EARTO Innovation Awards 2015

Technology for a better world | www.earto.eu

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How is Impact Delivered by European RTOs Today?

Maria Khorsand | EARTO President

The latest European Union Innovation Scoreboard reveals that Europe's innovation performance is fragile and imbalanced within European Member States with lower private R&I investments compared to the US & Asia. Today there is a clear understanding that while Europe creates excellent research, it is not able to capitalise enough on the knowledge it creates in terms of economic success, new products and jobs. To reverse such trends, attention should be brought to Europe's innovation value-chains and ecosystems.

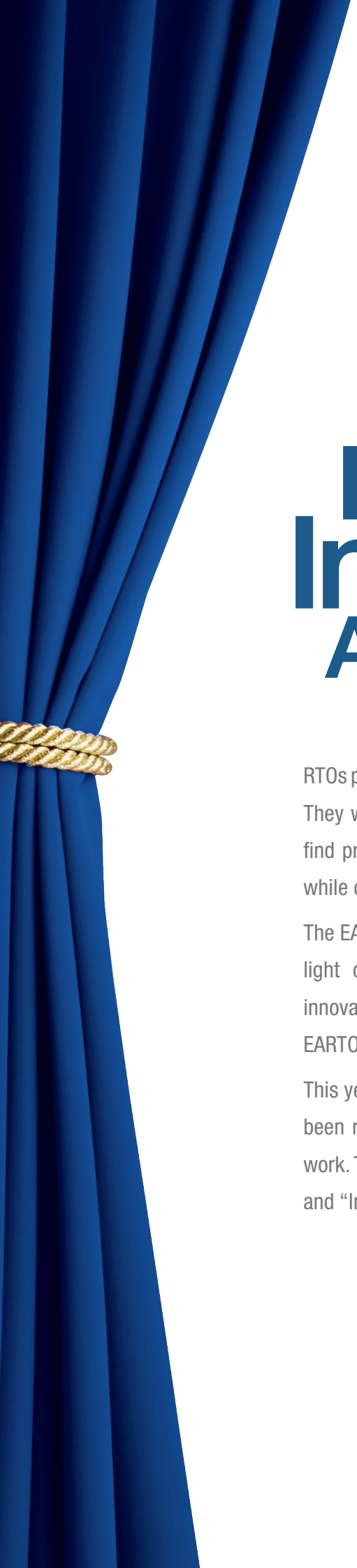
Europe needs more than ever to strengthen its innovation ecosystems. Research & Technology Organisations (RTOs) long experience of collaboration across the whole value chain means that they are ideally suited to manage existing and build new ecosystems and clusters that are driven by value chains. Cooperation across public and private stakeholders, sectors and national borders is one of the unique strengths of European RTOs. EU politicians and decision-makers are invited to continue their support to existing European value chains and innovation ecosystems and use RTOs to set up new ecosystems. In order to achieve this, EU decision-makers should support RTOs in managing the research and technological infrastructures and facilities necessary for innovation in such ecosystems.

Europe needs to improve its support to Europe's innovation value-chains. Hopefully, such efforts are on the way! Regions are already asked to think in terms of innovation smart specialization strategies by the EC DG REGIO when receiving structural funds. The EC DG R&I has launched Horizon 2020 programme with some new features looking at innovation. In addition, during ERA Conference last June, where EARTO was a key participating stakeholder, Commissioner for R&I Moedas has expressed his willingness to create a European Innovation Council aiming at fostering innovation through applied research. End June, the final report of the Key Enabling Technologies (KETs) High Level Group also put forward very concrete recommendations to increase the exploitation of KETs in Europe to allow European industry to face the increasing world competition. In the same line, EC President Juncker has just named Mr Madelin as his Chief Adviser for Innovation. We can only congratulate the EC for taking these important steps towards further addressing Europe's innovation challenges. EARTO offers its support and its members' capabilities to the EC to continue this key effort.

To further illustrate RTOs key contribution to innovation, this year's EARTO Innovation Awards has two categories: Impact Delivered and Impact Expected. The Impact Delivered Award will be given to an innovation already in the market and which has proven its impact on Europe's economy and/or society. The Impact Expected category will reward an RTO whose innovation is not yet on the market but has great potential in terms of impact on Europe's economy and/or society.

RTOs focus on solving today's problems and delivering innovations that have real value. Our Awards are demonstrating RTOs capacity to support Europe's innovation performance.

Hoping that you will enjoy the reading as well as our Innovation Awards ceremony,



EARTO Innovation Awards 2015

RTOs play a major role in the European innovation ecosystem. They work with both universities and industries in order to find practical solutions to the societal “Grand Challenges”, while creating economic growth and employment.

The EARTO Innovation Awards are given since 2009 to shed light on RTOs’ work. The awards are given to recent innovations, developed with a substantial input from an EARTO member.

This year the structure of the EARTO Innovation Awards has been reviewed in order to present a wider range of RTOs’ work. Two categories have been created: “Impact delivered” and “Impact expected”.

The prize competition is adjudicated by an independent jury which in 2015 comprises:

Clara de la Torre, Director, DG Research & Innovation, European Commission

Josef Affenzeller, AVL Austria

Hans-Jörg Bullinger – Former President Fraunhofer Gesellschaft & Member of the EC Research Innovation and Science Policy Experts High Level Group (RISE)

Simon Edmonds, Director Catapult Programme, Innovate UK

Christian Ehler, Member of the European Parliament

Jan-Eric Sundgren, Senior Adviser, AB Volvo

Impact delivered

1 FIRST PRIZE

Extractor welding torch: “by welders, for welders”

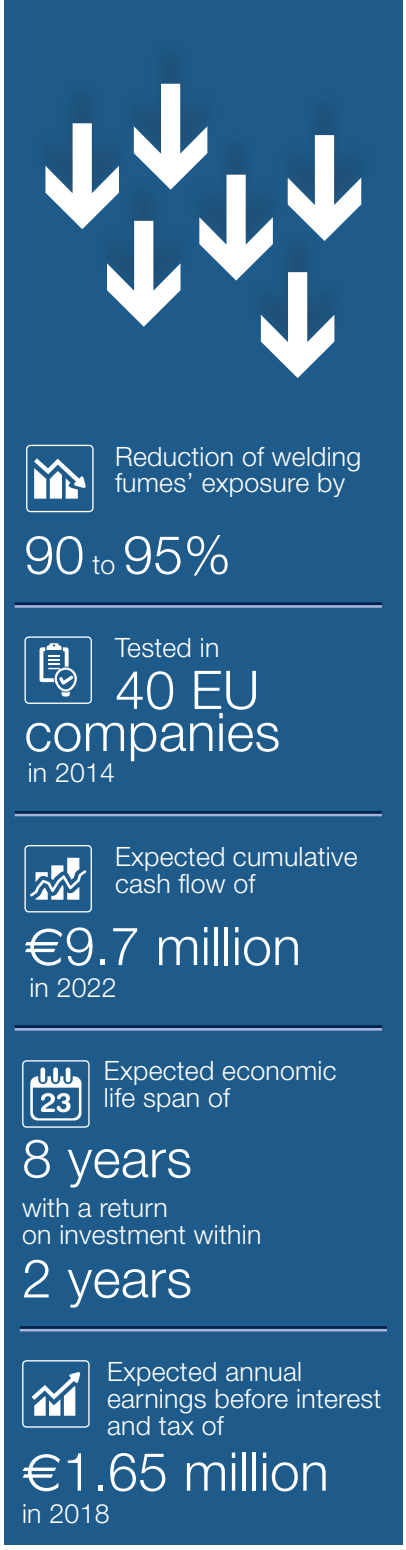
Welding smoke has adverse health effects on workers, which is why many countries have set strict standards to limit their exposure to such harmful fumes. To comply with these standards, EARTO member TNO has developed the 7XE EXTRACTOR, an innovative welding torch that extracts as much welding fumes as possible at source, reducing the welder’s exposure by at least 90 to 95%, without hampering the performance of the welding-torch.

