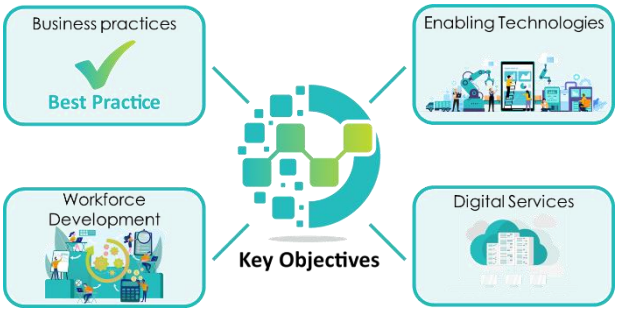
INFORMAL GROUP OF RTD LIAISON OFFICES

HORIZON SUCCESS STORIES

Examples of success stories

IRELAND – ENTERPRISE IRELAND

DENiM: Digital intelligence for collaborative ENergy management in Manufacturing

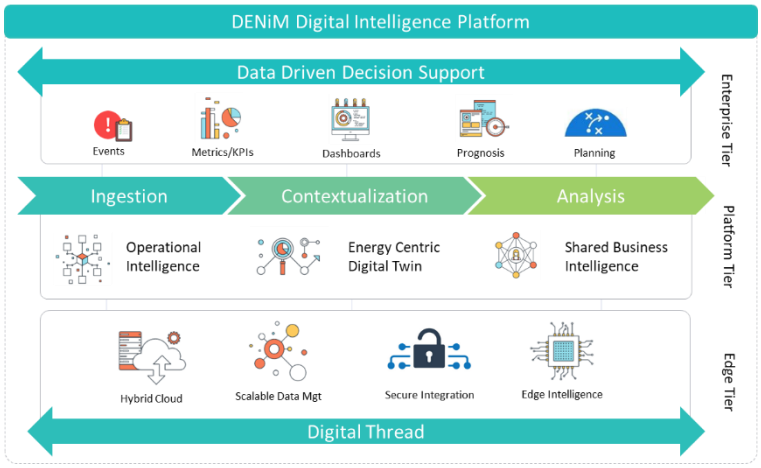


Energy efficiency and digital transformation are critical to ensure the sustainability of EU manufacturing**.**

Digital intelligence for collaborative ENergy management in Manufacturing "DENiM" is an EU project been led by The Nimbus Centre at Munster Technological University, Ireland. The aim of this EU-funded research project is to provide digital tools that support the manufacturing industry in unlocking the energy saving potential across their manufacturing processes.

Dr Alan McGibney and Dr Susan Rea were awarded the project (valued over €11 million), by the European Commission through the Horizon 2020 Technologies for Factories of the Future programme in 2020.

Manufacturing is one of the largest energy-consuming sectors and responsible for approximately a third of global energy demand. DENiM will demonstrate significant reduction of energy consumption across four diverse manufacturing sites in Ireland, Spain, Italy and Slovenia. DENiM aims to accelerate the digital transformation of manufacturing processes by providing novel technological solutions to support an holistic and collaborative approach to energy management. Industry can leverage advanced digital technologies to provide insight for decision making, manage resources more effectively, and ensure energy efficiency is an integral part of manufacturing decision procedures.



The project includes a consortium of 18 partner organizations bringing together a strong team of partners across 8 European countries. The consortium is well-balanced in terms of the involvement of academic, industrial, and SME partners.

Project Factsheet: DENiM Project, Website: https://denim-fof.eu/ Start Date: 1st November 2020

Si-DRIVE: Steering the way to better electric vehicle batteries

The drive to Net Zero and the need for all of us to help reduce emissions means that electric vehicles (EVs) need to become completely commonplace. The rate of EV uptake needs to improve, however, and for that to happen, EV batteries need to be cheaper, recharge faster and enable vehicles to go further without needing to be charged. One Irish-led consortium is hoping to make that happen, with its innovative re-imagination of the lithium-ion (Li-ion) battery. The **Si-DRIVE*** group is developing the next generation of rechargeable Li-ion batteries in a four-year project funded to the tune of €8m by the European Union through the Horizon 2020 programme.

"By developing a better Li-ion battery that increases the driving range of EVs, cuts both costs and recharge times, and makes for more cost-effective recycling," he explains, "Si-DRIVE is tackling the major barriers to electric vehicle (EV) uptake and allowing for the development of cost-competitive mass market EVs."

The project will also boost European competitiveness in the battery arena, while also contributing to cuts in greenhouse gas emissions. Furthermore, it will help protect EV users. "The **Si-DRIVE** technology will exceed the stringent demands of EV batteries where safety is paramount," says Professor Ryan. "It will do this by dramatically improving each component within the accepted Li-ion platform and achieving this in a competitive way, taking the full life of the battery into account."

The Si-DRIVE battery will have what is called 'second use applications', meaning it can be repurposed and reused in contexts with lower energy requirements when it is no longer powerful enough for its primary application in electric vehicles. "This is consistent with the principles of the circular economy," he adds.

This is cutting-edge innovation in practice, the work of the consortium is built on a novel silicon-**based chemistry giving significantly higher energy density for longer range with faster charging at a lower cost than conventional batteries.**

Si-DRIVE derives its name from the full project title: **Silicon Alloying Anodes for High Energy **D**ensity Batteries comprising Lithium **R**ich Cathodes and Safe **I**onic Liquid based Electrolytes for Enhanced High **V**oltag**E** Performance. For more information* **Si-DRIVE**

CISC: EU funding enables vital ‘human-centric’ AI work

Smart machines are here and they’re changing how the world works. As artificial intelligence (AI) becomes ever more embedded in business and society, the EU has declared the need for a ‘human-centric’ approach to AI.

In other words, we need to figure out how humans can best interact and collaborate with machines, both practically and in a more overarching way, when it comes to the socio-economic, legal and ethical implications. That means working on practical, ethical and legal frameworks for AI development, oversight and leadership.

How CISC aims to improve human-AI interaction

The network aims to hire, train and mentor early-stage researchers (ESR) or PhD students as collaborative intelligence (CI) scientists. **CISC** aims to give these 14 world-class, leading CI scientists the right expertise and skills in AI, human factors, neuro-ergonomics and system safety engineering to enable the development of a collaborative intelligence system.

Ensuring humans know how to work with AI

Ideally, AI enhances humans’ cognitive skills and creativity. It can do things like enabling robotics and analysis of huge data sets, freeing workers from low-level tasks and extending their physical capabilities. Enabling the best results can involve technology such as wearable sensors and optimised interfaces to give the person the most useful and relevant information from the machine.

“The paradox is that automation is very difficult to achieve,” adds Dr Leva, “unless the design has been such to allow the human being to be involved and to cater for the capability and knowledge that can get lost in translation. The less you tell the person to do, the less they know how to do when there’s an issue.”

Vital real-world results from live labs

As part of the project, the chosen researchers will work on live labs projects around real-world challenges such as alarm management in oil and gas, preventing humans from being overwhelmed by too much information in an emergency so they can intervene early and react promptly and appropriately. Others may investigate human-robot collaboration in spaces that are not typically visible to people, such as deep underwater or at the nanoparticle level.

See here for more information: **CISC**

NETHERLANDS – NETH-ER

Qlayers: painting sharks to save energy

Is it possible to save energy and reduce waste by painting shark skins? The answer is yes, according to innovative start-up Qlayers.

Qlayers has developed a technology that coats the surfaces of machines like wind turbines or ships. The unique technology applies drag-reducing 'sharkskin' microstructures on large industrial surfaces like ships, aeroplanes and wind turbine blades, making them more energy-efficient. Essentially, a robot paints the skins of sharks.

Aside from printing the microstructures, QLayers has also developed a robot that can apply the coatings automatically. This is not only innovative but also extremely sustainable, as the robot prevents 'overspray', which happens when some of the coatings are blown away by the wind.
People often want to build new solar panels or wind turbines when they think of sustainability but Qlayers shows that we can achieve a lot by improving the efficiency of our existing energy systems.

Founder Josefien de Groot was awarded the EU Rising Innovator 2020 prize, awarded to an exceptional women innovator under the age of 35, and has received funding through the SME instrument.

You can find more information on Cordis: Boosting the Performances of Wind Turbines thanks to Microstructure Coating | MicroCoating Project or on the project's Website: QLAYERS - Applying coatings of the future

ATELIER: Spreading positive energy in cities across Europe

Familiar with energy-neutral neighbourhoods? Amsterdam and Bilbao go one step further to build energy-positive districts: neighbourhoods that produce energy, not consume it.

By using 'positive energy district' innovation ateliers, that put citizen engagement first, the ATELIER project helps local districts become sustainable. The two lighthouse cities: Amsterdam and Bilboa, are pioneering different approaches, which are then tested and applied in six other cities across Europe (Bratislava, Budapest, Copenhagen, Krakow, Matosinhos, and Riga). These approaches include new technologies, but also building necessary infrastructure, identifying and removing legal barriers, as well as changing behaviour in the neighbourhoods.

The innovation ateliers are highly interactive. Residents of the neighbourhoods will turn into energy producers instead of energy consumers. It is therefore very important that they support the measures implemented by the cities, as if they don't like it, they will not make use of it and the intervention becomes pointless. Throughout the project, the 8 cities want to involve over 9000 citizens. Each of the cities will develop a 'City Vision 2050' that creates a roadmap for upscaling the solutions in the long term.

The project is inherently multidisciplinary. Engineers speak with people on the street to figure out what works, feeding-back to Legal personnel. By involving students from participating universities in all phases of the project, ATELIER also prepares younger generations to tackle the challenges of tomorrow.

More information on Cordis: Amsterdam

EUSocialCIT: The Future of Social Citizenship

What does it mean to be a social citizen in Europe? EUSocialCIT helps citizens reflect on what they want from Europe.

The EU Pillar of Social Rights grants 20 principles and rights to EU citizens, but who knows them in practice and how can you make use of them? EU project EUSocialCIT brings together 9 partners to help citizens reflect on what they want from the EU. The idea is not to provide policy recommendations to EU policymakers but to identify the gaps in regions and countries across the EU. There are plenty of social rights but how can you encourage citizens to claim them? Access to rights is therefore essential. The project is inherently European. It includes partners from across Europe, including those from the newer member states Poland and Lithuania. To have a truly European view of Social Europe, it is important to be inclusive.

The project gives a lot of attention to dissemination, producing an elaborate online platform to facilitate contact with stakeholder organisations. One of the partners is also preparing lesson materials for secondary schools. The researchers don't shy away from public scrutiny either: during the Porto Social Summit in 2021, researchers debate with the Portuguese minister and European Commissioner in charge of social policy.

More information on Cordis: The Future of European Social Citizenship | EUSOCIALCIT Project

AUSTRIA – FFG

subCULTron: Water Robots fighting against Pollution & Climate change!

In large lagoons such as Venice, great damage is caused by mass tourism, pollution, and climate change. To limit and monitor this, autonomous water robots are used. In this way, researchers can take several measurements at the same time, from different places. This is hugely beneficial in trying to combat and mitigate climate change.

When you think of Venice, you think of the idyllic canals. However, next time you take a romantic gondola ride and enter 'La Serenissima', you may want to be more careful and try to catch a glimpse of the swimming robots.

A team of researchers has 'released' a large group of water robots in the lagoon of Venice. This concerns more than 120 water robots, which have been released in collaboration with the subCULTron project for monitoring and limiting pollution. It may look like a scene from a Sci-fi movie, but these autonomous robots play a fundamental role in pursuing the city's objectives. The focus is on reducing/limiting pollution and climate change.

With new challenges come new solutions. At present, this specific challenge can be tackled most efficiently by means of water robots. The main objective of this project was to develop a state-of-the-art tool capable of monitoring large lagoon areas such as Venice and its underwater environment.

However, unlike traditional monitoring systems, the subCULTron system was intended for spatially distributed monitoring. This means that measurements must take place at the same time, in exactly the same place, spread over a long period. Researchers relied on a swarm of cheap and relatively small robots for this. This is in contrast to the usual method, which mainly used only one large robot. This single, larger robot is considerably more expensive than the swarm of small water robots. This unique self-organized architecture makes it possible for the robot swarm to act de-centrally and autonomously. Also, this swarm can react, instead of just taking measurements. These robots are also innovative in the way they are powered.. which is by mud!

For more information: https://cordis.europa.eu/project/id/640967

ADAPT: Developing heat- and drought-stress tolerant potatoes

Weather extremes are becoming the 'new normal' in times of climate change. This also has huge effects on our crops. The potato is one of the most important food crops in the world. Periods of heat and drought can lead to yield losses of up to 70 percent. Flooding of cultivated areas as a result of heavy rain can even lead to the loss of entire harvests. Therefore, its vulnerability to environmental stresses raises major concerns about food security. While there is limited knowledge of combined stress-signalling pathways in model plants like Arabidopsis, we have no such knowledge in crops such as potatoes, due to their particular metabolic mechanisms.

