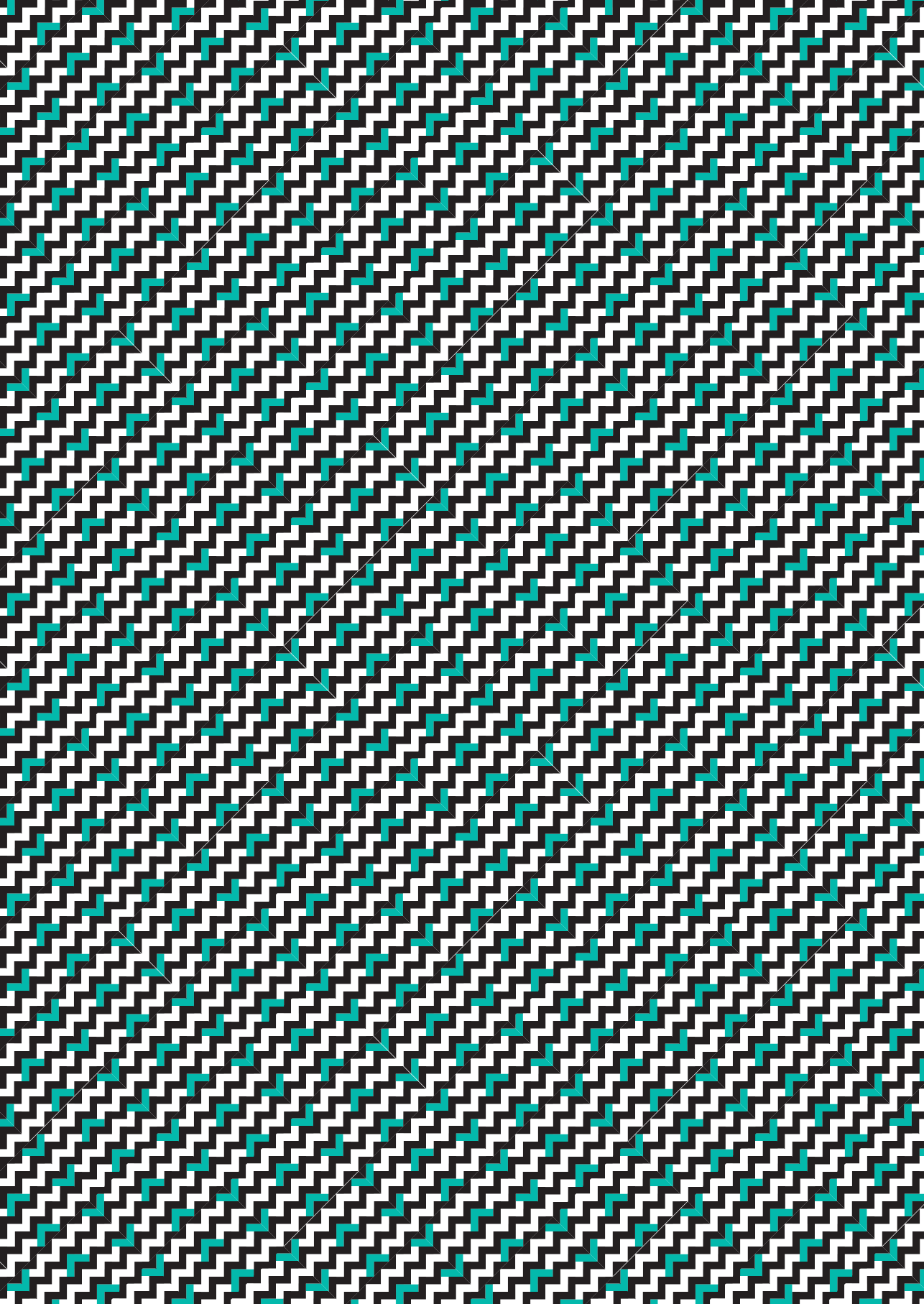
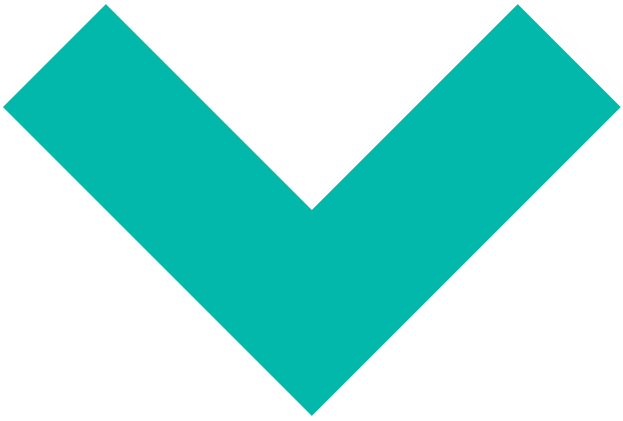
FROM IDEA TO IMPACT