TNO’s innovative Extractor welding torch overcame these technology barriers and achieves 90 to 95% reduction of welding fumes’ exposure.

Welding is a physically demanding job leading to a high percentage of sick leave particularly due to overexposure to welding fumes. This health issue has an important social cost given the severity of associated illnesses and the high number of workers concerned - 730,000 full time welders and 5.5 million welding-related workers in Europe. Such burden has also economic consequences for the SMEs involved in that sector threatening their financial position and competitiveness. Reducing this burden would thus have an important societal and economic impact.

Overcoming technological barriers

The current generation of extraction torches achieve a smoke reduction factor of 50%, but their development and implementation has been very slow, mainly because their size and weight hamper the welders’ performance, while the effect of the fume extraction is high-



Reduction of welding fumes' exposure by

90 to 95%

Tested in

40 EU companies

in 2014

Expected cumulative cash flow of

€9.7 million

in 2022

Expected economic life span of

8 years

with a return on investment within

2 years

Expected annual earnings before interest and tax of

€1.65 million

in 2018

ly dependent on the torch's position. Also, the torch extraction should not extract the "shield gas" that is essential for the quality of the weld. TNO's innovative Extractor welding torch overcame these technology barriers and achieves 90 to 95% reduction of welding fumes' exposure.

An innovation welcomed by workers

Such innovation has been made possible by a new industrial design that positions the suction openings of the welding torch at the top of the suction head, very close to the weld pool, without reducing the performance of the welding-torch. The innovative conical shape of the suction head allows the shielding gas to reach the weld pool without being sucked away, thereby guaranteeing good welding quality. Welders also appreciate the Extractor's lightweight and ergonomic design. Furthermore, such product has cleared the path for more innovations for welders: TNO is currently working on a mobile filtering system to reduce the costs of air filters currently applied during welding operations.

A financially sustainable product

TNO has submitted a patent application for its concept and has entered into an exclusive licensing deal with Translas for the commercial exploitation of the EXTRACTOR welding torch, which has been on sale since January 2015. The EXTRACTOR is a financially sustainable product, and the numbers in the business case are solid, assuming a steady increase in sales of 2,000 copies per year as of 2015, reaching 10,000 annually as of 2018 up to 2022.

TNO innovation for life

TNO, an independent Research and Technology Organisation, has over 3000 professionals who put their knowledge and experience to work in creating smart solutions to complex issues. These innovations help to sustainably strengthen industrial competitiveness and social wellbeing. We are partnered by some 3000 companies and organisations, including SMEs, in the Netherlands and around the world.

The organisation focuses on five transitions: healthy living, defence, safety and security, industry, energy, and urbanisation.

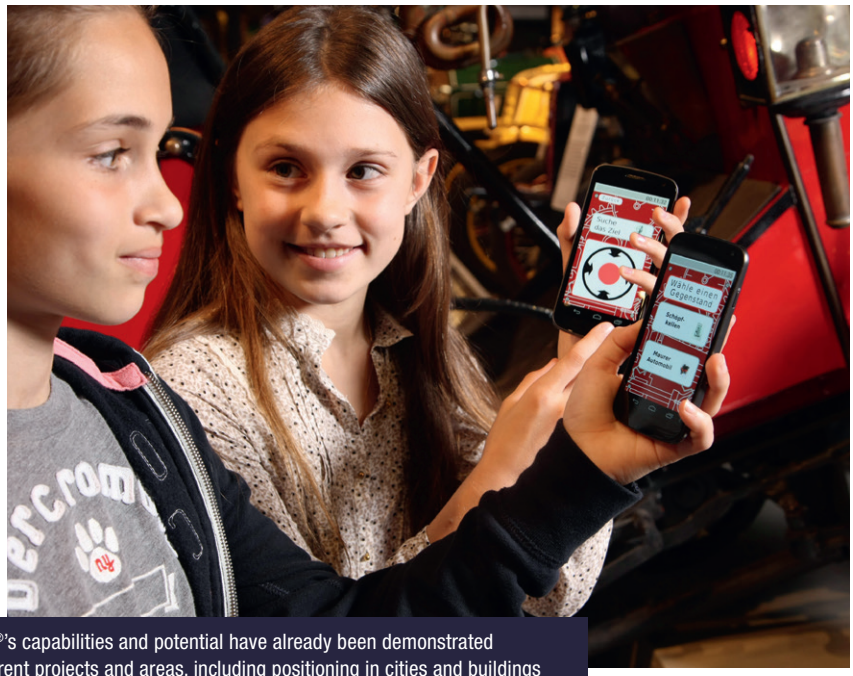
www.tno.nl

Impact delivered

2 SECOND PRIZE

Privacy-approved positioning technology for cities and buildings

Unrestricted personal mobility is nowadays a key prerequisite for people's social integration into their everyday environments. However, the well-established satellite-based Global Positioning System – GPS – reaches its limits when it comes to indoor spaces. Facilitating navigation beyond the entrance to a building is the challenge met by EARTO member Fraunhofer with the awiloc® positioning technology, developed as the perfect complement to GPS. Such technology determines indoor location accurate within a few meters, while ensuring the privacy of its users.



awiloc®'s capabilities and potential have already been demonstrated in different projects and areas, including positioning in cities and buildings or intermodal route planning.

Finding the right train platform or wheelchair-accessible route or finding its way inside shopping malls, office buildings, museums or subway stations are common needs today. Indeed, typical positioning systems such as GPS run up against their limits when used indoors where a large part of public life takes place. There is a clear lack of detailed knowledge on these particular locations, and it seems unlikely that big companies will step in to offer the level of detail that people need and require.

Significant improvement to the status quo

To address this issue, Fraunhofer has developed awiloc®, a positioning solu-

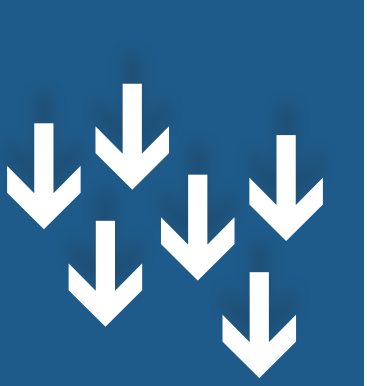
tion that uses existing wireless networks to assist people in public spaces by providing location-based information and services on wearables and smartphones. Thanks to this new technology, location can now be determined without requiring data communication or a central server since awiloc® software measures the received signal strength distribution and self-sufficiently determines its own position on the basis of these values. Data privacy regulators have thus approved this self-contained method and recognize it as fully compliant with data privacy regulations. Furthermore, in contrast to other technologies, awiloc® calculates continuous positioning information using movement vectors, including direction and speed, allowing mobile users to receive continuous support when and where they need it.

A wide range of users

awiloc®'s capabilities and potential have already been demonstrated in different projects and areas, including positioning in cities and buildings or intermodal route planning. This technology can help improving safety if used to plan and monitor evacuations for instance. Other markets for awiloc® include support to the elderly and people with disabilities, automotive applications or location-based games.

