80%. Europe lags behind in ICT research, investing only €80 per head as compared to €350 in Japan and €400 in the US. i2010 identifies steps to put more into ICT research and get more out of it, e.g. by trans-European demonstrator projects to test out promising research results and by integrating small and medium sized enterprises better in EU research projects.
- to promote an inclusive European information society. To close the gap between the information society "haves and have nots", the Commission will propose an Action Plan on e-Government for citizen-centred services (2006); three "quality of life" ICT flagship initiatives (technologies for an ageing society, intelligent vehicles that are smarter, safer and cleaner, and digital libraries) making multimedia and multilingual European culture available to all (2007); and actions to overcome the geographic and social "digital divide", culminating in a European Initiative on eInclusion (2008).

Sixth Framework Programme Research and Development

European research activities are structured around consecutive multi annual programmes, or so-called Framework Programmes for Research, Technological Development and Demonstration (RTD). The Sixth Framework Programme (FP6) sets out a number of priorities – (which includes the Information Society Technology (IST) Priority) for the EU's research, technological development and demonstration activities for the period 2003-2006. This booklet describes co-financed projects that are falling within the domain of ICT for Health during this timeframe.

These priorities have been identified on the basis of a set of common criteria reflecting the major concerns of increasing industrial competitiveness and the quality of life for European citizens in a global information society.

The IST thematic priority of the FP6 research and development programme has contributed directly to realising European policies for the knowledge society as reflected in the eEurope 2005 Action Plan, the immediate forerunner of the i2010 initiative.

The strategy adopted in Lisbon 2000 was for an accelerated transition to a competitive and dynamic knowledge economy capable of sustainable growth, with more and better jobs and greater social cohesion. This required wider adoption, broader availability and an extension of IST applications and services in all economic and public sectors and in society as a whole. Information Society Technologies are the key underlying technologies for easier and more efficient knowledge creation, sharing and exploitation.

The objectives of IST in FP6 are to ensure European leadership in generic and applied technologies at the heart of the knowledge economy. It aims to increase innovation and competitiveness in European businesses and industry and to contribute to greater benefits for all European citizens.

Overall, the focus of IST in FP6 is on the future generation of technologies in which computers and networks will be integrated into an everyday environment, rendering accessible a multitude of services and applications through easy-to-use human interfaces. This vision of ambient intelligence places individual users at the centre of future developments for an inclusive knowledge-based society for all.

This research effort reinforces and complements the eEurope 2005 objectives and looks beyond them to the i2010 goals of the EU of bringing IST applications and services to everyone, in every home and every school, and to every business.

The Community support for IST in FP6 has helped mobilise the industrial and research community around high-risk long term goals. It has facilitated the aggregation of public and private research efforts on a European scale and enabled the development of a European Research Area (ERA) in IST.

ICT for Health participation in FP6

The mission of the ICT for Health Unit is to contribute to the better health status and well-being of all European citizens, to bring economic and productivity benefits to the health systems of all Member States, and to stimulate growth and competitiveness of the eHealth industry in Europe.

The driving vision of the Unit is the concept of an ICT-enabled citizen centred health delivery system, with special emphasis on prevention of diseases and personalisation of care.

The ICT for Health Unit has been directly involved in calls one and four. Those calls included a dedicated so-called "strategic objective" relevant to eHealth.

The Unit was also involved in co-operation with the Directorate General for Research (DG RTD) in the second Call on Nano-technologies and nanosciences, knowledge-based multifunctional materials, and new production processes and devices (NMP). Finally, the Unit participated in setting strategic objectives in both the third and the sixth Calls.

FP6, Call 1 - eHealth

This Call covered two topics which represent a continuity with the Fifth Framework Programme (FP5), and a new topic of growing interest called Biomedical Informatics. The focus of the Call was:

Personal Health Systems:

• to develop smart and wearable biosensor technology (intelligent clothing and textiles) and implants that interact and communicate with other systems and patient's points of healthcare for the constant monitoring of health concerns resulting in better management of health problems and improved disease prevention and treatment of patients,

Decision Support Systems:

• to develop ICT systems to support health knowledge management, interoperability of health information sources; medical ontologies; clinical guidelines development; methods for decision support and risk analysis evidence based medicine, and risk management,

Biomedical Informatics:

• to develop and promote knowledge in the areas of medical informatics and bioinformatics that enable disease prevention and therapy, and the development of tools enabling the individualisation of diagnoses and treatment.

