

ICT Research

The policy perspective



© Jokerpropti... | Dreamstime.com

ICT for all

Technology supporting an inclusive world





This brochure has been produced for the Information Society Policy Link (ISPL) by the *ICT Results* editorial service. ISPL is an important part of the Information Society and Media Directorate-General's goal to draw clear lines between policy, policy-making and European research in the field of information and communications technology (ICT).

ISPL publications and other news are available via the website:

http://ec.europa.eu/information_society/activities/policy_link/

ICT Results is an online editorial service established on behalf of the Information Society and Media Directorate-General.

The service's main aim is to:

- raise the visibility of ICT-funded research results
- support projects' access to markets and encourage uptake of innovations
- raise awareness of European ICT programmes and activities

ICT Results website: <http://cordis.europa.eu/ictresults>

More reports in this series on *ICT Results*:

<http://cordis.europa.eu/ictresults/index.cfm?section=news&tpl=publication>



ICT, one for all

In this report produced for the publication series ICT Research: The Policy Perspective, we explore Europe's vision for a society where every individual can make a valuable contribution. Investments in pioneering and commercially focused research will produce information and communication technologies (ICTs) that should help everyone – including the elderly, disabled and marginalised – to fulfil their potential.

There is little doubt that ICT is the key enabling technology for European society. It is vital for business and powers our financial systems. It delivers our entertainment and keeps us in touch with friends and communities. Without ICT – our computers, televisions, mobile devices, plus all the technology embedded in everyday objects – we would struggle to work, shop and travel.

So how is it, then, that almost a third of European citizens – around 150 million people – are not actively participating in this modern, high-tech society? Fewer than 15% of people aged 65 and only one in three of the unemployed regularly use the internet. About 74 million Europeans with low levels of education and a third of people in rural and remote areas remain 'unconnected'.

The **Riga Ministerial Declaration**, made in 2006, clearly states Europe's intentions to make it a priority that digital technologies are both open to everyone, without barriers, and are used to overcome social and economic exclusion. As a result, **eInclusion** is given top priority as one of the three pillars of the **i2010 strategy** (the EU policy framework for the development of ICT technologies and digital media).

ICT, heal thyself

Although technological advances risk creating a digital divide (of ICT 'haves' and 'have nots'), ICT still has the capacity to make society more inclusive. First, it can deliver innovative technological solutions for disadvantaged groups (e.g. remote health monitoring for elderly people). Second, it can bridge the very divide it sometimes creates.

For example, when local authorities push their online services they risk excluding people without internet access or individuals who are unable to operate personal computers, or who don't know how to navigate the web. But additional ICT developments and deployments could add a voice-activated telephone systems or a digital TV option to the mix.

A significant research effort is trying to develop ICTs that will allow everyone, especially disadvantaged groups, to participate fully in society. This research is being coordinated through the **Seventh Framework Programme** (FP7), the **ICT Policy Support Programme** (PSP) of the **Competitiveness and Innovation Programme** (CIP) and other collaborative research initiatives.

The Commission has identified the issues of **ageing** and **eAccessibility** as the two most pressing areas for coordinated research. These areas have clear needs for innovative ICT, potential mass markets and consequently attract significant interest from industry.

Ageing well in the high-tech era

Europe is experiencing a dramatic demographic shift towards a more elderly society. Average life expectancy is now over 80, and by 2020 about a quarter of the EU population will be over 65. By 2050, the number of people over 85 will have tripled.

The needs of elderly citizens – and their impact on European society and economic sustainability – is beginning to dominate political thinking. For example, recent OECD analyses point to escalating costs as a result of ageing populations in Japan, the USA and Europe. Fertility rates are also declining, hence the ratio between people at work and the remaining population will change from about 4:1 today to 2:1 by 2050 in most European countries.

New technologies that help older Europeans to work longer, stay active and live independently are crucial if we are to value older generations rather

than view them as a burden. Without a higher level of participation of the elder population in employment, and without better tailored and more effective health- and social care services, these trends will put serious pressure on Europe's social models and public finances.

ICTs have a key role to play to overcome these challenges. New technologies can address the daily difficulties that older people face – medical, physical and social – and keep them active at work and/or in their community.

An **Action Plan for Ageing Well in the Information Society** was adopted by the Commission, in June 2007, and is a flagship initiative of i2010. The Action Plan outlines initiatives for removing obstacles – from a lack of industry awareness of market opportunities and unclear business models, to numerous legal and technological barriers – that hinder growth in the market for ICTs for ageing well. It also promotes policies to encourage greater risk taking, to stimulate the market and foster innovation.

An ongoing study on behalf of the Commission, entitled 'ICT & Ageing – Users, Markets and Technologies', is helping to identify existing market barriers that hinder the uptake of technologies for independent living and recommend ways to address the needs of older people and allow businesses to access potential markets.

But the most relevant ICT research and development (R&D) work will be designed to produce a 'triple win': improve the quality of life for elderly people and their carers and relatives; create new business opportunities for Europe's ICT industry; and help to personalise health- and social care.

European collaborative research into ICT and ageing has an impressive heritage: by mid – 2009, more than 30 projects have been launched in this area under FP6 and FP7. The budget for ageing-related ICT R&D under FP7 is expected to be about €400 million.

Challenge 7 of the FP7 ICT Work Programme encompasses the earliest phases of research into ageing well. With a five- to ten-year horizon, projects funded through Challenge 7 will anticipate how

the growing population of tech-savvy over-65s – with an estimated €3000 billion of wealth – will drive a lucrative mass market for ageing-related technologies (e.g. smart and adaptable domestic robots) over the next decade.

