



THE EUROPEAN ASSOCIATION OF  
RESEARCH & TECHNOLOGY  
ORGANISATIONS

**Impact  
Delivered**



# FOREWORD



“Impact Delivered” is the title of the 2011 EARTO brochure of innovation case studies, and it is the strap-line which we shall be using for all future EARTO publications. RTOs exist to support governments in tackling the grand challenges of the day, including helping to build and sustain the competitiveness of firms both large and small. Thus RTOs are expected to achieve tangible results, to meet targets, and indeed many RTOs operate according to medium-term (e.g. five-year) strategic plans negotiated with their sponsoring governments.

“Impact Delivered” neatly sums up what RTOs do: help change society and the economy for the better.

As this brochure comes off the printing presses, the European Commission is publishing its detailed proposals for the next European research and innovation programme, Horizon 2020. We see there a clear focus on tackling “grand societal challenges” and on “innovation”: by contrast, previous programmes focussed on “research and technological development” in selected “thematic priority” areas. It is important that the change in the wording – from “research” to “innovation” and from “themes” to “challenges” – is reflected in the programmes and projects actually implemented under Horizon 2020. Commissioner Geoghegan-Quinn’s frequent insistence that she wants to see real results on the ground is encouraging.

The Commission’s bid for an 80bn budget for Horizon 2020 looks at first glance like a major advance on FP7 (plus the parts of the CIP and the EIT to be included in Horizon 2020). Indeed, in terms of headline numbers, it represents a 40% increase. In truth, though, there is no real increase at all. The FP7 budget was programmed from the beginning to rise year-on-year, so that by the time 2013 arrives – the final year of FP7 – we shall be spending about 10bn annually. Thus, just to sustain that level of expenditure will require 70bn during the next seven-year period. And we shall need additional funds in order to satisfy the new “innovation” objectives,

a perhaps expanded EIT, etc. This is not the place to speculate on whether and how additional resources might be found (reduced agricultural spending, Structural Funds, European Investment Bank . . .). The message is, rather, that the crisis of the past three years continues to leave its mark. Public budgets practically everywhere remain tight and probably will continue to do so for some time to come. At the same time, global competition continues to grow. Europe’s future competitive advantage can lie only in a knowledge-based economy. Thus we must find the resources to maintain and expand our investment in research and innovation. That is for the politicians to do. The RTO community, for its part, stands ready to continue and intensify its work with the universities, with public agencies, and with large and small firms to help turn science into technology, knowledge into value, invention into innovation – Impact Delivered!

The several case studies in this brochure give a flavour of RTOs’ work. They include innovations at the leading edge of science and technology, but also clever combinations and integration of existing technologies to produce new opportunities and solutions. There are innovations for small firms and others that have benefitted large ones, and there are several examples of RTO contributions to quality of life and tackling grand challenges. We have included, too, examples of innovations produced with funding from EU programmes, notably the Framework Programmes for Research and Technological Development. As the policy debate on the final shape of Horizon 2020 begins, this brochure is a reminder that RTOs are major players in EU research and innovation programmes and that they put those resources to good, practical effect. They look forward to doing the same within Horizon 2020.

Impact Delivered!

A handwritten signature in black ink, appearing to read 'Erkki KM Leppävuori'.

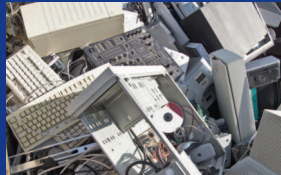
**Erkki KM Leppävuori**

President and CEO of VTT Technical Research Centre of Finland  
President of EARTO

# Technology for a better world



Secure energy supply



Electronic waste recycling



Fresh water supply



Aircraft safety



Disaster management



Sustainable agriculture



Superconductor for industry



Solar energy



Healthcare



Satellite monitoring



Brain surgery



Mobile microscope



More efficient production

# Impact Delivered

# Superconducting heater gives metal industry green boost

EARTO member SINTEF has developed a revolutionary energy-saving induction heater for the metals industry which is the first truly commercial application of Nobel Prize-winning high-temperature superconductor technology. A major breakthrough on the way towards establishing superconductors as a key technology of sustainable power engineering, this world-first magnetic billet heater makes the production of aluminium parts faster, cheaper, higher quality and dramatically more energy efficient.

Heating large solid cylinders, or billets, of aluminium and other metals so that they can be manipulated into products and profiles

**One single superconducting induction heater saves energy corresponding to more than 800 barrels of oil per year**

ranks among the most energy-consuming of extrusion-related processes. Energy losses are also substantial, adding up to around 2 billion kWh annually from Europe's conventional aluminium billet heaters alone. Pressure for a more sustainable, sophisticated alternative has been mounting as the automotive, aerospace, transport and building industries make ever-more exacting demands for aluminium products with increasingly complex geometries and better mechanical properties and surface qualities.

## Transformational technology

SINTEF combined novel electrotechnology and materials with an altered heating process design to create an entirely new kind of billet heater based on electromagnetic induction.

**If the new heating technology was adopted by all European aluminium and copper plants, the potential energy savings would equate to around €66 million a year**

The heater capitalises on the properties of superconductors to create powerful, controllable magnetic fields without any energy loss and on its novel heating process to enable

even and deep heating throughout the billet. With funding from the German Federal Environmental Foundation (DBU), the technology was developed into a commercial product by superconductor energy technology company Zenergy Power. It can now be used to heat aluminium, copper, brass, magnesium, titanium and inconel as well as spray- and plasma-compacted materials.