The enormous interest in and the growing maturity of the sector was reflected in the huge number of proposals received in response to the publication of Call 1.

A total of 175 proposals were received for a total cost of over €1.2 billion and requesting a total grant of €915.1 million. Twenty proposals were subsequently selected, negotiated and awarded a contract. Four of them – two integrated projects: CLINICIP and MYHEART, and two specific targeted research projects: INTREPID and AUBADE were in the field of Personal Health Systems. Three networks of excellence were funded with the objective of structuring the research community in the field of Biomedical Informatics. The remainder addressed tools for health professionals for risk management and patient safety.

The table below lists the funded projects.

Project Acronym	Project n°	Instru-ment	EC funding
ALLADIN	507424	STREP	3.300.000
AMICA	507048	STREP	2.649.996
ARTEMIS	002103	STREP	1.989.000
AUBADE	507605	STREP	2.000.000
BIOPATTERN	508803	NoE	6.400.000
CARDITIS	507170	STREP	2.200.000
CARE-PATHS	507017	STREP	2.200.000
CLINICIP	506965	IP	7.500.000
COCOON	507126	IP	6.700.000
DICOEMS	507760	STREP	2.000.000
DOC @ HAND	508015	STREP	2.999.850
INFOBIOMED	507585	NoE	4.850.000
INTREPID	507464	STREP	2.000.000
MYHEART	507816	IP	16.000.000
NOESIS	507960	IP	4.400.000
PALLIANET	507863	STREP	2.350.000
PIPS	507019	IP	9.847.255
SEMANTIC MINING	507505	NoE	5.000.000
TACIT	507691	STREP	2.500.000
TMA-BRIDGE	507871	SSA	550.000
Total 20			€ 87.436.101

FP6, Call 2 - IST/NMP Joint Call - Bio-sensors for Diagnosis and Healthcare

This call, which was jointly managed by the Directorate General for Research and the Directorate General for Information Society and Media, involved 3 Units.

The long-term objective was the development of new medical instruments and/or intelligent diagnosis equipment for healthcare of the future, using advanced biosensors. Innovative biomedical sensing systems can, in combination with information technologies, offer both a reliable and easy-to-use basis for cost effective healthcare systems. The focus of the Call was on:

- Research to support the development of technological demonstrators that offer enhanced diagnostic capabilities meeting requirements of cost and disposability. Proposals were required to take into account all aspects of the development life cycle of biomedical sensors and health monitoring systems including clinical validation, networking and communication capabilities.
- Radical improvement of sensitivity, accuracy, precision, stability, selectivity, reproducibility, reliability, cost and where necessary sterilisation and biocompatibility of bio-sensing systems.
- Integration activities aiming at exploring recent advances in the fields of NMP, IST and molecular biology for increasing molecular recognition and cellular recognition capacities, thus supporting the development of the next generation of molecular recognition and cellular recognition devices.

[5] Associated Candidate Countries of the EU: Bulgaria, Romania and Turkey.

- Activities addressing health issues in a holistic manner using and/or including the development of bio-sensor-based integrated systems (non-invasive or minimally invasive, with embedded data treatment and networking/communication capabilities) allowing interactions with their environment and implementing the vision of ambient intelligence.

19 proposals were awarded a contract of which the ICT for Health Unit was attributed one Integrated Project (IP) – SMARTHEALTH and one Specific Targeted Research Project (STREP) – MicroActive.

Project Acronym	Project n°	Instrument	EC funding
MicroActive	017319	STREP	1.600.000
SMARTHEALTH	016817	IP	12.298.211
Total 2			€ 13.898.211

FP6, Call 3

The objective of the third Call were to launch complementary accompanying actions (a) to improve the participation of organisations from the New Member States and the Associated Candidate Countries[5], (b) to prepare for future international co-operations, and (c) to improve the networking and co-ordination of national, regional and European research activities.