The EU-funded project ADAPT studies the dynamics of complex signalling and response mechanisms, to identify the molecular mechanisms of adaptation to combined stresses in potatoes. One aim of the project is to develop new strategies for increased productivity, stability and quality under multiple stress conditions such as heat, drought and flooding with experimentation sites all over Europe. Participating researchers combine their expertise in the fields of molecular biology, stress physiology, systems biology and analytics with engineering and molecular plant breeding. The project also engages end-user-oriented organisations for 'variety typing' and trade, to translate the obtained results directly into practical applications.

Based on the research activities, molecular markers will be identified and used in targeted breeding of stress-tolerant potato varieties that deliver stable yields even under difficult climatic conditions of the future.

More information: https://cordis.europa.eu/project/id/862858 or https://adapt.univie.ac.at/

LandSense: A Citizen Observatory and Innovation Marketplace for Land Use and Land Cover Monitoring

The fight against the climate crisis requires precise knowledge of the complex ecosystem of our earth and its changes. Earth observation has therefore become a central mission of international research today. We owe significant advances in knowledge of the state of our planet to the view from space made possible by satellite programs such as that of the European Union – Copernicus. However, data from space must also be validated by professional inquiries on the ground. These are expensive and often cannot be carried out at the desired frequency. Citizen Science opens up a cost-effective alternative, which the EU-funded research project LandSense made use of.

Data was collected not only from trained professionals, but also from “citizen scientists” who collectively contributed to citizen observatories. Such "Citizen Observatories" are community-driven initiatives that use a range of mobile and web-based applications to collect data about the local environment. Not only do citizen scientists play a key role in monitoring land use and land cover, the data they collect can also directly support environmental decision-making.

Policy-relevant campaigns were carried out in close collaboration with multiple stakeholders to ensure that citizens' observations contribute to EU-wide environmental policy and decision-making. The LandSense engagement platform provided citizens with numerous tools: for discussions, online voting, collaborative mapping, as well as events related to various campaigns that include public consultations.

More information at https://cordis.europa.eu/project/id/689812 or www.landsense.eu

ESTONIA – ETAG

UOP Lab: a €32 million Estonian-Finnish initiative develops smart city solutions for export around the world

Across the world, municipal leaders dream of using digital tech to optimise everything from refuse collection to public space and local transport but few cities are living this dream. Making a city smart means connecting hordes of sensors and actuators to the Internet of Things, and then turning the resulting data into actionable insights. Deploying the necessary systems is both expensive and disruptive, particularly as every city tends to start from scratch.

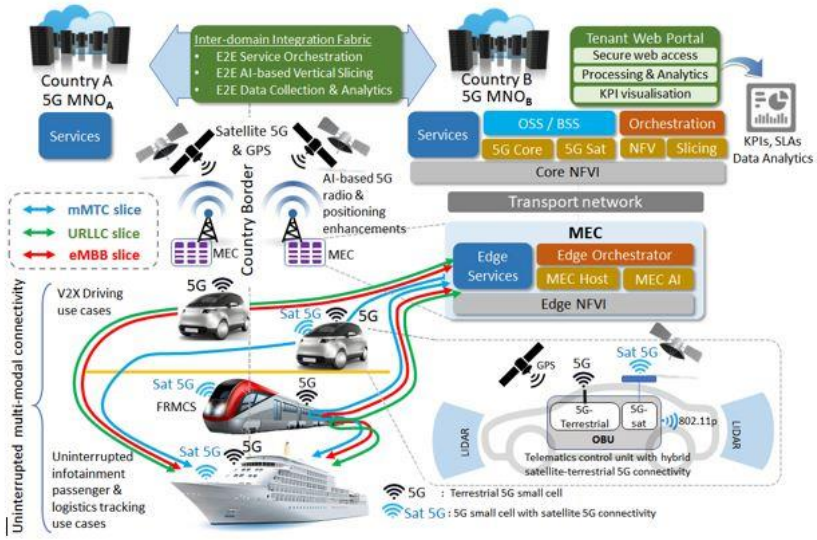
The new Finest Twins initiative, backed by €15 million from the EU Horizon 2020 programme and €17 million from the Estonian government (Ministry of Education and Research), is trying to change that paradigm by developing smart city solutions that can be applied anywhere in the world. Led by Tallinn University of Technology (TalTech), Aalto University, the Ministry of Economic Affairs and Communications of Estonia and Forum Virium Helsinki (an agency of the City of Helsinki), the initiative is looking to develop an "Urban Open Platform Lab (UOP Lab)"– an open and interoperable platform for connected sensors employed in smart city pilots: "There has been extreme fragmentation of technology applications in cities across Europe, and also across the world in general, and very often even the most basic services and solutions offered by cities do not work across borders," says Ralf-Martin Soe, the initiator of the project from TalTech. "Our focus is to facilitate a breakthrough of public services from being local to becoming cross-border." The project plans to support research and innovation across five domains – data, governance, mobility (transport), energy and the built environment.

The proposed UOP Lab will be based on open software and platform-standard solutions developed by the Fiware open source initiative. With a world-renowned digital government infrastructure based on open standards, Estonia is fertile ground for this kind of approach. Indeed, one of the key objectives of the Finest Twins initiative is to combine the smart city expertise of Aalto University and Forum Helsinki with Estonia's digital government knowhow. Helsinki is rebuilding an entire district of the city – Kalasatama – in line with smart city principles, at a cost of billions of euros, while Estonia's public sector offers a broad range of interoperable digital services underpinned by a robust electronic identification system. The Estonian government has "pretty much managed to fully transform from paper to digital, so there are no paper-based services left, if you exclude getting married and getting divorced," says Soe. Finnish and Estonian researchers will develop the UOP Lab at the new centre of excellence in Tallinn.

Read the full story by David Pringle in Science|Business.

Link to the original article at "Research in Estonia" web page: https://researchinestonia.eu/2020/02/17/sciencebusiness-can-smart-city-tech-go-global/, Cordis link: https://cordis.europa.eu/project/id/856602

5G-Routes: Estonian Scientists, Industry Partners Strive for Regional Interoperability



5G-ROUTES high-level unified CAM architectural illustration

Estonian scientists are leading an ambitious project to test 5G network technology interoperability across Finland, Estonia, and Latvia, a cross-border corridor known as Via Baltica-North. The project's aim is to ensure zero interruption to services moving from one country to another, and avoiding any disruption.

The project, called 5G-Routes, has a substantial budget of €11 million, the bulk of which is funded through the European Commission, and is set to run through to August 2023. The 5G-Routes consortium has 22 members, among them Tallinn Technical University (TalTech).

The 5G-Routes consortium includes partners from around Europe from diverse disciplines. It involves enterprises, universities, research centres, and network providers. While there are numerous goals for 5G-Routes, a central theme is cross-border interoperability, particularly on the passenger ferries that connect Helsinki with Tallinn, but also at border crossings, where the national border runs quite literally through the centre of the city.

"For this project, we see that connected and automated mobility is one of the greatest potential use cases for 5G," says Margus Krupp, 5G program manager at Telia Estonia.

Link to the original article at "Research in Estonia" web page: https://researchinestonia.eu/2020/12/09/with-5g-routes-estonian-scientists-industry-partners-strive-for-regional-interoperability/ and the CORDIS link: https://cordis.europa.eu/project/id/951867

SynBioTEC: Scientists make food supplements from wood

Senior Researcher and Team Leader, Petri-Jaan Lahtvee, showing his Tartu laboratory SynBioTEC. Photo credit: Marko Söönurm

Engineering nature is not a distant future. Many of us have already tasted it. Coca-Cola Zero uses an extract from the stevia plant that has been converted into a sweetener. Engineered products such as food supplements, medicine, biofuel, paint, even food created by scientists already surround us, and this is just the beginning.

As scientists are working on finding solutions to a more sustainable and nature-friendly life, the big question is: how to replace the oil that is extracted from the ground? The solutions must be efficient, fast and cost-effective, because getting oil from the earth is easy. Too easy! Can bioengineering compete with the old traditional (and wasteful!) ways? Yes! By converting waste into value. Estonia has a significant wood processing industry. This makes Estonia a great place to experiment with this material, but also find ways to create more value. For example, Lahtvee's team ERA Chair found a way to make most of the wood that is already being processed anyway. The team collaborates with Europe's biggest wood pellet company Graanul Invest. This company is an Estonian firm based in the capital Tallinn. Instead of burning the pellet, they extract sugars from wood waste and use it as "food" for non-conventional yeast. Lahtvee's team is investigating options to turn them into oil that can be used in many ways – converted into biofuel, paint, lubricant, food or medicine. Otherwise these sugars would be lost without making use of them. Lahtvee's laboratory has partnered with top laboratories and universities around the world and also collaborates with companies. The main goal from the beginning has been to create solutions that can be used in real life and would not just stay within the white walls of their lab.

Written by: Marian Männi. This article was funded by the European Regional Development Fund through Estonian Research Council.

Link to the original article at "Research in Estonia" web page: https://researchinestonia.eu/2020/03/31/playing-god-in-estonias-bio-lab/
Cordis link: https://cordis.europa.eu/project/id/668997

CYPRUS – EOC

SInnoPSis - ERA-Chair in Science and Innovation Policy and Studies

The ERA Chair in Science and Innovation Policy & Studies (SInnoPSis) aims to bring together excellent academics from linked scientific departments and consolidate all related research activities at the University of Cyprus (UCY). This vision is realised under the guidance of the ERA Chair holder, accompanied by a group of exceptional scientists in the field of Science and Innovation Policy and Studies (SIPS). Establishment of a multidisciplinary research unit will allow optimal exploitation of the existing research capacity and infrastructures of UCY and facilitate the gradual upgrade of the research activities in the field. The principal thematic focus will be on the SIPS field, including all connected fields with emphasis on Economics & Management and (secondarily), Social and Political Sciences, Philosophy and Information Technology.

The Chair and the group will aim to create significant impact in Cyprus, sharing expertise and research policy advice. For instance, interaction will be maintained with the Chief Scientist and the National Council of Research and Innovation in significant issues related to SIPS science and innovation policies in Cyprus.

The project "SInnoPSis" – ERA Chair in Science and Innovation Policy & Studies", has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement number: 857636 — SInnoPSis — H2020-WIDESPREAD-2018-2020/H2020-WIDESPREAD-2018.

Website: http://www.ucy.ac.cy/sinnopsis/
CORDIS link: https://cordis.europa.eu/project/id/857636

EMME-CARE - Eastern Mediterranean and Middle East Climate & Atmosphere Research Centre

EMME-CARE, funded under Horizon 2020 - Spreading Excellence and Widening Participation - Teaming and by the Cyprus Government, has been established with a view of creating a regional Centre of Excellence (CoE) for climate and atmosphere research in the Eastern Mediterranean and Middle East (EMME) region. This area has been identified as a global climate-change "hot spot".

A population of about 400 million is affected by dust storms, dryness, heat extremes and unparalleled air pollution in the EMME region, with severe environmental, health and socio-economic effects. Identified as a global climate change hotspot, the region is already facing adverse impacts ranging from extreme weather events to poor air quality, which are only due to intensify in the coming decades. If no action is taken, these harmful effects could soon lead to intolerable environmental conditions in the region, ultimately compromising human habitability and forcing mass migration.

EMME-CARE has set out to address these challenges through the establishment of a regional knowledge hub for environmental and climate change research and sustainable solutions. Accordingly, EMME-CARE upgraded the Atmosphere and Climate Division of the Cyprus Institute to create a new CoE – the Climate and Atmosphere Research Centre (CARE-C). CARE-C was officially launched in January 2020 and it operates as part of the Cyprus Institute.

In establishing CARE-C, the Cyprus Institute joined forces with world-leading institutes in the field of climate and environmental research that are acting as its Advanced Partners: the Max Planck Institute for Chemistry (MPIC) in Germany, the French Alternative Energies and Atomic Energy Commission (CEA) and the University of Helsinki (UHEL). CARE-C has set out to address the risks associated with air pollution and climate change in the EMME through a combination of research, innovation and education activities with a regional focus, capitalising on the strategic geopolitical location of Cyprus to create a link between Europe and the Middle East.

Specifically, CARE-C focuses on:

- Science and Research on Climate Change and Air Pollution over the Eastern Mediterranean and the Middle East (EMME) region;

- Innovation and Entrepreneurship focusing on identifying promising commercial research applications that contribute to the sustainable economic growth of Cyprus in a highly competitive international environment; and
- Education and Training with post-graduate degree courses on meteorology and atmospheric sciences, trainings on climate change and weather forecasting, and hands-on practice and knowledge transfer on atmospheric instrumentation.

Through furthering scientific leadership and excellence in climate and atmosphere research and promoting its applications in the context of public policy and sustainable economic growth, CARE-C aims to contribute to a healthier planet, and the shaping of a safer, more prosperous future for the citizens of the EMME region.

