

# EARTO INNOVATION AWARDS 2024

Technology for a better world

[www.ear.to.eu](http://www.ear.to.eu)





### **EARTO - European Association of Research and Technology Organisations**

Founded in 1999, EARTO promotes Research and Technology Organisations (RTOs) and represents their interest in Europe. EARTO network counts over 350 RTOs in more than 31 countries. EARTO members represent 228,000 highly-skilled researchers and engineers managing a wide range of technology infrastructures.

**CONTRIBUTE  
EU RD&I PROGRAMMES  
GLOBAL CHALLENGES  
EUROPE'S  
INDUSTRIAL COMPETITIVENESS  
EUROPEAN RESEARCH AREA**

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

**EARTO INNOVATION AWARDS 2024** ..... 03

### **IMPACT DELIVERED**

**1<sup>ST</sup> PRIZE** VITO – Blue Foot Membranes ..... 05

**2<sup>ND</sup> PRIZE** TNO – The CubeCAT laser Terminal ..... 06

**3<sup>RD</sup> PRIZE** CEA – Hydrogen Fuel Cell Stack Next Generation ..... 07

**MORE INNOVATIONS** ..... 08-12

### **IMPACT EXPECTED**

**1<sup>ST</sup> PRIZE** INESC TEC – iLoF ..... 14

**2<sup>ND</sup> PRIZE** VTT – Hypermine ..... 15

**3<sup>RD</sup> PRIZE** TYNDALL – MicroTIPs ..... 16

**MORE INNOVATIONS** ..... 17-21

### **RTOs INTERNATIONAL NETWORK RIN**

**DISCOVER INNOVATIONS FROM EARTO RIN MEMBERS** ..... 23-28

16 EARTO INNOVATION AWARDS YEARS

# EARTO INNOVATION AWARDS 2024

From the lab to your everyday life. RTOs innovate to improve your health and well-being, your safety and security, your mobility and connectivity. RTOs' technologies cover all scientific fields. Their work ranges from basic research to new products and services' development. RTOs are non-profit organisations whose core mission is to produce, combine and bridge various types of knowledge, skills and infrastructures to deliver a range of research and development activities in collaboration with public and industrial partners of all sizes. These activities aim to result in technological and social innovations and system solutions that contribute to and mutually reinforce their economic, societal and policy impacts.

## 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.

## IMPACT EXPECTED

For this category, the rewarded innovations (product or services) 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.

## THE AWARD COMPETITION IS ADJUDICATED BY AN INDEPENDENT JURY



**Christian Ehler**  
Member of the European Parliament



**Jana Kolar**  
Executive Director, CERIC-ERIC & Chair, ESFRI



**Salla Saastamoinen**  
Deputy Director General, DG Joint Research Center, European Commission



**Juan Antonio Tébar**  
Director, CDTI



**Dave Wilkes**  
Director, Innovate UK

## NUMBER OF APPLICATIONS SO FAR

59  
RTOs

396  
APPLICATIONS

23  
COUNTRIES

18  
COUNTRIES

21  
RTOs

75  
WINNERS

## NUMBER OF WINNERS SO FAR



# IMPACT **DELIVERED**

Discover  
more innovations  
from RTOs



## IMPACT DELIVERED



## VITO

VITO is an independent Flemish research organisation in the area of cleantech and sustainable development.

Our goal? To accelerate the transition to a sustainable world.

### A robust and reliable membrane technology for water reuse

In a world where circular water systems are crucial for sustainability, innovative solutions are imperative. Blue Foot, driven by a passion for water reuse, introduces an innovation with its Integrated Permeate Channel (IPC®) membranes, enabling industrial and municipal users to transition from wastewater discharge to reuse, thus closing the water loop on-premises.

#### INNOVATION

Blue Foot's IPC® membranes feature a unique construction: a 3-dimensional textile with membrane layers cast on both sides, fully anchored to create an Integrated Permeate Channel. This design offers unparalleled benefits, including minimal energy consumption, reduced footprint, and lower Total Cost of Ownership compared to traditional membrane solutions.

#### IMPACT DELIVERED

Blue Foot's impact extends far beyond its technological expertise. With a focus on Sustainable Development Goals (SDGs) 6, 12, and 9, Blue Foot has the potential to revolutionise water and sanitation, promote responsible consumption and production, and drive industry innovation and infrastructure. By reusing 14 million m3 of water annually and potentially saving 1.4 million kWh per year, Blue Foot contributes to substantial reductions in CO2 emissions, approximately 500 tons per year depending on energy sources.

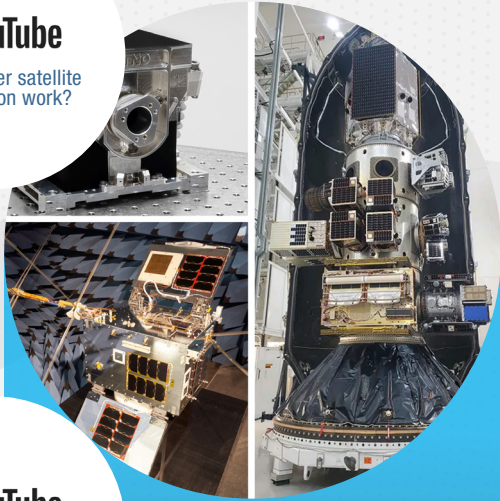
**BLUE FOOT**  
unbreakable membranes™  
[www.bluefootmembranes.com](http://www.bluefootmembranes.com)

 **vito**  
[www.vito.be](http://www.vito.be)

## IMPACT DELIVERED



How does laser satellite communication work?



Laser SATCOM, Space and Scientific Instrumentation



Credits to: AAC Hyperion, G&H, NSO, Dutch MoD and UTIAS-SFL

PRIZE  
**2<sup>ND</sup>**



## TNO

TNO connects people and knowledge to create innovations that sustainably strengthen the competitiveness of companies and the well-being of society.

### The CubeCAT laser terminal lights up the sky with unprecedented data rates

The available RF bandwidth to download satellite data is limited. The CubeCAT laser communication terminal overcomes this problem; it uses the power of light and the virtually unlimited bandwidth in the near-infrared spectrum for data transmission. CubeCAT is the result of multi-disciplinary R&D by TNO and industrial partners. All the efforts culminated in a laser communication terminal for small satellites, recently demonstrated in space.

### INNOVATION

CubeCAT, brings laser communication to small satellites. It achieves a record data rate of 1 Gigabit-per-second given its mass, size and power consumption. A key design challenge was to suppress satellite vibrations and perform highly accurate pointing and tracking. Imagine hitting a target travelling at 28,000 km/h the size of a postcard with a laser pointer, all the way from Amsterdam to the Eiffel Tower!

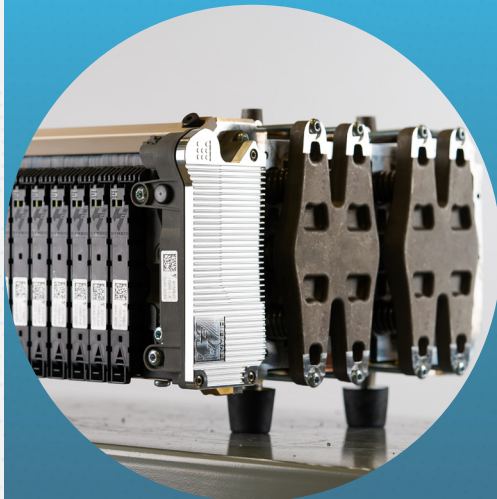
### IMPACT DELIVERED

The deployment and in-orbit demonstration of CubeCAT signals a future where fast, secure, and energy-efficient laser communication will revolutionise data relay from space to Earth for small satellites monitoring with high resolution climate change, deforestation, ocean health and emissions.



## IMPACT DELIVERED

PRIZE  
**3<sup>RD</sup>**



## CEA

The CEA is a French RTO providing solutions in four key fields: low-carbon energy, digital technology (nuclear and renewable), healthtech, defence and national security.

### StackPack™75, accelerating the development of clean mobility

A front-runner in zero-emission hydrogen mobility, Symbio, one of CEA's technology partners, combines industrial leadership, breakthrough innovation, and entrepreneurial agility to create tailor-made solutions and support its clients in the deployment of their clean mobility roadmaps. Symbio designs and manufactures a wide range of StackPacks that meet all power, durability, and autonomy needs of on-road and off-road hydrogen mobility.

 **SYMBIO**  
A FRONT-RUNNER HYDROGEN COMPANY  
[www.symbio.one](http://www.symbio.one)

### INNOVATION

Among its innovation roadmap, Symbio has focused on developing and validating a new best-in-class Hydrogen fuel cell Proton exchange membrane (PEM). The fuel cell stack, supported by a Hydrogen IPCEI grant, is the heart of Symbio's fuel cell system, named StackPack 75.