(a) The focus was on (i) the establishment and reinforcement of networks of research organisations from the New Member States and the Associated Candidate Countries with organisations from the other Member States, (ii) information and awareness events, and (iii) the promotion of research competencies in the New Member States and the Associated Candidate Countries. Activities were expected to have a pan-European focus on thematic issues related to one or several IST strategic objectives, including eHealth.

(b) The focus was (i) to enable European researchers to access knowledge, skills, technology and facilities available outside the EU, (ii) to strengthen Europe's participation in international research and development activities and accompanying measures, and (iii) to exploit research and development and policy complementarities so as to explore mutual benefits of the co-operation and increase access to market opportunities. Again, activities were expected to focus on thematic issues related to one or several IST strategic objectives, including eHealth.

(c) Support was provided for the improved networking and co-ordination of national, regional and European research policies, programmes and funding schemes related to one or several IST strategic objectives, aiming at improved integration of European IST research.

Three projects from the first and second objectives were selected and attributed to the ICT for Health Unit.

A fourth project, called EPIST, was attributed to the eInclusion Unit. It is a Specific Support Action (SSA) which encourages the organisation of brokering events for New Member States and Associated Candidate Countries in order to stimulate interest of eventual partners from these countries in involvement in FP6 and Seventh Framework Programme (FP7) projects in both eHealth (to which half of its resources are allotted) and eInclusion.

Project Acronym	Project n°	Instrument	EC funding
@Health	015886	SSA	344.000
eHealth ERA	015854	CA	950.000
Symbiomatics	015862	SSA	550.000
Total 3			€ 1.844.000

FP6, Call 4 - Integrated biomedical information for better health

This call for proposals provided continuity with the research investment in Biomedical Informatics started in Call 1 of FP6.

Its main objective was to support research and development on innovative ICT systems and services that process, integrate and use all relevant biomedical information aimed for improving health knowledge and processes related to prevention, diagnosis, treatment, and personalisation of health care. The focus of the Call was on

- Methods and systems for improved medical knowledge discovery and understanding through integration of biomedical information (e.g. using modelling, visualisation, data mining and grid technologies). For the purpose of the call, biomedical information include not only clinical information relating to tissues, organs or personal health-related information but also information at the level of molecules and cells, such as that acquired from genomics and proteomics research.
- Innovative systems and services for disease prevention, diagnosis and treatment based on integrated biomedical data and information on several levels (molecular, cellular, tissue, organ and person levels). The work is supposed to exploit advances in cognitive modelling, grid, mobile, imaging and micro- and nanotechnologies (such as wearable health monitoring technologies) and should lead to new approaches in disease prevention, early diagnosis, pharmaceutical research (e.g. drug development, use of information from clinical trials), enhancement of patient safety (e.g. prevention of adverse drug events), and support the personalisation of healthcare and improve / enhance / benefit to lifestyle management. The proposed systems and services should demonstrate measurable benefits, respect all aspects of confidentiality and privacy and be user friendly.

In addition, the Call focused on specific support actions and coordination actions. These should focus on developing roadmaps for research and developments in ICT for health, leading to recommendations for actions and to preparatory actions at European level.

The Call asked for research and development roadmaps in the following areas:

- Interoperability of eHealth systems,
- Development of an *in silico* model of a human being (virtual human),
- Beneficial uptake of HealthGrid technologies and applications for health research and health care services.

Finally, proposals were also called to co-ordinate and support the implementation to the Action Plan of the eHealth Communication COM(2004)356, including setting up of expert groups of Member States representatives, related to their relevant national authority, to support the coordination and development of national roadmaps for the take-up of eHealth systems and services.

A total of 147 proposals were received for this strategic objective, requesting a total grant of M€522.5. 16 specific targeted research projects, 3 specific support actions, 2 coordination actions and 3 integrated projects proposals were successful in the evaluation.

After the usual negotiations, the 24 contracts were awarded.