Secured financial viability

In contrast with other positioning systems awiloc® is both easy and economical to install since it can use existing infrastructures. Since 2008, with the awiloc® alliance an international network of partners has supported the ongoing development, and the launch of the awiloc® ToolChain in 2015 enabled license holders to develop their own commissioning tools and services. Over the next few years, Fraunhofer anticipates an annual project revenue of 500 to 800k€, while its partners will earn many times more for their products, thus helping to create and protect jobs in the industry.



70%
of people's time is typically spent indoors

1 000 companies
now offer location-based services in Germany

By 2018, the volume of indoor localisation market is expected to be of
2 to 5 M$

20%
market share for awiloc® in location-based museum guides

Annual project revenue of
500 to 800k€
for Fraunhofer over the next few years

Fraunhofer

The Fraunhofer-Gesellschaft is a leading research and technology organisation. Its activities are conducted by 66 Fraunhofer Institutes and research units located throughout Europe. Fraunhofer employs a staff of around 24,000 who work with an annual research budget totalling 2 billion euros, 70% of which is generated through contract research on behalf of industry and publicly funded research projects. awiloc® was invented by the Fraunhofer Institute for Integrated Circuits IIS, which has reached worldwide recognition with the creation of mp3.

www.fraunhofer.de
www.iis.fraunhofer.de

Impact delivered

3

THIRD PRIZE

Sunfry baking donuts: reduced fat donuts of superior quality

Helping improve people's health by reducing the levels of fats in their diets is the challenge undertaken by EARTO member SP Technical Research Institute of Sweden and CSM Bakery Solutions with its Sunfry Baking Technology. This innovation combines a unique selection of heating technologies to create a process that mimics the frying of donuts while conserving both taste and texture. The impact of such technology on health could be very significant. Indeed, if the 20,000 tonnes of donuts sold in Europe each year were Sunfry Baking Donuts, this would mean a reduction of 25 million kilocalories and 3,200 tons of fat.

The food industry is looking for technical solutions, knowing that changing habits to adopt healthier lifestyles is very difficult to achieve and maintain.

In Europe, obesity affects 10 to 30% of the adult population, and around 7% of the national budget is spent each year on diseases linked to obesity. Such health problems also have an economic impact since work absences and premature death incur productivity losses.

Making treats healthier

To help address this issue, the food industry is looking for technical solutions, knowing that changing habits to adopt healthier lifestyles is very difficult to achieve and maintain. However, making the foods people already enjoy healthier increases the chances of sustained improvement. Fried products are appreciated for their taste, their soft and moist crumb, and their crispy surface, but they also contain a high level of fat,

40%
fat reduction

45%
saturated fat reduction

Up to 25%
less calories

71%
of donuts eaters found Sunfry Baking Donuts better than current UK version

actual production of
700 tonne
per year, expected to grow

usually including saturated fatty acids. SP's and CSM Bakery Solutions challenge was to reduce considerably this fat level while keeping the appreciated quality properties of fried products.

Next generation donut

SP has been studying the potential of using infrared-radiation as an alternative process for conventional baking since the 1980s. Such process allows shorter baking times and can be adapted to a variety of products by changing the power level during baking. Moreover, the combination of infrared-radiation with other heating techniques gives further possibilities for process design and lead to the development of a unique process that mimics frying, keeping similar product quality such as crust, colour and thickness, crumb structure and volume. In addition, a better quality and healthier oil can be used (Sunflower oil instead of Palm fat) since it is added during processing, thus leading to further improvement of the nutritional profile.

Donuts eaters conquered

This technology has been protected by three patents, and is commercialised by CSM Bakery Solutions. A prototype continuous tunnel oven was developed by SP in collaboration with Ircon Drying Systems AB in Sweden. Sunfry Baking Donuts have been produced for consumer tests and the successful evaluations led to the creation of a full scale oven. The first production line was installed in the UK in 2011, producing Sunfry Baking Donuts for the markets in France, Italy and the UK. A second production line has been installed in Germany in 2014. Yearly tonnage at the moment approximates 700 tons, and is expected to grow significantly during the roll out in the rest of Europe.

SP your Science Partner

SP Technical Research Institute of Sweden is a Research and Technology Organisation which develops, tests and evaluates technologies, materials, products and processes for national and international customers. Providing an effective link between research and commercialisation, SP 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 technology & chemistry and measurement technology & calibration.

www.sp.se

Impact expected

1 FIRST PRIZE

A new generation of ultra-fast safe & green carbon batteries

Increasing the speed and frequency with which electricity storage devices can be charged was the main challenge set by the CEA, an EARTO member, in collaboration with Tours and Cergy-Pontoise universities and the spin-off NAWATechnologies in their NAWACap project. Their vision was to marry nano- and clean-technologies. It resulted in the development of a new generation of ultra-fast carbon batteries that can be recharged in few seconds, for a million of cycles and discharged in a few microseconds to few minutes. On top of being more efficient, those batteries are also cheaper, safer and more eco-friendly to manufacture.

The main innovation of the NAWACap project consists in the development of a carbon nanomaterial that can store more electric charges and that can charge quickly and then discharge the energy just as fast.

The lead-acid or Lithium batteries that are used today have many downsides that can easily be overcome with short-term energy storage solutions, called supercapacitors. These supercapacitors are indeed both much more reliable, easier and cheaper to maintain. However, today's supercapacitors have limited storage capacities – they can only store electricity for 30 seconds – and they are costly, which has limited their use so far. NAWACap overcomes these technological barriers by developing supercapacitors that are five times more powerful with the same weight and the same size.

Meeting the challenge

The main innovation of the NAWACap project consists in the development of a carbon nanomaterial that can store more electric charges and that can charge quickly and then discharge the energy just as fast. Moreover, its production process relies on photovoltaic cells manufacturing equipment while using renewable carbon sources as raw material, thus contributing to set up a new European route for making batteries both safer and cleaner.

Wide range of application

This new generation of supercapacitors overlooks two obstacles: used alone, they enable the fast charging of electricity, and combined with existing batteries, they can extend their power and lifetime. Initial markets concern urban public transportation vehicles and short-term storage in the electrical grid. Such batteries could indeed secure the 'Uninterrupted Power Supply' system for sensitive infrastructures like hospitals in case of network failure. This new technology can also lead to a better integration of renewable energies into the grid by making them more predictable. On the longer run, improvement potential is very promising particularly in the field of mobile applications.

energy density
3 to 5 times
greater than current technology

50 job
creations by 2020

global market
estimated to
5B€ in 2020
(25% in Europe,
more than 50% in Asia)

4 patents
to be exploited

revenue target for
NAWATechnologies of
30M€ in 2020
and 100M€ in 2025

Profitable future

NAWATechnologies, a spin-off from the CEA, was created in 2013. This start-up has risen 4M€ with public and private funds in 2014 and will set up its first production pilot line in 2015. A joint laboratory called NAWALab, gathering the CEA, Tours and Cergy-Pontoise universities and NAWATechnologies has been created in 2014. Commercial activities and first demonstrators are planned for 2016 and a massive production is expected in 2017 with identified and secured lead customers. Business plan's balance point is expected to be reached in 2019.