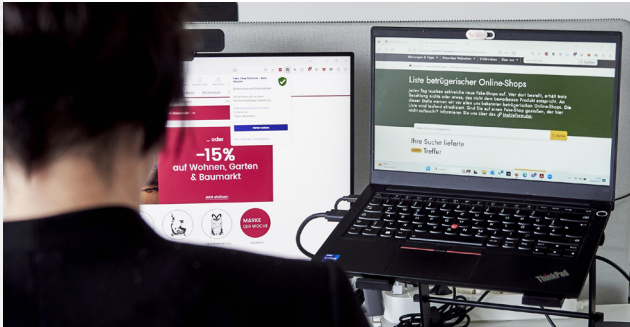
### IMPACT DELIVERED

Compared with the previous generation, this new stack is 30% more compact, and the specific design of its cells optimises the electrochemical reaction on the active surface by more than 20%. These innovations boost power density to 4.9 kW/l and efficiency to over 68%. In 2023, Symbio has inaugurated SymphonHy, the largest integrated fuel cells Gigafactory in Europe, with a current annual capacity of 16,000 fuel cell systems, and expected to reach 50,000 systems over time. The Group ambitions to manufacture 200,000 StackPacks by 2030, to accelerate the deployment of clean mobility that is respectful of both the environment and health.

 **cea**

[www.cea.fr](http://www.cea.fr)

## Mature AI-based Fake-Shop Detector protects customers during online shopping



Fake shops have been a growing problem for consumers in Austria for years. As the Watchlist Internet initiative gives evidence, every month over 1.000 Internet frauds are reported. Around 40% of them concern fake shops.

**Innovation:** AIT Austrian Institute of Technology, ÖIAT Austrian Institute for Applied Telecommunications and X-Net Services have developed an AI-based tool that protects customers during online shopping. The Fake-Shop Detector combines automated fraud detection and real-time protection using AI, directly in the user's Internet browser. Based on the Watchlist Internet fraud database machine learning algorithms have been trained to measure the similarity of web stores to known fake shops and warn the users in the form of a traffic light system.

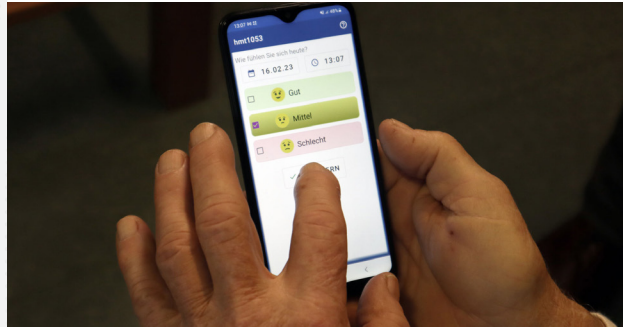
**Impact Delivered:** The Austrian innovation to protect customers against fraudulent online sellers, developed by fraud prevention experts from AIT, ÖIAT and X-Net, is attracting international interest in the meantime. The solution impresses by easy-to-use AI directly in the customer's Internet browser which includes the use on mobile devices free of charge, but without compromising the customer's privacy at any time.



The Austrian Institute of Technology (AIT) is a renowned provider of research services and innovations for industry and society in key areas of research.

[www.ait.ac.at](http://www.ait.ac.at)

## Revolutionising Healthcare with KIOLA Telehealth Platform



In today's fast-paced world, access to quality healthcare is more important than ever. With its innovative features and user-friendly interface, KIOLA is changing the landscape of healthcare delivery, making it more accessible and efficient for everyone.

**Innovation:** KIOLA Telehealth Platform offers a comprehensive suite of features designed to bring healthcare directly to patients' fingertips. From remote monitoring to secure messaging and file sharing, KIOLA provides a seamless and convenient way for patients to connect with their healthcare providers anytime, anywhere. With its emphasis on interoperability and regulatory compliance, KIOLA integrates seamlessly with existing healthcare systems, ensuring a smooth transition to remote care delivery, while supporting telemedical care plans, which allow generic utilisation as virtual information system for tele-care centers.

**Impact Delivered:** The impact of KIOLA Telehealth Platform extends far beyond convenience. By increasing access to healthcare services, KIOLA helps reduce healthcare disparities and improve health outcomes for patients worldwide. Moreover, by streamlining workflows and reducing unnecessary travel, KIOLA contributes to environmental sustainability and cost savings for both patients and healthcare providers. With its potential to transform the healthcare landscape, KIOLA is paving the way for a healthier, more connected future.



The Austrian Institute of Technology (AIT) is a renowned provider of research services and innovations for industry and society in key areas of research.

[www.ait.ac.at](http://www.ait.ac.at)

## Revolutionising patient monitoring



CSEM's Optical Cardiovascular Monitoring Technology (oCMT) is revolutionising patient monitoring. This pioneering innovation bridges the gap between patients' evolving needs and current monitoring systems' capabilities. oCMT enables continuous, clinically validated tracking of critical vital signs such as cardiac pulse, respiratory rate, blood oxygen saturation (SpO2), and blood pressure, significantly enhancing patient care quality.

**Innovation:** oCMT, comprises of ultra-low-power optical components, precision-engineered mechanical designs, and state-of-the-art electronic reference models, complemented by advanced analog front-end (AFE) drivers and sophisticated embedded algorithms. This technology suite not only cements CSEM's position as a frontrunner in medical wearable technology but also empowers the organisation to spearhead the dissemination of unparalleled vital sign monitoring solutions to its industrial partners.

**Impact Delivered:** oCMT has catalyzed the creation of over 15 novel products, transforming markets from hospital monitoring systems to consumer-oriented wearables. These innovations include wearable pulse oximeters, heart screening devices, continuous blood pressure monitors, and smartwatches with advanced health-tracking capabilities. Embracing oCMT paves the way for intuitive, comprehensive, and widely accessible patient monitoring with cutting-edge technology.

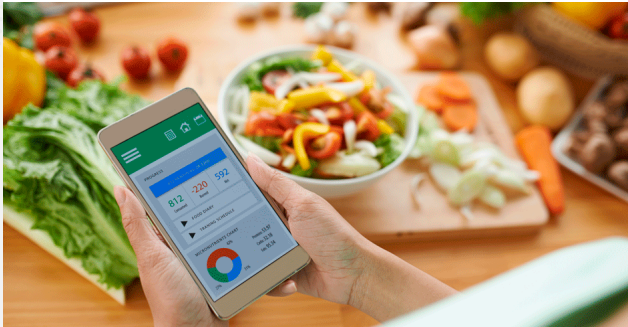


CSEM - Swiss innovation catalyst, specialising in Deep Tech for industry sectors like automotive, tooling, space, and medical.

[www.csem.ch](http://www.csem.ch)



## Digital platform for personalised food and diet recommendations



Adopting a healthy lifestyle is key to prevent the onset of non-communicable diseases, such as obesity, hypertension or cardiovascular diseases. People are in need of solutions to sustain healthier habits and guarantee an optimal health and physical conditions while ageing.

**Innovation:** EARTO member Eurecat has developed a digital solution to deliver actionable personalised plans to improve the health of people, based on their phenotype, genotype, behaviour, lifestyle and food preferences. The innovation applies omics sciences, especially metabolomics, to know the state of metabolic health and induce a behavioural change in nutrition and lifestyle habits.

**Impact Delivered:** This innovation has a significant impact on citizens' health and helps reducing health care system costs. It also contributes to increase user satisfaction and confidence in personalised nutrition and promote greater adherence to healthy dietary patterns.



Eurecat is the largest cross-sectoral and trans-national RTO in Catalonia, Spain, with 750 professionals covering all technological specialties to deliver added value to our society.

[www.eurecat.org](http://www.eurecat.org) - [www.preventomics.eu](http://www.preventomics.eu)

## Attractively Colored Solar Panels with High Efficiency



Towards sustainability, cities show a growing interest in integrating photovoltaics in buildings. Raising and solving the question of aesthetics, Fraunhofer ISE found a way of coloring photovoltaic modules while maintaining high efficiency.

**Innovation:** Inspired by the blue morpho butterfly, Fraunhofer ISE developed a MorphoColor® layer system based on a 3D photonic structure for coloring photovoltaic modules. The innovative technology pairs unprecedented color quality while maintaining a high module efficiency. Plus, it enables an extensive choice of colors, making it an excellent technology for e.g., building-integrated applications.

