

# ICT for Societal Challenges



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# Editorial

The **Digital Agenda for Europe** – one amongst the flagship initiatives under the **Europe 2020 Strategy** for smart, sustainable and inclusive growth – focuses on citizens and businesses' needs, addressing them by benefiting from 21<sup>st</sup> century technology and online services to boost job creation, promote economic prosperity and improve the daily lives of all Europeans.



Amongst the priority areas for action – including a digital *single market*, greater *interoperability*, boosting *internet trust and security*, much *faster internet access*, better *investment in research and development* – some are particularly close to concrete issues faced by citizens and society as a whole, such as ageing, health, digital skills and climate change.

How does the Digital Agenda for Europe contribute to addressing these societal challenges? How would a future digital society look like?

Thanks to Information and Communication Technologies (ICT), solutions that are or will soon become reality, it will be possible to provide all citizens, regardless their location, with **better and personalised healthcare**, achieving at the same time relevant cost savings for patients and the society at large.

Citizens and business' **interactions with public authorities will be faster and more effective**, also across the borders. A greater number of people will be able to **live safely and independently**, and those from disadvantaged groups will be able to get fully involved in society. Last but not least, ICT will help tackling environmental issues, such as **energy saving, in the perspective of a sustainable growth**.

This booklet will present you with the latest developments in ICT research and innovation in the field of societal challenges. A showcase of projects will illustrate the benefits ICT currently offers as well as its strong potential in addressing and solving societal challenges, showing how very concrete results are achieved through multidisciplinary solutions. Indeed, the involvement and mobilisation of key stakeholders – including industry (e.g. textile, automotive, robotic, biomedical, telecoms, utilities and electronics), governmental actors (European, national, regional and local authorities), universities, research centres and civil society – is and will be an indispensable point of strength to satisfy societal needs.

Enjoy the reading!

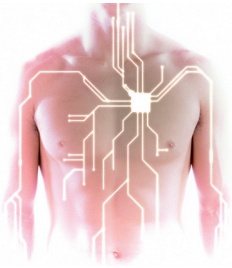


**Paul Timmers**  
Director ICT for Societal Challenges  
DG Information Society and Media  
European Commission

## Editorial team

Tiziana Arcarese  
Gemma Carolillo  
Peter Chloupek  
Anja Duchateau  
Elena Guarneri





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# Better and personalised healthcare, anywhere and at a lower cost

Better quality of care and controlled medical costs enable people to live independently: Information and Communication Technologies (ICT) have already strongly contributed to these goals but much more is still to be done in the future. By 2020 around 25% of the EU population will be over 65 and the ratio between people at work and the remaining population is expected to become 2 to 1, from the current 4 to 1. Tackling demographic trends due to ageing is one of the challenges where ICT can play a significant role. eHealth technologies enable the delivery of better and more efficient services to Europeans, regardless their location, by granting online access to personal health information, by supporting an early diagnosis for diseases and personalised therapies, as well as through implementing innovative telemedicine services. Ultimately, ICT should enable users to better manage their health and lifestyle, with a strong impact on the quality of the service received and of the health costs sustained by society.

But how to ensure secure availability of health information, an earlier disease diagnosis and faster, more tailored medical treatments? The **Digital Agenda for Europe** has defined a number of objectives, including the implementation of interoperable patient data records – which can be safely accessed and exchanged electronically across the EU by 2012. By 2015 all Europeans should have secure online access to their medical data and telemedicine services should be widely deployed by 2020.

## Managing health data

Up to 50% of European adults search online for health information. The need for widespread online access to accurate information on diseases and therapies, as well as to personal health data, is essential.

The **MyHeart** project focuses on the benefits coming from health information management for patients and carers. It developed intelligent systems (clothes with integrated sensors) for the prevention and monitoring of cardiovascular diseases, which are the leading cause of death in developed countries. In Europe only, about 45% of deaths are due to cardiovascular diseases and 20% of citizens suffer from chronic forms of these illnesses. The system gathers data on key health parameters, enabling different users such as people with cardiovascular diseases or those at risk of cardiovascular diseases but also healthy people, to control their health status and to improve their quality of life, while reducing the costs related to treatments.

### MyHeart

The project developed four prototypes:

- Activity Coach: making the most of physical exercise in terms of pleasure and health impact;
- Take Care: assessing and lowering risk factors for cardiovascular diseases by monitoring vital signs as well as by coaching and motivation;
- Neuro Rehab: improving and shortening rehabilitation processes;
- Heart Failure Management: improving life quality and expectancy of heart failure patients by early prediction and improved patient self-management.

<http://www.hitech-projects.com/euprojects/myheart/>

Funded by the Sixth Framework Programme (FP6)

Health information management and comparing clinical cases across Europe are at the basis of the **@neurIST** project. Clinicians can immediately see all relevant information about patients who suffered from cerebral aneurysm, similar cases previously managed and findings reported in scientific literature. By combining this information with new models based on numerical techniques, **@neurIST** aims to significantly improve the assessment of rupture risk for the patient and to help the clinician to optimise clinical care.

#### **@neurIST**

@neurIST adopted an IT infrastructure consisting of four software tools which:

- support the collection of personal and public data that might be relevant to treatment;
- complement data with new mathematically-derived measures, collection and processing complementary genetic data on a large number of patients;
- derive from evidence-based information by combining all data with observations of rupture in a large patient group;
- present information on treatments and outcomes in similar cases from participating centres across Europe.