Project Acronym	Project n°	Instrument	EC funding
@neurIST	027703	IP	12.605.239
ACGT	026996	IP	11.887.000
ASSIST	027510	STREP	2.630.000
DESSOS	027252	STREP	3.981.216
EuResist	027173	STREP	2.143.000
HealthAgents	027214	STREP	3.791.270
Health-e-Child	027749	IP	12.186.270
HEARTFAID	027107	STREP	2.089.759
I-KNOW	027294	STREP	3.092.810
ImmunoGrid	028069	STREP	1.951.042
LHDL	026932	STREP	2.250.520
MATCH	027266	STREP	2.015.033
MULTI-KNOWLEDGE	027106	STREP	2.440.000
NEUROWEB	518513	STREP	1.883.500
OFSETH	027869	STREP	2.324.353
Q-REC	027370	SSA	1.299.000
RIDE	027065	CA	1.156.266
SeaLife	027269	STREP	2.228.043
SemanticHEALTH	027328	SSA	968.860
SHARE	027694	SSA	980.000
SIMAP	027265	STREP	3.126.662
STEP	027642	CA	1.185.360
ViroLab	027446	STREP	3.334.840
WOUNDMONITOR	027859	STREP	1.665.687
Total 24			€ 83.215.730

FP6, Call 4 - Integrated Strengthening the Integration of the ICT research effort in an Enlarged Europe

The objective of this Call was to develop and validate innovative and efficient ICT-based systems and services in key application areas for the social and economic development of an enlarged Europe, with a view to strengthening the integration of the IST European Research Area.

eHealth was one of the application areas. Proposals were called for on research and development on advanced ICT-based eHealth systems and services focusing on: integrated health information systems; intelligent environment for health professionals, and online health services for patients and citizens. Proposed applications were expected to exploit advances in networking and mobile communications and ensure interoperability with existing networks. Moreover, eHealth applications were supposed to build on best practices established throughout Europe and ensure that all aspects of patient confidentiality and privacy were properly addressed.

29 proposals were received in the eHealth application area. Four proposals were successful in the evaluation and were awarded a contract.

An additional project (iWeb care) is supported by the eGovernment Unit. It focuses on preventing monetary mismanagement in the administrative application of several public services, one of which is eHealth.

Project Acronym	Project n°	Instrument	EC funding
HEALTH-PLUS	027126	STREP	2.200.000
RIGHT	027299	STREP	1.942.000
K4CARE	026968	STREP	3.133.785
SAPHIRE	027074	STREP	2.040.775

Total 4 € 9.316.560

FP6, Call 6 - Ambient Assisted Living for the Ageing Society

The ICT for Health Unit is involved in the Ambient Assisted Living strategic objective of Call 6 of FP6.

The aim of the Call was to extend the length of time for which elderly people can live independently in their preferred environment using the support offered by ICT solutions. It targeted the needs of individual elderly persons, their families and caretakers, rather than the health care institutions. This includes assistance to carry out daily activities, the monitoring of health and day to day activities and enhancing patient safety and security. It also covered means to improve access to social, medical and emergency services, and to facilitate social contacts as well as access to context based infotainment and entertainment.

Research will aim at highly innovative ICT-based solutions that are cost effective, reliable and user-friendly for assisted living. They will take into account design-for-all principles, where applicable. It will lead to integrated environments that bring together progress in various ICT building blocks and respond to key user requirements.

22 proposals were received in the eHealth application area. Three proposals were successful in the evaluation and were awarded a contract.

Project Acronym	Project n°	Instrument	EC funding
Caalyx	045215	STREP	1.850.000
Emerge	045056	STREP	2.449.964
Oldes	045282	STREP	2.500.000

Total 3 € 6.799.964

Future Activities of the ICT for Health

Working towards the Seventh Framework Programme

During FP6, ICT for Health began supporting research on systems for improving our understanding of diseases and enabling greater involvement of citizens in healthcare delivery.

These efforts have been the stepping stones to the support of ICT for Health activities under the Seventh Framework Programme (FP7). FP7 aims to support the change in the way healthcare is delivered and the way medical knowledge is managed and transferred to clinical practice.
This change entails a two-fold paradigm shift:

a) from **symptom-based** to **preventive healthcare** and
b) from **hospital-centred** to **person-centred** health systems.

Realising this paradigm shift will ensure continuity of care at all levels, from prevention to rehabilitation, and at all places where citizens/patients may need care, whether inside clinical settings or in their ordinary living and working environments. It will also enable the provision of personalised care, from lifestyle and health management to customised medicines and treatment.