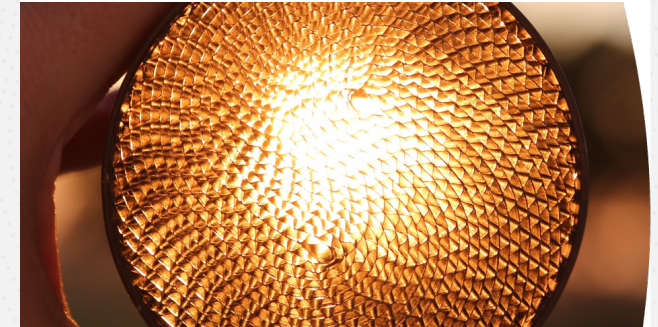
**Impact Delivered:** The first MorphoColor® PV installations on buildings appeared in 2022, demonstrating aesthetic building appearances in urban centers and rural areas as well as on industrial buildings. Megasol Energie AG is now scaling up the market production of their product with MorphoColor®. The target market is mainly Europe, especially those countries aiming at increasing the integration of photovoltaics in buildings, both residential and industrial. The innovation, optimised to match building applications in terms of aesthetics, efficiency and large-scale feasibility, is a key stepping stone towards SDG 7 (Affordable and Clean Energy) and 11 (Sustainable Cities and Communities).



Fraunhofer ISE is one of the 76 institutes/research units of Fraunhofer, the world's leading RTO for applied research, experimental development and technology transfer

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

## TURN2X pushes transition to renewable energy forward



TURN2X stands at the forefront of renewable energy technology, innovating in the field of Renewable Natural Gas (RNG) production from electricity. The approach promises to redefine industrial fuel use, advancing climate action goals. Through strategic integration of renewable resources, TURN2X is setting new standards for sustainable energy and aiding global efforts towards a more resilient and low-carbon future.

**Innovation:** Central to TURN2X's technological leap is the dynamic honeycomb methanation reactor, facilitating the conversion of green hydrogen and biogenic CO2 into RNG. This reactor thrives under dynamic load conditions, maintaining operational stability and efficiency in fluctuating renewable energy supply scenarios. This dynamic load handling represents a remarkable innovation, positioning TURN2X's RNG solution as both adaptable and scalable, key attributes in the transition to a renewable energy economy.

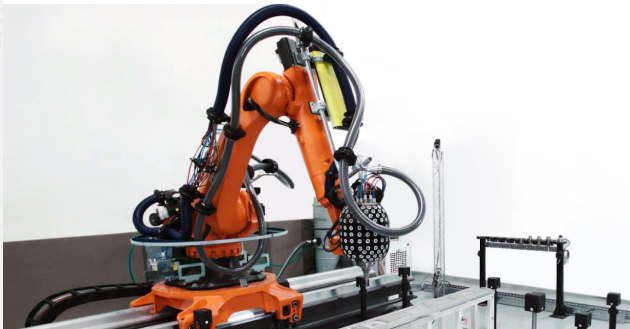
**Impact Delivered:** The introduction of TURN2X's e-Methane represents a significant leap forward in RNG technology. The process not only aligns with stringent EU standards for RFNBO but also positions TURN2X as a catalyst for change in energy-intensive sectors. By converting renewable sources into a direct substitute for fossil fuels, TURN2X's technology allows immediate integration into existing energy systems, promoting swift decarbonisation efforts across Europe.



The Karlsruhe Institute of Technology (KIT) is "The Research University in the Helmholtz Association". KIT is a strategic shareholder of Turn2X

[www.helmholtz.de](http://www.helmholtz.de) - [www.turn2x.com](http://www.turn2x.com)

## Revolutionising composite machining with Fibremach



At the heart of the manufacturing revolution, the Fibremach project emerges as an important innovation, redefining the standards of composite machining. This groundbreaking robot not only promises to elevate precision but also sets new benchmarks in environmental and workers safety.

**Innovation:** At its core, Fibremach boasts an internal dust extraction system that captures 98% of machining dust, a figure that drastically surpasses current capabilities. This leap forward ensures a safer work environment, significantly reducing health risks associated with airborne particles.

**Impact Delivered:** Coupled with a machining accuracy of +/- 0,15 mm, Fibremach triples the precision of traditional robots, offering an unmatched level of accuracy that exceeds the aerospace industry's stringent requirements. The innovation doesn't stop there; Fibremach is also a champion of sustainability, consuming 81% less energy than conventional methods for the dust aspiration. This efficiency not only slashes operational costs but also aligns with global efforts to reduce carbon footprints, marking a significant step towards greener manufacturing processes. As Fibremach rolls out onto the global stage, it stands as a testament to the power of collaborative innovation, promising to shape the future of robotic manufacturing for years to come.



IDEKO remains at the forefront of robotic manufacturing transformation, driving change and fostering progress across industries

[www.ideko.es](http://www.ideko.es) - [www.fibremach-project.eu](http://www.fibremach-project.eu)

## BioTfuel® paves the way to low-carbon footprint biokerosene



Bionext coordinates the expertise brought by its six partners and shareholders: IFP Energies nouvelles and its partners Avril, Axens, CEA, thyssenkrupp Industrial Solutions, and TotalEnergies. Together, they have successfully completed the test program on BioTfuel® demonstration units.

**Innovation:** This initial success has validated and optimised the process chain on a pre-industrial scale using four different types of biomass following more than 1500 hours of torrefaction and 1000 hours of gasification. This achievement paves the way for the industrial production of sustainable fuels for aviation, as well as road, maritime, and rail transport, all from lignocellulosic biomass. The technology can be highly integrated with renewable hydrogen to increase biogenic carbon yield. Axens is responsible for licensing the technology, producing basic engineering packages and promoting of the BioTfuel® process.

**Impact Delivered:** The deployment of BioTfuel® technology will contribute to achieving the Sustainable Aviation Fuel (SAF) incorporation targets proposed by the European Commission in 2021 as part of its 'Fit for 55' package, which aims for 5% in 2030, up to 70% by 2050. Each BioTfuel® industrial unit will enable the production of 30 to 300 kt/year of SAF and will create several hundred agricultural, forestry and industrial jobs.



IFPEN is a major research and training player in energy, transport and environment. From scientific concepts to technological solutions, innovation is at the heart of its mission.

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

## InRen: rhenium recovery from scrap



Within the framework of the "Intensification of the recovery of rhenium and other metals from superalloy scrap", a new technology for the processing of rhenium-containing scrap has been developed, taking into account both large-scale components not previously processed in Poland and in the world and smaller components not exceeding 30 mm in size, currently recycled by the company Innovator. The developed technology is based on electrodisolution of materials and is characterised by a high efficiency rate of more than 95%.

**Innovation:** This innovative technology will allow the recovery of rhenium in the form of high-purity compounds - NH<sub>4</sub>ReO<sub>4</sub>, HReO<sub>4</sub> and AgReO<sub>4</sub> - combined with the management of other valuable metals contained in the processed waste. In addition to rhenium, the metals recovered, such as nickel and cobalt, as well as low-melting metals (tantalum, tungsten, titanium, molybdenum) in the form of high-purity concentrates, become commercial products that can be used in the production of various types of alloys.

**Impact Delivered:** The company Innovator, currently the only domestic producer of NH<sub>4</sub>ReO<sub>4</sub> from rhenium-bearing scrap, achieved the opportunity to both increase the volume of processed superalloy scrap by 50% and increase its product range with new rhenium compounds (HReO<sub>4</sub> and AgReO<sub>4</sub>), so far not offered in Poland on an industrial scale.



Łukasiewicz-Institute of Non-Ferrous Metals provides innovative solutions in the fields of non-ferrous metals processing, critical elements recovery, new-generation materials.

[www.lukasiewicz.gov.pl](http://www.lukasiewicz.gov.pl) - [www.imn.lukasiewicz.gov.pl](http://www.imn.lukasiewicz.gov.pl)



## REFROHS: new Certified Reference Materials (CRMs)



The submitted solution is a series of new certified reference materials for materials based on low-alloy steel, copper, zinc, tin and aluminum, with certified Cd, Pb, Cr and Hg or As content, designated for use in sample analysis for compliance with the Restriction of Hazardous Substances - RoHS Directive. CRMs will be used as reference and calibration materials in controlling the content of the listed elements in electronic and electrical equipment.

**Innovation:** CRMs are new on the global market. CRMs come in series and can be used for direct calibration and control XRF spectrometres, spark-OES, IR analysers and other relevant analytical equipment. CRMs enable analysis using direct techniques, compliant with the ISO 17034 standard, and ensure the consistency of measurement results. The ecological nature of the CRMs are characterised by low environmental impact, meeting various standards and criteria for chemical composition. They enable the use of analytical techniques using solid samples instead of solution techniques - thus eliminating the use of concentrated acids.