CARE-C works in close collaboration with its Advanced Partners as well as many national institutions and organisations in Cyprus and the region. The work and collaborations focus on societally relevant issues related to the environment, atmosphere, climate, and natural resources. Further, relevant research activities have been nationally embedded in Cyprus through strong collaborations with the Departments and Units of the Ministry of Agriculture, Rural Development and Environment, the Ministry of Labour, Welfare and Social Insurance, the Ministry of Defence, and the Ministry of Health.

Website: https://emme-care.cyi.ac.cy/
CORDIS link: https://cordis.europa.eu/project/id/763699

CYENS: Centre of Excellence on Interactive media, Smart systems and Emerging Technologies

CYENS, empowers knowledge and technology transfer in the Cyprus region. CYENS is supported by the European Commission, the Republic of Cyprus and its founding Partners: the Municipality of Nicosia, the Max Planck Institute for Informatics (MPI), University College London, the University of Cyprus, the Cyprus University of Technology and the Open University of Cyprus.

CYENS, as a Centre of Excellence, cultivates a culture of innovation and creativity in an inspiring environment filled with academics, researchers, creative and forward-looking people, innovators, entrepreneurs, and practitioners. The Centre operates under the moto "Inspired by Humans, Designed for Humans" with the vision to produce world class research that drives innovation towards social and economic benefit while conducting excellent, internationally competitive scientific research in the areas of visual sciences, human factors and design, communication, and artificial intelligence. It sets out to meet the challenge with a total potential funding of more than 30 million euros for the first 7 years, from a Horizon 2020 'Teaming Action' and multiple other sources, and a business plan for long-term sustainability and growth. Hosting CYENS at the heart of the designated Creative Industries and Technology Quarter is part of the Municipality's strategy to foster the development of an inclusive innovation hub and vibrant creativity ecosystem. CYENS mobilises significant knowledge networks and social capital to provide a solid scientific base that encourages the development and application of new technologies and innovative entrepreneurship that can support start-ups and established innovation companies.

The Centre, through its Maker Space, a multifunction creative space open to the public; with cutting edge equipment and knowledgeable tutors and mentors, deploys scientific methodologies and state-of-the-art techniques into the research and product development pipelines of entities in Cyprus while minimising their risks and costs. The CYENS Maker Space aims to offer researchers, entrepreneurs, students and self-made makers opportunities to transform, share, test and perfect their ideas. The Co-working space is a space where start-ups and spin-offs; created by the researchers at CYENS or by collaborating groups will have a place to work. Collaborating groups or diverse groups of independent creative professionals and individuals will be able to work in a shared setting. The CYENS Co-working space aims to help those with common values to develop potential synergies.

CYENS adds to the pool of experts and innovators that exist locally by actively participating in pan-European initiatives aiming to connect professional researchers across the world and through leading European partners, MPI and UCL. Utilising the resources of RISE results in this manner will aid the

creation of multiple synergies, increasing the opportunities for international entities to collaborate with Cyprus.

Finally, CYENS aims to appeal to local youth- our next generation of innovators- and cultivate their interest in emerging technologies and STEAM-led education and equip them with skills, ambitions and networks to exploit opportunities that can transform the economy. These steps enable CYENS to fulfil its mission, vision and objective.

Website: https://www.cyens.org.cy/en-gb/ ; CORDIS link: https://cordis.europa.eu/project/id/739578 and https://cordis.europa.eu/article/id/428850-new-year-and-a-new-name-for-the-centre-of-excellence-rise

ROMANIA – ROST

DOORS Black Sea

Photo: Mike Rea

Since times of classical Greek and Roman antiquity the Black Sea has been the subject of legends. But it is one of the least studied and understood areas and a prime example of the adage that we know less about the Earth's sea floor than the surface of Mars. From prehistoric times until the period of the Iron Curtain and the Cold War, the Black Sea has been a border between civilisations, yet it has never been the focus of a comprehensive research programme. A number of international projects have brought together researchers on various topics, but never in a coherent and interdisciplinary programme to understand Black Sea ecosystems and processes, from its shores and riverbanks to its abyssal depths.

This situation is now changing with the European Commission's initiative to develop a Strategic Research and Innovation Agenda for the Black Sea, bringing together scientists from the riparian countries with those from other European Countries. Launched in 2019, the agenda aims for a healthy and productive Black Sea using Blue Growth for sustainable harnessing of its resources. RTD has started to implement the agenda through the Horizon 2020 Programme. For example, H2020 DOORS (Developing Optimal and Open Research Support for the Black Sea) is a project that will put in place a system of information from multiple sources of knowledge, spanning measurements to modelling. This will provide citizens, authorities, and scientists with a better understanding of the Black Sea and how its natural processes work, support innovation opportunities through the Blue Growth Accelerator. It will also help educate the next generation of researchers and professionals, with greater involvement of citizens from its shores. Together with the other Black Sea-dedicated Horizon 2020 projects, Black Sea CONNECT and BS BRIDGE, these complex research efforts will provide detailed knowledge of the Black Sea. By the year 2030, they will have developed a Science and Innovation Hub that makes a step change in the use of that knowledge for the benefit of citizens and the marine environment.

More information: www.doorsblacksea.eu

DOTLUMEN – empowering the blind

There are 40 million blind people today, and despite technological advancements, the most utilised mobility solutions are still the walking cane and the guide dog. The guide dog is unanimously seen as a good option, but has a few drawbacks. It can cost up to 60 thousand EUR to train a single guide dog – and it is a big responsibility for a blind person to provide care for such a companion.

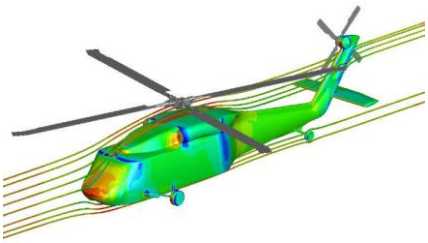
Because of this, there are only 28,000 guide dogs to 40 million individuals with visual disabilities. Using the latest in autonomous driving, artificial intelligence and robotics, '.lumen' offers a solution that mimics the benefits of a guide dog without the drawbacks that make it a non-scalable solution.

The company was founded by Cornel Amariei, a renowned Romanian inventor, speaker, and entrepreneur. Cornel was born in a family where his parents and sister lived with disabilities, severely limiting their mobility. Growing up in such an environment allowed Cornel to understand the role of assistive technology and inspired his work.

The mission to empower the blind transformed into a start-up at the beginning of 2020, and today it gathers over 40 engineers, professors, disability experts, industrial designers, and scientists. .lumen is also the first and only Romanian company to be selected for funding by the EIC Accelerator.

Find out more at https://www.dotlumen.com/

RoRCraft fuselage manufacturing for RACER Demonstrator



Together with the European Union, European aviation has the power to lead the way toward a climate neutral aviation system and set new global standards for safe, reliable, affordable, and clean air transport.

The RACER (Rapid And Cost-Effective Rotorcraft) demonstrator, is developed under the coordination of Airbus Helicopters within the Innovative Aircraft Development Platform: Fast Rotorcraft of the Clean Sky 2 programme (Clean Aviation Joint Undertaking). It is a next generation aircraft for rescue missions and rapid intervention, in a revolutionary configuration. This collaborative public-private partnership brought together approximately 50 different types of entities from all across Europe. (https://www.clean-aviation.eu/clean-sky-2/key-demonstrators/racer-compound-helicopter)

This chapter is part of a success story on development of a new compound rotocraft configuration combining vertical flight capabilities with the faster flight characteristics of a fixed-wing aeroplanes - the best of both worlds. This new 'concept' of helicopter aims to be suitable for the actual needs of the market and to prove unique capabilities. These include:

- 50% faster than a conventional helicopter;
- twice the area covered in 1 hour;
- lower sound footprint & CO2 emissions;
- 25% cost reduction per NM;
- suitable for performing costumer mission;
- reasonable cabin arrangement, a good range, a good payload;
- meeting the expectation for citizens and environment protection; and
- a shorter time to rescue and emergency.

In 2021, RoRCraft Consortium from Romania (INCAS - National Institute for Aerospace Research "Elie Carafoli" and ROMAERO SA), marked the completion of the RACER demonstrator fuselage, which was developed within Clean Sky 2 programme.

The activities completed by the RoRCraft Consortium, within the European partnership, consisted of:

- Design and development of the RACER central fuselage airframe: The hybrid structure fuselage of RACER demonstrator has been designed to minimize the weight by using composite materials and the recurring costs with the compliance of environmental requirements;
- Manufacturing and assembling of the RACER central fuselage airframe. For the first time in Romania, the first hybrid helicopter-structures for RACER were made, as well as the implementation of manufacturing and the required assembly technologies;

- Implementation of the test programme for flight approval and acceptance of the RACER prototype in 2022, by development of computational systems and numerical simulations in order to increase the analysis capacity of structure.

A new generation technology platform has been created to exploit the innovative potential of the latest "green" technologies and manufacturing processes in the aerospace sector. These results have been achieved due to a big collective effort and good cooperation between RoRCraft Consortium, Airbus Helicopters and Clean Sky 2 partners.

More information at: https://www.clean-aviation.eu/clean-sky-2/key-demonstrators/racer-compound-helicopter

HUNGARY – NRDIO

DEMOS: Democratic Efficacy & Populism in Europe

Is populism necessarily bad? Populism is a contested subject that not even scientists agree upon. Some view it as a communication style, others as a type of discourse, and a few even describe it as a political strategy. One way or another, populism is characterized as something negative because it tends to split society between the good people and the evil others. When politicians do that, society becomes polarized and what remains is neglect of minority rights, important in any democracy.

DEMOS (Democratic Efficacy and the Varieties of Populism in Europe) gave the idea of "populism" new meanings, studying it with the nuances and complexity it requires. Populism ascends when politics ignore what the people want, what they aspire to, and how they identify with politics.

But populism – with its multiple characteristics, good and bad, showing up among many political parties across Europe even today – at times stumbles against ideal notions of democracy, the protection of minorities being one of these, rendering complex analysis of its causes, manifestations, and impacts ever so more urgent.

Understanding today's needs, DEMOS studied populism from a multitude of perspectives, combining insights from psychology, sociology, political science, legal studies, media studies, and policy studies, in order to understand populism better and where it leads us. The project combined experimental research, deliberative polling, qualitative methods, survey research, interpretive legal analysis, theoretical research, and other methods to assess it. The rich interaction confirmed an assumption that when citizens share democratic values, skills, and engage with politics, they are more likely to resist the negative manifestations of populism: be they at the left or right side of the political spectrum.

DEMOS created games, educational materials, and policy knowledge to boost democratic skills and values. It also produced 125 publications, substantially advancing our knowledge about populism and democracy. DEMOS's findings reached over one million users on social media alone, and any user can download them for free on the project website. None of these results would have been possible without the collaborative work of 15 reputable and dedicated partner institutions across Europe. Over

100 scientists from various disciplines contributed to DEMOS, headed and coordinated by the Centre for Social Sciences of the Eötvös Loránd Research Network, a leading institution in the Social Sciences at the heart of Europe.

Read more about DEMOS at: https://demos-h2020.eu/en.

InnoChange: Driving Change and Capacity-Building Towards Innovative, Entrepreneurial Universities

In the new millennium, with the rapidly changing societies facing global challenges, universities need to transform themselves not to follow in the footsteps of a few pioneers, but to lead on continuous transformation. Higher education institutions willing to become the engine of local innovation ecosystems must make an institutional change happen within their own walls.

That is exactly what the InnoChange project aims to do: driving change towards innovative and entrepreneurial universities. Its geographical focus demonstrates that the consortium is ready to face challenges: they target universities from the Central-Eastern-European region, from countries that are known as moderate innovators. Building on the expertise of Heriot-Watt University and the expertise gained by Eötvös Loránd University within EIT Digital, a Romanian and a Slovakian HEI mobilised their communities to achieve institutional change.

The first step was to launch an asynchronous online course to provide students with entrepreneurial skills, which after an incredibly successful first edition with more than 200 participants is now locally multiplied at each institution. Empowering students as well as researchers to consider the commercial exploitation potential of their ideas and research results, training academic and non-academic staff to support innovation at universities, setting up a team of mentored individuals mastering both technical and entrepreneurial skills to help research groups take their state-of-the-art results to the market as products, as well as the creation of services, are the key pillars of these efforts. In addition to building an inter-connected cross-national entrepreneurial community to enhance cross-fertilisation and maximise impact, gamification is a tool to reach out to wider audiences when it comes to promoting gender equality in teaching and research activity.

More info: http://innochangeproject.eu

UNEXUP: Exploration of mineral deposits in flooded mines by underwater robots

Bridging science-fiction and reality!

This story starts in 2016, when a group of researchers and engineers under the leadership of University of Miskolc, Hungary, had an ambitious vision on how the exploration of mineral deposits in flooded mines could be made by underwater robots. This pure scientific curiosity has gained life with the Horizon 2020 UNEXMIN project (2016–2019).