INNOVATING TOGETHER FOR A BETTER SOCIETY

How the five Flemish universities make a difference





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How the five Flemish universities make a difference

VLAAMSE
INTERUNIVERSITAIRE
RAAD

PREFACE

Research at our universities continuously generates new knowledge, broadens the knowledge base and thus contributes directly to the innovative strength and economic potential of Flanders. Thanks to an intense interaction between universities, knowledge centres, spin-offs and industry, we are even setting the tone globally in certain domains. Universities play a key role, through research and innovation, in the search for sustainable answers to global and local societal challenges in the areas of climate, energy, food, mobility, care and security. Against the background of the protracted COVID-19 crisis, our universities are providing fuel for the Flemish resilience more than ever.

Our bright minds focus on research that makes society better, they lay the foundation for innovative products and services that improve people's daily lives and make them more pleasant. They don't do this alone. They cannot do this alone. We are increasingly seeing how crucial the interaction is between university research, research in industry and research institutions and practice. Collaboration between universities, industry, government, societal organisations and citizens promotes the impact of research results on the lives of people worldwide. In turn, practical application serves as a source of data and as inspiration for new scientific research.

This publication brings you no less than 45 success stories of university innovations that provide an answer to challenges for our society. We give examples in seven different domains: Healthcare, Energy, Food & Agriculture, Mobility, Circular Economy, Smart Cities, Culture & Society. In addition, we also show how our universities have joined forces to tackle the COVID-19 crisis. The 45 striking examples are the result of project-based or structural partnerships between universities and industry, of research commissioned by industry and governments or of a transfer of research results via licenses and spin-offs. They are 45 beautiful illustrations of impactful collaboration in action.

Also discover in this publication how the Technology Transfer Offices (TTOs) of the universities bridge the gap between scientists, industry and governments. The TTOs thus help strengthen the societal impact of the collaboration between researchers and partners. We conclude with a few key figures that show that our Flemish universities score high in leading international research and innovation rankings.

Koen Verlaeckt
Secretary General VLIR

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HEALTH

FAST AND RELIABLE HEARING TEST

In 2014, researchers from KU Leuven developed a test to screen people's hearing abilities, based on the detection of random combinations of three numbers in a context of noise. In everyday life, situations are rarely completely quiet, and so this so-called Digit Triplet Test (DTT) determines the level of speech at which a test person still correctly understands half of what is being said in such a noisy context. On the basis of this 'speech comprehension threshold', it becomes apparent whether further diagnostic examinations are required. The DTT is so sensitive that even the slightest hearing loss can be detected very accurately.

The automatic self-test is easy to perform on a tablet in combination with calibrated, high-quality headphones. There is no need for sophisticated equipment or a soundproof test room. The past few years, occupational medical services and pupil guidance centres have been using it extensively. All school children in Flanders are tested with the DTT at two different ages.

In 2018, hearing specialist Lapperre licensed DTT in order to distribute, sell and maintain its software and hardware. The company uses it to quickly and reliably screen the hearing of its customers. In case of significant hearing loss, it refers them to an ear, nose and throat specialist for further examinations and a definitive diagnosis.