Research funded through Challenge 5 (eHealth) also complements specific ageing related solutions as elderly people will be the primary beneficiaries of advanced telecare and remote health-monitoring services.

This visionary research of FP7 is complemented by initiatives to develop market-ready applications. The **Ambient Assisted Living** (AAL) joint programme, launched in 2008, is dedicated to research that exploits existing technologies for solutions that help elderly citizens stay active, independent and socially connected. The six-year, €600 million AAL programme is funded by the EU, Member States and private enterprise.

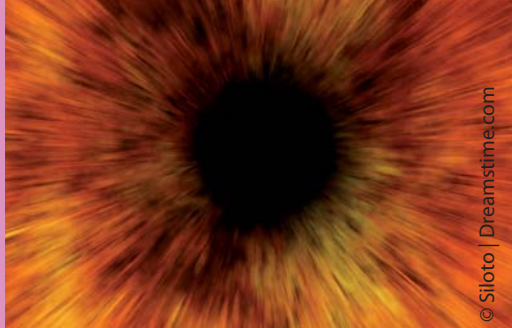
Ageing well is also an important theme of the ICT PSP. Pilot trials of proven ICT-based systems to help people as they age aim to assess the socio-economic impact of the technological solutions in different settings across Europe and pave the way for their widespread deployment.

So far (mid-2009), 10 large pilot projects related to ICT and ageing are being launched with the involvement of more than 30 European regions and more than €50 million in funding through this programme. ICT PSP funding is also available for networking activities "to develop and disseminate common approaches for accelerating the take-up of new ICT-based solutions for Ageing Well (building on public-private partnerships)."

Something for everyone

But eInclusion is not just about electronic aids for older people. After all, clever gadgets are useless if people cannot access the technology due to disability, education, financial standing or slow internet connections.

There are many striking examples of accessibility deficits today. Text relay services, essential for deaf and speech-impaired people, are only available



in half of the Member States; emergency services are directly accessible by text telephone in only a handful of Member States; broadcasting with audio description, subtitled TV programming and TV sign-language programming remains very poor; less than 10% of ATMs installed by the two main European retail banks provide 'talking' output.

Meanwhile, just over a third of households in the EU have broadband, high-speed internet connections – described by Commissioner Viviane Reding as a "passport to the information society and an essential condition for economic growth" – which although a big improvement on the 10% figure in 2003, shows there is still work to be done.

The Communication **Towards an Accessible Information Society**, adopted by the Commission in December 2008, recognises the importance of improving access to ICT, known as eAccessibility. It proposes a range of policies, legislation, standardisation and research initiatives to address the current lack of 'inclusivity'.

Under FP7, eAccessibility research is steered to coincide with market needs and business opportunities. Assistive technologies – devices that enable people with special needs to access all manner of technical products and services – are still important, but the foundation of eAccessibility today is the principle of mainstreaming, or making them even more widely available.

Until recently, Design for All (DfA) principles dominated. DfA looks at how to build the needs of specific user groups into product designs or user interfaces, but it tends to find the lowest common denominator. Now the focus is on personalisation and how mainstream products can be customised and optimised to suit every individual, whatever their needs. DfA equates to the notion of 'one product fits all (rather badly)'; while mainstreaming produces 'one adjustable product for all'.

Full cycle

Through the long-term research efforts under FP7, the commercial focus of the AAL joint programme and the ICT PSP's piloting of proven technologies, Europe has the research capacity to meet the EU's immediate needs and long-term vision for Inclusion.

Over the next five years eInclusion initiatives should drive productivity increases, job creation, new services and new markets for inclusive ICT – worth perhaps as much as €100 billion for European GDP. In the longer-term, research will lead to solutions that foster a more cohesive society where technology will no longer split populations between the tech-savvy and the ICT-ignorant. Age, education, location, employment or ability will be no barrier: ICT offers its benefits for all.

The potential of ICT for inclusion and ageing well has by now been well recognised and current policy actions and initiatives are expected to be continued and reinforced as part of the follow-up to the i2010 initiative. This will help Europe to deal with the challenges of ageing and social exclusion, while stimulating innovation and new markets for relevant ICT products and services.

More information:

Riga Declaration:

ec.europa.eu/information_society/events/ict_riga_2006/

i2010 strategy:

ec.europa.eu/information_society/europe/i2010/

FP7: cordis.europa.eu/fp7/

ICT PSP: ec.europa.eu/information_society/activities/ict_psp/

eAccessibility:

ec.europa.eu/information_society/activities/einclusion/policy/accessibility/

Ageing Well in the Information Society:

[/ec.europa.eu/information_society/activities/einclusion/policy/ageing/action_plan](http://ec.europa.eu/information_society/activities/einclusion/policy/ageing/action_plan)

Towards an Accessible Information Society:

epractice.eu/en/library/281881



Meeting the challenges

In just one generation, information and communication technologies (ICTs) have revolutionised the way we live, learn, work and play. They are at the heart of everything we do and have radically changed the ways in which people, industry, governments and society interact. Of course, ICT is supposed to make our lives easier, but sometimes it achieves the opposite. Many Europeans find that the ubiquitous presence of technology they cannot access or operate effectively cuts them off. Strategic ICT research is also discovering how ICT can provide answers to the problems of its own doing.