For four years the idea gained further insights and maturation that led to the development of the first underwater robot to meet the objectives of the project: the UX-1. This robot was tested and calibrated in the lab of INESC TEC, Porto, before being deployed to perform in different pilot tests – under increasingly challenging conditions. The successful accomplishment of UNEXMIN objectives triggered the consortium's ambition to think beyond research and bring this innovative exploration service to the market. In the following year the UNEXUP (2020–2022) EIT RawMaterials project – also coordinated by University of Miskolc – was kicked-off, with the mission of conducting commercial missions in Europe while further improving the robot's capacity of uncovering mysteries that would otherwise remain hidden.

The project designed a new robot with increased functionalities, modularity, and lower weight: the UX-1Neo. In the past 3 years, there have been field missions ranging from abandoned mines, operating water-wells to caves. The cameras and sensors installed in the robot allowed it to collect valuable spatial and (geo)scientific information from these sites without risks to humans! Therefore, this initiative has a potential contribution to the mining sector in Europe, as many mines that were abandoned in the past due to unfavourable economic and technological scenarios still contain minerals that are nowadays considered critical for industry.

Fun fact 1: in the Hranice Abyss cave in the Czech Republic UX-1Neo managed to reach a depth of -450m on 1st of August 2022, breaking the World Record mapping the deepest underwater cave in the Earth!

Fun fact 2: UX-1Neo also broke another World Record on 1st of December 2022 swimming more than 3.3 km laterally in a single dive in the abandoned fluorite mine of Pforzheim, Germany, even delivering normal-, and UV-light images from the fluorite ore-vein.

You can learn more about this journey at: https://unexup.eu/

POLAND – POLSCA

UniverScale - measuring the Universe

How large is our Universe? What is its history and ultimate future? These questions have been bothering masses of philosophers, scientists, and ordinary people since the dawn of time and the simplest answer is still that we do not know quite precisely.

To answer these questions we must know accurate distances to cosmic objects, which has been one of the most important, fascinating, and challenging goals in astrophysics.

An international team of astronomers from Poland, France, Chile, and Germany led by professor Grzegorz Pietrzyński from the **Nicolaus Copernicus Astronomical Center of the Polish Academy of Sciences in Warsaw (Poland)** is building a cosmic ruler, which will enable us to measure the Universe with an unprecedented precision close to 1%.

Such precision has been always a dream for astronomers and should provide a breakthrough in modern astrophysics. It should also help to answer our questions about the Universe more precisely, and eventually reveal some new cosmic mysteries.

This project is supported by the ERC Synergy Grant „UniverScale". More info at: https://araucaria.camk.edu.pl/

PhotoReact: industrial applications of photocatalysis

For most people, the sun is a source of pleasant warmth and we associate it with the joy felt when the sun's rays warm our face on a sunny day. While sunbathing, we usually do not think that without solar energy, life on earth could not exist. Sunlight is essential for the process of photosynthesis, in which, the transformation of solar energy into oxygen and simple organic compounds is possible thanks to the pigments present in the leaves. But can the sun also be used to synthesize more complex molecules, such as drugs? This question lies at the heart of a new field of chemistry - photocatalysis.

To answer it, **The Institute of Organic Chemistry Polish Academy of Sciences**, within the framework of the international **„PhotoReAct"** project, is looking for scientific solutions to use solar energy in chemical laboratories to synthesize organic compounds. In cooperation with outstanding European scientists from academia and industry (Belgium, France, Germany, Hungary, Italy, Spain, Switzerland & UK) we are creating a highly colourful world of new dyes, which accelerate reactions exposed to visible light and cutting-edge technological solutions to enable industrial implementation.

„PhotoReAct" not only illuminates chemical reactions, aids the development of knowledge and technology, most importantly, it illuminates the career paths of a new generation of researchers within the **Innovative Training Network funded by Marie Skłodowska-Curie Actions**. We believe that by combining the training of young scientists with ground-breaking research, we will take photocatalysis to the next level and contribute to the development of sustainable chemistry, responding to the global challenges in line with the principles of the EU Green Deal and Circular Economy.



Project website: https://www.photoreact.eu/
CORDIS database: https://cordis.europa.eu/project/id/956324

OPERAS: The Future of Scholarly Writing

Scholarship is about communicating ideas to each other but the way we are doing it changes all the time. The invention of writing allowed a thought to be transmitted when we're not seeing each other face-to-face. The advent of print enabled the very same message to reach large groups of people. Currently, digital formats allow researchers to express arguments and findings in different media forms but how does this actually work? This is exactly what the OPERAS Innovation Lab is interested in.

In the world of print we used to treat books and articles as the end of the research process. But today we can link the text, data, and visualisation in one narrative, allowing readers to navigate it in ways they find useful and inspiring. When scholars want to convey practical advice, they can create toolkits benefiting from the digital formats of short essays and movie clips. Research blogs give researchers an opportunity to communicate their research at early stages in a less formal way and engage in discussion with their peers and wider audiences. So, the future of writing means using a variety of media forms to communicate research ideas and results more effectively.

This looks promising and exciting, but it is not that easy for scholars who are used to working in traditional settings, writing books or articles and giving talks in university halls. The role of the OPERAS Innovation lab is to gather knowledge about new communication practices in Social Sciences and Humanities and use this knowledge to help researchers embrace new technologies. We ask what authors need to communicate effectively and help them to acquire these competencies. Based on workshops, interviews and case-studies we prepare guidelines and training resources bringing scholars closer to the new ways of communicating. When they need a tool or service that doesn't yet exist, we try to build a prototype that could be used by them.

Website: https://www.operas-eu.org/
Outputs: https://zenodo.org/communities/operaslab/
CORDIS (Horizon 2020 project): https://cordis.europa.eu/project/id/871069
CORDIS (Horizon Europa project) https://cordis.europa.eu/project/id/101079608

SLOVAKIA – SLORD

ANDREA - Test kit delivers reliable prostate cancer diagnoses

Meet Andrea. Andrea is a Slovak EU-funded research project. Andrea will help patients with suspected prostate cancer. How?

Imagine your doctor suspects you may have prostate cancer. As scary as the thought may be, it is not your only worry. To confirm or to rule out the diagnosis, you must undergo prostate biopsy, during which the doctor takes a sample of the affected tissue with a needle. The procedure is painful and potentially traumatic. You think you could live without that? So does Andrea.

With the support of an ERC grant, Andrea developed a proof of concept for a revolutionary prostate cancer screening technology that will only cost you a few drops of blood. The new test is the first of its kind in the world. It detects changes in a glycan (complex carbohydrates) attached to a protein in the blood. The changes in a glycan are cancer-specific, that is they can tell us if cancer is present in the body. The protein is organ-specific and can tell us *where* it is present. Together they provide an exceptionally accurate and reliable diagnosis even in early stages of the disease.

In the future, this fast and cheap blood test will help avoid many needless biopsies prescribed on the basis of inaccurate testing technologies of today. In simple terms, you will no longer go through the scary procedure on account of mere inflammation. On the other hand, you can be sure that you get the right care if really needed because the new test will detect cancer even where other would fail.
The Slovak researchers are already on their way to bring the technology to market fuelled by a follow-up EIC Accelerator grant. With the prestigious EU funding mark, they are in a much better position in approaching global investors than from a national level.

Thus, it may soon be that millions of patients around the world will be diagnosed faster, more accurately, with minimal discomfort and, ultimately, with better health outcomes. **Andrea did well.**

More information at: https://glycanostics.com/# and https://cordis.europa.eu/article/id/429007-test-kit-delivers-reliable-prostate-cancer-diagnoses

AURORAL: Merging rural with digital

Digitalisation allows us to leverage the power of data to make our communities more efficient, sustainable, and resilient. However, there exists a digital divide between dense urban areas and vast rural regions. But not for long. Thanks to AURORAL even sparsely populated or difficult-to-navigate regions will be able to build their own Smart Communities. By connecting and sharing locally produced data, it aims to create an open exploitable database for wide range of practical applications.
For instance, in Austria, AURORAL will pilot on-demand mobility services for tourists and locals powered by regional renewable energy. Moreover, in the arctic northern parts of Norway, recognized by islands with scattered settlements, it will offer transport of medical supplies, vaccines, and feedstuffs to both human and animals by aerial drones.

All in all, AURORAL will perform pilots in 7 European regions aiming to increase their economic growth via innovative solutions in the domains of energy, mobility, health, tourism and more. Building on a solution successfully developed through another Horizon 2020 project, Slovak ICT company Bavenir and its partners will empower regions to exploit benefits of the digital transition.

More information at: https://www.auroral.eu/#/ and https://cordis.europa.eu/project/id/101016854

SENS: smart waste management

We all produce waste. A large quantity of it. Sometimes, for example when we work from home, we fill our bins faster than usual. Sometimes we go for holidays and the bins stay empty. And sometimes we mix different types of waste in the same bin because we do not know how to separate particular items. The result? Waste collectors make unnecessary collection rounds or come too late and contaminated waste is driven back and forth since sorting lines cannot process it. This leads to unnecessary costs, CO2 emissions and wasted time. But what if garbage men and women had a Superman's vision to know exactly when our waste needs to be collected? What if they were able to see into a bin to recognise waste contamination?

This is exactly what the EIC project SENS by Slovak company SENSONEO tries to achieve. Not through fancy glasses or cool eye lens but with the help of unique Smart Sensors built into bins that monitor waste in real time using IoT or GSM. To work with the sensors, the innovators have been developing sophisticated software that provides waste management data to cities and businesses and helps them optimize waste collection routes, frequencies, and vehicle loads. SENS is also developing a prototype of a sensor that uses radar technology to identify different types of waste contamination.

Though it may sound like science fiction, SENS is already in the course of demonstrating that the solutions can work not only in small towns but also in as large and densely populated areas as EU capitals. This is why SENS has been carried out as an EU project. The first two cities that have a chance to benefit from large-scale deployment of the smart waste management solutions are Bratislava and Prague. The expected 30% collection cost reduction and 60% reduction of CO2 emissions caused in the waste collection process are a lot to look forward to.

More information at: https://sme.easme-web.eu/?b=899999466 and https://sensoneo.com/reference/smart-waste-deployemnet-bratislava-052021/ https://sensoneo.com/eic-sensoneo-prague-1/

BELGIUM – FWO

ScreenME - Enhancing excellence in screen media entrepreneurship

The Horizon2020 twinning project ScreenME has, as its objective, enhancing excellence in screen media entrepreneurship at Tallinn University (TLU). To do so, ScreenME has established a network of universities across Europe that aim to improve research into and teaching of entrepreneurship for the screen media industry. ScreenME will develop a teaching course and will kick off research initiatives and projects on entrepreneurial activities in media organisations. ScreenME involves academics and other stakeholders (media organisations, start-ups, policy-makers, etc.) through the institutionalization of a screen media entrepreneurship research hub, the ScreenME-Hub, at TLU. The research group on 'Studies in Media, Innovation and Technology (SMIT)' of the **Vrije Universiteit Brussel (VUB)** is partner in the network and is involved in two cross-cutting activities of the project: support for early stage researchers and developing stakeholder involvement.

The role of imec-SMIT-VUB in ScreenME

SMIT is involved in two cross-cutting activities: support for early stage researchers, and developing stakeholder involvement. SMIT is a research centre within the Vrije Universiteit Brussel (VUB) and is also a core research group at imec, Europe's leading research centre for nanotechnology and digital innovation. SMIT's goal is to understand the impact of technology on everyday practices and to design strategic guidelines to shape innovation responding to user needs and expectations, thus empowering people and society.

ScreenME has a whole work package dedicated to **early-stage researcher development** on the bases of the institutionalisation as well as enhanced scholarship of teaching. Activities include strengthening the international networking and support for early-stage researchers; exchanging best practices, experience and know-how in terms of mentoring and including early-stage researchers; improving publication impact of early-stage researchers. The objective is for TLU to increase its reputation and attractiveness for national and international early-stage researchers in the field. In the longer term, this will enhance the sustainability of research excellence on screen media entrepreneurship at TLU. SMIT is leading the task dealing with networking and joint workshops for early-stage researchers. This includes co-organizing two webinars and two workshops (one workshop was already organized within the emma 2021 conference). SMIT will write a public report on the workshops and their results.

Stakeholder involvement is crucial to improve the universities' overall societal engagement, notably via knowledge transfer. It also supports researchers' activities, notably in terms of access to resources (data, funding, etc.). SMIT has a large amount of expertise regarding the involvement of industry and particularly policy stakeholders (policymakers, lawmakers, regulators). Within ScreenME, SMIT will

write a policy brief on the best practices of R&D networking, based on the project's numerous workshops on how to involve stakeholders in research activities (industry and policymakers). It leads the dissemination of project results to industry, researchers, policymakers, and other stakeholders. It contributes to activities regarding how to involve industry stakeholders in teaching activities.