<http://aneurist.org>

**Funded by the Seventh Framework Programme (FP7)**

Access to healthcare data also helps researchers to produce more accurate and faster tests on medicines to be launched on the market. Before a new drug is made available it is tested on a few thousand people. Once it is on the market, clinicians are responsible for recognising and reporting suspected side effects. However, a number of recent drug safety issues showed that adverse effects of drugs may be detected too late, when millions of patients have already been exposed to them. The **EU-ADR** project exploits advanced information and communication technologies to develop new ways of using existing clinical and biomedical data sources for the early detection of Adverse Drug Reactions (ADRs). The project uses anonymous electronic healthcare records of more than thirty million European citizens, who in turn will benefit from safer medicine consumption.

#### **EU-ADR**

The system collects information on the use of a drug in several European countries, as well as associated drug use and background rates of adverse drug events in the population. It then applies text mining, epidemiological and other computational techniques to assess and detect 'signals'.

The system also relies on the increasing wealth of available biomedical knowledge to gather information on the plausibility and potential susceptibility of every signal, in order to minimise false positives. Once generated, signals are substantiated by applying causality criteria.

<http://www.eu-adr-project.com>

**Funded by the Seventh Framework Programme (FP7)**

## **Benefiting from personalised care**

More effective care starts with a more precise diagnosis based on the patient's health history and current situation. ICT helps health professionals to improve the diagnosis and to adapt treatments to the patient's specific needs and profile.

The **euHeart** project builds computer models of the ill heart to personalise and optimise the selection of the most indicated treatment in several cardiovascular diseases such as heart failure and heart rhythm disorders, and also coronary artery, valvular and aortic diseases. The simulation tools can be used by the doctors to predict the outcome of different types of therapy. The result is not only beneficial to patients, who get personalised and safe care, but also to society, thanks to lower medical costs.

#### **EuHeart**

It employs clinical data from various sources, such as medical imaging, measurements of blood flow, blood pressure and electrocardiography. Computer models integrate heart behaviour and the aorta at molecular, cellular, tissue and organ level. These models also incorporate knowledge about how the cardiovascular disease disturbs the correct functioning of the heart at these levels.

<http://www.euHeart.eu>

**Funded by the Seventh Framework Programme (FP7)**

Infant and childhood diseases are a large and under-appreciated public health problem. Given that these patients have long lives ahead of them, the burden and costs are substantial for both families and society.

The **Health-e-Child** project sheds new light on paediatric disease management, using a large set of information, deriving from a personalised anatomic model extracted from advanced imaging, for an earlier identification and a more tailored treatment of serious congenital heart diseases. The Health-e-Child databases and infrastructure helps to improve the success rates of resolving difficult medical cases, it helps to save children's lives, it results in lower medical costs and reduces treatment duration. Its follow-up project Sim-e-Child, focused on the tetralogy of fallot disease, started early 2010 and is being internationally extended by involving two U.S. partners.

#### **HEALTH-e-CHILD**

The Health-e-Child project supported clinical decision making by improving disease identification and linking similar cases across a network of leading hospitals.

The availability of Health-e-Child databases enabled researchers to conduct a new generation of epidemiological studies, based on broader, better-integrated, and 'cleaner' information.

<http://www.health-e-child.org/>

**Funded by the Sixth Framework Programme (FP6)**

The **HeartCycle** project builds on the work of MyHeart and takes a more personalised approach to heart disease management. It has developed technologies and services to remotely monitor heart patients at home motivating them to comply with treatment requirements and to adopt a healthy lifestyle. The project is targeted at heart failure and coronary artery disease patients. Closely monitoring the effects of medication and lifestyle allows for a more personalised treatment plan, which may, for example, include adjustment of medication on a more frequent basis or configuration of personalised exercises.

#### **HeartCycle**

It is based on a system consisting of an inner home-based loop directly interacting with the patient, giving feedback, motivation and tailored help; an outer loop involving medical professionals to maintain a personalised care plan for optimal therapy. The daily analysis of the patient status through easy-to-use wearable sensor technologies allow for a much more frequent and earlier adaptation of the therapy and for immediate intervention in case of unfavourable trends.

<http://www.heartcycle.eu>

**Funded by the Seventh Framework Programme (FP7)**

## **Adequate care to everyone, everywhere**

Providing patients with the needed treatment, wherever they are, is one of biggest challenges of eHealth. On one hand this implies sharing good practices in diagnosis and treatment of diseases and, on the other hand, in giving the opportunity to people to travel freely throughout Europe – knowing that they themselves or their carers can access the necessary health information from anywhere. The resulting impact on health safety and quality of life is massive: the availability of vital information, especially for patients suffering from chronic diseases, enables them to move across borders without anxiety and to receive the most appropriate treatment whenever needed.

Pioneer in this field, the **epSOS** pilot project validates and improves patient summaries, which include general and medical information about the patient and his current medications, and ePrescription, in order to get the required medicine in any foreign pharmacy participating in the epSOS pilot phase, across EU borders.

#### **epSOS**

It aims at improving medical treatment of citizens while abroad by providing healthcare professionals with the necessary electronic patient data. The result is a service infrastructure enabling the exchange of patient data – Patient Summaries and ePrescriptions – across borders.

<http://www.epsos.eu>

**Funded by the ICT Policy Support Programme (ICT PSP) – Competitiveness & Innovation Programme (CIP)**

The widespread usage of telemedicine services - based on interaction between doctors and patients or among health professionals through electronic media - is an opportunity for citizens and a driver of great economic impact: the European telecare market is expected to be worth more than five B€/year by 2015. However, despite a general level of maturity in telemedicine applications and Personal Health Systems (PHS) - devices which enable the provision of personalised health services regardless the patient's location - the market is not yet developed on a large scale at local, regional, national or even international level, and, although there are some good examples, transfer of solutions across healthcare centers and borders are not yet the rule. The new project epSOS II is working on this last issue, welcoming 11 new European and external countries.