No-one left behind

In just a decade, we have progressed from users accessing simple information on web pages via a dial-up modem to creating their own web content and uploading from mobile phones via wireless broadband. But the pace is too much for some who feel isolated in the digital world. Targeted research is producing some ingenious solutions that will remove the inherent risk that ICTs could exclude as much as include the people they are meant to help.

Joined-up e-society

Today, more than 1.5 billion people stay connected using a wide range of personal and mobile devices. Add to this incredible network the so-called 'internet of things' and suddenly everybody and everything is linked up... unless you can't fathom how to control your central heating from your car's dashboard console! At the dawn of a new era of internet connectivity, complementary ICT research must ensure that everyone gets linked in.

Technology at your service

If you feel compelled to check your work email at home or have family hooked on the social networking giant Facebook you could easily feel a slave to technology. But ICTs are designed to make our lives easier and more productive, not the other way round. Major EU investment in ground breaking research, especially in robotics and services, heralds an age of smart and adaptable systems which could be ideal to support people with special needs, including those requiring continuous care and monitoring, and technologies designed for the elderly.

Fast facts about ICT inclusion, or lack thereof

Many Europeans still reap few or no benefits from ICT and there are resilient gaps in ICT use. Examples of where work is still needed to boost internet use in the EU include:

- 57% of individuals living in the EU did not regularly use the internet
- 10% of people over 65 used the internet, against 68% of those aged 16-24
- 24% of people with low education used the internet, against 73% of those with high education
- 32% of the unemployed used the internet, against 54% of those employed
- 3% of public websites surveyed comply with minimum web accessibility standards and guidelines, hindering access to web content and services for people with disabilities who comprise some 15% of the EU population



© Edbockstoc... | Dreamstime.com

Be part of it!

Pervasive technology is great – so long as you know how to use it. Many elderly and disabled people particularly struggle to operate new equipment. On-going research is helping to prevent people getting left behind, finding technological solutions to the barriers that ICTs may have raised in the past.

Silver surfers are heroic figures – elderly people who have conquered a new technology and exploit the power of ICT to the full. But these trailblazers are still quite exceptional, in more ways than one. The vast majority of elderly people, along with marginalised individuals and those with disabilities, miss out on the everyday benefits of modern technology.

Whether the barriers are physical (for example, 21% of over 50s have severe hearing, vision or dexterity problems, making it difficult or impossible to use standard ICT equipment), financial or geographical, ICTs can easily become tools of exclusion.

Access all areas

The Riga Declaration stated that, by 2010, at least 90% of Europeans should have access to broadband connections – ‘always on’ internet allowing faster data transfer rates. In response, the Commission adopted a policy framework for **Bridging the Broadband Gap**. Action is also being taken to ensure that every citizen has the skills to use ICTs.

But eAccessibility requires a lot more than better training courses and miles of fibre-optic cable which is one way of delivering faster internet speed. The needs of the elderly, the disabled and other vulnerable groups must be at the heart of new technological development.

No-one left behind

ICT is at the heart of everything we do, but many people are unable to access or use high-tech tools. European research is finding ways for ICT to bridge the digital divide and solve the problems of its own making.

A key study for the Commission suggests that eAccessibility still has some way to go. Challenges include the existing **eAccessibility deficit** (people with disabilities are still unable to use everyday ICTs), the **eAccessibility gap** (Europe lags behind Australia, Canada and the United States) and the **eAccessibility patchwork** (the attention given to this issue varies considerably between Member States).

This is why the Commission has allocated more than €400 million in research funds for inclusion projects under FP7. The 2009-2010 ICT Work Programme particularly highlights the need for inclusive design through mainstreaming, whereby generalised support for accessibility features are embedded within mainstream ICT-based products. To support this vision, research will focus on modelling and simulation systems to make it easier for manufacturers to develop accessibility options for a wide range of different user requirements.

Other areas of eAccessibility research that could feed into mainstream applications include 3D displays, virtual reality (VR) and the ultimate personalised ICT control system: the direct brain-to-computer connection (also known as brain-computer interface).

It could be a decade before VR systems find their way into mainstream products. In the interim, the



ICT PSP is helping to stimulate the wider uptake of proven eAccessibility solutions. Digital Television for All (DTV4All) is the first eAccessibility project funded under this programme.

The idea is that set-top boxes will house capabilities to access specialist services (e.g. mature subtitling, audio description, audio subtitling and signing services) for people with hearing and visual impairments. The large-scale pilot will analyse the impact of these services and prioritise the technical improvements and legislative reforms that will be necessary to drive the take up of these services.

The ICT PSP Work Programme 2008 focuses on two additional areas where there is market opportunity for eAccessibility technologies. One looks at making emergency services accessible to everyone, via a so-called Total Conversation platform that permits citizens with disabilities to interact with an emergency control centre using video, text and audio, with additional support for

extra plug-ins, such as automated speech-to-text or lip-animation.

In 2008 and 2009, the Work Programmes of the ICT PSP have targeted financial support to a variety of pilots developing eAccessibility solutions. These have included real-time multimedia (video, text, etc.) access to emergency services, and the integration of care platforms and remote sensing networks for elderly residents into smart domestic technologies (e.g. home security and energy management systems). The ICT PSP also supports networking activities, for example to improve European implementation of web accessibility standards or research into accessible self-service terminals, such as ATMs and e-ticketing machines.

The EU is driving eAccessibility research and making it go mainstream. And we all stand to benefit as we discover that technologies can be fully personalised to our individual requirements, wherever and wherever we are.