What is the added value for imec-SMIT-VUB of taking part in a European R&I project? At SMIT, we already have a significant experience in taking part in EU projects but this is **the first time** we are (and more generally the VUB is) **involved in a so-called WIDESPREAD project**, which aims at the realisation of the research and innovation potential in all parts of Europe. By nature, ScreenME revolves around the lead partner, TLU, who defines the main concept and more generally the expectations, in terms of how its excellence can be increased.

All research centres involved have a lot to gain from this collaboration and the knowledge exchanged. SMIT can take away lessons on how other partners support their early-stage researchers and how they involve a wide variety of stakeholders in their research and teaching activities. Also, ScreenME has allowed us to build and strengthen collaboration with several partners. This has delivered concrete results, both in terms of joint publications and further engagement in joint project proposals.

This project has received funding from Horizon 2020, the EU's research and innovation programme from 2014-2020, under grant agreement No 952156.

RUSTICA project: circular bio-based nutrient valorisation chains

RUSTICA focuses on demonstration and implementation of circular bio-based nutrient valorisation chains, focusing on waste from the fruit and vegetable agro-food system. The project kicked off in 2021 and will run until 2024. It will use a strong multi-actor approach, combining knowledge and experience from many different relevant stakeholder groups to co-create both socio-economic and technological knowledge in four case study regions in Europe and one in Colombia. For the technical development, 5 technologies (Pyrolysis, insect cultivation, Carboxylic Acid Platform, Microbial protein production and electrodialysis) are used to produce 5 building blocks out of organic agricultural waste streams (Biochar, Insect biomass & chitin, insect frass, Microbial protein, and nutrient concentration). These building blocks will be mixed with compost in different ratios, depending on the needs of the soil, to develop an ecological, adaptable, and economic fertilizer.

Open innovation approach

At the core of this project is an open innovation approach with iterative learning loops to ensure the implementation of input from a diverse set of stakeholders, optimize learning and maximize chances of practical implementation. Our open innovation approach is- by definition- multi-actor. It does not only aim at co-developing feasible solutions for nutrient recovery from fruit and vegetable waste streams through strong interaction between the diverse set of project partners (e.g., research organizations, technology providers, processors, industrial actors, and farmer organizations), but collaboration will also be set up with additional actors including policymakers, forestry, and nature agencies. This will be done by establishing 5 regional multi-actor networks of which four are in Europe and one in South America.

Project partners

To make this project a success, 16 partners from all over Europe, have joined the RUSTICA consortium. The consortium is composed of technology providers, (agricultural) research institutions, economic and legal experts. The diversity within the consortium allows a wide view on all the challenges faced. The Flanders-based **company DRANCO** is one of the project partners and acts as technical project manager, taking responsibility for the technical aspects of the project. DRANCO participates in this project to further develop its own technologies, to network and to help make the transition to a more circular (bio-)based economy. Working on the project is more diverse than we could image and offers us a mutual-learning experience.

The broader picture

The EU depends strongly on external sources for the supply of key fertilizers used in agriculture. Resource depletion and an increasing global demand for mineral fertilizers may, in the long term, lead to price tensions with an impact on food security. Mineral-based fertilization also poses significant environmental problems, linked e.g., to the amounts of fossil energy needed to produce and transport these fertilizers. Agri-food specialization has led to regional imbalances: whilst in some regions a nutrient overabundance is causing severe environmental impacts (e.g. nitrate pollution), others are experiencing nutrient deficits. These contrasting effects may also be observed between locations within the same region.

Several technologies are being developed to recover and re-use nutrients from organic by-products, but many are insufficiently matured, and the characteristics of end-products do not always match end-user preferences. It is expected that the EU 'circular economy package' will boost the emergence and commercialization of such new fertilizers, hence it is important to understand their agronomic and environmental performance to establish adequate policies, guidelines and application rules.

The RUSTICA project obtained funding under Horizon 2020, more in particular under the topic 'Closing nutrient cycles'.

Stargate project for sustainable aviation

The Stargate project obtained funding under the special Green Deal call of Horizon 2020, under the topic of "green ports and airports". It received the maximum score from evaluators and was selected from more than 40 projects. Stargate's purpose is to prove that sustainable aviation is possible and happening. It focuses on the further decarbonization of the aviation industry, the improvement of local environmental quality and the stimulation of the modal split. Together with a consortium of 21 European partners with a diverse and rich expertise (airports, community partners, knowledge institutions, consultants, local governments), Brussels Airport takes the lead as lighthouse airport to develop and implement innovative solutions. Results that prove successful can be deployed at fellow airports (Toulouse, Budapest, Athens). Over the course of the coming five years, the consortium will exchange knowledge to investigate and realize more than 30 concrete projects.

The urge to take climate action and evolve towards a net zero carbon economy has never been clearer. Now that the aviation industry is facing major challenges, it is the ideal moment to accelerate its green transformation and evolve towards multimodal hubs for sustainable and smart mobility. Brussels Airport grasped the opportunity to join forces with other airports, airlines, operational partners, academics, and experienced consultancy agencies across Europe to exchange knowledge and invest in innovations for a more sustainable aviation. Hence the birth of the ambitious 'Stargate' project, selected by the European Commission to implement over thirty projects in the coming five years.

"Sustainability has been a cornerstone of our airport activities for more than ten years now," Arnaud Feist, CEO Brussels Airport Company, explains. *"For the last two years, the COVID-19 crisis seriously shook our global economy. Individuals, companies and governments started rethinking our societal patterns: how we live, work, think and the way we travel. However, aviation remains indispensable to connect people and transport valuable goods across the world. Airports create wellbeing, welfare and fuel our economy with new opportunities – but if we want a bright future, it must be a sustainable one. This is why Brussels Airport took the initiative to submit the progressive Stargate programme together with 21 partners, following the call of the European Commission. We are pleased that our project received a 24.8 million euros grant within the European Green Deal, a strong signal for us to roll up our sleeves, put our heads together and start working on innovative solutions that make a difference – in the short and in the long term."*

It is safe to say that there is no quick fix, nor will we reach substantial change or impact if we cannot overcome divergent motives through a holistic approach. Leveraging the connection between each link in the air transport supply-chain implies a giant opportunity for greening our industry. "*Resolving the complex challenges climate change and other societal evolutions thrown at us requires a shared*

belief, effort and persistence: we want to show sustainable aviation is possible and happening." This is precisely where the strength of the Stargate project lies: in its collaborative spirit, incorporated thanks to the consortium of a diverse group of partnerships, both in terms of expertise and geographic distribution within Europe. Each of these airport partners, universities, mobility or energy partners and local governments provide added-value through their specific expertise to apply changes in a particular field. "*The fellow airports will be the first to roll out the solutions that prove successful at Brussels Airport,"* Feist adds. "*In the coming five years, we will learn from each other and we plan to spread this knowledge to a broader audience, setting a new 'green' standard for our industry…we are fully aware that there is a difficult road ahead towards net-zero carbon aviation*," confirms Christel Vandenhouten, Head of Sustainable Development at Brussels Airport Company. Air transportation of the future needs to cut Greenhouse Gas Emissions drastically and rise to the challenge of searching, testing and developing alternative energy sources. In order to improve the living quality of our surroundings, we need to reduce noise and improve air quality. Vandenhouten continues: *"With Stargate, we set up projects that strive to overcome current obstacles. We focus on promising technical innovations, but we also develop* 3 *economic business models to implement them and to promote the use of sustainable alternatives: whether it is the production of Sustainable Aviation Fuels at our airport for partner airlines or the stimulation of eco-friendly ways of transportation for our passengers, our employees and our neighbours. In order to not only invent solutions but put them into practice and ensure continuous improvement, we need everyone aboard. In terms of green energy supply, we value once more the connection with our local environment. We believe out-of-the-box thinking and courageous acting are the key to success, which is why we explore the possibility to cooperate with households nearby to share a solar panel park, as well as the idea of collecting organic waste (fruit & vegetables, garden waste, food waste, …) to turn local waste into green energy."*

SWITZERLAND – SWISSCORE

SUN-to-LIQUID: Fuels from solar energy: A European success story

The efforts to tackle climate change and to push forward the European Green Deal require advancements in research & innovation. The Horizon 2020 project 'SUN-to-LIQUID' provides exactly that, by developing the technology for producing renewable drop-in fuels based on solar energy (see CORDIS project information). The technology developed is driven by concentrated solar radiation and thermochemically converts water and CO_2 at high temperatures into a high-quality synthesis gas, which in-turn is processed into liquid transportation fuels, such as synthetic kerosene (jet fuel) which can make aviation more sustainable. In 2021, the 'SUN-to-LIQUID' consortium won the 22nd ENERGY GLOBE WORLD AWARD, an influential award for sustainability worldwide (see SwissCore article).

The project showcases the great value of collaborating in a consortium with partners from across Europe, including Germany, Spain, Switzerland, and the Netherlands. Different funding schemes contributed to the novel technology, illustrating the importance of the European Research Area where national and EU funding instruments, e.g. European Research Council, Horizon 2020, and the Swiss State Secretariat for Education, Research and Innovation, contributed to the success of the 'SUN-to-LIQUID' project. Two participating scientists: Prof. Aldo Steinfeld of ETH Zurich and Prof. Bernhard Hoffschmidt, Director of the Institute of Solar Research at the German Aerospace Center (DLR), played crucial roles in transferring the technology to industry. On one hand, Steinfeld's former doctoral students went on to found the ETH spin-offs 'Synhelion' (solar fuels production), and 'Climeworks (direct air capture of CO_2). On the other hand, Hoffschmidt, a long-time project partner of Steinfeld, co-founded the DLR spin-off Heliokon (heliostat design and manufacturing), which merged with Synhelion in 2021. The company is currently scaling up the solar technology for producing renewable kerosene at an industrial scale, first in Germany and then in Spain (see SwissCore article).

Further information: https://www.sun-to-liquid.eu/

Vatorex: the EU and Swiss funded start-up pushes for biodiversity with eco-friendly and innovative mite treatment for honeybees

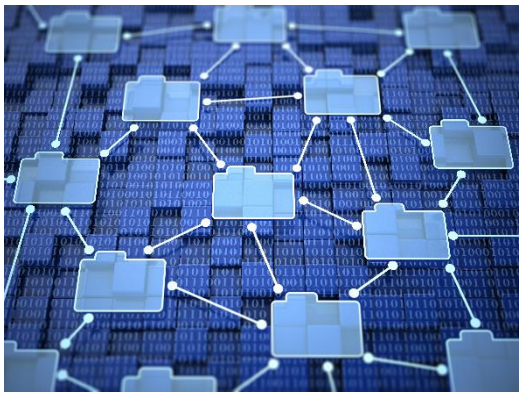
Founded in 2016, the startup Vatorex developed a sustainable solution to combat the number one cause of honeybee mortality – the Varroa mite. The parasite harms the bees' immune system; thus, most affected bees will not survive the winter. Conventional solutions involve chemicals and cause unwanted side-effects for the bees and the honey (see SwissCore article).

Vatorex's idea takes a different approach without using chemicals to fight the Varroa mite with heat treatment. This eco-friendly and innovative treatment for honeybees increases their productivity, strengthens failing colonies, and improves biodiversity. As global biodiversity loss and degradation of ecosystems continue at an alarming speed, this innovative mite treatment goes along with the EU Biodiversity Strategy 2030, which aims to put Europe's biodiversity on a path to recovery by 2030. It also supports the objective of the EU Pollinators Initiative to address the decline of pollinators in the EU and contribute to global conservation efforts.

In 2017, Vatorex applied for phase 1 of the SME Instrument under Horizon 2020 and received a €50,000 grant to conduct a feasibility study. In 2020, the EIC awarded them a €1.6m grant. In 2016, Vatorex received initial funding from Zurich Cantonal Bank and support from Venture Kick. Besides, it benefited from coaching from Innosuisse and Startup Campus. Vatorex has now customers in Switzerland and in numerous European countries.

Further information: https://www.vatorex.com/

Wiplash: European researchers lead the way on the computer chips of the future



As Europe seeks to shore up its position in the global semiconductor value chain through the proposed EU Chips Act, European research actors are showing the way forward. In the key field of chip architecture, a consortium of European laboratories is at the forefront in developing the next generation of powerful microchips. They are doing so by resolving the conundrum of how to enable the increasingly specialized and heterogenous components of modern chips to communicate efficiently, while not limiting their flexibility and adaptability to different tasks. The Wiplash project seeks to show that an approach involving on-chip wireless communication, which enables the reconfiguring of the connections between units, can accelerate AI processing at least ten-fold. Traditionally, connections within chips and between chips are made with wires. Once wired, no changes in the circuits can be made. New technologies like graphene antennas have opened the door to wireless communication on chips. This allows circuits to be adapted for different applications, a flexibility which could have a tremendous impact on the design of processors within drones, cars, cell phones, laptops, or in data centres.