**Impact Delivered:** The produced CRMs are the first ones in the world that enable to perform quick and fully quantitative analysis of metallic RoHS samples using calibration and limiting method, directly from the solid sample providing full measurement consistency traceability and global recognition of results.



Łukasiewicz-Institute of Non-Ferrous Metals provides innovative solutions in the fields of non-ferrous metals processing, critical elements recovery, new-generation materials.

[www.lukasiewicz.gov.pl](http://www.lukasiewicz.gov.pl) - [www.imn.lukasiewicz.gov.pl](http://www.imn.lukasiewicz.gov.pl)

## Wireless Autonomous Temperature Measurement System designed for switchgear located in hazardous voltage zones



Wireless temperature sensors for quality monitoring electrical connections increase safety and reliability of power supply systems. They constantly monitor temperature and alert about threats of failure at a very early stage. Application of temperature sensors in MV switchgears on compulsory requirements for live components requirements for the sensor, which must be characterised by lack batteries, autonomous power supply and wireless communication.

**Innovation:** The solution consists of wireless data transmission which eliminates copper transmission connections and power supply circuit harvesting energy from ambient electromagnetic fields. The system can be used for retrofitting existing switchgears and thus prolong their lifetime. Due to retrofitting of existing infrastructure, the system reduces used switchgear scrapping and enhances the environment health factors like chemical pollution.

**Impact Delivered:** The purpose of the eTemp system is to diagnose and prevent potential failures and power outages through continuous verification of quality of electrical connections. The functionality of this system increases safety and extends the service life of electrical devices, which translates into lower expenditure investment in the future. eTemp system perfectly fits into the predictive maintenance model.



Łukasiewicz – ITR conducts comprehensive and interdisciplinary scientific examinations and development activities in regard to ICT systems, electronics and Industry 4.0 solutions.

[www.lukasiewicz.gov.pl](http://www.lukasiewicz.gov.pl) - [www.itr.lukasiewicz.gov.pl](http://www.itr.lukasiewicz.gov.pl)

## Chlm4FoodI, an innovative solution to detect contaminants in food industry



Food safety is one of the food industry's priorities. In the area of foreign body detection, metal detection and X-rays are used for high-density materials, but in the case of low-density contaminants, there is a lack of solutions.

**Innovation:** Chlm4FoodI is a complete solution for the detection and expulsion of foreign matter or low-density contaminants in bulk foods using hyperspectral vision in the near-infrared. Software then analyses the complete spectral fingerprint at a very high-speed using a combination of an efficient lighting system applying Machine Learning algorithms running in powerful Graphics Processing Units. Chlm4FoodI represents an optimal solution for the food industry, and especially in the nuts, snacks and spices sectors, for process optimisation, quality assurance and safety.

**Impact Delivered:** The main expected impact on the industry is an improvement in food safety as a consequence of reducing the incidence of the appearance of foreign bodies in food, as well as a reduction in losses caused by the return of contaminated batches. The technology is protected through industrial secrecy and the exploitation rights are 100% owned by AINIA and its application has already been validated in several target industries.



The Network of Technological Centres of the Valencian Community (REDIT) is a private non-profit association that integrates and represents the 11 technological centres of the region.

[www.redit.es](http://www.redit.es) - [www.ainia.com](http://www.ainia.com)

## H2SITE: enabling hydrogen transportation for a sustainable future



Transporting hydrogen (H<sub>2</sub>) is one of the greatest challenges to enable its use as energy vector. Low-cost, low-carbon hydrogen is often not produced where it is consumed and there is a lack of efficient long distance hydrogen transportation solutions. Failing to solve this problem could lead to an increase in the cost of H<sub>2</sub> for end users by 80 to 300%.

**Innovation:** H2SITE commercialises innovative and patented palladium-alloy membrane reactor technology to solve this problem by allowing the use of current gas infrastructure, of hydrogen carriers that are easy to produce and transport (ammonia, methanol, syngas) or of geologically developed hydrogen. The membrane allows for the efficient separation of hydrogen from mixed gases and carriers, achieving over 98% hydrogen recovery and 99.97% hydrogen purity, all at a lower cost than any alternative technology, that enables industry to adopt low-carbon hydrogen as an alternative energy.

**Impact Delivered:** The reactors enable hydrogen transportation with the common goal of decarbonisation hard-to-abate industries worth more than \$100b. TECNALIA is creating a new deep-tech European industry that will reduce 5 Gigaton of CO<sub>2</sub> by 2030.



TECNALIA is the largest private, non-profit Research & Technology Organisation (RTO) in Spain, a benchmark in Europe and a member of the BRTA. Creating Growth – Improving Society

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

## World's first mass-production of sustainable smart IoT devices



For more than a decade, Printed Electronics was promised to revolutionise electronics manufacturing due to its additive, sustainable and scalable nature, but the hockey stick growth did not materialise, and it was facing the 'valley of death'. Enter TracXon, the world's first foundry for complex Printed Electronics manufacturing, spun-off by TNO (The Netherlands) in 2022, to transform this high-potential technology from lab to fab.

**Innovation:** TracXon's Printed Electronics technology combines roll-to-roll (R2R) printing of complex and compact electrical circuitry with high-speed assembly of traditional silicon chips and components, enabling products that were hitherto not possible. Leveraging advanced printing expertise and unique assembly technology backed by IP, TracXon is the first to go into mass production of complex IoT (Internet of Things) and Wearable devices in a R2R manner.

**Impact Delivered:** TracXon has enabled their B2B customers to commercialise products that are flexible, conformal and non-intrusive. Think of wearable sensors that disappear into everyday clothing; or, smart stickers that monitor vital signs non-intrusively; and smart labels that monitor location, temperature, etc., of pharmaceutical packages, thereby confirming their fidelity. These benefits are further enhanced by the sustainable nature of TracXon's fully-additive manufacturing processes.



TNO connects people and knowledge to create innovations that sustainably strengthen the competitiveness of companies and the well-being of society.

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





# IMPACT **EXPECTED**

Discover  
more innovations  
from RTOs

IMPACT  
EXPECTED

PRIZE  
**1<sup>ST</sup>**



## INESC TEC

INESC TEC – Institute for Systems and Computer Engineering, Technology and Science is a major Portuguese RTO dedicated to R&D and tech transfer of digital innovations.

### Digital profiling technology to improve One Health

Detecting micro and nano targets is critical in drug development, clinical trials, diagnostics and other One Health subfields. However, current solutions present poor economic efficiency and induce unnecessary patients discomfort, which can be drastically improved by the iLoF innovation.

#### INNOVATION

iLoF is an AI-powered photonic technology to select the right patients for the right clinical management by extracting unique digital fingerprints based on key biological micro and nano targets. Non-invasive and using only light, iLoF promises to revolutionise personalised medicine and drug development by finding an affordable way to lead the patient to the right treatment.

#### IMPACT EXPECTED

The ground-breaking screening tool iLoF decreases screening time by 70% and reduces costs by up to 40%. Benefiting patients and pharmaceutical companies alike, it fosters innovation in personalised medicine, improves trial outcomes, and offers hope for millions affected, contributing to economic growth and societal well-being.



[www.inesctec.pt](http://www.inesctec.pt)

## IMPACT EXPECTED



## VTT

VTT Technical Research Centre of Finland is one of Europe's leading research institutions. We partner with companies and society to turn global challenges into sustainable growth.

### Hypermine, a pivotal step towards sustainable mining

In the dynamic landscape of the global mining industry, the imperative for innovation has never been more critical. This growth is propelled by the universal shift towards green and digital transition, underscoring the demand for essential metals and minerals. Amidst this surge, the mining sector grapples with a pivotal challenge: the urgent need for enhanced mineral detection techniques, while minimising the environmental impact caused by mining.

#### INNOVATION

Hypermine is a cutting-edge analyser that uses a laser-based hyperspectral sensor to scan the surface of mine materials and reveal their mineral contents. Unlike current available sensing technologies, Hypermine can operate during the excavation stage of mining. It allows real-time mineralogy sensing that optimises mine management. Hence, this innovation enables mining companies to achieve richer ore concentrations to be further processed, which not only ensures a more profitable production, but also significantly reduces the environmental footprint of mining activities.