Projects in view

UNIC
Dfa@Inclusion
AEGIS
ELU
ENABLED

One way to bridge the broadband gap is to use satellite technology for remote areas. Two-way connectivity is not a new idea, but the signal has to travel 36,000 kilometres into space and back; the delay makes some applications such as internet telephony (VoIP) erratic. The cost of the connection is often prohibitive for farmers and other rural residents who may just want to send email and check the weather forecast.

The **UNIC** project replaces individual satellite dishes with a single dish to create a collective satellite gateway for a whole village or rural area. Local homes and businesses can then connect to the gateway via cables or wireless technologies, such as WiMAX. The monthly cost would be somewhere between 50 and 100 percent more than the common urban DSL connections, but would be cost effective in villages with populations of up to a thousand people.

The UNIC system improves data rates and services by prioritising access depending on what each user is doing. Someone making a videoconference or VoIP call, for example, would take priority over someone simply surfing the web.

Digital television is provided on top of the bandwidth used for internet access, while the system also offers ample scope for other services to be added. The use of a set-top box and TV makes it possible for people without computers to access services just by pressing buttons on a remote control, thereby helping to bridge the digital divide as well as the broadband gap.

With faster speeds and a growing number of services accessible over traditional and wireless networks it is ever more important that the needs of marginalised groups are considered carefully and incorporated into projects. Specific designs for people with visual or cognitive impairments are necessary, but it would be even better – and more efficient – if designs of standard technology could allow for these people at the outset.

The FP6 **Design for all for eInclusion** (Dfa@Inclusion) project fosters this approach and encourages engineers and developers to consider the needs of all potential users when they create new ICTs. Dfa@e-Inclusion is therefore exploring ways to produce a set of references and engineering practices which can be used to ensure accessibility and inclusion issues are properly addressed throughout the production cycle.

The FP7 **AEGIS** project takes ICT designers from DfA to mainstreaming solutions. It will produce toolkits so that developers can engrave accessibility into mainstream products, such as desktop applications, mobile phones and PDAs. The project will analyse the specific requirements of people

with visual, hearing, motion, speech and cognitive impairments, then find ways to add these requirements into general customisation features and 'plug & play' support modules.

The Enhanced Learning Unlimited (**ELU**) project, meanwhile, makes lifelong learning more accessible by developing tools that make it easier for training providers and educational institutions to deliver interactive learning via digital TV, as well as online. The project produced templates for multimedia pages and presentations, interactive quizzes, a virtual teacher, and support for ancillary devices.

Researchers also created the ELU Script, which describes every course, and an authoring tool, which helps educators to create complex interactive courses through a visual interface and a little knowledge of the technology that makes interactive TV possible. By the end of the project the partners had produced and delivered six test courses, including an 'ICT Basics' course for adults aged over 35 who had no or only very basic knowledge of ICTs.

Numerous research projects have developed assistive technologies to help specific disadvantaged groups make the most of existing ICTs, such as the internet. The **ENABLED** project produced no less than 17 prototype devices and software platforms – two of which have been patented – to help the visually impaired.

Part of the project developed software applications with tactile, haptic and audio feedback devices to

help visually impaired people feel and hear digital maps of where they want to go. Users move a cursor around the 'Vital map' with a device akin to a computer mouse; small pins create shapes under the palm of their hand.

The device could produce the sensation of a square block to define a building, or form into different icons to depict different shops and services – an 'H' for a hospital, for example.

"Braille readers and audio readers let blind people read or hear text from computers and the internet, but until now there has been no easy or practical way to portray graphical information," explains Wai Yu, ENABLED's coordinator. "We chose to work with maps because they are particularly useful for visually impaired people."

Having obtained a 'mental image' of the map from the computer, users can then take the route information with them when they venture outside. For that purpose, the project partners used a commercially available navigation aid called the Trekker, which uses GPS to guide users as they walk around, much like a navigation system in a car.

More information:

UNIC <http://www.unic-project.org/>

Dfa@Inclusion <http://www.dfaei.org>

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

ELU <http://www.elu-project.com>

ENABLED <http://www.enabledweb.org/>



© Kmitu | Dreamstime.com

Getting hooked

ICT is all about connections. First it was the web, then social networking, instant messaging and Skype internet calling. And the “internet of things” – objects networking via embedded chips – is just around the corner. A vast wealth of European research is looking at how to use these exciting opportunities to meet the needs of isolated people and connect them into the modern society.

Some people choose to run their entire lives over the internet – teleworking, online gaming and entertainment, Facebook social networking and e-shopping. But whether you prefer virtual friends or face-to-face encounters, relationships and connections with other people are an essential part of everyday life.

For the elderly, the disabled, the housebound, or those who have little money for social activity, contact with other people may be lacking, affecting their personal wellbeing and health and potentially imposing an additional financial burden on public services.

But ICT has the power to reconnect people, bring some life back into their lives. It can build virtual communities for mutual support and help people access opportunities beyond their everyday experience. ICT opens up a new world: information, business, social contact, and opportunities to interact with people from different backgrounds and cultures.

Europe is championing the application of ICT for inclusion and is investing heavily in research that will produce new networking applications and online services geared towards people who have probably never heard of instant messaging or Twitter casting.

One essential connection that European research is trying to improve is the link between citizens and public authorities. Elderly people and those with disabilities probably have to interact with government departments and public agencies far more than average, so it is critical that the digitisation of public services does not exclude the people who would benefit most from streamlined online services.

