10 must-see projects at ICT 2015 in Lisbon

10 representative projects as appetiser of what is showcased at ICT 2015

- **Graphene, the magic material for Europe's future**
- **Extend your body with an avatar**
- **Feel or hear: How technology helps blind people**
- **Saving on electricity and mobility costs**
- **ICT for understanding and exploring the Human Brain**
- **Technology that leaps out of the screen**
- **Using virtual reality tools to enter large datasets**
- **Big Data analytics for Earth Sciences**
- **Setting up your own digital business has never been easier**
- **Connecting scientists all over the world**

#ICT2015

Graphene, the magic material for Europe's future

Extremely fast charging batteries, new light systems, flexible displays and touch-screens, water filters – these are just some of the possible uses of Graphene, a revolutionary, almost magic new material. It is set to play an important role also in the automotive, aerospace, photonics and electronics industry, in the medical world and in many other sectors.

Graphene possesses an extraordinary combination of physical and technical properties: it is the thinnest material, it conducts electricity, it is stronger than steel and entails unique optical properties. The project investigates and exploits the unique properties of this revolutionary carbon-based material. Thanks to groundbreaking experiments in Graphene, Sir Kostya Novoselov, invited speaker in the plenary session of the ICT 2015 conference, has been awarded the Nobel Prize in Physics jointly with Andre Geim.

The Graphene project is, along with the Human Brain Project (also showcasing at ICT 2015), the first of the European Commission's Future and Emerging Technology Flagships, whose mission is to address the big scientific and technological challenges through long-term, multidisciplinary research.

The Graphene booth can be found in the Off-site of ICT 2015 at Praça do Comércio.
"Introducing Mr G" (Animation about Graphene)

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Extend your body with an avatar

Imagine mentally sending a robot exploring a remote place, while you're still sitting in front of your computer. You simply operate your “avatar” thinking where you want it to go, seeing what the avatar sees, experiencing the place without being physically there. This will soon become possible thanks to "embodiment" technologies. The technology works via a Brain-Computer Interface (BCI): the sensor system detects your brain activity and transmits the signals to the avatar, which then acts according to your "orders". The full embodiment experience is granted by special glasses transmitting, in real-time, the images captured by the avatar video. This technique could help disabled patients by restoring some of their functions: they will be able to move humanoid robots or only parts of them (e.g. arms) via a BCI, and use the avatar to perform everyday works for them. Prototypes have been partly developed within the EU-funded project VERE.

The same concept also works the other way round: by stimulating patients (through a visual or hearing stimulus or by touch), it is possible to map the active brain regions. This is critical for some patients with epilepsy (intractable seizure disorders) or brain tumours, as it complements available techniques to localise precisely the affected areas. It allows surgeons to protect, during surgery, essential brain regions (like primary motor and sensory cortex, as well as brain areas supporting language and memory functions) to avoid neurological deficits. The software system (CortiQ) is already on the market and used in clinical trials (in Japan and US) replacing electrical stimulation, with the advantage of less secondary effects to the patients.

Booth C14 in the Connect Area (hall 1) at ICT 2015
Press contact: Dr. Günter Edlinger, edlinger@gtec.at, phone: +43-676-9442860
Euronews video about VERE prototype (until 2:50)
Video CortiQ

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Feel or hear: How technology helps blind people

Making life a little bit easier for blind and visually impaired people is the core drive of two EU-funded research projects: Blindpad and ABBI. Blindpad (Personal Assistive Device for the BLIND) makes graphical content (such as tactile maps or drawings) accessible by the sense of touch. ABBI (Audio Bracelet for Blind Interactions) builds an audio bracelet for blind children that will provide spatial information on where and how movement around them occurs.

Blindpad will produce a device that will look like a tablet PC. Its surface, however, will not remain smooth and flat. Parts of it can be lowered or raised just enough for someone touching it to feel the difference, thus "displaying" a line, a dot, an arrow or other symbols or geometric shapes. By touching it, visually impaired people can understand maps or graphical symbols and get information about their surroundings, for example the location of a door. Thanks to Blindpad a visually impaired child could share a classroom with sighted students (while the latter observe the teacher tracing a symbol on the blackboard, their visually impaired classmate could also follow the course from his/her desk) or it could help blind people find their way around a room, a building or a city, by allowing them to develop a mental map of their surroundings.

While Blindpad uses touch, ABBI works with sounds and with children!. The child wears the device on the wrist or feet. As the child moves, the bracelet emits different beeping sounds, depending on the different movements the child makes. This helps the child build a representation of his/her movement in space. Such sound sources could also be placed on other persons or objects to provide a better sense of the events taking place in the environment and to improve the mobility and social skills of these children and adults. This way the audio bracelet helps visually impaired children position themselves, find their orientation, and coordinate their movements, thus supporting their mobility and social skills.

Booth C16 in the Connect Area (hall 1) at ICT 2015 (joint stand under the title "Tech for VIPs")
Blindpad at Festival of Science (video, Italian language)
Blindpad article on the iit-website (also available in Italian)

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Saving on electricity and mobility costs

You've heard of using renewable energies at home to preserve the environment but also to cut your bills. How about using them to also cut your mobility or transport costs?