FROM CAMEL PROTEINS TO DISEASE FIGHTERS

Plenty of drugs and diagnostic tests cannot be developed without using antibodies. These are proteins formed by our body's immune system which are able to detect and neutralize harmful substances and cells. However, the production of these antibodies in the laboratory is complex and expensive. A coincidental discovery from 1989 provided an outcome: it turned out that the antibodies of camelids, like llamas, dromedaries and camels, are smaller and more durable than their human counterparts, that they are resistant to more extreme conditions and easier to produce and manipulate.

Researchers at the Vrije Universiteit Brussel (VUB) have succeeded in developing fragments of these natural disease fighters into so-called Nanobodies® which are not repelled by humans. This proved to be the breeding ground for years of groundbreaking research and eventually the creation of various VUB spin-offs.

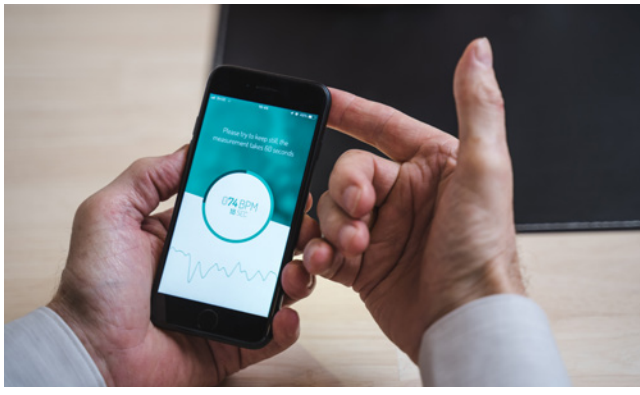
One of them, Ablynx, now Sanofi, launched the first medicine against *thrombotic thrombocytopenic purpura*, a rare, life-threatening condition in which blood clots clog smaller blood vessels. Another, PRECIRIX®, the former Camel-IDS, targets cancer cells via radio-immunotherapy, sparing healthy tissue. Finally, Confo Therapeutics, uses Nanobodies to freeze proteins in the ideal form to develop drugs. The biotech company is thus targeting pulmonary and hepatic fibrosis and rare, neurological disorders.

MEDICAL APP SAVES LIVES

One in five strokes is being caused by heart rhythm disorders, 75 percent of which could have been avoided by early screening and follow-up. That is why FibriCheck has been developed, the first medically recognized app which uses a combination of artificial intelligence and medical software for the early detection of heart rhythm disorders.

Currently, more than 250.000 app users get an accurate analysis of their heart rhythm on their smartphone or smartwatch. Over 1.500 cardiologists and GPs from twelve different countries are prescribing FibriCheck, which allows them to access their patients' data at any time and any place. Thus, the app offers more efficient care and follow-up of symptomatic patients and more effective (pre)screening of people with an increased risk.

The app developer, Qompium, a spin-off from UHasselt and Ziekenhuis Oost-Limburg, has been proclaimed best digital health company by the European Society of Cardiology. The app has been approved for the American market and will be able to save many lives there as well.



I didn't know what happened to me when I had my first stroke in 2013. The doctors couldn't find a cause. Two years later, it happened again and I was lucky again, because I also recovered from this TIA (*Transient Ischemic Attack, a temporary closure of a cerebral vein caused by a blood clot*, ed.). Fortunately, the first FibriCheck prototype had just been made available. After two months of monitoring, we discovered the cause of my problems: short episodes of atrial fibrillation that were difficult to detect until then. Thanks to this app, I now receive the right medication to protect me in the future.

Luc Grieten, 59 years old

© Lawrence Schoonbroodt

CELL THERAPY IN ACCELERATION

Nowadays, the medical world is very hopeful about the potential of cell therapy. This includes any form of treatment in which living cells help to heal or support the patient, for example in the case of damaged heart muscle, an aggressive cancer or multiple sclerosis. Numerous young biotech companies are therefore working hard on the advancement of different kinds of cell therapy.