The Commission's **eGovernment Action Plan** outlines the EU's main policy initiatives for the exploitation of ICT in government and the delivery of public services and administration. Inclusive eGovernment is one of five priorities and focuses on how to develop flexible, multi-channel platforms that every citizen can use

Joined up e-society

ICT already helps people communicate more easily, build networks of friends and exchange information. European research builds on these capabilities and finds novel ways to link marginalised individuals back into society.

irrespective of their age, the language they speak or physical or mental abilities.

Perhaps one of the most exciting aspects of networking that ICT has to offer is the anticipated future evolution of the internet. The development of miniaturised, low power, wireless-enabled microchips now makes it feasible to embed ICT into almost any object, thereby creating a vast internet of things. In the near future, people will be able to benefit from connections not just with other people, but also their homes or their cars. Vulnerable people could benefit as smart networks connect tiny sensors, medical equipment and even domestic appliances to ensure they are safe and well.

Research on elements of such applications fall under numerous Challenges of the FP7 ICT Work Programme. Independent living platforms, for example, would incorporate aspects of pervasive networking (Challenge 1), cognitive systems (Challenge 2) and innovative components (Challenge 3). Such platforms would also provide more personalised health care (Challenge 5).

The Ambient Assisted Living joint research programme is a perfect complement to the long-term perspective of FP7 research. Its overall objective is “to enhance the quality of life of older people and strengthen the industrial base in Europe through the use of... ICT.” It specifically aims to take existing ICT and develop prototypes with commercial viability. A first batch of 21 projects is already underway.

The second call for research proposals, which closed in May 2009, called for projects where ICT would improve the social interaction of elderly people. The aim of the call was to develop innovative ICT-based solutions aimed at “helping people to be active, joyful and socially connected in the society as they age”, which would contribute to their health, overall quality of life and to social inclusion. The call recognises that ICT applications can bridge distances, prevent loneliness and help older people enjoy life.



© Ppdigital | Dreamstime.com

Projects in view

PASION

S.M.S.

Citizen Media

Cascadas

SOPRANO

PERSONA

One of the reasons that elderly people avoid communicating by email or instant messaging is that they find it hard to express themselves – conversations devoid of facial expression and body language are harder to understand. But that will not be a problem for much longer. The **PASION** project has developed a suite of tools to communicate precisely this kind of information.

And even more remarkable than the technological advances are the applications that the technology enables, including new kinds of online gaming, new forms of groupware, even tele-psychiatry.

For example, the project has developed a prototype that runs on a mobile phone and provides information that users can exploit to coordinate their work. It can show information like user availability, or indicators and visualisations that illustrate the social position of a user in the group. It also offers information on user mood. Currently, this works via self-reporting, but soon it will be generated automatically. It can even tell you what the user is doing at a particular moment.

The tele-psychiatry application is especially compelling. Using special software to analyse facial expressions and a voice link, psychiatrists and care workers could work with their patients at a distance, helping them to deal with their problems.

But will any of these applications hit the high street? Simple sensors that indicate physiological state, like the heart rate, cost little to produce, are well accepted among younger users, and could be deployed cheaply. Initially, they would probably be used for social networking or gaming applications, but could easily be incorporated into applications and monitoring systems for elderly users.

Another research project promises to make it much easier to develop useful mobile services for disadvantaged people. Mobile applications do not enjoy universal standards. Even the most modern mobile phones have a comparatively small screen, and a dinky keypad, but the **S.M.S.** project has developed a platform and a suite of supporting tools to get round these constraints and make mobile services simple.

“We wanted to make our Simple Mobile Services platform open source, and universal, so they do not depend exclusively on service providers,” explains Nicola Blefari Melazzi, coordinator of the project.

The package should make it easier for companies – not limited to mobile operators – to develop targeted mobile applications that could help improve inclusiveness. For instance, S.M.S. has developed MEMs (Mobile Electronic Memos) which are an electronic note that users can use to capture information about locations, people, services and websites, and to share the information with friends and colleagues.

The software developed by the S.M.S. project makes it easy for users to send MEMs to other users, to share them with a broader community, or to use them as input for online services. So a user in a specific location can capture a MEM for the location and send it to a friend. This would help to link people, such as hospitalised patients, housebound mums or other isolated individuals, to the wider world. People with visual impairments could also use MEMs to navigate

more easily in unknown towns and cities and easily capture information about people they have met and places they have been.

Another project is making it easier for people without computer skills to unleash their creative side on the web. "**Citizen Media** is about social change," says Michiel Pelt of Alcatel-Lucent Bell Labs, the coordinator of the project.

Individuals, families, and local communities who have no knowledge of user-generated content, or the internet as a whole, were the project's target audience, not technical experts or people who already know how to program.

"We wanted to understand what drives people, and the 'social change' aspect of the project is that users adapt their behaviour and embrace the new application concepts," says Pelt. The project offers the chance for 'user-generated content' – like the digital photos gathering proverbial dust on our hard drives – to be published to networked audiovisual systems like portals, platforms, or digital TV. This of course borrows from the explosive popularity of social networks. But because these technologies tend to be for more experienced internet users, the project stripped the idea back to basics, back to specific user needs, so that everyone could use them.

The project instigated a virtual treasure hunt competition between communities in Austria, Germany and Norway. Teams had to score as many points as possible for their community through games and other interactive applications, such as hiding content (multimedia caches like photos or films) that other mobile or PC users could track down.

It is easy to see how such a platform can create better cohesion within communities by including a full spectrum of participants. The simplicity of the system makes it open for everyone. The platform was nominated for an eInclusion Award.