The **Renewing Health** project aims at delivering telemedicine and PHS services to the large segment of the population suffering from Chronic Obstructive Pulmonary Diseases (COPD), diabetes and cardiovascular diseases. The project implements large-scale real-life pilots for the validation and evaluation of innovative and patient-centred PHS and telemedicine services using a common rigorous assessment method (MAST). The ultimate goal is to demonstrate that PHS and telemedicine services are sustainable and improve the quality of life, and moreover they enable patients' involvement and empowerment while optimising the use of resources in healthcare provision.

#### **RENEWING HEALTH**

Applying the Model for Assessment of Telemedicine (MAST) on a total sample of 7900 patients suffering from COPD, the project provides the foundation for evidence of the effects of telemedicine services and PHS. Regions and partners collaborate to manage issues such as integration, patients' involvement and user perceptions, as well as transferability of knowledge and results pooled by the project to other regions in Europe.

<http://www.renewinghealth.eu>

Funded by the ICT Policy Support Programme (ICT PSP) – Competitiveness & Innovation Programme (CIP)



# Effective online public services for citizens and businesses

Effective interaction between public administrations, citizens and businesses is essential to build the digital society. Online delivery of basic services to citizens (e.g. personal documents and certificates, income taxes and job search tools) and businesses (e.g. company registration, social contributions, corporate tax, VAT) help public authorities to meet people's needs. Today, many public services are available online. While the "passive" use (e.g. reading information) of public authorities' websites has remained pretty stable over the past years, there has been a steady increase in the "interactive" use of these services, such as the downloading of official forms (from 20% in 2004 to 27% in 2009) and returning completed forms (from 11% to 20%). However, progress still has to be made. Today, less than 40% of EU citizens and 70% of EU businesses use online public services in Europe. Also, most public services do not work across borders, and services for online registration of new companies are still lagging behind.

The European Commission is working towards effective online public services via the **eGovernment Action Plan**, which aims to empower users to actively contribute to the production of eGovernment services or even policy-making, fostering transparency and openness of digital public administrations services to function as efficiently in other EU Member States as they do at home, and increasing the overall usage. Concrete goals include the registration of data with governments on a "only once" basis, the EU-wide use of national electronic identities (eID), the personalisation of services to better respond to real user needs and the promotion of more open, proactive and transparent administrations.

The eGovernment Action Plan is fully in line with the **Digital Agenda for Europe** (DAE) which addresses these challenges by ensuring that public sector websites are fully accessible by 2015; by requesting Member States to agree by 2011 on a common list of key cross-border public services; implementing seamless cross-border e-Government services in the EU single market, with the ultimate goal of enabling companies to set up and run a business, and for citizens to study, work,

reside and retire anywhere in the EU. Key in the strategy is the development of large scale pilot projects (LSP) engaging stakeholders such as public authorities, service providers and research centres across the EU in the implementation of common solutions to deliver online public services and make them accessible throughout Europe. So far, three LSP have been developed – STORK, PEPPOL and SPOCS – and one, e-CODEX, was launched in January 2011.

## Cross-border public services to make life easier for citizens and businesses

Most public online services do not work across borders or involve heavy procedures to be accessible. People from one EU country cannot easily apply for public services in another country than the one in which they are established, using for instance national electronic identity cards. This reduces the mobility of citizens and businesses.

Interoperability refers to the possibility of different systems and organisations to work together and exchange information electronically. It is central in the DAE strategy for public services, which highlights the importance of ICT-based solutions to for example, enrol in higher education, register a car and participate to a public tender throughout Europe.

Building on the existing national electronic public services, the **STORK** project extends current national services to a new level by making them accessible across borders through users' electronic identities. It has developed a European Electronic Identity (eID) Interoperability Platform allowing citizens to use their national electronic identities to access public eGovernment services in other Member States, in full respect of data protection and privacy rules.

### STORK

The project implements six pilot initiatives:

- 1 – Cross-border authentication for online public services via eIDs;
- 2 – Cross-border safer Chat application ;
- 3 – Student Mobility;
- 4 – Cross-border eDelivery;
- 5 – Change of Address;
- 6 – Citizens identification and authentication to access EC applications via national eIDs.

<http://www.eid-stork.eu>

Funded by the ICT Policy Support Programme (ICT PSP) – Competitiveness & Innovation Programme (CIP)

eProcurement is one of the high impact services representing a major portion of Europe's economy – some 16% of public administration expenditure. Increase in trans-EU procurement serves the goal of a single market, it can make Europe more competitive especially for SMEs, and it offers substantial efficiency gains.

Companies often find it difficult to access public procurement. Moreover, while many EU countries are using electronic procurement (eProcurement) to make bidding for public sector contracts, these solutions are often implemented as isolated islands within Member States. The **PEPPOL** project aims at making public procurement easier and more efficient by improving electronic communication between companies and government bodies. PEPPOL is an important step towards achieving the Single European Market by enabling the connection between existing

### PEPPOL

The project allows any company in the EU to communicate electronically with any EU governmental institution to fulfil procurement procedures. This will result in benefits for SMEs and EU governments at every level that will enjoy reduced costs through automated and simplified processes and more competition in bids. Electronic processes also ensure transparency and better control of funding, as well as the possibility of facilitating green and sustainable procurement.