#### IMPACT EXPECTED

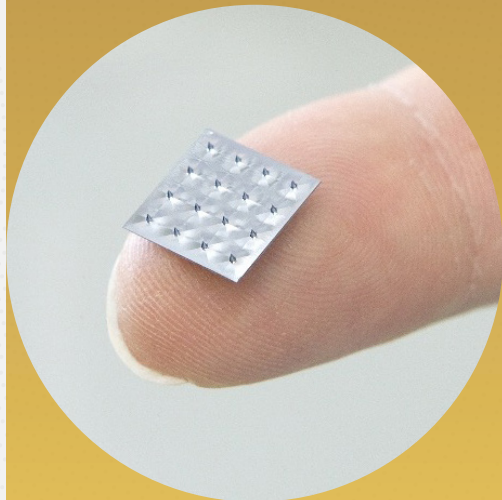
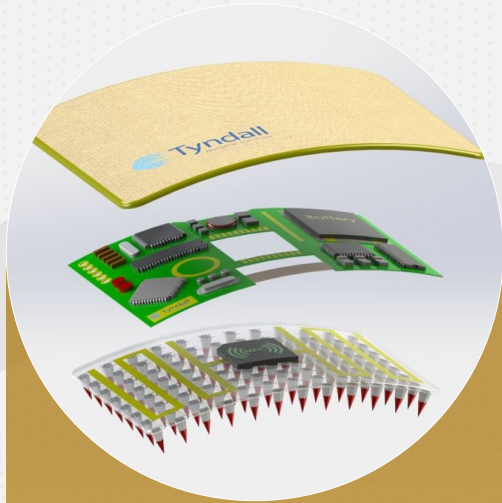
The innovation is expected to enhance the profitability of mining companies by 3 to 10%, with 10% energy savings and 15% water savings, as well as minimising waste generation and land use by 10%. Hypermine represents a pivotal step forward in achieving economic growth while preserving our planet, shaping the future of sustainable mining.

VTT

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



## IMPACT EXPECTED



# TYNDALL

Tyndall National Institute is a leading European research centre in integrated ICT hardware and systems. Tyndall's core research areas include photonics and micro-nano electronics.

## Improved patient wellbeing through the use of connected microneedles

Despite being just a fraction of a millimetre thick, human skin presents a formidable barrier to the delivery of drugs and vaccines as well as to the monitoring of biomarkers and electrical signals. To address the limitations of conventional needle-based techniques in delivery and diagnostics, devices using short, sharp microneedles less than 0,5 mm tall are being developed as a patient-friendly alternative.

### INNOVATION

Tyndall National Institute is integrating painless microneedles with smart sensors, actuators, electronics and wireless connectivity to create an entirely new class of medical devices that we refer to as Micro Transdermal Interface Platforms (MicroTIPs). Using microneedles to interface with the skin, MicroTIPs will continuously monitor patient wellbeing, autonomously deliver medicants tailored in real time to the needs of the user, and provide a two-way link between the patient and healthcare provider.

### IMPACT EXPECTED

The unobtrusive, painless and cloud-connected MicroTIPs technology will have a significant impact on the delivery of healthcare programmes by enabling better adherence to prescribed treatments. In turn, downstream economic and social impacts will accrue, most notably in improved treatment outcomes and better patient health, leading to a corresponding decrease in the cost of drug provision and patient care.



[www.tyndall.ie](http://www.tyndall.ie)



## Achieving climate-neutral agriculture through endophyte technologies



There is an urgent need to reduce net emissions of greenhouse gases and to increase the sustainability of food production, under consideration of emerging pathogens as well as extreme weather events pose major threats on crop production. Furthermore, the energy crisis and the energy needs for the production of inorganic fertilizers raise the need of alternative solutions. Microbial technologies are considered as one of the most promising tools to replace or at least reduce the input of agrochemicals and have been found to exhibit plant beneficial functions.

**Innovation:** Endophytes colonise the plant interior and have a very intimate relationship with their plant host, providing substantial support to the growth, health, and stress resilience. However, most endophytes are lost when applied on plants due to harsh environmental conditions. AIT developed the ENDOBOOST approach – where selected AIT proprietary strains are applied using the ENDOSEED technology, which employs seeds as carrier, leading to strongly improved survival of endophytes on plants.

**Impact Expected:** The developed delivery technologies are highly innovative and warrant colonisation and high efficacy of the endophytes serving as sustainable alternatives of agro-chemicals. The AIT team greatly participated in the discovery of endophytes and developed endophyte-based technologies, some of them have reached the market already.



The Austrian Institute of Technology (AIT) is a renowned provider of research services and innovations for industry and society in key areas of research

[www.ait.ac.at](http://www.ait.ac.at)

## Sense Aeronautics platform: your eyes in the sky



Drones represent a huge opportunity for many services and industries. Most drones that are flying incorporate at least a camera for either recording or streaming what they see. That is a lot of footage to be analysed. True scalability of drone operations is only possible in autonomous scenarios where a human can oversee the operations of many drones at a time. And only through video analysis capabilities equal or beyond those of a human operator, can such autonomy be achieved. In terms of the safety and reach of the flights and the efficiency of the services themselves, the full potential of drones in our society and economy is still to be unleashed.

**Innovation:** Gradiant, EARTO Member through ATIGA, has the vision of drones performing operations and high added value missions autonomously thanks to full and real-time understanding of the world around them.

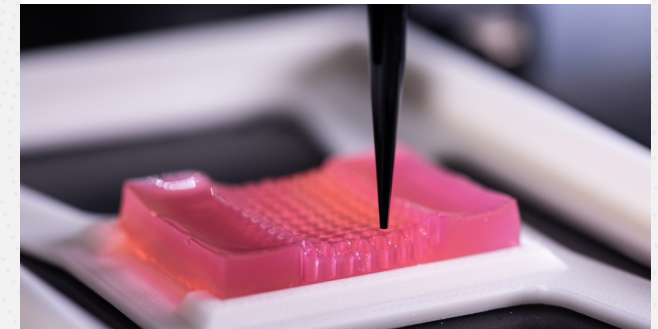
**Impact Expected:** The mission is to develop the best AI-powered video analytics systems and ensure they can be integrated and exploited as part of the growing UAS (Unmanned Aerial System) ecosystem, for any operation, anywhere in the world. In Q3 2023 Gradiant launched Sense Aeronautics, a spin-off company aimed at commercially exploiting the results of this innovation.



ATIGA is the alliance of the seven Galician technology centres, with the mission to generate and transfer technology to the productive sector to serve society and business

[www.atiga.es](http://www.atiga.es) - [www.gradiant.org](http://www.gradiant.org) - [www.senseaeronautics.com](http://www.senseaeronautics.com)

## MicroHisto: Revolutionising organoids histological analysis



While complex in vitro models including organoids are emerging as promising tools in biomedical research, their full potential in drug screening, disease modeling, and personalised medicine is hindered by the lack of robust validation and standardisation, particularly in analytical procedures. The transition from well-established macro-sample processing to organoids poses significant challenges, especially in histology, the gold standard method for tissue analysis.

**Innovation:** CSEM introduces MicroHisto, an innovative solution tailored for organoid histology. This process significantly enhances sample traceability and analytical efficiency by arraying multiple organoids into a single histology section. MicroHisto offers a standardised microhistology solution compatible with industry-standard automated sample handling.

**Impact Expected:** This innovation promises to advance drug screening, disease modeling, and personalised medicine. In addition to social and environmental benefits, the improved efficiency offered by MicroHisto translates into significant cost savings for histological analysis, making it a financially advantageous solution for research institutions and biotech companies as well as hospitals.



CSEM is a Swiss technology innovation center, non-profit Research and Technology Organisation (RTO) that translates technological solutions into business success

[www.csem.ch](http://www.csem.ch)

## Membrane Electrode Assemblies to boost hydrogen production and the fuel cells sector



There is a need to develop new solutions to adopt hydrogen as a renewable energy source by increasing the local manufacturing of electrolysers and fuel cells and their components, unlocking local energy sovereignty since combustible could be generated in Km0 in Europe.

**Innovation:** Eurecat has developed a novel Membrane Electrode Assemblies (MEAs) system based on the sequential printing of membranes, catalysts and gas diffusion layers for hydrogen generation and conversion applications. The technology demonstrates the feasibility of substituting conventional MEA architectures while using less raw materials in a solution based on more sustainable production and at a lower cost.

**Impact Expected:** The innovation will provide alternative and more sustainable routes for the production and conversion of hydrogen as energy vector, boosting a hydrogen-powered society. This project is expected to reach the market within 3 years with the energy production and mobility sectors as target markets.



Eurecat is the largest cross-sectorial and trans-national RTO in Catalonia, Spain, with 750 professionals covering all technological specialties to deliver added value to our society.

[www.eurecat.org](http://www.eurecat.org)

## Resolving the end-of-life of thermoset composites for a plastic free planet



With over 67% of thermoset composite waste ending in landfills or being incinerated, plastic waste has become one of the major threats to our ecosystems.