Simplicity is a key to eInclusion, so what happens if the 'future internet,' connecting you to potentially hundreds of devices, becomes overwhelming for users? Researchers are working hard to ensure greater connectivity does not mean greater complexity.

Cascadas is working on behind-the-scenes technology that will help to keep things simpler for end-users. The project proposes a new approach to manage the complexities of future service networks: creating an ecosystem whose atomic building block is the Autonomic Communication Element (ACE).

"[The project] was set-up with the goal of investigating autonomics as an emerging technology for creating innovative and flexible 'service networks' ecosystems for ICT – telecommunications and the future internet," explains Antonio Manzalini, coordinator of Cascadas.

Autonomic technology takes inspiration from the biological characteristics of the human autonomic nervous systems which makes decisions on its own. Using high-level policies, an autonomic system constantly checks and optimises its status and it automatically adapts to changing conditions, with limited human intervention.

ACEs are lightweight software components, pervasively distributed, that are self-configuring, self-organising and self-healing. They can combine various elements together to create a service for any

type of device on any type of network. This kind of autonomic configuration is exactly what end-users want, especially the less tech-savvy.

The large-scale **SOPRANO** project, meanwhile, looks specifically at integrating older people with functional impairments into social life and increasing their independence. The project will develop stand-alone assistive technologies to compensate for the motor, sensory and cognitive difficulties frequently experienced by older adults. But it also seeks to install advanced ICTs into the home environment and develop the 'smart home' concept that is easy for elderly people to use and understand. In particular the partners will integrate devices into the home to provide tele-care services and more overall control of the living space to support both professional and informal carers in their work.

Unfortunately, the uptake of such exciting services can be hampered by the fragmented European market. The FP7 **PERSONA** project will therefore help to support the market growth of AAL technologies by providing some harmonisation. The project partners are developing a scalable, open standard platform and guidelines that developers can use to build a vast range of psychologically pleasant, easy-to-use and affordable AAL services.

More information:

PASION <http://www.ist-pasion.com>

S.M.S. <http://www.ist-sms.org>

Citizen Media <http://www.ist-citizenmedia.org>

Cascadas <http://www.cascadas-project.org>

SOPRANO <http://www.soprano-ip.org>

PERSONA <http://www.aal-persona.org>

CIP PSP: technologies coming of age

The CIP PSP is funding a number of projects that bring together service providers and ICT integrators in several European regions to pilot large-scale trials of existing technology as a step towards commercial production. The aim is to stimulate pan-European market uptake and refine business deployment strategies.

For example...

CommonWell: a pilot developing a platform which integrates services to support the effective management of chronic disease, and to address issues which affect independence, such as reduced agility, vision or hearing. The results of evaluating the pilot operation will be used to extend service provision and promote the wider uptake of this model of care across Europe.

<http://www.commonwell.eu>

Dreaming: driven by industry, this pilot intends to validate new, economically sustainable home assistance and inclusion services that can extend the independent living of elderly citizens in their homes and break their loneliness. The project will evaluate health and safety monitoring and assistance at home, through user-friendly technology (sensors, TV based videoconferencing) that respects privacy. The study will help participants to refine their business strategies in view of large-scale deployment.

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

T-Seniority: demonstrating efficient access to health- and social care for the ageing population through digital TV. It will assess how digital TV can best aid the provision of assistance programmes, including home care, tele-assistance, mobile telecom services, tele-alarms and nursing services.

<http://tseniority.idieikon.com>



Technology offers a welcome helping hand

ICT can make life easier for the elderly and disabled by lightening the load of daily living. Researchers are integrating robotics, smart systems and sophisticated sensor networks to build a variety of domestic aids that make it easier for people to live independently and remain active in society.

Agnes has suffered from multiple sclerosis for years. She is housebound and has little confidence in going out, even on her motorised wheelchair. Her family phone up frequently, but they live too far away to check up on her daily. Fortunately, she has a companion. He dispenses her medicines, keeps tabs on her food supplies and orders the weekly shopping. He monitors her movements and suggests when she should visit the doctor for a check up. And he is always on stand by to alert the emergency services if she falls or her condition suddenly deteriorates.

Today, it seems unlikely that a smart companion like this could be a robot, but prototypes of robotic systems that perform these tasks are already under development.

Europe has an impressive heritage in robotics research. Since the 1980s, the EU has funded a wide range of projects that have led the evolution of robots from industrial slaves to the intelligent, interactive domestic assistants – even companions – that could easily become commercially available within the next ten to 15 years.

The disabled and the elderly will be the first to benefit from this next generation of smart home help. Indeed robotics research within FP6 and FP7 has been geared to the development of robotics applications in domestic settings.