Seven parties constitute the research consortium, coordinated by the Universitat Politecnica de Catalunya. Other members include the Universita di Bologna, the Universität Siegen, and the Technische Hochschule Aachen, as well as two private partners: the German company Amo, and Zürich-based IBM Research. Additionally, EPFL's Embedded Systems Laboratory (ESL), is leading the key development of a simulation framework. This framework allows the other Wiplash project partners to test their novel chip architectures and use the simulation results to optimize their performance. In addition to the technology's concrete use-cases, the project contributes to European know-how and competencies in circuit design in general. This is essential to ensure European technology sovereignty in this strategic sector. The project has been funded through the pilot phase of the European Innovation Council (EIC) Pathfinder, the Horizon 2020 instrument promoting disruptive technological innovation.

Further information: https://www.wiplash.eu/index.html

FINLAND – FILI

New Cotton Project: Going beyond cotton

The cost of ‘fast fashion’ is undeniable. The textile industry is sadly among the most polluting industries globally, generating a whopping 1.2 billion tons of CO2 per year, as huge amounts of textile waste are being landfilled or burned. Finnish engineers have the answer. This is the story of the pioneers who have a passion for problem-solving and practical solutions in making life better for us all: the people and nature. Imagine if there was a way to capture the value in waste by transforming it as a new and versatile textile fibre? Infinited Fiber is on a mission to make textile circularity an everyday reality.

In the EU-funded New Cotton project, their cutting-edge carbamate technology can process textile waste such as mixed fibre and other cellulose-based materials and give it a new life. In the future, circular and sustainable production and consumption can be a reality. Infinited Fiber shows us how post-consumer waste textiles can be recycled efficiently with lower environmental impact using the IFC technology. Working together with leading global brands, New Cotton project and Infinited Fiber works for a more sustainable fashion future for us all.

CORDIS web page: https://cordis.europa.eu/project/id/101000559
Projects own website: https://newcottonproject.eu/
See also: https://infinitedfiber.com/

GRACE: detection, response and environmental impact assessment of Arctic oil spills

Among many things, climate change has highlighted the search for new shipping routes in the Arctic. The problem is that increased shipping can lead to oil spills. As the area is remote, cold and icy, usual equipment may not suffice. This means that new solutions are needed for a more effective response.

This is the story of the innovative GRACE project for Integrated oil-spill response actions and environmental effects. GRACE has developed improved mitigation tools for better monitoring, response, and impact assessment such as the Environment & Oil Spill Response -analytical tool, a mechanism for environmental assessment to support oil response planning.

How do they do this, you may ask? They offer real-time, high-resolution data through a management system that uses web-based interfaces. The system creates alarms for potential oil spills while presenting data through graphs and tables. As a user, this helps you to calculate the statistical probabilities of oil spills occurring in the future: simple, yet efficient! According to Ms Kirsten Jørgensen, the project coordinator at the Finnish Environment Institute (SYKE), GRACE not only promotes the business potential for companies working in the industry, but also increases the public acceptance of offshore activities subject to thorough environmental assessments.

CORDIS webpage: https://cordis.europa.eu/article/id/406999-enhanced-detection-response-and-impact-assessment-of-arctic-oil-spills
Project webpage: https://www.grace-oil-project.eu/en-US

Towards plant-based carbon-negative functional materials

Think about textiles that could be used in your clothes or window shades, adapting their warming/cooling capacity based on the external temperature or solar illumination. Protective covers that adapt to the weather could be made correspondingly to the needs of e.g., agriculture or other type of outdoor work. The real advantage is that such functional textiles would indirectly decrease the need for heating/cooling many buildings and allow energy savings, thus providing an important economic opportunity. This reality could be closer than you thought.

In this EU funded project pioneering research is carried out with functional fibres. The study aims to develop smart materials that react to changes in their environment. It will clarify how, in response to changes in light or temperature, the soft materials could change colours or move. These kinds of fibres can be built into modular multifunctional textiles using traditional knitting and weaving techniques, leading also to more complex networks. In an interview, Assistant Professor Jaana Vapaavuori explained: ‘‘I am extremely eager to study functional materials, because by developing them it is possible to improve the environmental friendliness of buildings with material that autonomously change according to weather conditions. I am grateful to the EU for this funding, which enables research that is still in its initial stage, but which has potential to develop smart and energy-efficient applications which interact with their environment.”. Materials that react autonomously could be used to develop solutions like blinds that react to temperature changes, or protective textiles for the needs of agriculture.

Youtube: https://www.youtube.com/watch?v=hqXBeoYIPvY
CORDIS webpage: https://cordis.europa.eu/project/id/949648

NORWAY – RCN

PYROCO2: Sustainable value creation from industrial CO_2

How can CO2-emissions from industry be captured and turned into valuable products? A Norwegian-led project will demonstrate a new process at a large scale.

Achieving climate neutrality by 2050 requires new, climate-positive solutions that can boost the European market. Emerging new solutions for carbon capture, utilisation, and storage (CCUS) have great potential to decarbonise production in the chemical industry. At the same time, CCUS allows value creation from the industry's own carbon emissions.

The PYROCO2 project will demonstrate- at scale- a new path to create value-added chemicals and materials from industrial CO2 emissions, while improving the sustainability of the chemical industry in Europe. Actors from many sectors and disciplines are needed to solve the challenges with such a complex project. The joint aim is to establish the PYROCO2 process as a gamechanger for carbon-intensive industries, that will be able to create valuable products from their emissions.

The PYROCO2 demonstrator plant will have a capacity to produce at least 4,000 tonnes of acetone annually from almost 10,000 tonnes of industrial CO2 and green hydrogen, through a process called thermophilic microbial conversion. It will also serve as a platform for generating many other chemicals, fuel additives, and materials. It will be located at the industrial cluster of Herøya Industrial Park in southern Norway. Here, the PYROCO2 process will benefit from close to 100% renewable electricity in the Norwegian energy grid and complement ongoing large-scale carbon capture and storage (CCS) efforts in Norway.

From here, the PYROCO2 project will establish itself as a lighthouse for innovative CCU technologies that can benefit equally the European industries, citizens, and the environment, on the path to a climate-neutral Europe with global impact. PYROCO2 is funded with 40 million Euros under the Green Deal call under Horizon 2020.
More information: www.pyroco2.eu

DACOTA: Biotech products from seaweed supporting Green Deal objectives

How can seaweed be harvested sustainably and used as a raw material for a large number of high-quality products? An innovative technology to harvest and refine seaweed will now be taken to an industrial scale.

The amount of seaweed along Europe's coast constitutes an untapped potential when it comes to sustainable exploitation for high-quality products. High-grade powders from seaweed are in-demand in a number of markets, such as pharma, health, food, agro and chemical industries. The brown macroalga Laminaria hyperborean is found in abundance in the North Atlantic, with a standing biomass of minimum 1.5 million tonnes open for harvesting each year. There is huge potential to use this resource more efficiently. Moreover, there is a need for a shift towards a greener alginate-based seaweed industry.

Alginor, a Norwegian marine biotech SME, was founded in 2014 with an aim to establish Europe's first biorefinery for marine resources. The company has verified an innovative technology with funding from the SME Instrument under H2020, increasing the utilisation ratio of seaweeds from 15 to 100%. Furthermore, it does not use harmful chemicals, and it has none of the emissions from previous seaweed industry. The company's harvesting method interferes minimally with the seabed and surrounding marine life during harvesting. Combined, this leads to total utilisation of the raw material, with zero waste and zero emissions.

In the DACOTA project, funded by the EIC Accelerator's "Green Deal"-call in 2020, the technology is taken to the industrial scale, including design and construction of a demonstrator harvesting vessel and biorefinery. Moreover, the company has attracted over 200 investors and plans to go public in the near future, which demonstrates the large untapped potential and value that lies in the sustainable utilisation of large kelp. Alginor is currently developing and commercializing high-quality products for sale to seven global market segments, including pharmaceutical and nutraceutical companies.

EIC Accelerator data hub (easme-web.eu)
Direct link
Project: Demonstration And Commercialisation Of The AORTA-innovation
Project Acronym: DACOTA
Project Type: Phase 2

Lifebrain: Brain imaging across Europe for healthy minds

What can MRI brain scans from over 5000 participants across Europe teach us about brain health? Researchers are addressing numerous questions about the brain based on the extensive data from the Lifebrain database.

Many environmental, social, occupational, and lifestyle factors influence brain health. The Lifebrain project aims to identify these factors and understand how they influence brain development, cognitive function, and mental health at different stages of life.

To understand fully what is happening within the brain, the same people should be followed over time, lasting many years, to be able to see what has truly changed. This has been most important in the Lifebrain studies, by pooling pre-existing 40,000 magnetic resonance imaging (MRI) brain scans from 5200 participants (18-80 year olds) across Europe, through a close cooperation involving SMEs as well as large European brain research centres.

Lifebrain data revealed how education, socio-economic status, sleep or loneliness may be less important for slowing down brain ageing and reducing risk of developing dementia than previously assumed. Attending college for example, does not seem to affect age-related brain decline. Moreover, we should not be worried about sleeping too little; if we sleep more than five hours per night, it does not seem to have a notable effect on the brain in the long run. These findings do not mean that education and sleep are not important for the brain but that we need to understand more of how these factors affect the brain. For example, it is possible that it is not the duration of the sleep, which is important for brain health, but sleep quality.

Another Lifebrain study suggests that rather than using expensive MRIs, tiny blood samples (dried blood spots) could be taken by finger-prick to provide insights in future individual brain health. Our best chance of fighting cognitive decline and dementia seems to come from early preventative measures using data from all along the lifespan.

The Lifebrain database will be maintained and expanded with future waves of data collection to support new research. The researchers continue to work on questions like: Does physical activity help prevent dementia? Can a healthy heart reduce our chance of developing dementia? How does personality influence risk of developing dementia?

For updates, follow website, Facebook page and Twitter account.

GERMANY – KOWI

OneNet: for a single European electrical system

With the transition to a climate-neutral, fossil free energy sector, the energy system is shifting away from centralized large power plants. In the future, energy will be produced by solar panels on the roof, individual hydropower plants or by many different wind turbines on- and offshore. This decentralization poses a challenge to the existing power grid, as it will require much more flexible and adaptive solutions than before. The Horizon2020-funded project "OneNet" led by the Fraunhofer Institute for Applied Information Technology FIT, aims to create a fully replicable and scalable architecture that enables the whole European electrical system to operate as a single system. This approach allows the universal participation of stakeholders regardless of their physical location – at every level from small consumer to large producers. OneNet draws from the existing scientific evidence and brings together over 70 European partners to build the energy system of the future. Ultimately the project facilitates the shift to a decentralized and flexible energy supply system, that delivers fossil free and sustainable energy to consumers by safeguarding a reliable energy supply. To reach an European consensus and broad acceptance, an ongoing stakeholder dialogue has been launched. In the GRIFOn platform, project partners will discuss an interoperability strategy and potential market designs for OneNet.

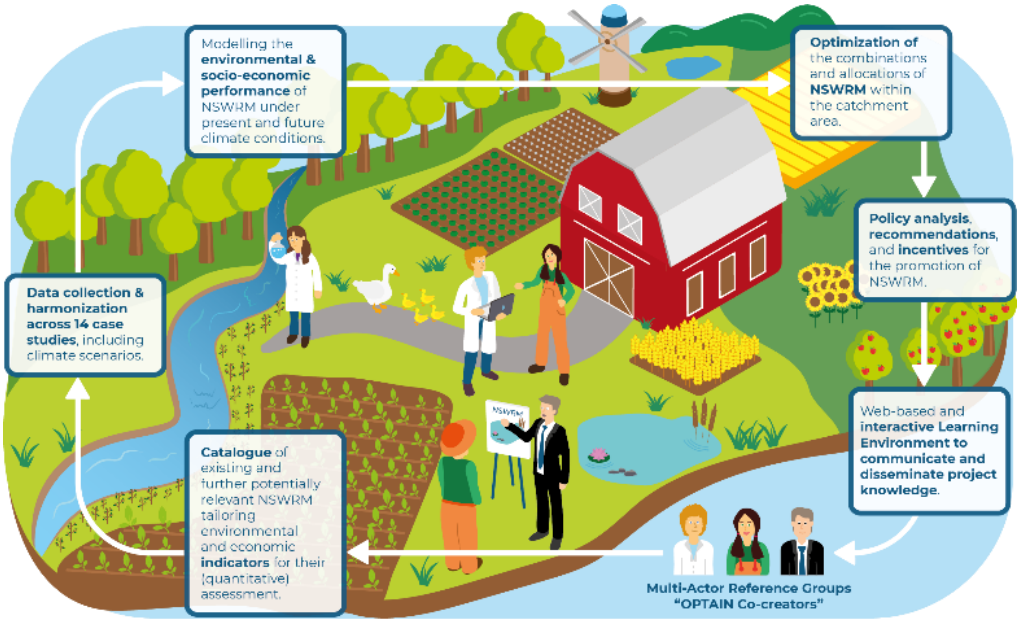
More Information at https://onenet-project.eu/the-project/
https://cordis.europa.eu/project/id/957739

OPTAIN - OPtimal strategies to retAIN and re-use water and nutrients

OPTAIN

Optimal Strategies to Retain Water and Nutrients

The number of droughts and heavy rainfalls is on the rise! Conflicts among agricultural water uses and other human and environmental demands for water seem to be omnipresent!