The CEA - Alternative Energies and Atomic Energy Commission - is a French government-funded research and technology organisation and a prominent player in the European Research Area. The CEA is active in four main areas: low-carbon energies, defence & security, information technologies and health technologies. In each of these fields, the CEA maintains a cross-disciplinary culture of engineers and researchers, building on the synergies between fundamental and technological research.

www.cea.fr

Impact expected

2 SECOND PRIZE

New therapeutic methods for chronic skin diseases

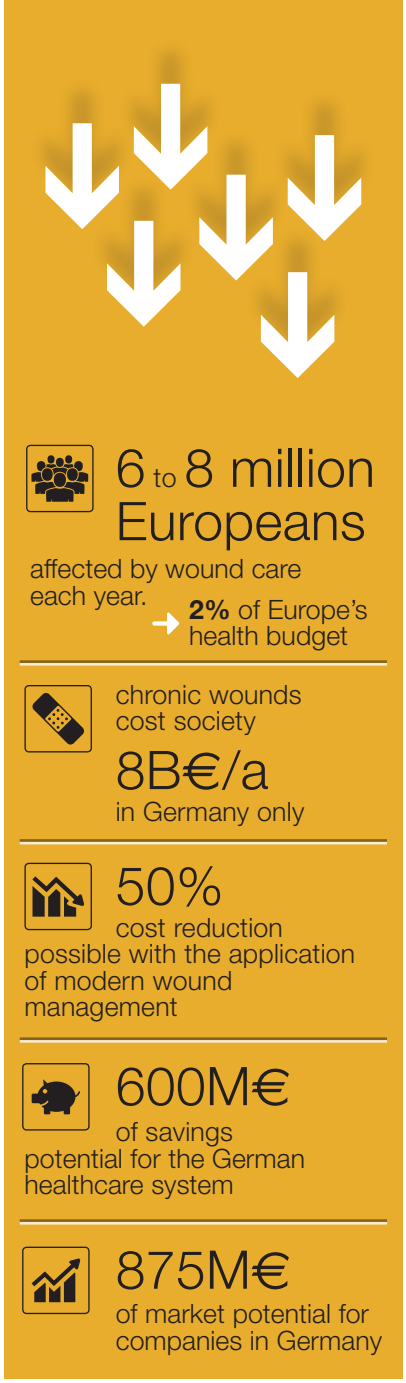
The effective and cost-efficient treatment of chronic wounds is a great challenge in healthcare. Indeed, demographic changes have resulted in a constant increase in chronic skin disorders. Therefore, developing new forms of treatment is extremely important to reduce costs and at the same time improve healthcare. For the individual treatment of these wounds EARTO member Fraunhofer aims to develop economical and innovative self-care therapy procedures in its SkinHeal project, which enables patients to self-care their wounds as far and as long as possible.

The project partners developed an innovative way of taking pictures of the wound healing progress while through imaging by luminescent particles of different colours specifically attached to different macrophages

In 2009, up to 8 million Europeans were affected by chronic skin wounds, and the number is expected to increase since the European population is growing older while the number of available care forces is declining. Such treatments also have an important economic impact on healthcare systems, representing around 2 % of Europe's health budget. Innovative and payable diagnosis and treatments are thus becoming essential to improve wound healing and reduce costs.

Self-diagnosis on the healing status of a wound

Researchers from five Fraunhofer Institutes have joined forces to make the treatment of chronic wounds more effective with four major innovations. First, they developed in-vitro models for



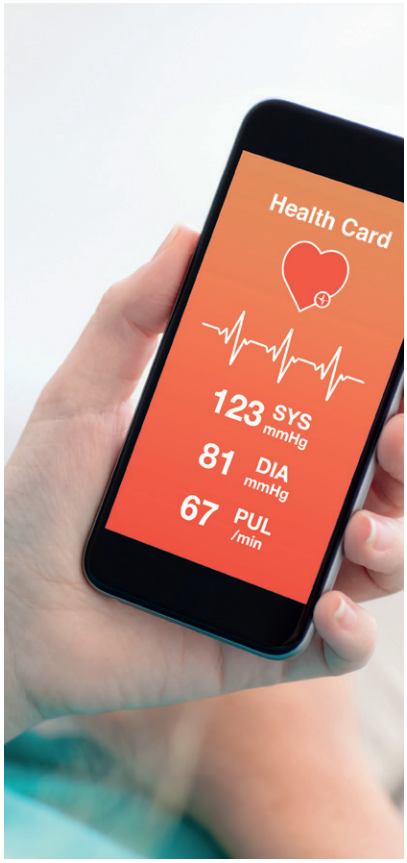
6 to 8 million Europeans
affected by wound care each year.
→ **2%** of Europe's health budget

chronic wounds cost society
8B€/a
in Germany only

50%
cost reduction possible with the application of modern wound management

600M€
of savings potential for the German healthcare system

875M€
of market potential for companies in Germany



High saving potential for the healthcare system

Several patent applications have been made by Fraunhofer to protect these innovations. The immediate application is targeted through the FhG-Spin-Off PharmedArtis. First contacts to leading companies in the advanced wound care market in Europe were established. Indeed, despite the higher unit price for these innovative products, the saving potential achieved through shorter treatment time, less staff and less material use is tremendous. The savings for the German healthcare system alone would be around 600 M€, while the market potential for companies offering the innovative wound dressing would be 875 M€.

chronic wounds which can significantly reduce the amount of required animal testing and the cost of developing new medication. They then adapted microfluid actuators and sensors into the wound dressing thus enabling the extraction of the wound fluid to check the healing process without having to change the wound dressing. Alternatively, the actuators can be used e.g. for oxygen therapy. The third innovation enables the integration of immunotoxins in the wound patch to strengthen the wound healing process. Finally, the project partners developed an innovative way of taking pictures of the wound healing progress while through imaging by luminescent particles of different colours specifically attached to different macrophages, enabling a fast telediagnosis on the healing process.

Vision: diagnostic tools applied via smartphone at home

The goal of this project is to develop simple patient friendly therapies which enable patients of all ages to take care of themselves. As a visionary long-term goal, the monitoring of the healing process itself should be possible by means of easy to handle diagnostic tools applied via smartphone at home.

Fraunhofer

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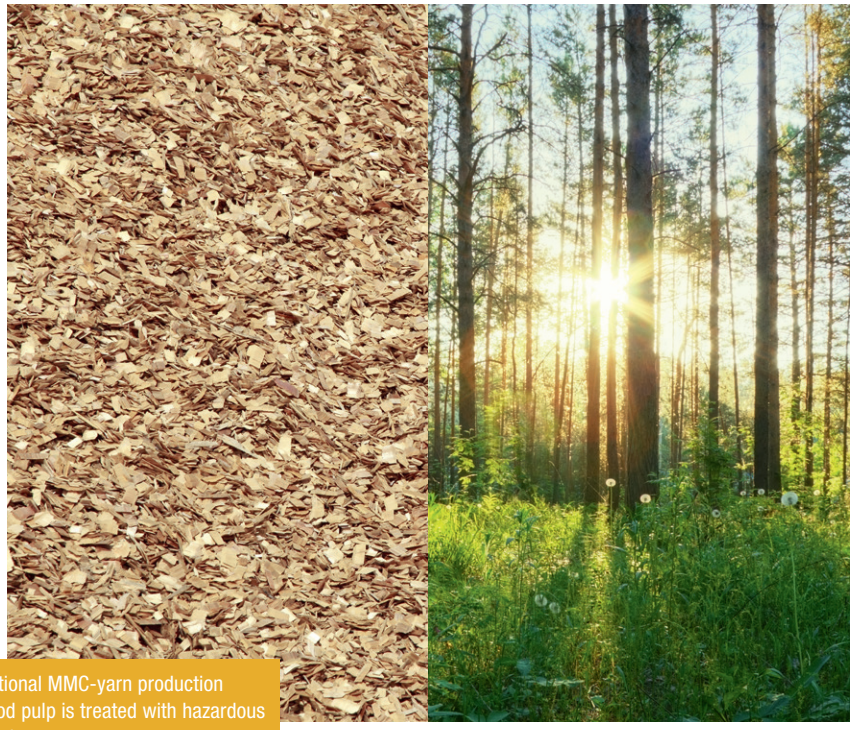
www.fraunhofer.de

Environmentally-friendly fibre-to-yarn technology

No truly sustainable pathway for the production of textile yarns is available today, and the demand for environmentally-friendly products is increasing. EARTO member VTT Technical Research Centre of Finland Ltd has introduced a promising new technique for producing fibrous yarns directly from wood pulp through a novel wet spinning process with no dissolution chemicals. The method has potential of producing low-cost textile yarns with good mechanical properties and very low environmental impact.