FREE-MOBY could help you do that. The project uses photovoltaic installations not only to provide electricity to home appliances, but also to charge a plugged-in vehicle, while selling excess energy to the grid. This whole system is controlled remotely by a smart phone. The results are: a lower home energy bill – because of the use of stored energy in a battery rack during peak hours – plus lower operation costs of the electric vehicle – because it is charged by renewable energy produced by photovoltaic panels installed on the roof of a house. Additionally, the vehicle also uses energy produced by smart photovoltaic panels integrated in its body.

The vision is that the types of electric vehicles proposed and the bidirectional energy routing between vehicles and homes will motivate a rapid deployment of safe, securely connected, low priced electric vehicles and a further impulse to install integrated photovoltaic-battery systems in houses across the EU. Free-Moby continues an effort that started with the P-MOB project.

Booth C23 in the Connect Area (hall 1) of ICT 2015
Press contact: Pietro Perlo, phone: +39 3357199243

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ICT for understanding and exploring the Human Brain

Understanding the human brain is one of the greatest challenges facing 21st century science. The project was launched in October 2013 will last for ten years with a support of €1 billion as one of the two flagship initiatives in Future and Emerging Technologies.

The goal of the Human Brain Project is to better understand the human brain and its diseases, using information and communication technology (ICT) as a catalyst for a global collaborative effort. It is about modelling and simulating the brain using supercomputers. HBP will deliver revolutionary computing technologies mimicking the brain with its power, fault-tolerance and consumption efficiency. HBP is designed as an open, big data integrator project rather than a project producing more data. Therefore the focus is on using the very large corpus of neurophysiological data that are dormant in data repositories and to exploit them to build the model. To achieve its ambitious goals, the HBP brings together many different scientific communities: from neuroscience and medicine to mathematics, computer science, high performance computing and robotics.

What sets the HBP apart from existing scientific approaches in understanding the human brain is that it is developing an ICT infrastructure in order to build brain computer models. The HBP ICT infrastructure will be open to all relevant scientific communities to make progress in neuroscience, computing and medicine.

Booth i08 in the Innovate Area (hall 2) at ICT 2015
Video presentation

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Technology that leaps out of the screen

Imagine pulling objects and data out of the screen of your smartphone or laptop and handling them as any other object around you: that is the vision of GHOST (Generic, Highly-Organic Shape-Changing Interfaces), project, designed to revolutionise user interaction with technology as it allows us to handle objects, and even data, in a completely new way.

GHOST adds 3D dimension to our flat screens to allow us perceiving and manipulating data. It thus does not just display holograms, but shows, for example, real bar charts that can be pulled, pushed or re-ordered; in the future, we could even be pulling hills and valleys out of a map. This would allow a surgeon, for instance, to work on a virtual brain physically, with the full tactile experience, before performing a real-life operation. Designers and artists using physical proxies such as clay can mould and remould objects and store them in the computer as they work.

GHOST has produced prototypes to showcase shape-changing applications. 'Emerge' is one such prototype which allows data in bar charts to be pulled out of the screen by fingertips. The information, whether it's election results or rainfall patterns, can then be re-ordered and broken down by column, row or individually, in order to visualise it better.

The researchers have also been working with 'morphees', that is flexible mobile devices with lycra or alloy displays which bend and stretch according to use. These can change shape automatically to form screens to shield your fingers when you type in a PIN code, for example, or to move the display to the twists and turns of a game. And such devices can be enlarged by the hand to examine data closer and shrunk again for storing away in a case or pocket.

The project is confident that displays which change shape as you use them are probably only five years off now.

Booth i11 in the Innovate Area (hall 2) at ICT 2015
Press contact: John Tiab, Copenhagen University, john.tiab@di.ku.dk, phone +4581946750
Videos
Deformable screens that change shape
Towards rapid prototyping with shape-changing displays for designers
Pioneering 3D touch screens (BBC video)

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Using virtual reality tools to enter large datasets

In our digital societies, we generate more and more data. Whether it relates to geographical information, weather, research, transport, energy consumption, or health, data collection is easy. But how to make sense of all these big and complex datasets?

Researchers from the CEEDs project believe there may be help at hand in evaluating big data from an unlikely source: our subconscious. We are aware of about only 10% of our brain activity; CEEDs researchers have been looking at ways to increase that percentage, so we can perform better in our environment, overwhelmed by data. They built an immersive 3D room, the CEEDs eXperience Induction Machine (XIM), which uses virtual reality tools and sensors, to make the subconscious 'visible' and allow the user to "see" and establish relationships within large datasets. The XIM infrastructure was combined with the latest generation hardware and immersive VR technologies in BrainX3. Employing a range of visual, audio and tactile sensor systems, it also monitors users' reaction to the experience to find out what they focus on and how they do it.

Possible applications range from inspection of satellite imagery and oil prospecting, to astronomy, economics and historical research. Future development of CEEDs might also go over big data; it could help with gathering feedback from users in physical environments such as museums, libraries, shops, concerts, training classes etc.