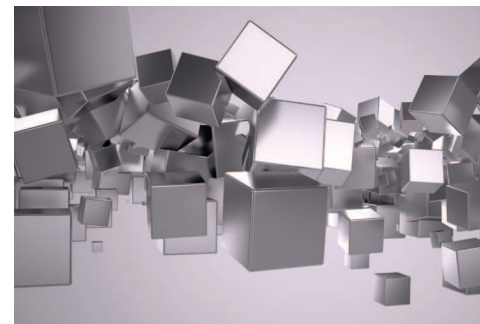
## Optimal outcomes

Not only does the new heater avoid the large energy losses of conventional heaters, increasing energy efficiency by 50%, it also pushes up productivity by 25%. The enhanced controllability

and reproducibility of the billet temperature mean an end to the overheating common with previous heaters and a new era of extrusions with optimised characteristics and exceptional finishes. A number of additional factors provide significant incentives for industry take-up: easy installation, minimal maintenance, flexible operation without coil change and economic payback within one year.

## Influential innovation

This step-change heating technology has had an immediate impact, being licensed by SINTEF to Zenergy Power for manufacture by its partner Bultmann and winning Europe's largest environmental prize of €500,000 from DBU. The first industrial user of the heater, aluminium profile manufacturer Weseralu, confirmed the claimed 50% reduction in energy consumption and four more heaters have subsequently been sold. Customers include the world's largest aluminium extrusion company. Once industry is convinced of the heater's operational efficiency it has great potential to take over this market and pave the way for Europe to assume the lead in the anticipated multi-billion Euro market for high-temperature superconductor equipment.



**'The adoption of superconductor-based heating equipment has enabled us to set new standards in energy efficient production. Further to this, the superior heating performance of the machine has enabled us to operate our extrusion line with a greater degree of versatility and significantly improved our overall productivity levels.'** Heinz Hagemann, Weseralu



**SINTEF**

SINTEF is the largest independent research organisation in Scandinavia. It is a broadly-based, multidisciplinary research group with international top-level expertise in technology, medicine and social sciences. SINTEF has 2,100 employees from 69 different countries. Forty six per cent of its researchers hold doctorates. The organisation's turnover in 2010 was €350 million, more than 90% of which was won in open competition for contracts from industry and the public sector.

[www.sintef.com](http://www.sintef.com)



# Ceramics system helps sector shape up for the future

The Institute of Ceramic Technology (ITC), represented by EARTO member FEDIT, and Spanish SME Macer have developed a ceramic tile pressing control system which is increasing product quality and enhancing the reputation and competitive advantage of the European tile industry. By automatically taking into account and regulating all the variables involved in the production process to deliver tiles of consistent size, or calibre, the CALIBRE UNICO system has the potential to dramatically reduce the volume of tiles rejected, saving Spain's tile industry €90 million a year.

Inconsistency of tile size is one of the most important problems in the ceramic tile sector, leading to expensive wastage, difficult installation and customer dissatisfaction. Size variation is primarily linked to inadequate control of the dry bulk density of tile bodies during the forming process, which results in shrinkage variations during drying. Current bulk density monitoring and adjustment procedures are manual, imprecise and irregular. An automated system capable of equalising bulk density precisely and reliably would make the achievement of a single uniform tile size for each batch possible for the first time.

## Uniting for uniformity

Machinery manufacturer Macer worked with the ITC to design just such a system in a project partly funded by the Regional Government Department of Industry and the Valencian Institute for Small and Medium-sized Enterprises. The partners created the comprehensive tile pressing control system by bringing together an innovative infrared lens capable of very precisely measuring moisture content, a new mould load-control system and a device to continually regulate pressure according to key variables.

## Moulding the future

CALIBRE UNICO automatically and continually takes into account moisture content, compaction pressure, tile thickness and carried load to ensure that all tiles have the same bulk density regardless of changes in humidity or spray-dried powder loading differences in different parts of the mould. The system not only minimises production problems, production time, costs and waste, its sophisticated independently-operable mould components also enable a new level of production versatility as different tiles with different thicknesses and reliefs can now be produced together in the same mould.

## Spreading the word

The CALIBRE UNICO system has been installed by 12 Spanish tile manufacturing companies and in early 2012 a number of overseas organisations will also introduce it into their operations. It has been promoted in Turkey and Brazil and at QUALICER, the



**A typical tile manufacturer producing around 4 million square metres of tiles annually would save around €400,000 a year by using the CALIBRE UNICO system**

world congress on ceramic tile quality, as well as by Spain's Department of Support to Innovation. In recognition of its innovation excellence and

commercial potential, CALIBRE UNICO was awarded the Alfa de Oro Prize for Innovation by the Spanish Ceramic and Glass Society at the CEVISAMA 2010 trade fair.

**'After the introduction of the CALIBRE UNICO system we reduced the number of calibres per production, were better able to combine different sizes of each item and secured many inventory management advantages. Our customers now have confidence that they will get tiles of the same dimension on different purchase orders.'** Juan Jose Gargallo, Zirconio



ITC is one of the technology centres associated to Fedit, the Spanish Federation of Technology Centers. ITC is a technology centre of ceramics and related companies whose main objective is to improve the sector's competitiveness. ITC works in many different research areas including: ceramics (pavements and coating, glazes, enamels and colours, raw materials, baked clay products), mechanical equipment, porcelain, majolica and pottery, sanitary equipment, technical ceramics and fire-resistant materials. Fedit is the main private research, development and innovation agent in Spain. [www.fedit.com](http://www.fedit.com)

# Innovative neural probe boosts success of brain surgery



An innovative neural probe developed by EARTO member Imec in collaboration with a European consortium of academic and industrial organisations is opening the way for safer and less invasive brain surgery. Able to position individual electrodes with respect to cells for the first time, the probe enables breakthroughs in our understanding of how the brain functions.