<http://www.peppol.eu>

Funded by the ICT Policy Support Programme (ICT PSP) – Competitiveness & Innovation Programme (CIP)

eProcurement communities, which is essential to allow businesses to bid for public sector contracts and handle ordering and invoicing anywhere in Europe.

Benefiting from the results achieved by PEPPOL and STORK, the **SPOCS** project aims at building the next generation Points of Single Contact (PSCs) – intermediaries between service providers and national public administrations - through electronic procedures. The PSCs are “one-stop shops” that fulfil two main functions: information dissemination and online completion of administrative procedures. However, there is still a limited availability of online procedures and the interoperability between national eGovernment services is poor. In this context, SPOCS aims at providing seamless electronic procedures by enhancing cross-border interoperability. It is expected to contribute to fostering competitiveness, gaining efficiency and administrative simplification, increasing transparency and user-friendliness of procedures for service providers and recipients.

### SPOCS

SPOCS addresses:

- User identification and authentication;
- Provision of supporting electronic documents;
- Syndication of data and eDirectories;
- A Secure delivery and data tracking exchanges.

<http://www.eu-spocs.eu>

Funded by the ICT Policy Support Programme (ICT PSP) – Competitiveness & Innovation Programme (CIP)

Interoperability between legal authorities is at the basis of the **e-CODEX** project, launched in January 2011 to improve cross-border access of citizens and businesses to the judicial system of other countries in Europe. By developing a collaborative approach, e-CODEX will work on a sustainable e-Justice area with fewer practical and technical barriers throughout Europe.

### e-CODEX

e-CODEX mainly builds on existing national solutions to develop a pan-European interoperability layer. Connecting existing systems will allow communication and data exchanges based on the development of common technical standards in the field of e-Identity, e-Signatures, e-Payment and e-Filing.

<http://www.ecodex.eu/>

Funded by the ICT Policy Support Programme (ICT PSP) – Competitiveness & Innovation Programme (CIP)

### EGOV4U

EGOV4U offers a multi-channel approach. The main channels are ICT-based but may be self-service (one-stop shops, walk-in locations) or face-to-face and facilitated by practitioners or intermediaries.

<http://www.egov4u.eu>

Funded by the ICT Policy Support Programme (ICT PSP) – Competitiveness & Innovation Programme (CIP)

## Citizens on the move

More and more Europeans live and work in a country different from their country of origin. A strong cooperation between Member States is therefore a high priority to allow for an effective transmission of individual data between national authorities.

The **European Civil Registry Network** project (ECRN) is based on a software system and common infrastructure among Civil Acts Registries of national administrations allowing EU Member States' local administrations to exchange civil status acts (birth, death, marriage, divorce etc.) in electronic form via internet in a fast, secure and certified way. Civil servants are the ECRN main target groups.

## Making online public services available to all citizens

In 2010, 30% of EU citizens had never used the Internet and had therefore never benefited from e-Government services. They often belong to the most socially disadvantaged groups (the elderly, the unemployed, people on low income, disabled), with the greatest need of public service resources.

The objective of the **EGOV4U** project is to provide socially disadvantaged citizens with online services targeted to their needs. It does so by making technology available in people's homes and in their community; by sharing and re-using best practice solutions for flexible, personalised and multi-channel services and assessing their outcomes; and by providing training and disseminating results across the EU. Central to the strategy is the involvement of the third sector (e.g. NGOs) and local actors to deliver the service.

Reducing administrative burdens for businesses is a challenge for public administrations. The **Rural Inclusion** project deploys existing infrastructures offered by regional public authorities to facilitate the use of innovative online public services by businesses – particularly SMEs - in rural areas.

### RURAL INCLUSION

It focuses on supporting existing public services through a rigorous and reusable service process analysis and modelling, and facilitates the correct identification of small businesses' needs and requirements. The service is complemented by a number of other web-based applications facilitating communication between businesses and regional public authorities in rural areas.

<http://www.rural-inclusion.eu>

Funded by the ICT Policy Support Programme (ICT PSP) – Competitiveness & Innovation Programme (CIP)

## Active participation in political life and decision-making

Is participation in politics and decision making still something which is limited to a few groups? Technology - particularly social media - is contributing a lot to involving more and more people in the political debate. However, information and resources made available to citizens by governments and public administrations can be difficult to understand. This leads to a sense of detachment and disillusionment towards public bodies and the democratic process itself.

The **Puzzled by Policy** project (launched in October 2010) aims at providing all citizens with a unique online platform to learn about EU policy and to find out what specific policies are relevant to them at national level. Users can contribute to policy drafting and impact assessments, helping decision makers at national and European level to better understand the impact of their policies by feeding citizen reactions back to them.

Along the same line, the **ImmigrationPolicy2.0** project (launched in September 2010) uses state-of-the-art ICT technologies (including Web2.0 and social networking) to pilot a range of citizen-centred services (e.g. searchable inventories on national migration policies and related legislation). The key objective is to facilitate citizens' involvement in immigration policy development, granting access to policy information and enabling them to express their point of view. At the same time, the project aims at harmonising immigration policies and actions across the EU, providing public administrators, politicians and decision makers with input to the preparation of immigration policy texts, the development and testing of policy models and the evaluation of possible scenarios.