As healthcare is an information-intensive domain, ICT for Health can be instrumental in supporting this paradigm shift by developing systems and services to:

- ***accelerate the advancement*** of medical knowledge and ***improve the understanding*** of disease related processes;
- ***empower citizens*** to become actively involved in managing their own health;
- ***improve*** the ***prevention*** and ***early diagnosis*** of many diseases, thus reducing overall healthcare costs and improving citizens' quality of life;
- ***enhance patient safety***;
- ***enable cost-effective management of chronic diseases***; and
- ***facilitate active ageing*** and ***independent living*** for the ageing population. The proposed research activities focus on three main areas:

Personal Health Systems
for preventive healthcare and patient empowerment…

Support to Personal Health Systems continues in FP7. In the first call of FP7, the focus is on two main areas:

a) **Personalised Monitoring:** This entails solutions based on wearable or portable ICT systems, which empower citizens to participate in healthcare processes and facilitate remote monitoring and care. These solutions are targeted at persons at risk (preventive monitoring) or with chronic health conditions (chronic disease management). The emphasis is on non-invasive or minimally-invasive, multi-parametric monitoring, which is combined with expert feedback and care, in closed-loop systems.
b) **Point-of-Care diagnostics:** This area refers to systems for multi-analyte screening applications at primary care level. These are based on portable or handheld devices, capable of carrying out multiple tests at e.g. genome and proteome levels. The aim is to: identify predisposition to diseases; enable early diagnosis of a disease or its recurrence; and provide detailed information to aid treatment, such as dosage advice or indications when an individual should not be treated by a particular drug.

Management of Health Risks
to enhance patient safety…

The importance of managing health risks and improving patient safety is fast becoming a priority issue on the health agenda. Health risk and patient safety should therefore be taken into account by all eHealth solutions. Data mining techniques, adverse event reporting systems, risk assessment algorithms and decision support algorithms applied to data in electronic health records can save lives by preventing adverse events and risky procedures. Virtual clinical trials should also reduce the risk for patients participating in such trials. Furthermore, health pathway models, encompassing citizen/patient passage through clinical pathways, would improve the prior identification of all risks to citizens's future health. Modelling and simulation of health pathways and patient profiles can determine quantitatively

the risk associated to each treatment or operation and optimise the patient recovery. Research on ICT tools for monitoring and risk management of large scale events, like the spread of pandemic diseases or bio-terrorist attacks, is also crucial.

Virtual Physiological Human for disease understanding and simulation…

The flagship activity for FP7 in the area of Biomedical Informatics is the development of a computational framework for multilevel modelling and simulation of human anatomy and physiology, the Virtual Physiological Human. This is seen as the "grand challenge" for several disciplines at the crossroads of ICT and biosciences. Its ultimate goal is to let scientists and medical practitioners know as much as possible about the "real physiological human" by tackling all areas of human anatomy and physiology and integrating data from all levels (molecule, cell, tissue, organ, etc). It also aims to enable the transition to personalised healthcare, based on the use of models, simulation and visualisation techniques for predicting the outcome of interventions (surgical and pharmacological) on the individual. The concept of the Virtual Physiological Human can also assist the design of targeted implants and artificial organs for the individual, as well as the discovery of innovative personalised drugs.

An example of a cross cutting theme to be addressed in FP7 includes **HealthGrid**, an **infrastructure for biomedical research and applications**. HealthGrid is concerned with the use of Grid technologies in the biomedical field. HealthGrid represents not only access to and sharing of large distributed data sources, but also a high performance/high throughput infrastructure for computationally demanding applications and a problem solving environment for biomedical research and patient care. From the perspective of healthcare provision, HealthGrid promises to support the deployment of health information networks and play a role in interoperability standardisation activities.

The vision of HealthGrid requires close collaboration between projects developing Grid middleware, deploying Grid infrastructures and developing end-user biomedical Grid applications. In the FP7, HealthGrid will represent an enabling technology for many research fields in eHealth. This is particularly true for the domains of the Virtual Physiological Human and the technical and semantic integration of data.