Brain probes have been used for decades to study brain function and disease but their potential has been limited by the difficulty of precisely positioning electrodes relative to single neurons. To date, probe positioning has been a matter of trial and error as it has been impossible to mechanically optimise the position of electrodes independently of each other.

## Locking on to a solution

This problem was overcome by NeuroProbes, a FP6 project coordinated by Imec which developed electronic depth control (EDC) technology allowing individual electrodes to be positioned without any mechanical displacement. The EDC probe has hundreds of electronically switchable electrodes which scan for the most informative neural signals, lock onto them and eventually adjust their position during the course of an experiment.

**'The probe provides a more flexible platform for midbrain stimulation, better activation properties when compared to our current human implant as well as better recording properties'** Hanover Medical School

## Improving surgical outcomes

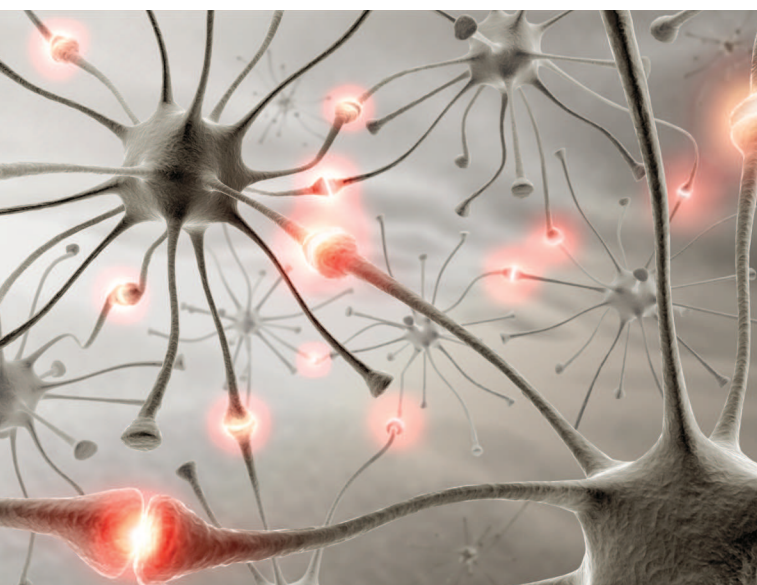
The probe's ability to record single neurons means that current research can be refined and entirely new tracks explored. It also opens the door to improvements in pre-operative diagnostics for a variety of conditions, pinpointing for example where an epileptic seizure was generated and enabling the removal of as little tissue as possible during surgery.

## Probing commercial applications

The EDC probe is now being used successfully by the research groups involved with NeuroProbes and by new users from other leading European neuroscience centres for experiments enabling, for example, ultimate brain mapping encompassing deep brain and cortical brain regions. The probe's

enormous commercial potential is being explored by project partners and a start-up company, ATLAS Neuroengineering, which is using the technology to undertake free behavioural animal studies and explore intraspinal microstimulation applications.

**It is estimated that approximately 50 million people around the world suffer from epilepsy, a condition which the EDC probe can be used to treat more effectively by pinpointing where an epileptic seizure was generated**



**Imec** carries out world-leading research in nanoelectronics and nanotechnology to deliver industry-relevant technology solutions for better healthcare, smart electronics, sustainable energy and safer transport.

Headquartered in Belgium, Imec has a staff of more than 1900, including over 500 resident and guest industrial researchers, and offices in the Netherlands, Taiwan, USA, China, Japan and India.

[www2.imec.be](http://www2.imec.be)

# Virtual power plants set to secure Europe's electricity supply



A smart grid concept developed by an FP6 consortium including EARTO member Fraunhofer IWES is set to make Europe's ageing energy infrastructure ready for the challenges ahead. By creating virtual power plants to maximise the contribution distributed



energy resources (DER) make to the electric power system, the FENIX project has demonstrated the feasibility of a cost-effective, secure and sustainable European electricity supply system capable of helping to meet energy and climate change targets. If Europe is to meet its target to derive 20% of its energy requirements from renewable sources by 2020, increasing numbers of small-scale solar plants, wind turbines and combined heat and power plants will need to play a greater part in the energy mix. Where these energy producers are connected to the distribution network it is in a costly, piecemeal way and may cause

operational problems, damaging supply security and ultimately limiting deployment. As the numbers of DER rise to the many thousands that will be needed in the future, there is a compelling need to optimise their contribution to Europe's electricity supply with a new kind of intelligent, integrated energy infrastructure.

## Making connections

FENIX (Flexible Electricity Networks to Integrate the eXpected energy evolution) brought together 20 partners, including research organisations, DER owners and utility and ICT specialists, to develop an active grid concept enabling the aggregation of the output of a large number of DER using a large scale virtual power plant (LSVPP) incorporating a novel control system and communication network. The LSVPP can control the DER within its portfolio, trading the energy generated and offering ancillary services to Transmission and Distribution System Operators.

## Overcoming barriers

FENIX represents a first, decisive step towards the economically and operationally-viable integration of renewable energy sources into the existing electricity supply system. It means that DER owners can participate commercially and cost-effectively in the market and operators have the opportunity to take full advantage

of the flexibility of DER for system operation. Crucially, the system gives the visibility and control needed to ensure that energy generated by DER does not cause an overload or overvoltage, which removes a fundamental operational barrier. It also has the scalability to provide power on national as well as regional and local levels.