In traditional MMC-yarn production the wood pulp is treated with hazardous chemicals.

Currently, only 5 to 8% of textiles are recycled globally. Cotton is the thirstiest and most pesticide intensive crop and its production is limited to irrigation possibilities, while synthetics yarns like nylon are made from non-biodegradable petrochemicals and their production often creates very potent greenhouse gases. Some progress towards sustainability has been made with man-made cellulose (MMC) yarn whose market increases by 9% each year. However, in traditional MMC-yarn production the wood pulp is treated with hazardous chemicals. This makes the most MMC yarn production technologies (e.g. viscose) harmful to the environment, on top of being very expensive.

Innovative wood fibre yarn: eco-friendly and cost-efficient

Tightening legislation and scarcer natural resources increases the demand for low energy, high quality and environmentally friendly yarn production technologies. Invented at VTT in 2011, the new Fibre-to-Yarn technology allows simpler and more flexible production of bio-based, resource-efficient yarns with excellent recyclability and significantly lower production cost, thus providing a perfect alternative to current commercial textile yarns, both economically and environmentally. This new technology uses virgin pulp fibres as raw material, which is very multi-functional and no harmful chemicals are needed in the process. The developed technology uses a wet spinning process enabling the production of a wide variety of yarns including coloured and conductive fibre yarns, with the possibility to adjust smoothness, stretch and hydrophobicity.

Revolutionizing both the pulp and textile industry

Patents protect this new Fibre-to-Yarn technology. The most interesting market segment is apparel and textile products, with the objective to give cost efficient and sustainable alternative to cotton, oil and MMC-based yarns. Other very interesting market segments include for instance medical applications, bio composite reinforcements and even traditional paper yarn market.

60% less production costs than cotton

up to 20% of global cotton usage could be replaced with Finnish harvesting surplus alone

1,95M€ investment secured for first phase

Commercialisation plan:

- **2016:** Production capacity of **100 ton/a**
- **2019:** The first industrial scale production plant with **10,000-25,000 tons/a** capacity
- **2025:** The first full scale production plant with **50,000-100,000 tons/a** capacity

A promising path to commercialization success

Spinnova, a VTT spin-off company, was established in 2014 to commercialise Fibre-to-Yarn globally. By 2016, this technology will be proven at semi industrial scale and yarn properties like washability, stiffness and hand-feel will be further developed to meet the customer demand. An industrial pilot able to produce up to 25,000 tons of yarn annually will then be built by 2019, and will show how well the fibre yarn is accepted by consumers and how economical expectations are actually met. Finally, a full scale industrial production plant with the capacity up to 100,000 tons will be established by 2025.

VTT Technical Research Centre of Finland Ltd is the leading research and technology company in the Nordic countries.

We use our research and knowledge to provide expert services for our domestic and international customers and partners, in both private and public sectors.

We use 4,000,000 hours of brainpower a year to develop new technological solutions.

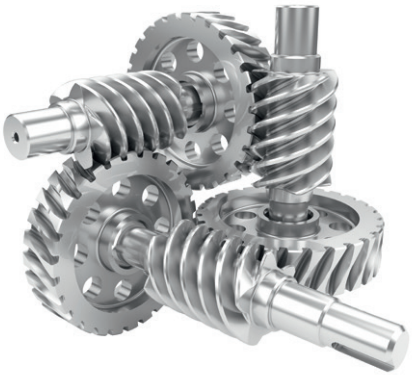
www.vttresearch.com

Discover more innovations from RTOs

Impact **delivered**

For this category, the rewarded innovations (product or services) have social and/or economic relevance, innovative originality, are today on the market and have proven their impact.

Innovative worm gear for high-tech lifting systems



Worm gears are one centerpiece of screw jacks systems, e.g. for lifting systems. These systems possess strict requirements on the materials used in order to minimize the susceptibility to seizure, and therefore, the actual worm gears consist of steel/bronze pairings. However, due to inflation, dependency on the price fluctuations of the actually used raw materials increases manufacturing costs of screw jack systems, decreasing competitivity on the world market.

ACR's Innovation: As a substitution for this expensive solution, EARTO member ACR's institute V-Research developped new long-life, high-load worm gears with innovative polymer-coated steel. Additionally, only standard manufacturing processes are used for this new concept, simplifying the integration of the innovation in the production line.

Impact delivered: Such redesign of the worm gear can increase the lifespan by 55% and the working loads by 30%, which will lead to a reduction of the system's dimensions with the same performance. This system also decreases manufacturing and material costs by 30% while preserving limited resources. The greater independence from the raw material market gives an obvious competitive advantage and ensures a better supply security for the end customers.

ACR
AUSTRIAN COOPERATIVE RESEARCH
KOOPERATION MIT KOMPETENZ

ACR is an Austrian association of RTOs in the areas of building, energy, food, materials and economic studies. It maintains strong links with SMEs.

www.acr.ac.at

Cost-efficient air quality predictions for China

In China, the health impact from air pollution had an estimated impact of $1.4 trillion in 2010. The stringent air pollution reduction plans that the Chinese government have recently issued will take time to take effect and make any significant impact. In the meantime the most polluted regions are obliged to monitor the air quality according to set standards and warn the public of heavy pollution episodes. However, many of China's 74 key regions still fail to adequately forecast the air pollution. Compliance is hampered by the reliance on complex and costly air quality dispersion models.

VITO's Innovation: EARTO member VITO deployed an innovative operational air quality prediction system (OPAQ) in cooperation with a Chinese SME. Its performance is comparable to the more complex models while being easier to install and operate, less sensitive to data availability and more affordable.

Impact delivered: In 2011, the spin-off LiboVITO was created to provide Chinese cities with EU based air quality modelling alternatives, helping cities to build adequate air quality improvement policies and improve citizens' quality of life. The company has a 25% market share and accumulated sales of 700K€. By the middle of 2015, OPAQ was predicting air quality concentrations in 11 cities, spanning across 7 provinces in central and east China.

vito
vision on technology

VITO is a Belgium RTO in the areas of cleantech and sustainable development, elaborating solutions for the large societal challenges of today such as climate change, food security, resource scarcity, sustainable energy and healthy cities.

www.vito.be

Real-time tracking of rapidly moving objects

Optical tracking of moving objects uses observation data from camera networks to reconstruct the path of a motion, which plays a decisive role in strategy analysis in sports for instance. However, particular challenges arise from the complexity and variety of movement sequences, increasing the need for mathematical models complex enough to overcome such problems but simple enough to enable real-time processing of huge amounts of data.

SCCH's Innovation: SCCH, EARTO member through UAR, developped MotioEye, an optical tracking system using a new mathematical method to compute 3D coordinates of the soccer ball in real-time and even at low resolution. Video-based data are collected via a network of cameras and the tracked ball is located in real time. The image positions are then assembled to full 3D track.