# Living independently, safely and involved in society

Elderly living independently and safely at home rather than in hospital or in care centres; people with disabilities easily interacting with their environment; youngsters at risk of marginalisation helped by video games to be re-integrated into society: these are just some examples of the benefits Information and Communication Technologies (ICTs) can bring to people. Despite the progress achieved so far in developing ICT potential, there are still lots of **challenges ahead**: for instance, as of today, 150 million (around 30%) Europeans have never used the Internet (most of them falling in the so-called disadvantaged groups: aged 65-74; on low income; the unemployed, the less educated; the disabled); in 2009, 60% of Europeans made regular use of internet, while the average for disadvantaged people was 41%. Furthermore, in 2009, 64% of Europeans had at least some level of **digital skills**, but only 45% of people in disadvantaged groups did so.

The **Digital Agenda for Europe** sets specific **targets** to be achieved by 2015: halving the proportion of population that has never used the internet (to 15%); increasing regular internet use from 60% to 75% in the general population and from 41% to 60% for disadvantaged people. In order to tackle these issues, the European Commission has been developing and supporting ICT-based solutions for the users' benefit, starting from their needs and current situation.

## Helping elderly people to live independently and safely at home

Active involvement of elderly, disabled and people with physical impairments in society starts by improving their living conditions in their own environment, and facilitating their social life and contacts. This has also a positive impact on their families and care-givers. « Smart houses » - i.e. houses with automatic systems for lighting, temperature control, multi-media and many other functions – are designed with this purpose, but their functioning has to be simplified.

The solutions developed by the **i2Home** project go in this direction as they allow interaction with smart houses through easy-to-use devices (e.g. TV screens or mobile phones) tailored to the users' specific needs, through which any home appliance and service can be managed.

### i2Home

The project developed a personalised and simplified Universal Remote Console interface enabling anyone to easily interact with smart houses. Users can define what they want to control and how: lights, fridge, heating, TV, but also services such as a calendar and reminder systems can be handled through the users' chosen device.

<http://www.i2home.org>

Funded by the Sixth Framework Programme (FP6)

Along the same objectives, the pilot projects **HomeSweetHome** and **Dreaming** have been launched: the former brings together a set of home-based services to support elderly in their daily activities and to allow carers to remotely assess their ability to stay independent; whereas the latter is designed to maintain users socially engaged via video, sensors, and mobile communications.

### HomeSweetHome

HomeSweetHome offers some key services:

- Elderly-friendly videoconferencing, designed for users with no/little ICT experience and limited manual skills;
- Domotic subsystems, to enable people to keep on managing their homes even when their mobility is declining;
- Navigation Subsystems, helping users to find a predetermined location;
- Mental Faculty Maintaining Subsystems, based on computer games to preserve mental faculties.

<http://www.homesweethome-project.be>

Funded by the ICT Policy Support Programme (ICT PSP) – Competitiveness & Innovation Programme (CIP)

## DREAMING

DREAMING integrates familiar devices - such as blood pressure cuffs, mobile phones and TV - in a single platform. The system is based on a "box" installed at the user's home and connected to the network. Key information on the environment where the person lives and on his clinical parameters are sent to a Contact Centre which can take action and, when necessary, dispatch the appropriate resources (e.g. fire brigade or ambulance).

<http://www.dreaming-project.org>

Funded by: ICT Policy Support Programme (ICT PSP) – Competitiveness & Innovation Programme (CIP)

Tens of millions of elderly in the EU suffering from mild dementia may be able to look after themselves and free up their carers thanks to a new system. The **Cogknow** system addresses dementia symptoms – such as short-term memory, loss of self-confidence in socialising and a sense of insecurity in performing basic tasks – and enables patients to continue living independently for a longer time.

## COGKNOW

The solution is based on a flat-screen monitor for the home, and on a mobile smart phone with an extremely simplified user interface. Both devices are controlled by a touch screen. The in-home system can issue reminders from wake-up time in the morning until bed time. These can be recorded in a friend or relative's voice, and give instructions for all sorts of daily activities.

<http://www.cogknow.eu>

Funded by Sixth Framework Programme (FP6)

Independent living is also at the core of the **Rosetta** project, which specifically addresses people with progressive chronic disabilities, such as Alzheimer's disease, helping them to keep their independency and quality of life as long as possible, and supporting their carers.

## Rosetta

The system is based on:

- An advanced awareness and prevention service, e.g. smart cameras to monitor users' activities;
- An early detection system to monitor behaviours and detect changes in chronic long-term conditions;
- An elderly day navigator, e.g. reminders of daily activities, a visual phonebook, digital communication facilities.

<http://www.aal-rosetta.eu>

Funded by the Ambient Assisted Living Joint Programme (AAL JP)

Rosetta is funded by the **Ambient Assisted Living Joint Programme (AAL JP)**, which aims at improving the quality of life of elderly people and strengthening the competitiveness of European industry in the AAL field through the use of ICT. Launched in 2008, the Programme involves 23 European countries and has a total budget of €700M over six years – 50% from the AAL partner countries and the 7<sup>th</sup> Research Framework Programme of the EU and 50% from participating private organisations.

## Technology to communicate and socialise better

Only 20% of the elderly are active internet users. They can communicate more and better thanks to devices they are more familiar with, such as TV screens and TV remote controls. The **T-Seniority** project has developed a solution based on digital TV specifically tailored for elderly people. Using a TV set, people can get information, contact public services and receive care via tele-monitoring. The TV-conferencing facilities enable them to stay in touch with their carers, family members and their local community.

### T-Seniority

It enables the elderly to get local and general interest information, it can contact public services and it can receive care via tele-monitoring.

T-Seniority helps to strengthen social relationships and to fight the isolation often experienced by the elderly and bridges physical, psychological and generational gaps.