## Generating results

Two large field deployments have validated the tools and strategies of the FENIX solution, one focusing on combined heat and power plants and the other on DER units integrated with distribution network management and markets. A miniature version of a virtual power plant has also been built at the Fraunhofer IWES, which enables grid and plant operators to try out new technologies. The concept is also playing a part in FP7 project Twenties, which is focused on making it possible to significantly increase the use of wind power in Europe, and in the E-Energy-funded developing and testing of core elements of an 'internet of energy'. The next step is to develop the technology to enable the integration of the maximum possible number of renewable energy suppliers.

**'National Grid sees FENIX as an important enabling technology, building on smart meters and internet communications to expand decentralised/distributed markets'** Lewis Dale, National Grid, UK

**Renewable energy sources currently make a disappointingly small contribution of around 14% to Europe's electricity supply**



**The Fraunhofer-Gesellschaft** is the

leading organisation for applied research in Europe. Its research activities are conducted by 60 Fraunhofer Institutes at over 40 different locations throughout Germany. The Fraunhofer-Gesellschaft employs a staff of around 18,000, who work with an annual research budget totaling €1.66 billion. Roughly two thirds of this sum is generated through contract research on behalf of industry and publicly-funded research projects. Branches in the USA and Asia serve to promote international cooperation.

[www.fraunhofer.de](http://www.fraunhofer.de)



# Wearable technologies at the heart of new healthcare systems



A breakthrough intelligent biomedical clothing system developed by a FP6 consortium including EARTO member CSEM is helping to prevent the development of cardiovascular disease (CVD) and to open up a new mass market for European industry. With 20% of all European citizens suffering from chronic heart disease, and an even higher proportion at risk, it has been estimated that if the MyHeart system was adopted by just 10% of the population it could save €32 billion in healthcare costs and avert around 158,000 deaths every year.

**'These technologies have the potential to revolutionise patient care. Ultimately, this approach could help fewer health professionals deliver more effective care to more patients at reduced cost' Professor J G Cleland, cardiologist**

CVD is the most important cause of premature death and morbidity in Europe, with up to 10 million people suffering from heart failure or serious structural heart disease. CVD already costs Europe around €169 billion a year and, with the population ageing, this is set to increase. A healthy and preventative lifestyle as well as early diagnosis could systematically fight the origin of CVD, which is why technology that empowers individuals to take responsibility for their health and enables healthcare professionals to more easily monitor their patients could dramatically impact the incidence and treatment of CVD.

## Technology-enabled textiles

Six years of research by 40 partners covering the entire value chain from textile research to fashion and electronic design resulted in the creation and clinical testing of the MyHeart system. CSEM was responsible for the embedded processing and wearable electronics critical to the system, which brings together novel wearable technologies incorporating textile and electronic sensors, personalised algorithms and on-body computing and user feedback devices to enable the design of a wide range of medical and home-based applications.

## Personally-tailored systems

MyHeart offers continuous monitoring of patients' vital signs according to their individual needs and prescribed therapy and facilitates ongoing diagnosis and analysis of health status, interaction between users and healthcare professionals and seamless access to treatment when required. It can be tailored to specific user



Copyright Weartech-GOW 2011

groups and could help, for example, to motivate the 57% of European citizens who are physically inactive, encourage the 25% of the population who are obese to adopt healthier lifestyles and diagnose and treat the 40% of people

who suffer from acute stress. Solutions can also be developed for the early diagnosis and prediction of acute events such as myocardial infarction and heart pump failure.

## Spin-out commercialisation

MyHeart technologies have already been commercialised by a number of project partners through spin-out companies. Spanish firm Weartech has developed a range of smart clothes for health, sports and industrial applications. A bio-feedback device measuring activity levels is being validated by the Swiss Federal Office of Sports on behalf of ActiSmile. And CEA-LETI created spin-off Movea to produce, among other applications, physical rehabilitation monitoring solutions. Consortium leader Philips has gone on to invest more than €10 billion in related company acquisitions to help it take a lead in home health care technologies such as smart beds that monitor patients' vital signs.

**45% of all deaths in Europe are the result of cardiovascular diseases which the MyHeart system is designed to help prevent and diagnose**



**CSEM** is a Swiss research, development and innovation centre specialising in micro and nanotechnology, nanomedicine, robotics, packaging and information technology. The centre creates a dynamic link between research and high-tech industry, and also collaborates with other innovation centres around Europe, to transform scientific and technological knowledge into elegant solutions for cutting-edge products and applications.  
[www.csem.ch](http://www.csem.ch)

# Mobile microscope puts doctors in the picture

Technology that turns a mobile phone camera into a microscope, developed by EARTO member VTT, has huge potential in telemedicine as well as in fields from environmental monitoring to marketing and packaging to anti-counterfeiting. By enabling microscopic images to be recorded, processed and transferred in an instant at low cost using a device carried around everyday by millions of people in all corners of the world, the microscope add-on module has the potential to play an important role in the diagnosis of diseases such as malaria, tuberculosis and skin cancer and in the tracking of infectious diseases.

**With 5.6 billion mobile phones in use around the world, the potential of the microscope add-on module is vast**

been denied to many people, especially in remote locations and developing countries. Capitalising on the accessibility, portability, connectivity and data processing capability of mobile phones to overcome these problems makes them a powerful platform for developing new microscope-based devices for healthcare applications. A high resolution mobile microscope could also open up opportunities in many other industries.

## Low-cost lens

Building on technology developed with funding from TEKES and with several Finnish companies, VTT embarked on a project to explore and progress some of these opportunities. First it created a LED illumination-based microscope module which has a special plastic lens that can be manufactured cost effectively in large volumes by injection moulding. Capable of taking pictures of objects at 0.01mm resolution, the device can be easily added on to a mobile phone to form a very compact analysis package. In the next version of the module, VTT added several LEDs at different angles, which enabled 3D profile measurements based on a photometric stereo method.