Impact delivered: Movements of small, poorly textured objects can be measured to the exact decimetre up to 25 times per second and depicted on the screen. The possible applications are diverse and the functionality of the system has already been successfully demonstrated in several international installations.

scch software competence center hagenberg

UAR Upper Austrian Research GmbH

UAR is an Austrian association of RTOs promoting innovative solutions at the crossroads where fundamental research meets applied research and offering businesses access to R&D of the highest quality.

www.scch.at **www.uar.at**

Heat & ultrasound to prevent foodborne diseases

Each year in the EU, illnesses like Salmonella and Campylobacter caused by the ingestion of pathogens through contaminated food affect more than 10 million people, and lead to hundreds of deaths. The economic burden on society amounts to more than 5 billion euros yearly. Food security is thus a grand challenge, and consumers should be able to eat without risking becoming ill.

FORCE Technology's Innovation: EARTO member FORCE Technology developed SonoSteam®, a chemical-free decontamination process designed for food and non-food surfaces. Such technology combines the effect of hot steam and high-frequency ultrasound, which results in a heat transfer so fast that microorganisms are reduced within seconds without causing any significant changes to appearance or odour.

Impact delivered: The SonoSteam technology is now patented in more than 50 countries, and the treatment offers a broad range of solutions to improve food safety and customer satisfaction. Due to process times as short as 0.5-2.0 seconds, the technology can keep up with modern process lines. Significantly high decontamination levels have also been achieved on different material surfaces.

FORCE TECHNOLOGY

FORCE Technology is a Danish RTO targeting its effort to sell highly specialised engineering knowledge for practical and cost-effective solutions to a wide range of industries.

www.forcetechnology.com

Innovative software to measure pollution levels

35 million tons of hazardous waste are generated each year in the European Union. The storage of such waste is a key issue nowadays, and those materials all have different pollution levels which need to be well characterized. Indeed, uncertainties related to the delineation of contaminated areas play a fundamental role in the decision-making process and directly impact the decontamination feasibility conditions.

CEA's innovation: Several years ago, EARTO member CEA prototyped Kartotrak, a software which was at first dedicated to radio-contaminated site characterization and signed a collaborative and operating agreement with GEOVARIANCES for its industrial development and sale. Today, Kartotrak is an easy-to-use and innovative software solution which enables precise waste categorization, helps understand the level of soil pollution (radioactive or chemical) and provides assessments during environmental crisis. Consequently, Kartotrak minimises the volume of badly-categorized waste, resulting in a better storage decision management.

Impact delivered: Kartotrak has widely been used, bringing revenues of 2.4 million euros in 2012. The software has already improved the pollution characterization of industrial sites leading to significant financial savings and efficiency gains. It was also very valuable to determine the soil and space radiological pollution levels during the Fukushima-Daiichi nuclear disaster.

The CEA - Alternative Energies and Atomic Energy Commission - is a French government-funded research and technology organisation and a prominent player in the European Research Area.

www.cea.fr

Double-effect security washer for bolted joints

Bolted joints are one of the most common elements in construction and machine design. They consist of fasteners that capture and join objects together, and are secured with the mating of screw threads. However, severe vibration and dynamic loads can induce spontaneous loosening and loss of preload compensation, lowering reliability. Up to today, no global solution existed to counter both loosening and slackening issues together, which has an impact on safety.

CTI network's Innovation: EARTO member CTI's innovation tackles both issues thanks to a wedge-effect solution to prevent loosening and a spring-effect to compensate the loss of preload. This solution is applicable to the industry as a whole and it is fully secured since contrary to previous systems, no compromise needs to be made.

Impact delivered: This product is relevant for various industrial sectors including energy, transport and mechanical infrastructure. Many industrial partners have been involved in its development and the product was launched in 2013 by the company NORD-LOCK. More than 3000 sales were generated during the first year of commercialisation and the product is now sold in more than 20 countries.

CTI Network is a French RTO providing companies with testing and evaluation infrastructures, scientific and technological abilities, information, training and consultancy.

www.reseau-cti.com

Discover more innovations from RTOs

Impact expected

For this category, the rewarded innovations have social and/or economic relevance, innovative originality, are not yet on the market as a final product/service but promise to have a great impact.

Innovative bioplastic created from bread waste

Bioplastics obtained from natural renewable sources are well-known alternatives to traditional oil-based plastics. However their production causes social concerns due to the competition with food crops. The search for alternative sources for bioplastics production is thus necessary, and using food waste to do so would be a much more environmentally-friendly solution.

AIMPLAS's Innovation: In the BREAD4PLA project, AIMPLAS-Technological Institute of Plastics (Valencia, Spain-FEDIT member), demonstrated the industrial feasibility of an innovative and sustainable solution to produce compostable plastic from bakery waste. The pre-productive pilot plant process has demonstrated the viability of this innovative bioplastic and its use in the fabrication of a 100% biodegradable film for the packaging of bakery products, thus closing the life cycle.

Impact expected: Prices for standard feedstocks being up to 8 times higher than prices of bakery waste, the production of BREAD4PLA bioplastic has thus a competitive cost of 1.69€Ton. 680 tons/year could be produced from the waste of a single big bakery. This would replace the equivalent amount of conventional plastics in the bakery sector at a competitive cost.

AIMPLAS
INSTITUTO TECNOLÓGICO DEL PLÁSTICO

AIMPLAS is a Spanish non-profit association whose main mission is to boost and encourage innovation, technological development and private research on plastic sector, with broad expertise in EU projects.

www.aimplas.net

Transportation biofuels from organic waste

252 million tons of waste was produced by the EU27 in 2011, only 25% of which was recycled. In the meantime, the increasing demand for energy, the predicted shortage of fossil fuels and related environmental concerns are pushing towards new sources of liquid fuels. Integrating the need for waste management with the sustainable biofuel sector is thus a promissing opportunity.

Eni s.p.a.'s Innovation: Eni s.p.a, EARTO member through AIRI, has developed a process that converts wet waste material into a bio-oil similar to fossil fuels. Such bio-oil is more stable than that produced by traditional processes, and it can be considered for biofuel upgrading, burned directly in boilers, or used as a valuable raw materials for the chemical industry.

Impact expected: This technology has now been proven up to the pilot scale. The pilot plant, built in 2013, can process up to 10kg/hour of wet waste material. The next step is the commercialisation of the technology which can be applied worldwide, especially in countries with high waste disposal costs.

Airi
ASSOCIAZIONE ITALIANA PER LA RICERCA INDUSTRIALE

AIRI is an Italian association of RTOs, industries and financial institutions, funded in 1974 to promote industrial Research and Innovation in Italy and to enhance co-operation between the private and public sector.

www.airi.it

A 15-minute test for the diagnosis of ebola

The epidemic of Ebola, raging in West Africa since December 2013, has affected nearly 27,500 people to date, officially causing 11,220 deaths and an economic shortfall of 6.2 billion euros for Sub-Saharan countries. The need for inexpensive and easy-to-use diagnosis is crucial in this context to prevent Ebola from becoming endemic, however existing tests are very much lacking in that respect.

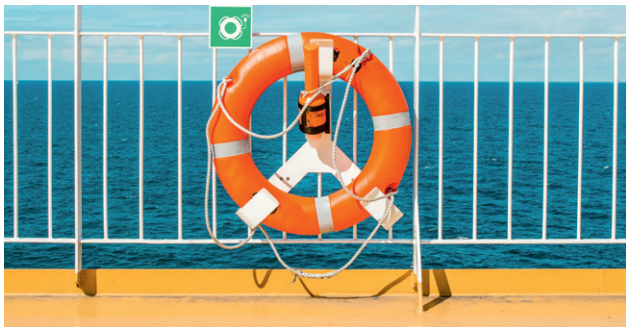
CEA's Innovation: EARTO member CEA has developped an on field rapid test named the Ebola eZYSCREEN® which can diagnose the Ebola virus disease from a drop of blood in 15 minutes. Such test meets all the criteria set by the World Health Organization and it is compact, robust, easy to use, and inexpensive at the same time. Its implementation requires no laboratory equipment, no electricity, and no highly qualified personnel.