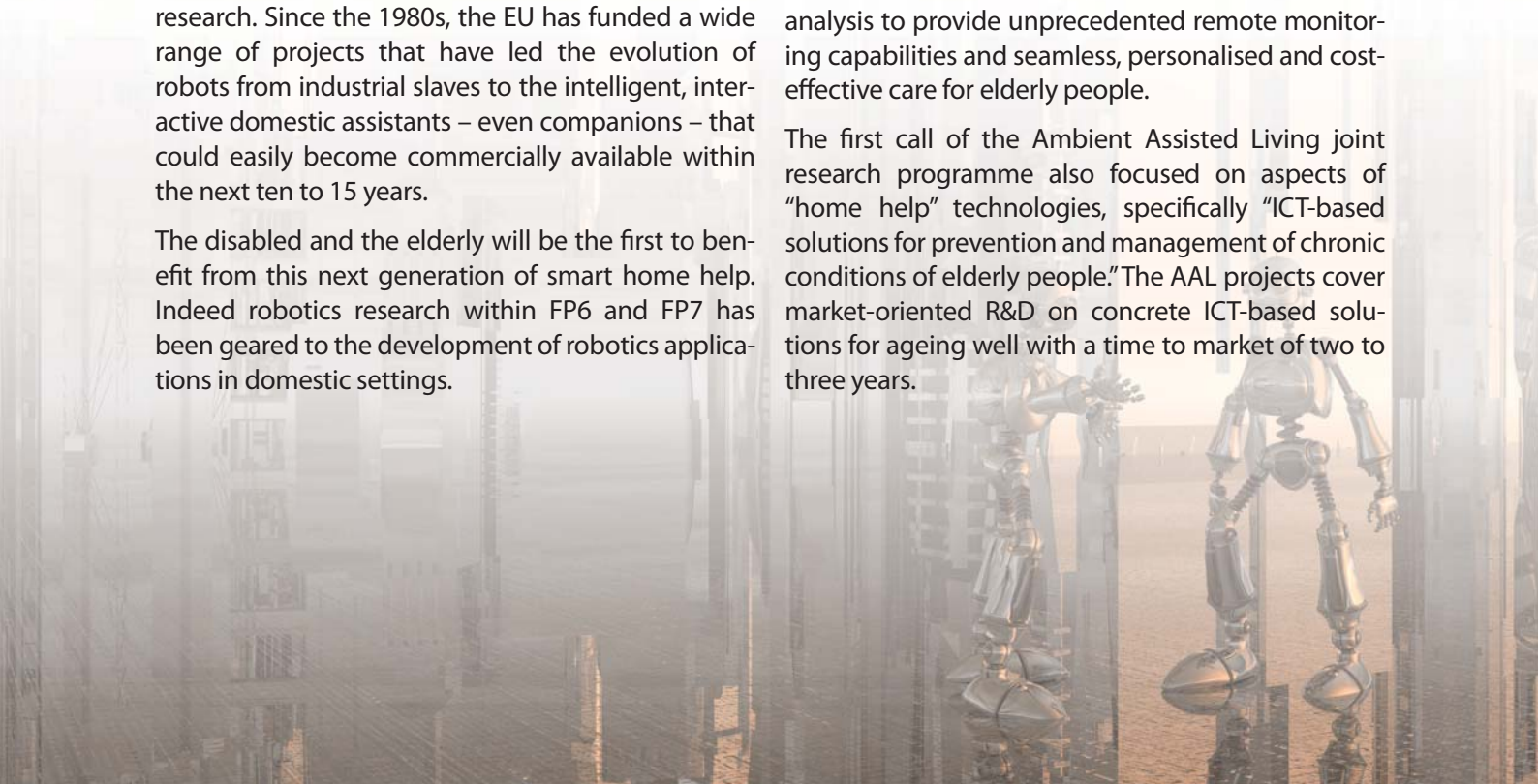
Life made simpler and better

One of the ultimate aims of ICT is to make life simpler and better. For the elderly and people with disabilities that can often boil down to a helping hand at home. As a world leader in robotics research, Europe is pushing the boundaries of domestic robotics and other home help services exploiting the latest ICT developments.

The ICT FP7 Work Programme 2009-2010 continues in the same vein. It calls for more focus on service robots that will fit seamlessly into intelligent home environments. They must also be highly adaptable so they can be produced for a mass market, but cater to the individual needs of elderly users and their carers. Research is required to produce autonomous self-learning robotics solutions that, in the era of the internet of things, can share contextual information with other objects in the surroundings of the user. They must be able to navigate unknown environments, function safely around people and their interactions must take account of a users specific communication requirements.

FP7 also promotes the development of so-called "ICT-based platforms for independent living." These combine the latest in sensor networks and data analysis to provide unprecedented remote monitoring capabilities and seamless, personalised and cost-effective care for elderly people.

The first call of the Ambient Assisted Living joint research programme also focused on aspects of "home help" technologies, specifically "ICT-based solutions for prevention and management of chronic conditions of elderly people." The AAL projects cover market-oriented R&D on concrete ICT-based solutions for ageing well with a time to market of two to three years.



AALIANCE

ICTs have developed so fast and are so pervasive in society that action for eInclusion is urgent. Short-term, commercially focused research plays an important role by delivering products and services to remedy the inequalities. But short-sightedness must not fly in the face of the long-term vision and research agenda for eInclusion in Europe.

Innovation platforms provide the foundation for a smooth and seamless development of commercially viable solutions, from the earliest stages of research to market-ready applications.

The market for AAL technologies in Europe's ageing population is set to grow rapidly over the next few decades. For example, the market for smart home applications (age-related assistance in shopping,

dressing, moving independently) will triple between 2005 and 2020, from 13 million people up to 37 million. Similarly, the number of people with several forms of age-related impairment is expected to reach 84 million in 2020.

But fragmentation in research efforts could hamper the development of commercially successful solutions. AALIANCE is funded through FP7 to gather together all AAL stakeholders and coordinate their research activities. The aim is to map out R&D needs and agree on a strategic research agenda with a mid- to long-term perspective.

Its work will feed directly into European AAL research policy and help to steer funding through FP7 and the AAL joint research programme.

The current emphasis for assistive technologies focuses on less intrusive and smarter 'intimate' solutions. No-one enjoys being wired up to a monitoring machine, but wearing smart clothes, for instance, that continuously check a person's vital signs – and even contact their health care worker or the emergency services when things are amiss – are much less invasive.