**'The market and business opportunities of a low-cost add-on microscope module are outstanding. Besides vast potential in telemedicine, applications in industrial quality inspections as well as counterfeit detection show great promise' Janne Suhonen, VTT**

## Instant images

The module brings extremely low cost 2D and 3D microscope capabilities to many more people, enabling instant microscopic image recording, image processing with a smart phone and wireless transfer via Bluetooth or multimedia messaging or email. As well as being able to send images of blood samples and skin directly to doctors and specialists for analysis and diagnosis, the device can connect the pictures to GPS location data so doctors can track the progression of infectious disease in real time. Combined with printed components, it can also be used for applications like home pregnancy tests.



## Smart solutions

The mobile microscope has received great interest from several sectors, including materials inspection and biological analysis, and commercialisation discussions are currently underway between VTT and an SME. One application proving of particular interest is intelligent packaging. With product details such as ingredients and nutrition data taking up increasing amounts of valuable space on packaging, being able to encode all this information within tags or bar codes represents a very attractive solution. Optical readers based on the mobile microscope technology which enable consumers to access this information using their mobile phones could make this a reality.



**VTT Technical Research  
Centre of Finland** is the biggest

multi-technological applied research organisation in Northern Europe. With its staff of 2,900, its unique research facilities and extensive global co-operation networks, it provides leading-edge technology solutions and innovation services. VTT works to enhance its customers' competitiveness and competence, creating the prerequisites for society's sustainable development, employment and wellbeing.  
[www.vtt.fi](http://www.vtt.fi)

# Bomb-proof luggage container takes aircraft safety to new heights



A blast-resistant container for passenger luggage developed by a FP7 consortium coordinated by EARTO member D'Appolonia is protecting aircraft from in-flight, onboard threats. FLY-BAG's textile-composite structure absorbs explosions from bombs small enough to be hidden in luggage and powerful enough to cause catastrophic damage, bringing a new level of safety to civil aviation.

## Providing convincing evidence

Full-scale blast tests of FLY-BAG prototypes were a complete success and a full system installation on a commercial plane confirmed its ease of use with no equipment or hold modifications or training required, removing important barriers to adoption. The consortium is currently working towards certification by the European Aviation Safety Agency as well as acceptance by major aircraft manufacturers and carriers across Europe.

**FLY-BAG is just a sixth of the cost, and a third of the weight, of its predecessor, the hardened luggage container**



A small bomb smuggled inside luggage held in the cargo hold can result in the rapid and total disintegration of an aircraft, as we know from disasters like Lockerbie in 1988, when 270 people were killed. The more recent parcel bomb attempts highlighted the ever-present threat posed by terrorist attacks. As existing hardened luggage containers are too heavy and costly to gain market acceptance, there was a clear need for a novel solution.

## Integrating innovative technologies

Three years of research led the consortium to an innovative and affordable solution, a light-weight, multi-layered bag which addresses all the dangers of an onboard explosion. FLY-BAG has ballistic yarns preventing fragments exiting the bag and damaging the airframe, an inner coating for gas tightness, a controlled deformation mechanism to absorb blast energy and reinforced composite sheets for blast load absorption.

## Expanding into new territory

FLY-BAG has huge global market potential. As it can be adapted for both narrow and wide-body aircraft it's got both passenger and cargo sectors covered. It could also be used to optimise safety across the transport industry as a whole through the creation of shipping, road and rail containers. Spin-off products might include garbage bins for crowded areas, curtains for security-sensitive buildings and fast-action covers enabling improvised explosive devices (IEDs) to be neutralised while waiting for the arrival of bomb disposal experts.

**D'APPOLONIA**

**D'Appolonia** is an Italian engineering

and innovation consulting firm providing integrated services to private and public sector customers in the environment, energy, oil and gas, construction, transport, space and security sectors. With over 600 engineers and scientists, the company supports customers from conceptual design and definition of specifications up to implementation, optimisation and validation.

[www.dappolonia.it](http://www.dappolonia.it)

**Installation of FLY-BAGs on the world's Airbus 320 and Boeing 737 fleets alone would result in a turnover of more than €600 million**



# Fire-fighting robot leads the way to safer disaster management



An unmanned, remotely controlled fire-fighting vehicle developed by a FP7 consortium including EARTO member Brodarski Institute can enter into the heart of the most dangerous fires to save victims, property and the environment without jeopardising fire fighters' lives. Half-tank, half fire engine, FireRob represents a new category of fire and rescue machine and is destined to have a significant social and economic impact around the world.

The threat of major incidents like industrial and wild fires is ever present, the risks and problems involved with fighting them enormous. Six Spanish fire fighters were killed by the fires that swept across southern Europe in 2009, eight citizens lost their lives too. Disasters at plants handling hazardous and inflammable materials, such as Japan's Fukushima nuclear plant, also test existing fire-fighting equipment to its limits.

## Integrating intelligence

A collaborative R&D project led by Croatian robotic vehicle producer DOK-ING set about dramatically extending these limits. Brodarski Institute coordinated the project's R&D activities, which involved developing advanced intumescent coatings to create a multi-layer protective heat shield and customising and integrating a remote control navigation and positioning system with a 2km

range and 50cm pinpoint accuracy as well as a high resolution video imaging system so the robot can 'see' clearly in dark and smoky conditions.

**'Don't send a man to do a machine's job' is the powerful slogan of FireRob's advertising campaign**

## Extinguishing the competition

Equipped with the latest fire-fighting technologies, plus two storage containers for water and foam, FireRob can extinguish fires with minimal damage to itself and its operators, who remain outside the range of danger. More than this, it can tackle fires in areas inaccessible to traditional fire engines, clear a path for other fire-fighting vehicles and, once within the fire, recognise different burning and non-burning objects, including people.