Unfortunately, it is not easy to extensively test these therapies and subsequently, bring them to the patient. It requires, amongst other things, specialized infrastructure. This was provided in 2019 by Anicells, a spin-off from the University of Antwerp, which aims at facilitating and accelerating cell therapy research, and consequently, at encouraging commercialization at a larger scale. At Anicells, researchers and companies can make use of specialized laboratory facilities and consult experts on legislation, good manufacturing practices and medical logistics.

IMPROVED PHARMACEUTICAL FREEZE-DRYING SYSTEMS

About half of all medicines on the market are lyophilized. This freeze-drying process is necessary to give (bio)pharmaceutical solutions the desired shelf life and quality without compromising its activity. The conversion of aqueous solutions of heat-labile vaccines to a dried, porous form ensures that those vaccines can be rapidly dissolved into a solution for example and, moreover, can be stably distributed and stored.

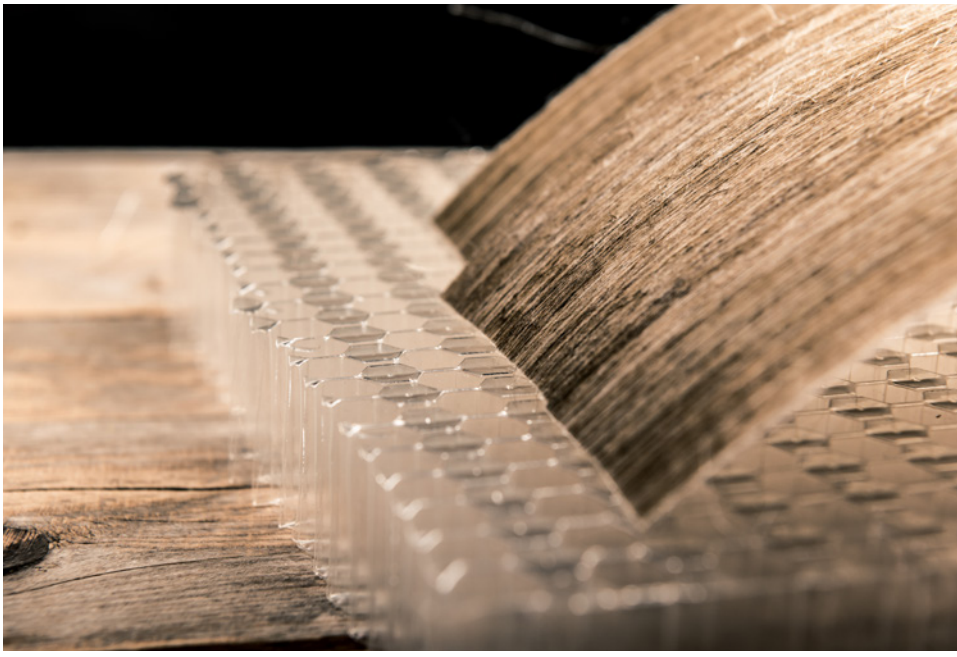
Unfortunately, the traditional way of freeze-drying, in large quantities at the same time, is a slow, energy-intensive and therefore expensive part of the production process. But thanks to Rheavita, a Ghent University spin-off, lyophilizing no longer has to be done per batch, but becomes a continuous process. This transformation ensures that the processing time is more than 40 times shorter than before, guarantees better quality – every processed product is continuously checked during production – and allows products to work much more flexibly. In other words, the benefits are enormous.

ENERGY

EXTREMELY LIGHT PANELS FOR MORE ECONOMICAL TRANSPORT

Heavy vehicles and trucks consume a lot of fuel and are very polluting. To reduce their weight and thereby reduce their fuel consumption, manufacturers are increasingly using light but strong materials. So-called sandwich panels with a honeycomb structure are, for example, extremely suitable.