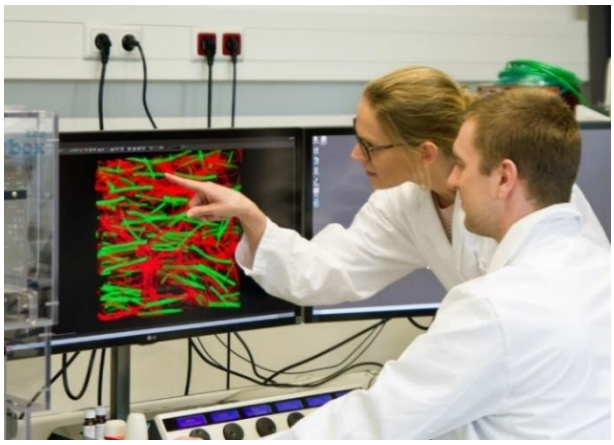
*NSWRM - Natural/Small Water Retention Measures

However, these seemingly irresolvable conflicts can be mitigated! Have a look at the benefits of Natural/Small Water Retention Measures (NSWRMs). Inspired by nature itself, these measures help to retain and re-use water and nutrients and thus support a better adaptation to extreme events that exacerbate conflicts between agricultural water uses and other human and environmental demands for water.

With invaluable help from local stakeholders, the scientists of the EU Horizon 2020 funded project OPTAIN are currently identifying efficient and easy-to-implement techniques for the retention and reuse of water and nutrients in small agricultural catchments across Boreal, Continental, and Pannonian regions of Europe. This all is being done by elaborating on the current state of knowledge, the experience of stakeholders from 14 case studies involved in the project as well as innovative scientific modelling and optimisation approaches. Based on environmental and economic sustainability indicators the scientist will identify where in a catchment NSWRMs should be allocated and which combinations of measures are especially effective in the different regions of Europe.

Would like to find out more? Have a look at CORDIS and the OPTAIN website.

Anisogel: An injectable guidance system for nerve cells



In many tissues of the human body, such as nerve tissue, the spatial organisation of cells plays an important role. Nerve cells and their long protrusions assemble into nerve tracts and transport information throughout the body. If such tissue is so severely injured that it does not simply heal on its own, a biomaterial bridge with precise spatial orientation is necessary to guide regenerating cells during the healing process. But how can one instruct the nerves to grow in a certain direction? This is the question Laura De Laporte and her team at DWI – Leibniz Institute for Interactive Materials have been working on within the scope of the EU funded project "ANISOGEL".

Inside the body, an extracellular matrix surrounds the cells. It provides mechanical support and promotes spatial tissue organization. To regenerate damaged tissue, an artificial matrix can temporarily replace the natural extracellular matrix. This matrix needs to mimic the natural cell environment in order to efficiently stimulate the regenerative potential of the surrounding tissue. Solid implants, however, may impair remaining healthy tissue. Therefore, soft, injectable materials are needed that allow for a minimal invasive therapy, which is particularly beneficial for sensitive tissues, such as the spinal cord. The novel gel, also called "Anisogel" due to its guidance properties provided by incorporated magneto-responsive short rod-shaped polymer microgels or fibres, has already been successfully tested in cell culture experiments for stimulated, directional nerve growth.

The Horizon Europe project "ReWIRE", which is a new Doctoral Network that will officially start in January 2023, goes one step further and will combine the Anisogel technology with innovative translational neurotechnologies and rehabilitation interventions for the repair and restoration of neurological functions following spinal cord injuries (SCI). The project will equip next-generation scientists with unique skills to develop ground-breaking therapeutic solutions for patients with paralysis. The overall goal is to translate combinatorial SCI therapies from bench to bedside in a timely manner, thereby improving the patients' quality of life and reducing societal burden. In addition, two ERC Proof of Concept projects resulted from the Anisogel Platform to apply the material inside peripheral nerve grafts (PeriGO), as well as to develop a novel magnetic-field assisted bioprinting technique to print structured tissues (Bioarchitecture).

More info about Anisogel can be found at: https://cordis.europa.eu/project/id/637853

Video abstract provided by Advanced Science News and the journal Small: https://www.youtube.com/watch?v=136xwXsLWGg

DENMARK – DANRO

E-Ferry: To travel is to live…

This famous quote is from the Danish author Hans Christian Andersen. Travelers sailing on the ferry "Ellen" from the island of Fynen to the island Ærø should remember this wisdom. Ellen is a research and innovation adventure into developing a 100% electrically powered ferry, that contributes to the green transition at sea.

The ambition of the project was to design, build and demonstrate that a 100% electrically powered passenger and car ferry can sail significantly further than previous e-ferries. And it worked! Named Ellen, she went from being an experimental protype to becoming a stable, fast, and economical ferry. Passengers enjoy sailing with her. The e-ferry makes less noise, pollutes less, and does not smell like an old diesel-powered ferry …and she even sails faster.

One of the advantages of an e-ferry, is that the electric system utilises the energy exceptionally well. 85% of the energy supplied by the ferry's chargers actually ends up propelling her forward. This is both due to a very efficient electric motor, which is even mechanically quite simple, and the fact that they are very small and light for their power output level. Ellen relieves the global environment of 4000 tons of CO_2 plus other climate gasses annually, compared to a diesel ferry. The local environment benefits from half a ton of toxic particles not emitted. The CO_2 emissions from producing the battery were already saved again during only 3 months of operation. Since they are expected to last for 10 years, it is a really good deal for the climate that Ellen has taken to the seas.

It is estimated that 80% of Europe's ferry routes are not longer than Ellens. She has thus "paved the way" for greener routes in the future. Remember, to travel is to live!

More info at : http://e-ferryproject.eu

Prevent-nCoV: Promising results for new generation of COVID vaccines

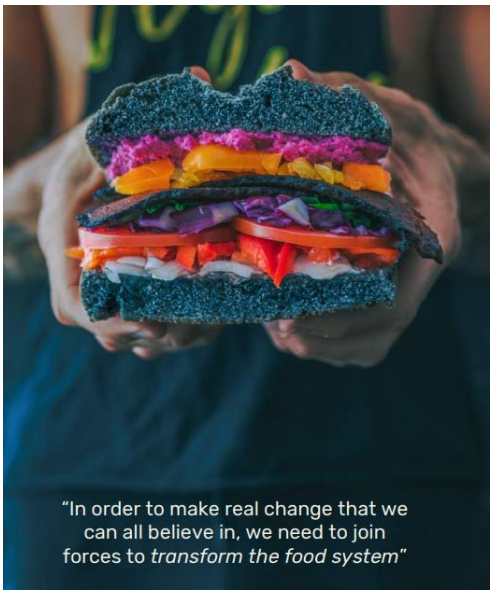
Many Europeans have been vaccinated and boosted with shots from Pfizer-Biontech or Moderna. Both vaccines are based on so-called RNA technology. But soon we may see a new generation of COVID vaccines based on cVLP technology, which is showing promising results, both in terms of high levels of antibodies and the longevity of the protection against COVID compared to the currently approved vaccines. It is also expected to be more efficient against new variants of COVID.

The new vaccine type was developed in the Prevent-nCoV project by an international team of researchers based in Denmark, the Netherlands, Germany and a Danish pharmaceutical company. Knowns as ABNCoV2, the vaccine is based on the so-called platform technology cVLP. cVPL is shorthand for Capid Virus-like Particle, which is a particle that mimics a virus. The vaccine is made up of an artificial virus shell, which is empty inside and thus cannot make humans sick. Spike proteins are fixed to the outside of the shell, which are identical to those, that the real virus uses to penetrate the body's cells. When injected into the human body, the immune system is activated and starts producing large quantities of antibodies against the virus.

While the researchers were not the first to emerge from the race for a vaccine, this new generation of vaccines is expected to be more effective against new mutations, something we will need in the future. Another advantage is that the vaccine is expected to be suitable for fridge storage. This will make it a very effective weapon in the global fight against future COVID epidemics.

More info at https://cordis.europa.eu/project/id/101003608

FoodSHIFT2030: Tomorrow's green kitchen



Citizens in cities like Barcelona, Bari and Brasov are working full steam at creating tomorrow's green kitchen. They are central actors in a strong, international team comprising local authorities, SMEs, NGOs, universities, and network partners. Together they want to create a sustainable and lasting green transition, that goes all the way into our fridges. If it is up to the project, we will be eating many more plant-based meals based on resilient plants grown by local producers.

The target of the FoodSHIFT2030 project is to start an ambitious, citizen-led drive for change of the European food system towards a more circular, climate neutral future. This change necessitates that we more and more often eat e.g. a plant based burger instead of a meat-burger, that we increase our food safety and security, reduce the emission of greenhouse gases while maintaining our quality of life in both the cities and the countryside.

The key to create a citizen-driven transformation of the food system is the establishment of food laboratories in cities like Athens, Avignon, Barcelona, Bari, Brasov, Berlin, Copenhagen and Wroclaw. Each lab works on maturing, combining and upscaling existing innovations in production, distribution, consumption and recirculation of food. The door to the labs is open to anyone with an interest in and enthusiasm for the food system. They are welcome to collaborate to advance relevant food innovations, that contribute to tomorrow's climate neutral kitchen. The lab in Copenhagen focuses on innovations that deliver sustainable, healthy, and varied local food for professional kitchens while encouraging citizen engagement and job creation.

You and I are important co-creators of the strategies and plans for citizen-driven innovation of the food system – without us it will be hard to create real and lasting transformation. To support the effect for the environment, the economy and society of the innovations created, FoodSHIFT has developed a number of indicators. Hopefully they will all be in the green field by the end of the project in 2023. Bonne Appetit!

More info at: https://foodshift2030.eu/

SPAIN – SOST

AMADIX: Early cancer detection in blood

AMADIX is a leading molecular diagnostics company focused on liquid biopsy, developing innovative diagnostic tests for early cancer detection in blood. The mission of the company is extending people´s lives, developing disruptive technologies to detect tumours years in advance before symptoms appear. This is a different way of diagnostics versus invasive procedures like colonoscopy or biopsies.

The company develops products addressing healthy individuals, for early cancer detection in a blood draw, avoiding the complications of existing invasive procedures, such as tumour biopsies. The most advanced product is PreveCol, an innovative and highly accurate blood-based test for colorectal cancer diagnosis based on a unique combination of cutting-edge molecular biomarkers. These biomarkers identify healthy individuals from tumour and precancerous polyps before the symptoms appear and with higher accuracy than current alternatives.

PreveCol detects premalignant lesions as precancerous polyps, which will be malignant in a few years, at a stage when it is still possible to remove them. It is indicated to screen healthy population 50 to 85 years old. The proof of concept has been demonstrated over 1000 patient samples – all colonoscopy verified – and it has been validated in additional 3300 patient samples from a European perspective study in Germany and Poland, with the support from the European Commission through a grant of €2,8M (H2020 programme).

The non-invasive nature of PreveCol, combined with its high accuracy, will change the paradigm of colon cancer screening programs, ensuring better compliance and improving the survival and quality of life of patients. PreveCol counts with the regulatory approval CE mark since May 2022 and has been recently launched into the market. The company continues to go further exploring the combination of clinical records and patient lifestyle through the latest Artificial Intelligence (AI) and Advanced Data Analytical Tools, to identify new risk factors to develop cancer. The objective is identifying individuals at risk of developing cancer in the future, to prevent it and extend their lives. For this accomplishment, AMADIX has secured the support of the EIC. The company's test pipeline includes – besides PreveCol - two blood-based tests for early detection of lung and pancreatic cancer.

More information at: https://amadix.com/

Smowltech: Improving the quality of online evaluations

Nowadays, people study in a very different way than in the past. And if we can be trained 100% online, why can't we be evaluated similarly? Now you can take courses, selection processes and university degrees remotely so that students and users can flexibly manage their studies and carry them out without travelling. Smowltech replies to this need with its SMOWL proctoring software.

A remote monitoring tool allows companies and educational institutions to take online exams. It will enable people to demonstrate that they have obtained the knowledge reliably. SMOWL is designed to be easily integrated into educational centres' and companies' different virtual campuses so users can complete their entire training process online.
What do we achieve with this? A more effective way to facilitate access to quality education, avoid unnecessary travel and allow people to reconcile their work, family, and academic life. The planet also appreciates it since, besides those unnecessary travels, taking online exams avoids a significant waste of paper and CO2 compared to traditional exams. All this is possible thanks to Smowltech's selection for phase 2 of the Horizon 2020 SME Instrument.

Do you want to learn how SMOWL works? Visit our website and discover it!