## Blazing a trail

FireRob has been successfully commercialised by DOK-ING, which has sold two of the €600,000 machines to the Russian Government.

While production continues, a global marketing campaign by the consortium is convincing fire departments and industry leaders of FireRob's value to fire fighters operating in the most challenging and dangerous conditions. High priority targets of the campaign include oil refineries, chemical and nuclear plants and military and flammable goods storage depots.

**FireRob's unique heat shield protects the vehicle for an unprecedented period of time at extremely high temperatures**



BRODARSKI INSTITUT d.o.o.

**Brodarski Institute** is a Croatian research and technology organisation that creates, transfers and applies knowledge to help organisations develop innovative, high added value products and services for domestic and international markets. Specialising in the marine industry, control engineering, renewable energy sources and eco technologies, the Institute has more than 60 years' experience of establishing partnerships providing customers with high quality, inter-disciplinary support from its scientists and engineers and access to its specialised laboratories and equipment.

[www.hrbi.hr](http://www.hrbi.hr)

# Separation system enables European recyclers to reclaim valuable metals



An innovative detection system for recycling waste electrical and electronic equipment (WEEE) developed by a CRAFT consortium including EARTO member Tecnia is improving the competitiveness of Europe's recycling sector. By enabling the automated separation of non-ferrous metals, the SORMEN system is increasing the market value of electronic scrap and reducing the cost of processing, landfill and compliance with European directives.

The effective processing and recycling of electric and electronic waste is vital, not only because it is non-biodegradable and can be

**'We have verified that the hyperspectral technology used in the SORMEN project has great potential as it allows analysis in wavelengths that have not been used until now and as a result it has applications in the recycling, food, agriculture and pharmacy sectors' Javier Fontanillas, Infaimon**

contaminated with highly toxic substances but also to enable the recycling sector to realise the full financial potential of scrap. With more than 90% of Europe's 6.5 million tonnes of waste already going to landfill every year, there is a pressing need to improve

existing inefficient manual separation methods - for valuable non-ferrous metals in particular.

## Accurate separation

Representing 13% of total WEEE waste, non-ferrous metals such as aluminium, copper, zinc, brass and lead can't be properly separated by conventional methods as their colour, shape and weight are similar. This means that recycling companies are losing out as the price of these metals - which has increased by more than 100% in recent years - depends largely on purity. As a result of the SORMEN project, part of FP6, companies can now detect even the smallest fraction of non-ferrous metal using a highly reliable, automated system capable of classifying metals with 95% accuracy.

## Substantial benefits

The detection system, which overcomes the limitations of colour cameras by using multispectral and hyperspectral image analysis, can be incorporated into recycling plants to reduce production

costs, minimise dependency of results on individual workers and shield them from potentially damaging substances. In terms of just one metal, aluminium,



the system increases the volume recovered by up to 40% which, for a typical SME processing 400 tonnes of waste a year, translates into a direct benefit of €600,000.

## Broad applications

Two SMEs in the consortium, Indumetal and IGE Hennemann, are interested in applying the technology to some of their products and preferred distributor Infaimon, a computer vision specialist, is promoting the hyperspectral technology in Iberia and South America. The system is also of potential relevance and benefit to the 700 to 1200 European companies working in recycling. Studies indicate that manufacturers could sell around six of the recycling machines a year at a cost of €90,000 each. It has also been shown that the technology's ability to describe and segment hyperspectral and multispectral images opens up potentially valuable opportunities in food classification, medical imaging, remote sensing and steel analysis.

**The worldwide market for e-waste recovery is predicted to grow from €3.9 billion in 2009 to nearly €10.11 billion by the end of 2014**

**Studies confirm that the SORMEN system can easily reduce the recycling costs of European SMEs involved in the sector by 10%**



## TECNALIA Research & Innovation

is a private applied research and technology organisation in

Spain. Its mission is to transform knowledge into GDP and improve people's quality of life by generating business opportunities for companies through multidisciplinary research in the areas of sustainable development, innovation and society, ICT, healthcare, industry and transport. It has 22 worldwide offices, 1,500 employees and 3,900 clients.

[www.tecnalia.com](http://www.tecnalia.com)



# World's supply of fresh water set to benefit from breakthrough desalination process

A technical breakthrough in desalination made by EARTO member TNO and eight Dutch partners is set to have a major role in the global fresh water supply. Memstill technology transforms seawater into drinking water with the highest quality and lowest cost and energy use of any other available method, making it one of the most promising solutions to the predicted explosion in demand for clean potable water as populations increase and freshwater supplies diminish.

Already, over one billion people in the world don't have access to safe water. With the global population predicted to increase by 50% in the next 20 years, seawater, which accounts for 97% of the

world's water, is increasingly seen as a vital source of drinking water. Conventional desalination technologies such as reverse osmosis are used in some countries but there is a compelling need to overcome their prohibitive expense, energy consumption and leakage rates.

**'For large-scale water production, the costs of using Memstill come out at around 30 to 40 eurocents per m3 - and the residual heat is free - this puts it ahead of other state-of-the-art techniques like reverse osmosis, multi-effect distillation and multi-stage flashing' Albert Jansen, TNO**

## Energy excellence

The Memstill partnership's innovation involves heating seawater using residual heat from industrial plants - a free and boundless energy resource - to produce near-distilled water through a vaporisation and condensation process. A microfiltration-type membrane provides the barrier that enables water vapour to pass through, leading liquid water with dissolved salts behind as the residue. With no fossil fuels required to drive the process, which itself involves only minor temperature differences, Memstill makes no contribution to the production of greenhouse gases.