<http://tseniority.idieikon.com>

Funded by the ICT Policy Support Programme (ICT PSP) – Competitiveness & Innovation Programme (CIP)

Being involved in society also implies that people who are typically excluded get an opportunity to better communicate and interact with the external environment. The **Cogain** project coordinated efforts of developers of new communication tools to the benefit of people with disabilities. Thanks to a gaze and eye-tracking technology – which allows controlling game functions only by using the eyes – the online world is opened to those affected by severe motor disabilities, who can “appear” as an avatar in a virtual environment and interact. “It could be life changing for the large number of paralysed people whose only means of communicating is with their eyes. Second Life, for example, could really be a second life for them, providing not only entertainment but versatile electronic services, for example, education,” says Aulikki Hyrskykari, a researcher at Tampere University.

### COGAIN

The technology allows users to control game functions by using their eyes only. For people suffering from conditions such as cerebral palsy, motor neurone disease (MND) or the so-called locked-in syndromes, the research results carried out by COGAIN offer the opportunity to move around and interact in a virtual environment.

<http://www.cogain.org>

Funded by the Sixth Framework Programme (FP6)

The **Replay** project deals with youth marginalisation by using the ICT tools youngsters are most familiar with: videogames. Addressing the problems behind antisocial behaviour through interactive games helps to remove communication barriers and to accompany the person through a more socially integrated path.

### REPLAY

The game is structured in two phases: a “game run” whereby the player “travels” through a futuristic world and has to respond to some questions and make choices linked to very concrete situations; and the “replay” where the expert (e.g. psychologist, teacher...) replays the game and the responses together with the child and starts a discussion on the answers and choices and on the reasons behind them.

<http://www.replayproject.eu>

Funded by the Seventh Framework Programme (FP7)

The REPLAY game has been trialled in schools in the UK, Spain and Romania with more than 150 young people. Experts reported significant progress in terms of the openness of the dialogue and measurable improvements in the quality and depth of the relationship between themselves and individual players.

## Moving about

It is estimated that one in three people aged over 65 is at risk of falling – going up to one in two for those above 80. Falls often have very serious psychological and physical consequences, including a real risk of fatality. Technology allows developing solutions which makes it possible for elderly and disabled with severe injuries to walk and move safely.

A solution for fall prevention is provided by the research project **Smiling**, which has designed a ‘smart shoe’ that retrains the elderly’s motor skills and restores their postural balance, reducing the probabilities of fall.

### SMILING

The solution here developed feeds the information about the patients’ gait via sensors hidden in their shoes. After the walking pattern is analysed, the shoe performs small variations in height and slope on the patient’s feet and legs. These variations loosen stiff walking patterns and bring back flexibility and stability. The solution comes with a comprehensive rehabilitation programme that can be followed in health care and fitness centres and, in the future, at home.

<http://www.smilingproject.eu>

Funded by the Seventh Framework Programme (FP7)

The purpose of the **MindWalker** research project is to help restore the walking ability of people who have lost the use of their legs due to spinal cord injuries. The solution is based on a robotic exoskeleton (an outer shell) worn by disabled people, which is powered by actuators and controlled by their brain. MindWalker is an example of Brain-Neural-Computer-Interaction (BNCI) research, which is focused on how brain activity can be recorded and used (through sensors which can be worn, without the need for implants or wires) to interact with and control an electronic device. So far BNCI research has focused on technology for people with severe body or brain impairments. However, there are many other potential applications – e.g. in the development of interfaces for the gaming industry.

#### **MindWalker**

To date, BNCI technology to control e.g. a wheelchair required the brain to focus on a specific command. Here the user only needs to imagine walking to control the robotic exoskeleton which emulates the spinal cord functions to maintain the body balance while walking.

<https://mindwalker-project.eu/>

Funded by the Seventh Framework Programme (FP7)

## **Making technologies accessible to all**

While ICTs can offer better chances for people with disabilities, as demonstrated by the solutions mentioned above, technologies, in their pervasiveness, can also represent a barrier. The UN's Convention on the Rights of Persons with Disabilities, upholds accessibility as a right for all, including access to digital technologies. A cluster of projects seeks to make this right a reality.

Access services enable those with physical, mental or age-related impairments to access the storyline of a television programme. Digital television is currently being rolled out across Europe – bringing about opportunities to improve those services.

The **DTV4ALL** (Digital Television for All) pilot aims at ensuring that those opportunities are not lost by identifying:

- Improvements to existing access services and ways of addressing the key technical, organisational and legal obstacles to the sustainable take-up of these services under the digital switch over

- Key emerging access services, and the devices and platforms needed to support them.

#### **DTV4All**

DTV4All issued recommendations and guidelines for future access services and has presented them to the UN International Telecommunications Union and to the European Broadcasting Union. They address devices specifications; content guidelines and guidelines for broadcasters and platform operators.

<http://www.psp-dtv4all.org/>

Funded by the ICT Policy Support Programme (ICT PSP) – Competitiveness & Innovation Programme (CIP)

The integrated project **AEGIS** aims at helping designers and developers to embed accessibility support into every aspect of ICT in particular for Unix desktop platforms, the web applications and mobile devices. It provides them with an open accessibility framework based on third generation interoperability architecture for interfacing assistive technology.

#### **Aegis**

The Aegis project addresses the design, development and deployment of accessible mainstream ICT. As part of the validation/demonstration, some compatible assistive components are developed. One example is an OpenOffice module to turn documents into Braille encoded files or to print these directly to a Braille embosser.