The Blue Box: Testing kit to detect breast cancer

If dogs are able to smell cancer, why can't we? Designed after a dog's olfactory system and olfactory neurons, *The Blue Box* is an under-development AI-powered medical device aimed at breast cancer testing in a non-invasive, non-irradiating, inexpensive, specific and user-friendly way... just by introducing a urine sample in a box! **This innovative method has been designed by 25-year-old Spanish woman: Judit Giró Benet.** During her studies, Giró observed that a dog is able to sniff out lung cancer through a patient's breath. Her fascination with this discovery took her to replicate a dog's olfactory system for her undergraduate final project. After joining the UC Irvine's Master of Embedded and Cyber-physical Systems programme, she incorporated artificial intelligence into her platform and obtained a device that now detects over 95 percent of late-stage breast cancer! This achievement made her the winner of the 2020 James Dyson International Award.

It can be said that *The Blue Box* is a change in the way society fights breast cancer, because it has the potential to make cancer screening a part of daily life. As opposed to the current painful and inconvenient procedure that sometimes leads to anxiety, this method enables women to get easily self-tested at home without any pain. This not only improves the living conditions of women but can also save many lives in the long term.

LATVIA – LAT.TECH

NGEAR 3D: 3D Glasses for medical education

Optical Reality headset for Operating Room and High-end Operations

LIGHTSPACE TECHNOLOGIES is a global leader in multi-focal AR headset technology. The company has invented the world's first multi-focal technology that uses multiple screens for eye accommodation that comes as close to natural viewing as possible.

When precision matters

Multiple focal planes, the closest of them being 25cm from eyes, enables performing actions previously impossible with AR: surgeries, digital manufacturing, and other high-precision activities.

No eye strain

Lightspace AR headsets are multi-focal accommodating. It reduces eye strain, Vergence-Accommodation Conflict and allows objects to be viewed in near distance, with an unlimited use time.

The project in brief

Medical, digital manufacturing and professional 3D graphics require accommodating Augmented Reality Glasses that can visualize high-quality 3D images between 0.3-2.0m distance. The project's main activity is the development of next-generation Augmented Reality headset/glasses that provide required visualization quality and accommodation to professionals in healthcare and similar use areas. The prototypes of Augmented Reality headset and glasses are validated with strategic partners. Partners included a market-leading medical AR application company and cardio surgeons from two hospitals as well as a global leading car manufacturer. Dissemination of project results is expected at several marketing and technology events. Freedom of operation will be ensured by patent research and IP protection activities.

Lightspace Technologies has signed Grant Agreement No. 960828 with the European Commission to receive grant funding of 2.25 million EUR from the European Union's Horizon 2020 research and innovation programme on activity "Next Generation Enhanced Augmented Reality 3D Glasses for medical education, pre-procedural planning, intra-procedural visualization, and patient rehabilitation — NGEAR 3D."

More info: https://lightspace3d.com/about/

VIOBOND: Replacing toxic with natural

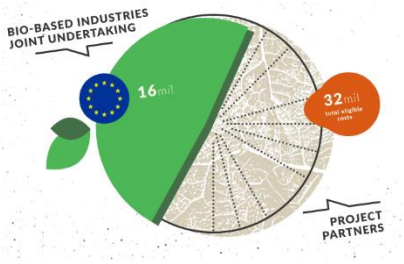
The VIOBOND consortium aims to take essential commercialisation steps based on the natural wood component lignin, creating industrial technologies to significantly reduce the share of fossil raw materials in phenol formaldehyde resin, which is widely used in various everyday products. The project was selected as part of a call under HORIZON 2020.

The main objective of the project is to build a new bio-based resin plant in Latvia, utilizing lignin from different biorefineries to partially replace phenol and formaldehyde in a variety of resin products. Lignin commercialization for higher value application is essential for commercial and sustainable biorefinery production and crucial to facilitating future investments for biorefineries.

Replacing toxic with natural

Nowadays, science and technology have developed to the point that people can divide wood into its components. Phenol and formaldehyde, which are the compounds of most commonly used resins, are harmful to humans, whereas lignin is a natural, sustainable by-product.

The bilateral research work with Latvijas Finieris has been in process for about a year, with the objective of examining and improving the potential of hydrolysis lignin grade for different resin products. The VIOBOND project will be an important continuation of this systematic co-operation leading to lignin-based resin commercialisation.



At present, focused research into valorising lignin is continuously growing globally, making it possible to predict a wide array of applications for lignin in the near future. The VIOBOND project's managing partner Latvijas Finieris has already taken an important step in this direction. In cooperation with the chemical and mechanical wood processing company Stora Enso, an adhesive has been developed in which pulp production-derived sulfonated Kraft lignin has been used as a partial substitute for the traditionally used fossil-based phenol, and birch plywood products RIGA ECOlogical are available on the market.

The challenge that needs to be overcome is to persuade customers that lignin is a sustainable, renewable alternative and is not inferior to traditional raw materials.

Grant agreement ID: 101022987 / 1 Sept 2021 - 31 Aug 2026

More info: https://viobond.eu/project/

5G-Routes: 5th Generation connected and automated mobility EU trials

To conduct advanced field trials of the most representative and innovative CAM applications seamlessly functioning across a designated 5G cross-border corridor ('Via Baltica-North'). The corridor spans 3 EU member states borders (Latvia-Estonia-Finland) in order to validate the latest 5G features and 3GPP specifications under realistic conditions. This will accelerate the widespread deployment of 5G E2E interoperable CAM ecosystems and services in digitised motorways, railways and shipways throughout Europe.

Objectives

- To develop innovative and commercially exploitable CAM use-cases for automotive, railway and maritime sectors within the cross-border context;
- To analyse the technical and business requirements for the use-cases to enable extensive large-scale CAM field trials in the 'Via Baltica-North' 5G corridor;
- To advance and optimise the enabling technologies using AI for the reliable, seamless and uninterrupted delivery of interoperable CAM services across borders;
- To leverage and upgrade key assets from previous results and commercial products; to integrate the technological enablers in an end-to end CAM ecosystem, to setup the 5G corridor and to facilitate lab and large-scale field trial validation;
- To demonstrate the potential and the user value in advanced CAM deployments at cross-border areas, by characterising and optimising 5G technologies at both lab tests and large-scale trials, so as to validate applicable standards and key target KPIs thus boosting the confidence for wide adoption of interoperable CAM services in Europe;
- To develop and validate the business models of advanced CAM use cases that can be offered on top of existing services in a multi cross-border 5G operator environment, demonstrating benefits from potential operational cost reductions and new revenue generation streams;
- To identify and validate applicable standards as well as provide rationalised contribution to key standardisation bodies so as to sustain standardisation in the telecom and automotive sectors within the CAM context;

- To ensure long-term success through wide dissemination of the project's results; to exploit synergies with other 5G-PPP projects and 5G CAM initiatives; to actively contribute to the 5G Action Plan strategic initiative with results from 5G technologies validation in CAM trials for the benefit of the European 5G, automotive, railways, maritime, transport & logistics industries, the university education and training of young and other professionals.

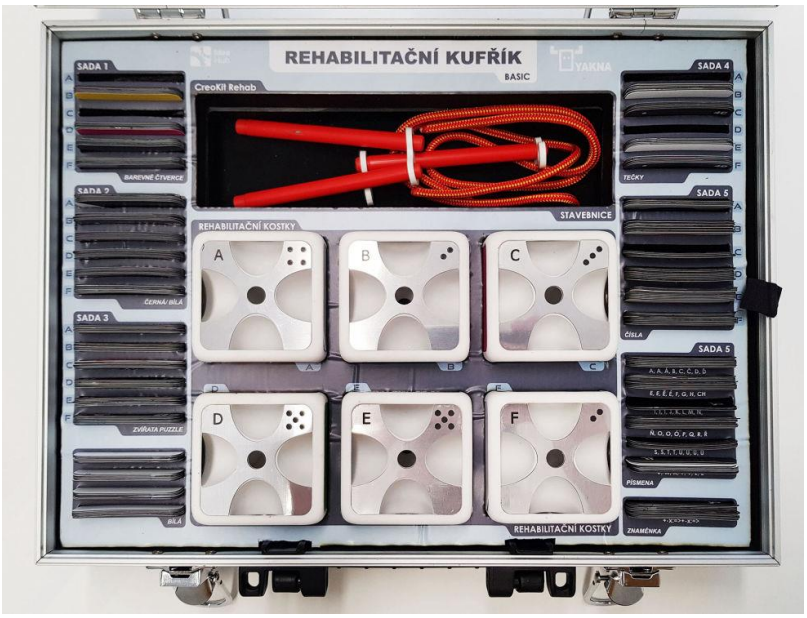
LATVIAN PARTNERS: PASAŽIERU VILCIENS

Grant agreement ID: 951867 / 1 Sept 2020 - 31 Aug 2024

More info: https://www.5g-routes.eu/

CZECHIA – CZELO

Eddie : smart neurorehabilitation software



Rehabilitation suitcase

EU Contribution: € 50 000
Coordinated by: YAKNA s.r.o.

Traumatic brain injuries are responsible for an estimated 57 000 deaths and 1.5 million hospital admissions in the European Union alone each year. The treatment requires a complex cognitive rehabilitation approach early on to avoid disorders becoming chronic.

Project Eddie, coordinated by the Czech company YAKNA s.r.o., is creating smart neurorehabilitation software for patients in the early stages of treatment to assist them in regaining cognitive functions. The project was named after Eddie Edwards, who, despite his fate, decided that one day he would compete in the Olympics. The founders believe that hidden heroes with determination, perseverance, and courage, such as Eddie, have the potential not only to succeed, but also to change and inspire the world around them.

The objective of the project is to connect applied neuropsychology, information technology, academic institutions, and industry. The application is based on clinical psychological experience, current state of knowledge in neuroplasticity and prediction models based on machine learning and Big Data analysis.

One of the first hardware (offline) results of the project is the rehabilitation kit. It includes 6 rehab blocks, 6 sets of interchangeable block sides and building set CreoKit Rehab.

More information: https://cordis.europa.eu/project/id/855803; https://yakna.cz/eddie/

The LEXIS: Large-scale EXecution for Industry & Society

EU Contribution: € 12 218 545,50
Coordinated by: VSB-Technical University Ostrava

Platform bringing Innovation and faster modelling options for the fields of aviation, meteorology, climate, earthquakes, and tsunamis by combining data from their European counterparts.

The LEXIS project, coordinated by VSB-Technical University Ostrava has built an advanced engineering platform at the confluence of HPC, Cloud and Big Data, which leverages existing, geographically distributed large-scale resources in a federation of **established EU supercomputing centres.** It employs Big Data Analytics solutions and augments them with Cloud services.

Driven by the requirements of several pilot test cases, the LEXIS platform relies on best-in-class data management solutions (EUDAT) and advanced, distributed orchestration solutions (TOSCA), augmenting them with new, efficient hardware and platform capabilities (e.g. in the form of Data Nodes and federation, usage monitoring and accounting/billing support).

Thus, LEXIS has realised an innovative solution aimed at stimulating the interest of European industry and at creating an ecosystem of organisations that benefit from the LEXIS platform and its well-integrated HPC, HPDA and Data Management solutions.

More information: https://cordis.europa.eu/project/id/825532

SWEETOOLS: Smart Biologics – Developing New Tools in Glycobiology

EU Contribution: € 1 405 625
Coordinated by: Institute of Organic Chemistry and Biochemistry of the CAS

Thanks to an ERC Grant, the Institute of Organic Chemistry and Biochemistry of the CAS made a surprising **discovery that could result in a new method suitable for use in the treatment of viral diseases and anticancer immunotherapy.**

The EU-funded SWEETOOLS project aimed to improve our understanding of the role of sugars in human biology. Glycans are chain-like structures that are composed of single sugar molecules (monosaccharides) linked together by chemical bonds. They are key to many biological processes. They enable cells to recognise molecules and orchestrate cell-to-cell interaction. Within cells, they are involved in protein folding, positioning, transport, and quality control.

Viruses and bacteria not only attach themselves to glycans, but the spike protein of viruses, including SARS-CoV-2, is sometimes coated with glycans, camouflaging the virus from the immune system. Glycan changes often correlate with pathological states, such as inflammation and cancer.

The SWEETOOLS project, funded by the European Research Council, developed a methodology to construct libraries of glycans linked to a peptide. These 'glycopeptides conjugates' can be used to screen various glycan-processing enzymes.

The team also discovered that synthetic versions of naturally occurring glycans can be metabolically processed by live cells, forming natural glycoconjugates. The team engineered these to be 'chemically' modifiable inside cells or at the surface, offering cheaper immunomodulators.

The first patent application on the chemical re-engineering of cells has already been filed, with in-vitro experiments using different cancer cell lines underway.

More information: https://cordis.europa.eu/project/id/677465

The SWEETOOLS project has also secured additional European funding (ERC Proof of concept - Chemical Engineering of Natural Killer Cells for Cancer Immunotherapy) to validate the commercial potential of the discovery.