## Additional application

With its simple compact construction, Memstill can be sited wherever there's a heat source and saltwater to produce best quality drinking water. But it has another application too - processing



already-treated industrial wastewater. By creating higher quality wastewater that can be used in industry and mining processing, the technology can also help take industrial demand away from public water supplies, reduce the volume of wastewater disposed into the environment and enable compliance with imminent new European regulations on the salt content of industrial waste water.

## Impressive pilots

Worldwide licenses to Memstill technology have been obtained by AquaStill, an SME, and Keppel Seghers, which have set up pilot plants in Singapore and the Netherlands, with E.ON. A larger plant is being built on Singapore Refining Company's petroleum refinery which will filter 100m3 of seawater a day. TNO is continuing to develop new applications, including drinking water systems for ocean-going yachts, and new energy concepts, such as using solar heat and small-scale household equipment to drive the process.

**Water-related illness kills more people each year than wars or conflict, with a quarter of all children who die before they're five dying of a water-related disease**

**TNO** innovation  
for life

TNO is an independent contract research organisation in the Netherlands committed to the appliance of scientific knowledge with the aim of strengthening the innovative power of industry and government. TNO works in the core areas of quality of life (healthy food, good working conditions, healthcare and sports), science and industry, the built environment and geosciences and information and communication technology.

[www.tno.nl](http://www.tno.nl)

# Access to satellite data helps developing countries monitor food supplies and environmental risks



Earth observation (EO) product sharing technology and related training developed by a FP7 project led by EARTO member VITO are contributing to Europe's international commitments to combating poverty and hunger and cooperating on sustainable development. By enabling fast, reliable and low cost access to EO data and derived information, DevCoCast is helping to improve environmental, climate and agricultural research, monitoring, planning and decision making in Africa, South America and China.

Europe is already making valuable use of GEONETCast, a global satellite broadcasting system providing worldwide access to EO products for weather, marine and land monitoring. Yet many of the countries with the greatest need for GEONETCast have been missing out. Developing countries are not benefiting enough from the system's easier, cheaper, more reliable and one-stop data access as they don't have the capabilities needed to access and use the wide variety of freely-shared products.

## Inspiring approach

The ambitious 15-partner DevCoCast (GEONETCast for and by Developing Countries) project aimed to provide everything needed to encourage and embed the use of GEONETCast in Africa and South America in particular, from hardware to software and training to support. The project is adding over 40 EO products, some originating in Africa and South America, to the GEONETCast broadcast. In addition, 11 DevCoCast-funded satellite receivers have already been installed at project partners and affiliated organisations so they can integrate GEONETCast into their work and share their experiences locally to inform and inspire new user communities.

## Tailoring solutions

By integrating the provided products into their own systems, users are able to capitalise on the near real-time data received

from GEONETCast satellites to suit their specific need, whether for research, reports for policymakers and the public, decision-support software tools, environmental monitoring services or early warning systems. Application themes are wide, encompassing vegetation and agriculture, fires and floods, water resources and ocean and weather.

## Spreading the word

DevCoCast has funded the installation of 14 receivers, in Brazil, Argentina, Senegal, Namibia, Tanzania, Ghana, Sudan, Eritrea, Mali and China, and has also

helped numerous other organisations install receivers using their own funds. DevCoCast-supported work includes food security, insect population, marine ecosystem and land degradation monitoring, fire management and water cycle and severe weather early warning systems. In Brazil and several African countries GEONETCast data has, for example, been integrated

into agricultural and crop forecasting systems, used in a network of 40 research centres and widely spread to universities, environmental secretariats and even private companies.

**'Our province experiences fairly regular droughts. Our drought committee has come to rely heavily on the NDVI-based maps (from DevCoCast) as a support tool for their work, which has resulted in many hundreds of millions of rands worth of drought relief in the form of stock feed over the last few years. Without these maps and data there would be no scientific, impartial basis to support the decision making processes during these events'** Michael Wallace, Western Cape Department of Agriculture, South Africa



**VITO** is an independent, customer-oriented research organisation based in Belgium providing innovative technological solutions as well as scientifically-based advice and support to stimulate sustainable development for local, national and European governments and organisations. Founded in 1991, VITO has 600 employees, a multi-disciplinary approach and recognised expertise in energy, environment and materials.  
[www.vito.be](http://www.vito.be)

# Quality label boosts European solar thermal industry



A certification scheme for solar thermal products developed by a pan-European partnership including EARTO member SP Technical Research Institute of Sweden is playing a major role in accelerating the growth of the market in Europe. By standardising and speeding administration and testing, the Solar Keymark quality assurance label is reducing barriers to trade caused by different national requirements and boosting the young European industry.

European platform for certification.

Uniquely, the scheme recognises equivalence between different types of materials

and enables accreditation for product 'families' based on one product test. Valid across Europe, the Keymark is issued by nominated certification bodies after the product has been tested by an accredited test laboratory.

**The manufacturer of a thermal solar collector sold in five countries can save €50,000 per product in testing and certification costs over five years by using the Solar Keymark system**

## Marketing stimulation

All the scheme's technical and testing details and documents are brought together on one user-friendly website, which actively encourages certification by making it easy and quick – preparation is possible in just three to four days. As well as increasing customer confidence and product quality, the Solar Keymark dramatically reduces the cost of testing and the time taken to launch new products and increases access to subsidy schemes, making it an impressively effective market stimulation tool.