<http://www.aegis-project.eu>

Funded by the Seventh Framework Programme (FP7)

The sister project **Accessible** is providing simulation facilities for designers and developers.

#### **Accessible**

The project develops an Assessment and Simulation module by enriching and merging different methodologies and tools to support and incorporate accessibility approaches for the design and development of new mainstream mobile and web applications, infomobility web services and description languages.

<http://www.accessible-project.eu>

Funded by the Seventh Framework Programme (FP7)



# Energy saving and care for the environment to support future growth

How to combine economic growth while respecting the environment and needing to cope with a shortage in resources? Sustainable growth – i.e. a long-term development pattern compatible with environmental issues - is one of the European Union's priorities. The EU is committed to building a low carbon society by setting ambitious energy and climate change objectives for 2020: to reduce greenhouse gas emissions by 20%, to increase the share of renewable energy to 20% and to make a 20% improvement in energy efficiency. Great attention is given to the contribution that policies, business strategies and individual behaviour can bring to achieve a more sustainable society. Information and Communication Technologies play an important role in this respect, supporting less resource-intensive production and allowing energy saving in for example buildings, transport and electricity networks. Furthermore, ICT can provide useful information about environmental parameters and personal behaviour, raising awareness and triggering a more responsible attitude with respect to energy use.

In order to make this happen, the **Digital Agenda for Europe** (DAE) emphasises the importance of quantifying the ICT industry's own energy performance and carbon footprint as well as its potential to render sectors such as buildings, transport and energy distribution more energy efficient. This is why the DAE stresses the importance of cross-sector industrial cooperation to accelerate the development and implementation of ICT-based solutions for smart grids (i.e. electricity networks using digital technology) and meters (i.e. electrical devices that record consumption), near-zero energy buildings and transport systems. In this regard the DAE has set specific targets:

- establishing a commonly agreed methodology to quantify the energy and carbon footprint of ICT goods, services and companies;
- supporting partnerships between the ICT sector and major emitting sectors (e.g. buildings and construction, transport and logistics, energy distribution) to improve energy efficiency and substantially reduce greenhouse gas emissions by 2013;

- assessing the potential contribution of smart grids to the decarbonisation of the economy and promoting their interoperability;
- reaching an agreement between member states on common functionalities for smart meters.

Besides the actions mentioned above, the European Commission is also funding a whole series of projects to improve the energy efficiency of data centres and to investigate how ICT could reduce energy and water consumption in other sectors such as buildings and grids.

## Changing behaviour at home as well as at work

Everyone can contribute to lowering our energy consumption requirements. Awareness is the first step towards the improvement of energy use. This is the base-line of the **BeAware** project, which has developed new information tools and services to help turn citizens into active energy-saving players. The project has developed Energy Life, a web-based solution for mobile phones which makes users become aware of the power consumption of their home appliances in real time, with the overall target of reducing power consumption in households by 15%.

### BeAware

Energy Life is equipped with ambient interfaces allowing to measure energy consumption of home appliances, helping users to monitor their consumption via mobile phones and adopt energy-saving behaviours. The solution uses gaming and learning tools, and provides real-time feedback and advice for energy savings.

<http://www.energyawareness.eu/beaware>

Funded by the Seventh Framework Programme (FP7)

The **SAVE ENERGY** project uses a serious game (virtual computer game used for professional training purposes) with an engaging virtual environment for users, citizens and policy makers to gain awareness, understanding and experience associated with energy saving attitudes.

#### **SAVE ENERGY**

The project is developed and tested in five pilot buildings in five European cities. The buildings are equipped with sensors, meters and control devices to monitor overall energy use. The real time data gathered is then centralised and used to generate an action plan for reducing energy use via the 'serious game' interface and real time information.

<http://www.ict4saveenergy.eu>

**Funded by the ICT Policy Support Programme (ICT PSP) - Competitiveness & Innovation Programme (CIP)**

## **Saving energy in public buildings and spaces**

Until recently, the focus of energy reduction in public buildings/spaces has been primarily in schools and offices. Hospitals, however, also use a large amount of energy. The **HosPilot** project provides an ICT-based service to drastically reduce the energy consumption of newly built hospitals and of existing ones needing renovation, while increasing well-being and comfort of end-users, i.e. patients, medical staff and visitors. HosPilot works in two main areas: lighting and HVAC (Heating, Ventilation and Air Conditioning), which account for nearly 80% of all energy use in hospitals.

#### **HosPilot**

The HosPilot system aims at:

- Assessing the hospital's energy-saving potential;
- Providing hospitals with an ICT-based scheme to reduce energy consumption;
- Implementing the scheme;
- Fine-tuning the scheme for maximum energy saving through regular monitoring.

<http://www.hospilot.eu/>

**Funded by the ICT Policy Support Programme (ICT PSP) - Competitiveness & Innovation Programme (CIP)**

Solid-state lighting using LED technology – i.e. solid-state devices that convert electric energy directly into light, thus minimising energy waste – can drastically reduce energy consumption. The **LITES** project develops a smart, LED-based street-lighting device compatible with EU electrical standards. The device allows optimal light delivery by adjusting light intensity according to external conditions. It can be used in secondary streets, commercial access routes, alleyways, pedestrian walks, cycle tracks, university paths and thoroughfares. This technology offers significant energy savings of up to 70% and directly results in economic and ecological savings for communities as well as increased traffic safety and public comfort.

#### **LITES**

A set of embedded sensors measures light, temperature, electrical current intensity and motion detection. The output data of the sensors is then processed by the software. The process allows for optimal regulation of light delivery.