CEEDs also studies applications immersing users into historical contexts. For example, the CEEDs' Holocaust Memorial installation provides an interactive narrative structure that represents key aspects of the holocaust, including its archaeological, social, cultural, psychological, and medical aspects. The objective here is to help users understand the importance of the holocaust.

Booth i12 in the Innovate Area (hall 2) at ICT 2015
Press contact: Jonathan Freeman, jonny.freeman@gmail.com, phone: +447973776750
Project website
Project story (in 6 languages)
Video: Beyond the subconscious
Video: Deep inside our subconscious

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Big Data analytics for Earth Sciences

Huge data sets are generated by the study of the earth, whether it's geology, oceanography or astronomy. But how do you make sure that this data is not just lost or sitting in an archive? The EarthServer project is there to push the boundaries of Big Earth Data processing by allowing researchers to easily access and analyse multi-dimensional data from a wide range of sources.

EarthServer has established services and technology that gather Earth science data such as satellite images, aerial imagery (e.g. from aircrafts) or weather data. The sources can be multiple, such as airplanes equipped with cameras and satellites equipped with sensors or imagers. The data is made available to everyone through a single source, using a peer network of data centres worldwide. EarthServer gathers all the data and then sorts it. A concrete result is that it would allow the historian of the future to easily find what the weather conditions were, how strong were the winds and sea currents in, for example, Le Havre on any given date.

EarthServer is using NASA's World Wind 3-D engine that allows users to zoom in from satellite altitude to any spot on Earth. The operational services on Earth Observation imagery, weather data, and Mars data will be demonstrated live at the booth.

There's a lot to gain from such large-scale data access and data sorting capability: for example, using long term Earth Observation monitoring (such as Landsat) could help us see how a place on Earth changed in the past several decades and to what extent. EarthServer could benefit several organisations and sectors ranging from Earth Observation in the broadest sense, climate and weather modelling, marine/ocean science and even the study of solar system bodies other than Earth. Last, but not least, all of us could use EarthServer to extract space- and time-variable weather information for our own, customized automatic weather forecasts to help us plan our day.

Booth T14 in the Transform Area (hall 2) of ICT 2015
Project website
More info on the technology powering EarthServer-2

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Setting up your own digital business has never been easier

FIWARE helps new digital business ideas come to life by making available a set of components that anyone can use to help turn their ideas into concrete solutions. Besides components, FIWARE comes with an innovation ecosystem formed by application developers, platform technology providers, startups and big companies, and organisations that make open data available. Building applications becomes then quicker, easier and cheaper, especially for start-ups and SMEs which can make use of

pre-fabricated components and access to open data, e.g. from cities. For example, Smartaxi, a mobile app helping taxi-drivers better meet demand, and FoodLoop, an app helping you find the best food offers around you, were developed with the use of tools provided by FIWARE.

FIWARE comes with an accelerator programme that promotes the take-up of FIWARE technologies among system integrators and application developers, with special focus on SMEs and startups. There are 16 accelerator projects providing support, e.g. mentoring, and training to startups and SMEs. Some examples of projects supported by the accelerator programme: TobyRich, developing smartphone controlled planes; Guide Me Right, developing an application that lets guests/tourists find local friends to show them around in the friends' city or region; 8fit, a mobile fitness app.

Booth T17 in the Transform Area (hall 2) of ICT 2015
Project website, see also The Future Internet Public-Private Partnership (PPP)

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Connecting scientists all over the world

The GÉANT network is a vital element of Europe's e-infrastructure strategy interconnecting Europe's national research and education networks (NRENs). It operates at speeds of up to 500Gbps, reaches 50m users in 10,000 institutions in Europe, and a total of 100 countries worldwide. The project was even included in the Guinness World Record for fastest provisioning of long haul optical transmission capacity (July 2013)!

GÉANT connects universities and the world's largest research projects, allowing researchers and innovators to share data, discuss and learn together, and test their innovations across the network, thus helping deliver real societal benefits. Some of Europe's greatest research wouldn't have taken place had it not been for GÉANT: research in particle physics (CERN's Large Hadron Collider), earth observation (EUMETSAT and Copernicus), radio astronomy (NEXPRES, and the in-planning Square Kilometre Array-SKA), Bioinformatics (EMBL-EBI) and medical & health (DECIDE, ITHANET).

From big science projects to the man in the street, the knowledge communities GÉANT serve libraries, museums, and hospitals with connectivity. At ICT2015 GÉANT will be showcasing MD-PAEDIGREE and CARDIOPROOF. These 2 projects are about to create the first Big Data and Model-Driven decision support system for paediatrics, connecting 7 hospitals across Europe. The project will also present a study on data sonification in cancer diagnosis: taking a biopsy is invasive and results can take weeks; research is underway into the use of audio devices for immediate diagnosis.

Booth EV5 in the EC Village (hall 2) at ICT 2015
Project website current project phase (GN4-1) – projects under Horizon 2020
Previous project website previous project phase (GN3plus) – projects under FP7 until 30 April 2015