**Innovation:** Aitiip, one of Fedit's RTOs, proposes a dual solution to solve the end-of-life of this type of plastics. On one hand, directed enzyme evolution strategies with selective degradation capabilities will allow controlled enzymatic degradation. The development of a methodology to add those enzymatic additives into the biobased polymeric matrix and/or in the recycling reactor will push the innovation even further. On the other hand, the development of customised biobased materials that have the ability to modify their molecular structure (bonding-debonding), allowing the separation and subsequent re-utilisation of their components, will contribute to the development of a new sustainable technology focused on the controlled separation and recovery of composite material components.

**Impact Expected:** The implementation of the proposed solutions makes a controlled stream of composite waste possible. In the near future, we will find a new generation of high-tech products such as aircrafts, boats, windmills, cars or trains that will be manufactured with fully recycled complex thermoset composites, getting a step closer to a plastic-free planet.



Fedit is a Spanish association of RTOs whose main mission is to boost and encourage innovation, technological development and private research

[www.fedit.com](http://www.fedit.com) - [www.aitiip.com](http://www.aitiip.com)

## Fraunhofer and partners DLR, MPL & FAU in QuNET to show tandem quantum-classical network security in governmental infrastructures



Secure digital infrastructures are the basis for sovereign governmental institutions and safeguard critical frameworks. They provide settings that foster industry and protect the citizens' rights in their digital identity. With increasing occurrences of cyber breaches, new concepts are needed for the security of digital infrastructures in the growing complexity of global networks.

**Innovation:** By uniting quantum and classical cryptographic primitives in a tandem approach, a new level of security was demonstrated for a video conference in governmental network. Quantum measurement principles make security quantifiable and breaches detectable, beyond classical resources of cyberattacks. Classical post-quantum cryptography offers resilience against future resources of emergent quantum computers. The agility of the tandem approach was validated using multiple protocols, encoding techniques and transmission bands in a dual free-space and fibre link.

**Impact Expected:** This innovation serves as incubator for the transformation of the European data sphere (public and private) and security industry. It guarantees long-term security for sensitive data and critical infrastructures against the emerging threat of quantum computers.



Fraunhofer IOF and HHI are two of the 76 institutes/research units of Fraunhofer, the world's leading RTO for applied research, experimental development, and technology transfer.

[www.fraunhofer.de](http://www.fraunhofer.de) - [www.iof.fraunhofer.de](http://www.iof.fraunhofer.de) - [www.hhi.fraunhofer.de](http://www.hhi.fraunhofer.de)



## Nothing less than a game changer for the world computing market



TECHIFAB was founded in 2021 to manufacture the TiF Memristors for ultra-fast and resource-efficient electronic circuits, to prepare for mass production, and to develop the many upcoming different kinds of applications.

**Innovation:** TECHIFABs TiF Memristor can process and store data in the same cell. TiF Memristors have scale-up potential to account for 100% of the market for core elements of neuromorphic computers. TECHIFAB will bring processing of sensor data at the edge to perfection. It will find correlations among all kind of data types and suits at the edge due to its low-power consumption especially (e.g. vibrations, speed and temperature sensors at rolls, angles, flanges or from camera and infrared sensors) and in real-time. Computing of edge-sensor data will get logically transparent, which is not easy. This enables complete automation of data processing at the sensor. More reliable, more robust decisions can be made when analysing sensor data.

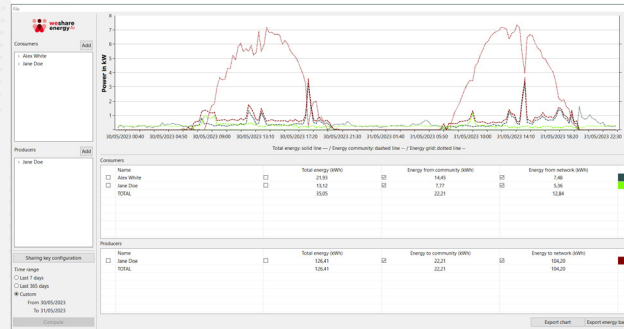
**Impact Expected:** Implementing the TiF Memristor hardware will pave the way for true industrial AI. The TiF Memristor provides companies with a powerful tool to improve prototyping for future high-level appliances. It allows the development engineers, researchers and designers working for companies to explore new contexts from edge sensor data in the prototyping phases of a product development project.



As an interdisciplinary research center, the Helmholtz-Zentrum Dresden-Rossendorf (HZDR) performs applied research in the fields of energy, health, and matter.

[www.helmholtz.de](http://www.helmholtz.de) - [www.hzdr.de](http://www.hzdr.de) - [www.techifab.com](http://www.techifab.com)

## Electricity sharing: an economic and ecological solution



Consumers are increasingly being called upon to participate in the energy transition, notably through electricity generation, self-consumption and now electricity sharing. Such a concept offers producers the opportunity to share their surplus electricity production with consumers who wish to benefit from locally produced renewable electricity, but who do not have the means to install solar panels themselves.

**Innovation:** LIST, in collaboration with the Institut Luxembourgeois de Régulation, the Luxembourg independent authority in charge of regulating the transport and distribution of electricity, developed a software named WeShareEnergy allowing any Luxembourg citizen or business to simulate its membership in an energy community, and configure a sharing key as well as possible to achieve targeted objectives.

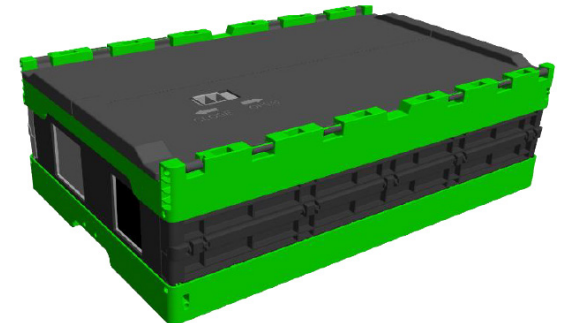
**Impact Expected:** Designed as an awareness tool and accelerator towards the energy transition through the sharing and consumption of local renewable energy as set in both the European Clean Energy Package and Luxembourg's integrated national energy and climate plan for the period 2021-2030, WeShareEnergy has the capacity to offer its users an access to environmentally friendly and cost-effective energy. In this way, people become less dependent on grid supply and exposed to the uncertainty as to energy market prices.



Luxembourg Institute of Science and Technology LIST, is a mission-driven Research and Technology Organisation active in the fields of materials, space, environment, and IT.

[www.list.lu](http://www.list.lu)

## e-PACK: an intelligent returnable packaging for the e-commerce industry



Around 170 billion orders are generated by e-commerce, which translated into a similar number of dispatches. Online shopping can have a negative environmental impact if the e-commerce is not properly thought-out. Transport of individual shipments, additional packaging and returns are problematic. It is not possible to talk about the fast development of e-commerce without mentioning its sustainability.

**Innovation:** e-Pack is an intelligent returnable packaging for the e-commerce industry, reusable and inspired by Physical Internet solutions. It also aims to reduce the carbon footprint of logistics processes and the environmental burden of the huge volumes of disposable packaging currently used.

**Impact Expected:** The innovation seeks to reduce the carbon footprint of logistics processes and negative environmental impact resulting from the huge volumes of currently used disposable packaging. It will be achieved by reusing the same packaging, better protection of goods and using loading space, easing the preparation of shipments as well as collecting and analysing additional information about delivery and return processes.



Łukasiewicz - Poznań Institute of Technology combines interdisciplinary research directions in the areas of modern mobility, sustainable economy and digital transformation.

[www.lukasiewicz.gov.pl](http://www.lukasiewicz.gov.pl) - [www.pit.lukasiewicz.gov.pl](http://www.pit.lukasiewicz.gov.pl)

## ORGALIVE, an innovative solution to preserve and recover solid organs



The gap between supply and demand for organs for transplantation continues due to the reduction of availability of optimal organs and the aging of the population itself, which will lead to a large increase in demand over the next few years.

**Innovation:** The ORGALIVE System, developed by AINIA, member of REDIT, consists of an organ preservation and recovery system that contributes to increasing the number of viable solid organs (liver and kidney) for transplantation. The development is led by AINIA's technical team providing the necessary infrastructure in matters such as computing, hygienic design, sensorisation as well as the cybersecurity aspects of the ORGALIVE Secured Cloud.

**Impact Expected:** The ORGALIVE System allows the preservation and recovery of the organ from its extraction from the donor to its implantation in the recipient, achieving that the environment of the organ is practically identical to that of the organism (normothermic system). So, ORGALIVE will allow to recover around 20% of the organs that are initially not considered optimal, reducing the waiting lists and the amount of patient's deaths.