The future internet and embedded ICT in household goods will help the elderly keep more control over their everyday lives, but still provide health care

workers and carers with more accurate and up-to-date medical information.

The convergence of ICT and robotics will first be felt across Europe in the homes of the elderly and disabled. Whereas today technology may cut them off from society, the smart systems currently under development will undoubtedly deliver remarkable benefits. A helping hand, some medical advice or a red alert to the emergency services, ICT will help these people live safer, healthier and more productive, enjoyable lives.



Projects in view

JAST
Feelix Growing
COGAIN
ElderGames
MAGNET Beyond

Many research groups are trying to build robots that could be less like workers and more like companions. But to play this role, they must be able to interact with people in natural ways, and play a pro-active part in joint tasks and decision-making. We need robots that can ask questions, discuss and explore possibilities, assess their companion's ideas and anticipate what their partners might do next.

The EU-funded **JAST** project brings a multidisciplinary team together to do just this. The project explores ways by which a robot can predict the actions and intentions of a human partner as they work collaboratively on a task.

You cannot make human-robot interaction more natural unless you understand what 'natural' actually means. But few studies have investigated the cognitive mechanisms that are the basis of joint activity (i.e. where two people are working together to achieve a common goal).

A major element of the JAST project, therefore, was to conduct studies of human-human collaboration. These experiments and observations fed into the development of more natural robotic behaviour. The studies revealed that 'mirror neurons' are activated in joint tasks. People observe their partners and the brain copies their action to try and make sense of

it. In other words, the brain processes the observed actions (and errors, it turns out) as if it is doing them itself. The JAST robotics partners have built a system that incorporates this capacity for observation and mirroring (or resonance).

"In our experiments the robot is not observing to learn a task," explains Wolfram Erlhagen from the University of Minho and one of the project consortium's research partners. "The JAST robots already know the task, but they observe behaviour, map it against the task, and quickly learn to anticipate [partner actions] or spot errors when the partner does not follow the correct or expected procedure."

Before robots like this one can be let loose around humans, however, they will have to learn some manners. Humans know how to behave according to the context they are in. This is subtle and would be difficult for a robot to understand, but the **Feelix Growing** project is doing its best to create robotic empathy.

A robot with empathy sounds like the stuff of sci-fi movies, but with the aid of neural networks, European researchers are developing robots in tune with our emotions. Feelix Growing is developing software empowering robots that can learn when a person is sad, happy or angry.

Using cameras and sensors, the very simple robots being built by the researchers – using mostly off-the-shelf parts – can detect different parameters, such as a person's facial expressions, voice, and proximity to determine emotional state. Much like a human child, the robot learns from experience how to respond to emotions displayed by people around it.

European researcher are not just looking at areas for helping the elderly or people with disabilities deal with boring everyday tasks. Technologies under

development are also bringing whole new worlds, like Second Life, World of Warcraft and interactive gaming, to those who are housebound, largely immobile or socially isolated.

Their window to the outside world is sophisticated “gaming-with-gaze” software, one of several innovations emerging from **COGAIN**, an EU-funded network of excellence aimed at coordinating efforts from developers of new communications tools for people with disabilities using gaze and eye-tracking technology.

For people suffering from conditions such as cerebral palsy, motor neurone disease (MND) or so-called locked-in syndromes, being able to move around and interact in a virtual environment is a “truly liberating experience,” says Howell Istance, a computer scientist who helped develop the software.

Playing games is important for elderly people too. “Play is good in itself,” says Malena Fabregat, coordinator of the **ElderGames** project, “but the challenge was to allow the users to train what the experts told us were the most important cognitive abilities in this period of life.” Extensive trials allowed the researchers to perfect an inviting, interactive play table and display, and develop a set of computer-driven games that exercise and track important cognitive skills, stimulate social give and take, and are fun. The software can alert caregivers if it detects potentially serious cognitive changes.

But with several domestic robots and a host of smart devices in the home – and virtual worlds beyond – will elderly or disabled individuals be able to cope with all the technology around them? The **MAGNET Beyond** project has developed a breakthrough platform designed for a world where people are swamped by personal devices telling them how to live their lives. The platform allows all sorts of current and emerging devices to communicate with each other through a system known as “personal networks”. Here the technology is built to do the difficult work of finding devices and connecting them.

The EU-funded project sought to provide compelling services delivered seamlessly to the user over self-managing and configuring technology. Essentially, the technology remains transparent, invisible to users with varying skills and understanding of ICT. The solutions developed by MAGNET Beyond should be an antidote to the technology curse – where it goes from solving to being the problem.

More information

ALLIANCE <http://www.aalliance.eu>

JAST <http://www.euprojects-jast.net>

Feelix Growing <http://www.feelix-growing.org>

COGAIN <http://www.cogain.org>

ElderGames <http://www.eldergames.eu>

MAGNET Beyond <http://magnet.aau.dk>

What's inside?

Content for this publication was provided by the *ICT Results* editorial service, working to showcase breakthrough ICT research in Europe. It is part of a series of domain surveys drawn together from articles featuring EU-funded ICT research.

ICT Results

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

European Commission contact:

The ICT Information Desk Office
BU25 02/160
B-1049 Brussels, Belgium
Fax: +32 2 296 83 88

Information Society and Media: Linking European Policies

Further information:

FP7 ICT Work Programme

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

Information Society Policy Link initiative:

http://ec.europa.eu/information_society/activities/policy_link