Impact expected: CEA signed an outsourcing agreement with VEDALAB, the European leader in rapid tests with a production capacity of 15 million tests per year. 5000 tests were produced to allow assessment of clinical performance on the field, favouring a rapid deployment in the second half of 2015.

The CEA - Alternative Energies and Atomic Energy Commission - is a French government-funded research and technology organisation and a prominent player in the European Research Area.

www.cea.fr

New technology for safe evacuation of ships



Safe and efficient passenger evacuation in case of an emergency at sea is a hot topic today in the aftermath of recent accidents. Indeed, evacuations are often delayed and chaotic while every second counts and can make the difference between life and death, highlighting the urgent need for robust technologies to gain efficiency in that field.

CSEM & Signalgenerix's Innovation: Through the innovation action Lynceus, the two RTOs both members of EARTO jointly developed ultra-low power wireless network technologies for realtime localisation of people in ships, enabling safe evacuation during emergencies by tracking and monitoring the behaviour of people on board.

Impact expected: The technologies are expected to contribute significantly in saving lives at sea. The potential buyers of such technology are directly involved in its design and manufacturing, and the partners expect a total revenue of 115 million euros within 5 years after the end of the project. The commercialisation will also significantly contribute to the European competitiveness through direct economic activity in the sector and the creation of jobs.

CSEM is a Swiss RTO whose mission is to develop micro-technologies and transfer them to the industrial sector.

www.csem.ch

Signalgenerix is a high-tech Cypriot RTO operating in the fields of Digital Signal Processing and Communication.

www.signalgenerix.com

Automated recognition of human behaviour in video streams

Recent years have shown a dramatic increase in violent attacks, and their economic impact was estimated at $9.8 trillion in 2013. Security is at the top of the agenda, and a global trend is to use cameras to combat crime and terrorism. However, this is not always accompanied by an increased number of staff watching incoming material, questionning how security can be guaranted.

TNO's Innovation: To support investigators with their tasks, EARTO member TNO has developed a technology that automatically analyses and detects the complex facets of human behaviour in video. An unlimited number of cameras can thus be monitored and a signal is given to the operator when deviant behaviour occurs.

Impact expected: HARVEST allows quicker response times for emergency services and increases life-saving capabilities and crime prevention. While prototypes are being developped, several other applications are envisaged outside the security domain. The worldwide market is expected to grow to €819 million by 2017 and the Dutch start-up QVI which will be commercialising HARVEST for the security domain expects to gain a market share of more than 3.5% by 2020.

TNO innovation for life

TNO, an independent Research and Technology Organisation, has some 3000 professionals who put their knowledge and experience to work in creating smart solutions to complex issues.

www.tno.nl

Innovative energy storage technology: the energy train

Energy storage fundamentally improves the way energy is generated, delivered and consumed, allowing to balance energy supply and demand instantaneously while preventing equipment failures and accidents during power outages. There is a constant need for cheaper and more efficient solutions in that field.

ECN's Innovation: The energy storage technology developped by EARTO member ECN is called Energy Train. Such train accelerates when the energy price is low, storing electricity as kinetic energy and decelerates when the price peaks allowing the kinetic energy to be converted back to electricity. The low cost of a high moving mass makes this innovation cheaper than most other storage technologies.

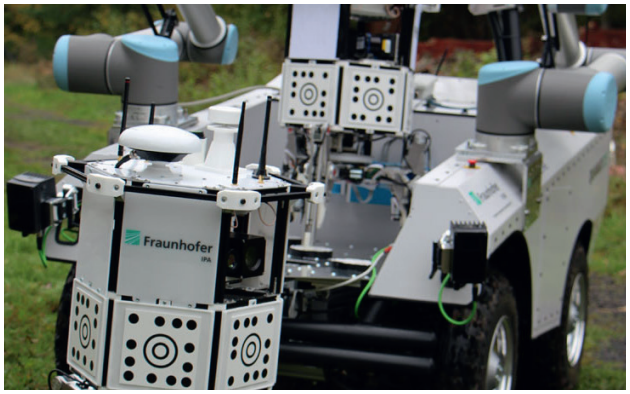
Impact expected: An Energy Train on a track with a 2.5km radius could store 2.5GW for a period of 8 hours and 400MW for 48 hours. Estimated costs are at 10% of competing technologies currently being developed. A single Energy Train system can cover the average power demand of a city the size of Amsterdam and it can be placed virtually anywhere.

ECN

ECN is a Dutch RTO focussing on the transition to more sustainable kinds of energy production and use including for instance solar and wind energy, biomass, energy efficiency, etc.

www.ecn.nl

Innovative robot sensor network to manage disasters & save lives



After Natural or industrial disasters, rescue teams are faced with the challenge of quickly adapting to a dramatically changed environment. However for saving lives every minute counts, and actual search and rescue methods, dominated by human forces and dogs, can be time-consuming. The development of new robot – and sensor – based technologies is required for an immediate assessment of the area and faster mission planning.

Fraunhofer's Innovation: The SENEKA project, developped by EARTO member Fraunhofer, uses autonomous ground and aerial robots combined with wireless networked sensors to securely transmit data to the rescue team. This system provides for an up-to-date map of the region, enabling the rescue teams to quickly identify sources of damage and dangerous areas and target the search for survivors more effectively.

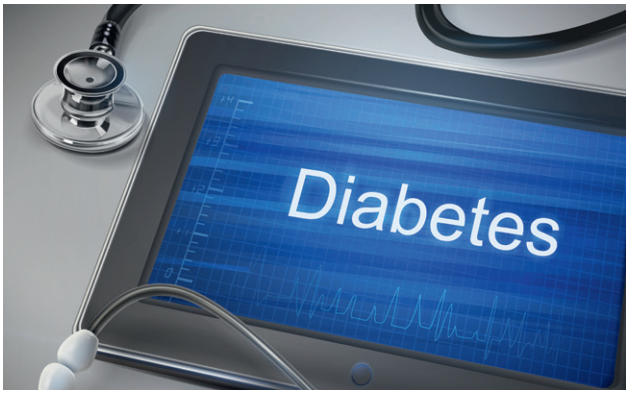
Impact expected: The global market for such tools has an estimated volume of $5 billion a year. SENEKA's researchers are now teaming up with industry to provide market-ready solutions. SENEKA's flexible system architecture enables it to be integrated in existing infrastructures, fostering the commercialization of application-driven and customer specific configurations.

Fraunhofer

The Fraunhofer-Gesellschaft is a leading research and technology organisation. Its activities are conducted by 66 Fraunhofer Institutes and research units located throughout Germany.

www.fraunhofer.de

Innovative system to support insulin dosing for diabetic patients in hospital



Diabetes mellitus is one of the most common chronic diseases worldwide. People with diabetes are hospitalized more frequently and require continuous glycemic control to keep blood glucose levels low without causing dangerous hypoglycemic events. Bad glucose control of type 2 diabetes patients increases the risks of mortality.