The Network of Technological Centres of the Valencian Community (REDIT) is a private non-profit association that integrates and represents the 11 technological centres of the region.

[www.redit.es](http://www.redit.es) - [www.ainia.com](http://www.ainia.com)

## Robotic Seabed Cleaning Platform enables the efficient removal of underwater litter



There are 86 M tons of plastics in the oceans, while 4 to 12 M tons are added every year. Only 1% is floating. The rest lies on the seabed, has been degraded in microplastics or ingested by sea life. This environmental issue has severe impact on ecosystems, health and economy. Some solutions are being tested for the surface plastics, but nothing for the seabed except low efficiency divers or remotely operated vehicles (10-15kg).

**Innovation:** SeabedCleaner is the first known efficient solution to remove plastics and marine litter from the seabed of our waterways. It combines a floating platform with a cable-driven robot, whose underwater frame holds perception sensors and tools and dives underwater to localise and remove the waste items (up to 20m, 130kg) without harming the ecosystem. It is also able to perform more traditional underwater commercial work.

**Impact Expected:** There are no more excuses for removing marine litter, it being too difficult, costly or dangerous with divers: SeabedCleaner testing campaigns allowed to remove 2 tons of litter from the Venice lagoon and its coastal area. SeabedCleaner is over 3 times faster and only 25 to 40% of the cost of divers. It also removes the fatality risks associated with professional divers (10 to 40% higher than onshore construction workers).



TECNALIA is the largest private, non-profit Research & Technology Organisation (RTO) in Spain, a benchmark in Europe and member of the BRTA. Creating Growth – Improving Society.

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

## A targeted, privacy-friendly methodology for battling poverty



Eurostat estimates that 20% of the EU population is at risk for poverty and social exclusion. At the same time, the non-take-up of minimum income benefits across Europe ranges from 29% to 57%. Governments want to reduce poverty by pro-actively reaching out to potential beneficiaries, but are challenged in striking the right balance between the benefits of a targeted approach and the privacy infringement caused by using personal data.

**Innovation:** TNO and the SVB (Sociale Verzekerings Bank - implementer of Dutch social insurance schemes) implemented a methodology and privacy-enhancing solution that allows an organisation to identify potential beneficiaries based on data from another organisation, without being able to see that data. The solution provides strong guarantees with respect to purpose limitation and data minimisation, as required by the GDPR (General Data Protection Regulation).

**Impact Expected:** A recent small-scale pilot demonstrated the feasibility of the solution on real citizen data. Close to 30 households now receive desperately needed financial aid. The SVB currently explores opportunities to expand the pilot with additional organisations. The methodology is applicable to broader data-sharing challenges and has already sparked the interest of many other organisations. It is considered an example in NICPET, a recently established organisation to foster the adoption of privacy-enhancing technologies.



TNO connects people and knowledge to create innovations that sustainably strengthen the competitiveness of companies and the well-being of society.

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



## Project Digneuron: Chips modeled on the human brain



The strategic SAL project "Digneuron" was largely inspired by the megatrend that things are becoming smarter, more connected and more energy-saving. A key to this lies in offloading artificial intelligence (AI) from the cloud directly into the things of our daily lives or into energy-saving embedded platforms. Applications of this "Internet of Things" range from smartphones to intelligent sensor and actuator systems, which are also finding their way into industry.

**Innovation:** Digneuron is an integrated circuit (microchip) capable of implementing AI solutions in miniature format with very low energy consumption. The system works on the principle of neural networks. This means that the neural network blocks contained in the chip mimic the way the human brain works. The neurons are arranged in layers and only communicate with neurons in their immediate vicinity in order to minimise energy consumption.

**Impact Expected:** The neural network blocks implemented on the Digneuron V1 chip have already been successfully used in an application, namely in the cooperative FFG project Firesat (Artificial Intelligence on Earth Observation Satellites), on which SAL worked together with Ororatech GmbH and Joanneum Research. The second generation of the chip, Digneuron V2, is made entirely of open-source parts, so it can be used by any company and can be easily adapted to specific applications.



Silicon Austria Labs GmbH (SAL) is a Research and Technology Organisation and Austria's top research center for electronic based Systems (EBS).

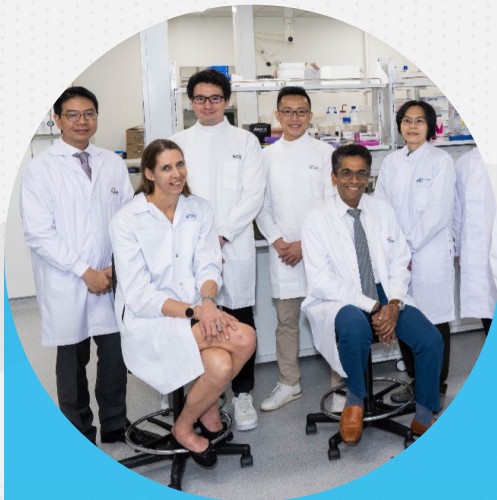
Upper Austrian Research GmbH (UAR) is the leading organisation for non- university research in Upper Austria. It promotes innovative solutions and provides access to excellent R&D capacities.

[www.uar.at](http://www.uar.at) - [www.silicon-austria-labs.com](http://www.silicon-austria-labs.com)



RTOs  
INTERNATIONAL  
NETWORK  
**RIN**

# RTOs INTERNATIONAL NETWORK RIN



## A\*STAR

The Agency for Science, Technology and Research (A\*STAR) is Singapore's lead public sector R&D agency and plays a key role in nurturing scientific talent and leaders for the biomedical, computer and physical sciences as well as engineering ecosystem.

EDDC is Singapore's national platform for drug discovery and development hosted within A\*STAR.

## Pinpointing Cancer Therapy for Fewer Side Effects

Marking a significant milestone in Singapore's drug discovery efforts, the US FDA approved the initiation of a first-in-human clinical trial of the first made-in-Singapore antibody-drug conjugate (ADC), EBC-129, in 2023. The ADC and the test used for patient selection were discovered and developed through the collaborative efforts of A\*STAR's Bioprocessing Technology Institute and Institute for Molecular and Cell Biology, the Experimental Drug Development Centre and the National Cancer Centre Singapore.

### INNOVATION

ADCs are able to selectively target cancer cells across a range of cancers, killing them while sparing normal, healthy cells. The method differs from conventional treatments such as chemotherapy, which damages healthy cells in the process. EBC-129 binds to specific epitopes on cancer cells, targeting a specific epitope that is glycosylated on CEACAM5 and CEACAM6 proteins and present in cancer cells, avoiding normal cells and ensuring targeted cancer cell destruction with fewer systemic side effects.

### IMPACT DELIVERED

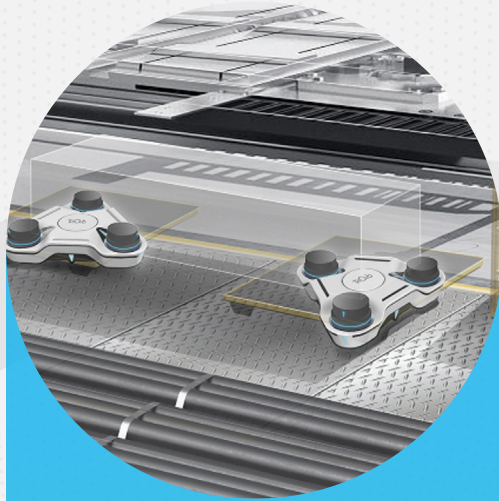
EBC-129 has progressed to the dose expansion phase of its Phase 1 clinical trial in 2024. Through its dual targeting approach (CEACAM5/6), it can target a broader range of cancers with high precision, potentially offering new hope for patients who have exhausted standard therapies. The approval for clinical trial initiation by the US FDA validates Singapore's robust research and development infrastructure and paves the way for future breakthroughs in targeted cancer therapies.



[www.a-star.edu.sg](http://www.a-star.edu.sg)



# RTOS INTERNATIONAL NETWORK RIN



Take a look at the demo video "TriOrb2025VISION"



[www.aist.go.jp](http://www.aist.go.jp)



[www.aist-solutions.co.jp](http://www.aist-solutions.co.jp)



[triorb.co.jp](http://triorb.co.jp)

## AIST

National Institute of Advanced Industrial Science and Technology (AIST) in Japan established AIST Solutions Co. (AISol) to accelerate social implementation of its technologies.

## Industrial Omnidirectional Platform for Flexible Production Systems

With the world's first unique omnidirectional movement mechanism for industrial use, TriOrb, an AISol Startup, enables true smart factories at manufacturing sites around the world. Unlike large distribution warehouses where Automatic Guided Vehicles and Autonomous Mobile Robots are constantly on the move, adoption of robots in manufacturing sites is limited due to complex production processes and harsh environments.