## Ambitious expansion

Solar Keymark is now the main quality label in its market, widely spread across Europe and increasingly recognised worldwide. There are already eight certification bodies and 19 accredited laboratories and a total of 1200 Solar Keymark licenses have been granted. The Solar Keymark Network, a group of academic, certification and industry bodies, is actively promoting the advantages of making the Keymark mandatory in Europe and discussing the development of a global scheme.

**Today more than 90% of solar thermal collectors sold in Europe are certified with the Solar Keymark**



## SP Technical Research Institute of Sweden

is a centre for research and innovation which develops, tests and evaluates technologies, materials, products and processes for national and international customers. Providing an effective link between research and commercialisation, the Institute takes a holistic approach based on interdisciplinary cooperation to innovation in its core areas of building and construction, electronics and ICT, fire, risk, safety and security, foods, materials

[www.sp.se](http://www.sp.se)

## Smart certification

To realise this potential, a project coordinated by the European Solar Thermal Industry Federation (ESTIF) created a common



# Mulch spray supports sustainable agriculture

A biodegradable, sprayable alternative to plastic mulch films, developed by the Institute of Polymer Chemistry and Technology (ICTP), represented by EARTO member AIRI, is helping agriculture become more sustainable. Combining natural polymers and waste fibres, the innovative mulch spray is not only easier to use and lower cost than other systems, it also protects the environment from the severe atmospheric pollutants produced by the burning of its plastic predecessor.

In Europe alone, plastic mulch films are laid over more than one million hectares of agricultural land to suppress weeds, retain soil moisture and provide nutrients – turning entire regions into ‘plasticlands’. But their negative impact extends far beyond the aesthetic. Disposal of these non-biodegradable films causes an environmental problem: they are either abandoned on the soil or burnt without control. While some biodegradable films have been developed, even the most successful have had to be modified to suit particular cultivations, which has affected their renewability and cost. Clearly, a radically new approach was needed.

## Going back to nature

By focusing its attention on the potential of natural polymers from renewable sources like seaweeds and crustaceous shells, ICTP delivered the required breakthrough. The end result is an entirely new kind of mulch system based on a waterborne solution containing natural polymers and reinforcing cellulosic fibres from waste materials such as seeds and peels from tomato, olive and

hemp processing. Sprayed on the land using everyday farm equipment, the mulch spray forms a film resistant for the time required for harvesting, when it can be simply rolled into the soil.

## Removing environmental costs

Agonomic tests have demonstrated the efficacy of the spray’s mechanical properties and degradation behaviour. Cost comparisons have highlighted its advantages. Using mulch spray rather than plastic films on soil saves €100 per hectare. Spray mulching for the cultivation of vegetables, fruits, ornamental plants and pots of flowers costs the same as controlling weeds traditionally with chemicals – but without the environmental costs. Many additional functions can also be incorporated easily into the spray, such as

fertilisers and insect repellents, and it can be used on trees – whose trunks can’t easily be wrapped in plastic film.

## Preparing for production

The mulch spray, which has been patented by ICTP, has been supplied free to a Chinese organisation, Wenzhou Science and Technology Office, for large-scale trials in Asia, Australia

**‘The benefits of the successful introduction of such natural spray technology in our industrial field would be really great, in terms of labour costs and saving of chemicals. Weeds and leaves have to be eradicated by hand every two weeks or chemical suppressants have to be sprayed regularly - with a cost of up to 5 €/cents per pot’ Mr M Altieri, Altiflor SAS**



and America. An Italian company is also carrying out trials on strawberries in the Mediterranean area, flowers in pots in Italy and Holland and fruit plants such as grapes and olive trees in Italy. Full production of the spray will start once these tests are completed, which is expected to be in 2012. In the meantime, ICTP is liaising with industrial groups from Europe, Canada and China who are very interested in the innovation.

**If the mulch spray captures just 20% of the world market of plastic mulching films, the result would be sales of 400,000 tons of material a year**



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ITALIANA  
PER LA RICERCA  
INDUSTRIALE

## The Institute of Chemistry and Technology of Polymers (ICTP)

is part of Italy’s network of National Research Council (CRN) institutes. Founded over 40 years

ago following the award of the Nobel Prize to Professor Giulio Natta for the discovery of polypropylene, the Institute’s work focuses on four areas: new eco-sustainable materials for agriculture, biomedicine and packaging, new methodologies related to the structure, properties and processing of polymer materials, innovative materials such as nanocomposites and chemical and physical synthesis and modification for multi-functional thermo-plastic systems and high-tech blends

[www.ictmp.ct.cnr.it](http://www.ictmp.ct.cnr.it)

# Research and technology organisations

- are specialised knowledge organisations dedicated to providing research and technology services in response to the major economic and social challenges and opportunities of our time.
- offer targeted basic and applied research; product and process technology development and knowledge transfer; access to advanced equipment and facilities; value-added technological information and consultancy; vocational training, laboratory, testing and certification services.
- work for and with governments, universities, firms both large and small, non-governmental organisations and others, in varying modes of engagement: collaborative multi-partner research, single-client contract work, branch-related collective research

## EARTO

- is the European trade association of the Research and Technology Organisations (RTOs), a non-profit organisation founded in 1999.
- promotes and defends the interests of its members towards European institutions and others, and offers them added-value services.
- groups over 350 Research and Technology Organisations with a combined staff of 150,000, an annual turnover of €15 billion, specialised equipment and facilities to a value of many € billions, and more than 100,000 customers annually.



**EARTO**

Rue Joseph II, 36-38

B-1000 Brussels

Tel: +322 502 86 98

Email: [secretariat@earto.eu](mailto:secretariat@earto.eu)

[www.earto.eu](http://www.earto.eu)