JOANNEUM RESEARCH's Innovation: EARTO member JOANNEUM RESEARCH developped in close cooperation with the Medical University of Graz the GlucoTab® system, which provides support for hospital staff involved with insulin therapy of patients suffering from type 2 diabetes. The system improves the clinical workflow and automaticaliy suggests the correct insulin dosage. GlucoTab® runs on a tablet computer and is thus highly mobile, allowing to treat patients directly at the bedside.

Impact expected: Using GlucoTab® saves time for health care professionals and improves patient's glucose control, increasing patient safety. Clinical validation confirmed indeed that average blood glucose concentration was reduced by up to 20% compared to standard care. The system is a CE-labelled medical device, and a GlucoTab®-Roll-out should take place in German and Austrian pilot hospitals by the end of 2015. The launch of a spin-off company distributing GlucoTab® application is expected for 2016.

JOANNEUM RESEARCH

JOANNEUM RESEARCH is an Austrian RTO which focuses on application-oriented research and development projects to promote technology transfer into the economy.

www.joanneum.at

Algae: the agricultural crop of the future

Fulfilling the needs of a growing world population is one of mankind's greatest challenges and it requires sustainable biomass sources. Algae are one of the most promising of these sources, offering both an alternative protein source as well as a natural replacement to chemically-derived food additives.

TNO's Innovation: EARTO member TNO has established a leading position in biorefining and industrialisation of algae as a new biobased crop. The VALORIE pilot factory, used by companies positionned on the whole value-chain of algae processing, is now able to extract both food and non-food components from an algae cell. These components can be applied in different kinds of products, resulting in a market pull for the use of this new feedstock.

Impact expected: VALORIE is able to process up to 15 kg of algae per hour. Extracting high-value vegetable oils and proteins, whose price ranges are between 25 to 100€/kg, are the primary focus at the moment. In the longer term, the high areal productivity of algae is very promising to reach the biodiesel target set by several countries.

TNO innovation for life

TNO, an independent Research and Technology Organisation, has some 3000 professionals who put their knowledge and experience to work in creating smart solutions to complex issues.

www.tno.nl

Fire safety in lightweight ships

Steel or other non-combustible materials have always been required in ship building until a 2002-performance-based regulation allowed for deviations, provided an equivalent level of safety could be demonstrated. It thereby allowed for more innovative ship design, including the use of lighter materials. However, the main obstacle remains to demonstrate the equivalent fire safety requirement.

SP's Innovation: To do that, EARTO member SP developped fire safety engineering tools preventing material combustibility and thermal degradation for innovative ship building using lightweight Fibre Reinforced Polymer (FRP) composites. Such material can thus replace conventional steel, allowing for a substantial weight reduction of up to 70%, which reduces the need for fuel or increases load or speed capacity while lowering the need for maintenance due to corrosion.

Impact expected: SP has contributed to several new builds and superstructure designs, and today's strong need for modernisation of much of the European short sea shipping fleet with environmentally-friendly transportation systems provides a potentially very large market for FRP composites. Such lightweight constructions enhance profitability in ship transport, reducing the cost of fuel or allowing the exchange of construction weight for payload.

SP Your Science Partner

SP Technical Research Institute of Sweden is a Research and Technology Organisation which develops, tests and evaluates technologies, materials, products and processes for national and international customers.

www.sp.se

A multi-pad electrode system for muscle rehabilitation

Neurological diseases affect the capacity of motor control and can lead, in severe cases, to the complete absence of muscular function. However, the nerve conductivity and the excitability of the muscles remain and can thus be activated by functional electrical stimulation using electrical current.

TECNALIA's Innovation: EARTO member Tecnalia developed an innovative technology for selective functional electrical stimulation applied via transcutaneous electrodes (FES:a). Such technology is a common rehabilitation technique for assisting patients with central nervous system lesions. The developed system is flexible, modular, configurable, wireless, small and lightweight, allowing to move towards a technology available to patients for daily use.

Impact expected: FES:a technology is currently in ongoing clinical use for usability evaluation and Tecnalia is in the process of creating a start-up company to proceed to the final industrialisation. Several hospitals are already committed to implement FES:a technology once the startup is created. The estimated turnover of each device is 3000 € per year and per patient, and the potential European market amounts up to 6 billion euros annually.

tecnalia Inspiring Business

Tecnalia Research & Innovation is a Spanish RTO aiming to transform knowledge into GDP, improving people's quality of life. The centre creates business opportunities for companies through multi-disciplinary and applied research in several areas.

www.tecnalia.com

Full-scale test environment for road safety

Every year, 1.3 million people die of road traffic accidents and up to 50 million are injured. Road safety has improved recently, but a necessary contribution to further decrease in casualties is to use active safety functions to avoid accidents or mitigate their consequences. However, active safety has to be developed for different traffic scenarios.

SP's Innovation: Along with other partners, EARTO member SP has created AstaZero, the world's first full-scale test environment for future road safety, which makes it possible to test advanced safety systems for all kinds of traffic and traffic situations. Astazero enables research, development and certification of future road safety systems, and functions as an international arena open to all actors in the field.

Impact expected: AstaZero reduces the number of deaths and serious injuries in road traffic, while helping the European automotive industry to keep the initiative as leading in safety for all types of road vehicles. Cooperation between different organisations led to the creation of an environment suited to many different needs, and industrial partners have committed themselves to the use of AstaZero during the years to come.

SP Your Science Partner

SP Technical Research Institute of Sweden is a Research and Technology Organisation which develops, tests and evaluates technologies, materials, products and processes for national and international customers.

www.sp.se

Improving cancer diagnostic with protein-based test

Colorectal cancer (CRC) is the third most common cancer with 500,000 CRC-related deaths each year. Screening for CRC can substantially impact the survival rates, however the performance of the current tests is suboptimal. Indeed, the detection is mostly in the later stages, and there are 9% of false-positives, leading to unecessary follow-up tests which are costly for health care and unpleasant for patients.

VITO's Innovation: The Health team's research by EARTO member VITO shows that a new protein-based test might overcome these disadvantages. A pannel of 26 protein biomarkers which can discriminate between healthy individuals and CRC patients was found and is currently being validated.

Impact expected: Once this protein-based test has been approved, some 100M tests will be performed each year in Europe which could substantially increase the survival rate while saving up to 3,7 B€ each year.

vito
vision on technology

VITO is a Belgium RTO in the areas of cleantech and sustainable development, elaborating solutions for the large societal challenges of today such as climate change, food security, resource scarcity, sustainable energy and healthy cities.

www.vito.be

New flame-retardant coating

Every day in Europe approximately 12 people are killed by fire and 120 are severely injured. Moreover, destructions caused by fire have a considerable impact on the environment with the production of toxic and corrosive compounds. It is thus necessary to limit the risks of fire by designing new materials with enhanced flammability resistance.

LIST's Innovation: An innovative phosphorus-based coating was developped by EARTO member LIST, providing a unique and versatile solution for a cost effective and environmentally-friendly flame retardant. Such treatment, consisting in depositing a thin multilayer corresponding to a 1% weight increase, is enough to obtain good fire retardancy performances. This low material input goes towards improved sustainability and sticks to the circular economy approach.

Impact expected: More than 2 million tonnes of flame retardants were consumed worldwide in 2013 and revenues are expected to reach $7.15 billion in 2021. Tests shows that LIST's innovative coating delays ignition up to 150% and reduces fire propagation with a heat release rate 25% lower. Public-Private partnerships are being established for developing the solution up to high technology readiness levels.

LUXEMBOURG INSTITUTE OF SCIENCE AND TECHNOLOGY
LIST

LIST is an RTO from Luxembourg conducting interdisciplinary and impact-driven research in the fields of materials, environment and IT.

www.list.lu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