### INNOVATION

TriOrb developed a platform, replacing wheels with "spheres" as the ideal shape for omnidirectional movement. By precisely controlling the spheres' rotation, the platform achieves stopping position accuracy in millimeters, and can traverse rough surfaces while maintaining high load capacity (based on the IP rights transferred from Kyushu Institute of Technology). TriOrb further coordinates multiple robots like land-based drones, creating a flexible transport system without relying on special equipment such as cranes and forklifts.

### IMPACT EXPECTED

TriOrb's mobility technology can be applied to various industries. Dr. Ishida, CEO, spent ten years at AIST on improving production processes. Using his experience, TriOrb aims to automate and add value to labour-intensive manufacturing. Its omnidirectional platform moves freely, even in narrow or complex spaces. This allows transport and collaborative robots to move precisely and work harmoniously with humans, accelerating the development of advanced production systems.



# ELDORADO

Reference in Research, Development and Innovation in Brazil, ELDORADO RTO has 25 years of experience in creating innovative technologies and solutions for companies and society.

## Intelligent Power Line Tower Inspection: Innovation Boosting Efficiency and Safety

Maintenance of power line assets is essential for ensuring a reliable electrical grid, but it is an expensive and hazardous task. Traditionally, operators climb power line towers for visual inspections to find wear failures. ELDORADO and TAESA, with resources from the R&D&I Program of ANEEL (Brazilian Electricity Regulatory Agency), developed an innovative solution by enabling intelligent autonomous remote inspections of tower components, ensuring people's safety and inspection efficiency.

### INNOVATION

This groundbreaking innovation enables remote inspections with precise and normalised high-resolution image capture to monitor component degradation over time. We developed a cutting-edge autonomous drone system that overcomes winds and tower electromagnetic fields. This unique system relies on a custom Edge AI route optimisation algorithm taking real-time positioning decisions and ensuring drones autonomously navigate towers for detailed images capture of components.

### IMPACT DELIVERED

The proposed autonomous drone inspections will boost efficiency, enabling coverage of nine towers per day, up to three times more than traditional methods. This will result in lower maintenance costs and improved transmission reliability, making electricity more affordable. The innovation will also minimise the operator exposure to hazardous environments. Additionally, it will establish an image data lake to improve decision-making and enable further advanced AI applications.



## INO

**INO is the largest centre of expertise in optics and photonics in Canada. Since 1989, it has developed innovative and valuable solutions to meet the needs of Canadian businesses.**

### Reducing dust emissions with LiDAR technology

**Air pollution is the third leading cause of premature death worldwide, killing nearly 7 million people yearly. Controlling the emissions of atmospheric pollutants is an imperative need to minimise the environmental repercussions of activities from various industrial sectors. Unfortunately, the techniques currently used for this purpose have their limits and can only detect emissions adequately if a cloud of particles passes next to stationary sensors.**

#### INNOVATION

Using LiDAR tech, INO has developed an advanced prototype of robust atmospheric mapping that can be installed in places where conditions are challenging. This prototype detects dust clouds over hundreds of meters away with unparalleled representativeness. The information collected, combined with data such as wind direction, ambient humidity and industrial site activities, can then be used to generate alerts when emissions exceed a certain threshold.

#### IMPACT DELIVERED

The technology currently targets port areas, where it has been tested under real conditions in Québec. However, it can also monitor emissions from mining sites, foundries, aluminum smelters, steel mills, cement plants or major construction sites. For research purposes, it could even be used in studies on air quality in communities. OraVentis Technologies, a company led by a former INO employee, aims to commercialise this solution within the next year.



[www.ino.ca](http://www.ino.ca)





## ITRI

ITRI is a world-leading applied technology research institute with more than 6,000 outstanding employees. Its mission is to drive industrial development, create economic value and enhance social well-being through technology R&D.

### ITRI Multi-Robot Collaboration System Technology

ITRI's advanced multi-robot collaboration system technology can perform complex assembly procedures by learning from operator demonstrations. This innovation significantly enhances flexibility, reconfigurability and efficiency of production lines. ITRI's expertise in integrating AI and developing innovative gripper concepts has led to participation in the Horizon Europe HARTU (Handling with AI-enhanced Robotic Technologies for flexible manufacturing) project since 2023.

#### INNOVATION

The multi-robot collaboration system developed by ITRI is capable of simultaneously controlling multiple robots and other devices to perform tasks. Integration with an AI-enabled learning mechanism for perception on assembly procedures, together with grasping policies and planning from operator demonstrations, allow this multi-robot collaboration system to perform hand tool assembly and other contact-rich tasks.

#### IMPACT DELIVERED

HARTU is an industry-led research initiative that addresses the major challenges of transitioning towards Industry 5.0. ITRI's multi-robot collaboration system with AI-enabled learning can help industries advance towards the vision of collaborative industry. Digitisation and green transformation for traditional manufacturing companies can be simultaneously achieved and accelerated via flexible, robust and reconfigurable production lines, handling a large variety of products and materials with high precision.



# NATIONAL RESEARCH COUNCIL CANADA

As a federal research and development organisation and Canada's engine for industrial innovation, the NRC is focused on research powering innovation for future prosperity.

## AI innovations transform transportation

The NRC's expertise in AI is helping meet emerging challenges in transportation and push the boundaries of innovation. Tests have proven these discoveries can significantly improve safety, reduce costs and limit climate effects.

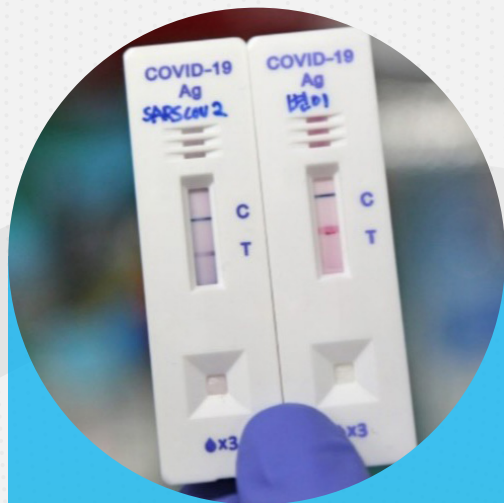
### INNOVATION

The NRC used its AI expertise to build and test a flight system for a self-flying helicopter. The NRC also developed integrated reality, which uses virtual reality to simulate real-world elements, such as turbulence, during an actual helicopter flight. On the ground, an AI-enabled tool is helping optimise transport truck traffic routes to cut travel distance, fuel costs and CO2 emissions. To improve the corrosion resistance of vehicle components, an NRC team is using custom sensors to inform AI and numerical simulation models.

### IMPACT DELIVERED

The NRC successfully completed the first autonomous flight of a large helicopter in Canada in 2022. Also, pioneering the first known flights using integrated reality enabled NRC experts to analyse pilot workload, test team training and significantly decrease flight-testing costs to improve ship-helicopter operations. Tests of the AI-enabled truck routing system showed significant reductions in: mileage required to complete routes (19%), number of vehicles required (24%) and wait times (33%). The data produced through digital models helped manufacturers increase safety, reduce costs and extend vehicle life.





## NST / KRICT

The National Research Council of Science and Technology (NST) supports and fosters 25 government-funded research institutes of Korea in the field of science and technology.

The Korea Research Institute of Chemical Technology (KRICT) is a Korean government-funded research institute specialised in R&D and convergence technologies in the field of chemistry.

### Integrated solutions for new viral diseases

Convergent solution for Emerging Virus Infection (CEVI) led by KRICT successfully developed integrated solutions to address the increase and diversification of infectious diseases spanning prevention, diagnosis and treatment.

#### INNOVATION

New immune antigens for MERS virus and new coronavirus using novel vaccine platform were developed as new vaccine candidates, whilst antibacterial and antiviral air purification technology was invented to prevent the spread of infectious diseases. The technology enables removing over 99% airborne microbes regardless of bacteria or virus type, thereby consistently reducing indoor transmission risks of infectious diseases akin to ventilation measures.

#### IMPACT DELIVERED

A significant number of technology transfer took place, resulting to 22 technologies worth a total of 35.2 billion KRW (2.36 million Euros). Clinical trials for COVID-19 vaccine candidates, and the process developing treatments and vaccines for infectious diseases was accelerated. Furthermore, a new high-sensitivity immunodiagnostic technology for COVID-19 contributed to the prevention of the spread of virus by diagnosing infection status and confirming the generation of neutralising antibodies in those who are vaccinated. Ultimately, this innovation is also expected to enhance response capability to infectious diseases on national level.

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 **KRICT** Korea Research Institute of  
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