<http://www.lites-project.eu>

**Funded by the ICT Policy Support Programme (ICT PSP) -Competitiveness & Innovation Programme (CIP)**

## **Connecting smart buildings to smart grids**

Connecting ICT devices to smart grids is another source of energy savings which is considered as one of the sustainable solutions to invest in now and for the future.

The **SmartHouse/SmartGrid** project tests in particular how ICT-enabled groups of smart houses – i.e. houses with advanced automatic systems for lighting, heating and other functions - can achieve higher levels of energy efficiency by connecting them into a network. The project builds on existing industry standards from the ICT and the energy sectors and communication and computing capabilities which are widespread in normal houses and working environments.

It has a three-fold goal: improving energy efficiency, increasing the penetration of renewable energies, and diversifying and decentralizing Europe's energy mix.

### SmartHouse/SmartGrid

The technology is field-tested in three countries, each focusing on a specific aspect:

- The Netherlands: how to handle large scale communication, negotiation and information exchange between thousands of smart energy devices simultaneously;
- Germany: how to interact intelligently with customers and deliver optimal home energy management;
- Greece: how to control smart energy devices in a fully decentralized and bottom-up way to achieve optimal energy efficiency and higher supply security for end-users.

<http://www.smarthouse-smartgrid.eu>

Funded by the Seventh Framework Programme (FP7)

## Reducing the energy consumption of Data Centres

In the era of information and data deluge, data centres play an increasingly critical role in every aspect of our socio-economic activity. While on one hand there is an insatiable need for more computation and storage power, the energy consumption in data centres on the other hand poses an “energy wall” that must be addressed to be able to advance to more powerful data centres. Moreover experience has shown that up to now only a holistic approach leads to the most efficient and sustainable solutions. This starts from the decision on the data centres location all the way up to the technologies used in the various systems, and the reuse of the heat that is produced by them.

The **GAMES** and **FIT4GREEN** projects are two ongoing initiatives on energy efficiency for data centres exploring two different approaches.

**GAMES** aims at developing innovative methodologies for individual Green, Real-Time and Energy-aware IT Service Centres. A Green IT Service Centre is an infrastructure for executing business services and a repository for the storage, management, and dissemination of data in which the mechanical, lighting, electrical and computer systems are designed for maximum energy efficiency and minimum environmental impact. Thanks to its holistic approach, **GAMES** is expected to increase energy efficiency in data centres by up to 25%.

### GAMES

The project will adopt an innovative approach taking into account the interrelations between different layers (business/applications, infrastructure, facility) and the effect of these interrelations on energy consumption.

It will deliver a methodology and toolset for the holistic design and operations monitoring of green IT service centres, trading-off Quality of Service, performance, virtual and physical resource allocation and overall energy efficiency.

<http://www.green-datacenters.eu/>

Funded by the Seventh Framework Programme (FP7)

The **FIT4GREEN** project applies power optimization by spreading load across multiple data centres. It enhances existing IT solutions deployment strategies by moving computation and services around a federation of IT data centres sites. The project expects to provide at least 20% saving in direct server and network devices energy consumption in comparison with a traditionally managed data centre and induce an additional 30% saving due to reduced cooling needs.

### FIT4GREEN

The project will create an energy-aware layer of plug-ins for data centre automation frameworks.

A FIT4GREEN optimisation layer will be placed on top of the current data centres management tools to orchestrate the allocation of ICT resources in an energy-efficient manner.

FIT4GREEN will explore optimal deployment solutions satisfying existing Service Level Agreements (SLAs) with minimal energy consumption and next-generation energy-aware SLAs.

<http://www.fit4green.eu>

Funded by the Seventh Framework Programme (FP7)

# Links to useful sources

## Digital Agenda for Europe

[http://ec.europa.eu/information\\_society/digital-agenda](http://ec.europa.eu/information_society/digital-agenda)

## Europe 2020: A strategy for smart, sustainable and inclusive growth

<http://ec.europa.eu/europe2020/>

## Competitiveness and Innovation Programme (CIP)

<http://ec.europa.eu/cip/>

## Seventh Framework Programme for R&D (FP7)

<http://cordis.europa.eu/fp7>

## Sixth Framework Programme for R&D (FP6)

<http://ec.europa.eu/research/fp6>

## eHealth

[http://ec.europa.eu/information\\_society/activities/health](http://ec.europa.eu/information_society/activities/health)

[http://ec.europa.eu/information\\_society/tl/qualif/health](http://ec.europa.eu/information_society/tl/qualif/health)

## eGovernment

<http://ec.europa.eu/egovernment>

[http://ec.europa.eu/information\\_society/tl/soccul/egov](http://ec.europa.eu/information_society/tl/soccul/egov)

## eInclusion

<http://ec.europa.eu/einclusion>

[http://ec.europa.eu/information\\_society/tl/soccul/eincl](http://ec.europa.eu/information_society/tl/soccul/eincl)

<http://www.aal-europe.eu/>

## ICT for Sustainable Growth

<http://ec.europa.eu/ictforsg>

[http://ec.europa.eu/information\\_society/tl/qualif/env](http://ec.europa.eu/information_society/tl/qualif/env)

## For further information

[info-h@ec.europa.eu](mailto:info-h@ec.europa.eu)



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## European Commission

Directorate-General Information Society and Media

Directorate H

B-1049 Brussels

Infodesk: [info-h@ec.europa.eu](mailto:info-h@ec.europa.eu)



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