EconCore, a KU Leuven spin-off, developed a highly automated, super-fast process to produce such panels in large volumes and at low cost. Thanks to this technology, car manufacturers can use the extremely light panels in trunks, hat boards, roofs and doors, and thus produce more economical vehicles.



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OPTIMISED OFFSHORE WIND TURBINES

To make wind energy ever more efficient, it is important to optimise the design, maintenance and lifespan of wind turbines. In offshore wind farms, they are subject to all kinds of forces of nature. The combined strain of wind and waves, for example, causes metal fatigue in the foundations. It is one of the most important parameters designers and operators of turbines should consider.

In this context 24SEA, a spin-off from the Vrije Universiteit Brussel (VUB), makes all the difference. The company specialises in structural health monitoring and advanced data analysis in offshore wind turbines. It designs, assembles and installs the systems that collect data, selects the sensors, organises the data transfer and storage, and it also analyses all the gathered information.

24SEA has a clear mission: to provide insights to offshore wind developers and operators, insights that are crucial to minimise the construction and installation costs of future structures, to reduce operating costs and, where possible, extend the lifespan. The spin-off has a 100 percent market share in the Belgian offshore wind market, but also coordinates projects in, for example, the United Kingdom, the Netherlands and France, and has also recently started installations in Taiwan. Since continuous research and ongoing development are essential for a technology company like this, 24SEA continues to work closely with universities and other research centres.

The offshore wind industry is a relatively young industry and is evolving technologically at a furious pace. Where a few years ago we were still building wind farms with 3-megawatt turbines, there now are plans in place for machines of 12 megawatts and more. At the same time, we note that not a single large-scale wind farm reaches its budgeted lifespan. Therefore, it is extremely important to gain experience, faster than we do now, and to learn as much as possible from the behaviour of existing turbines and their foundations. That is exactly what 24SEA is assisting us with. Thanks to their advanced monitoring, insights and links with academia, we are able to gain the much-needed experience at the speed required by this industry.

Cedric Vanden Haute, Lead Design Engineer at Parkwind, partner company of 24SEA

REDUCED ENERGY USE OF HEATING AND COOLING SYSTEMS

HVAC installations are responsible for one third of total energy consumption in Europe. The acronym stands for Heating, Ventilation and Air Conditioning as the systems take care of the heating and cooling of buildings. However, the energy efficiency of such installations is often unsatisfactory, due to a flawed design. The integration of more sustainable techniques such as heat pumps, the storage of solar heat and borehole energy in the soil could provide a solution. At the same time, such techniques can increase the complexity so that designers lose track.

Hysopt, a spin-off from the University of Antwerp, therefore developed unique software that helps users predict and quantify the performance of these complex, innovative installations already in the design phase. It allows a thorough comparison of different variants and thus indicates which is the best option. Hysopt is active in Belgium, but also assists construction managers in the Netherlands, Denmark and the United Kingdom to make optimal use of their heating and cooling systems.

TO A FUTURE WITH SOLAR CELLS IN SOUND WALLS, BIKE LANES AND MOTORWAYS

A cycle path in a rural area where the lighting starts every time a cyclist passes by: it is not a futuristic dream. It is possible with electricity that is generated during the day and stored by solar panels in the road surface, in combination with integrated batteries. And that is just one of the options that emerge thanks to IIPV, infrastructure-integrated solar cells.

UHasselt joined forces with eighteen Euregional partners to develop the technology and business models to enable IIPV breakthroughs along, for example, motorways and railways, where they can provide energy for street lighting. At the consortium, municipalities and project developers can come and discuss their future construction projects, make them future-proof and energy-neutral, and thus distinguish themselves as early adopters. This involves not only the integration of solar cells in the road surface, but also an efficient connection to a local or public electricity network, the use of batteries and more.

Thanks to this unique collaboration between the construction and solar cell sectors and to the attention to the entire system, affordable, sustainable and user-friendly solutions will be found in ever more places.

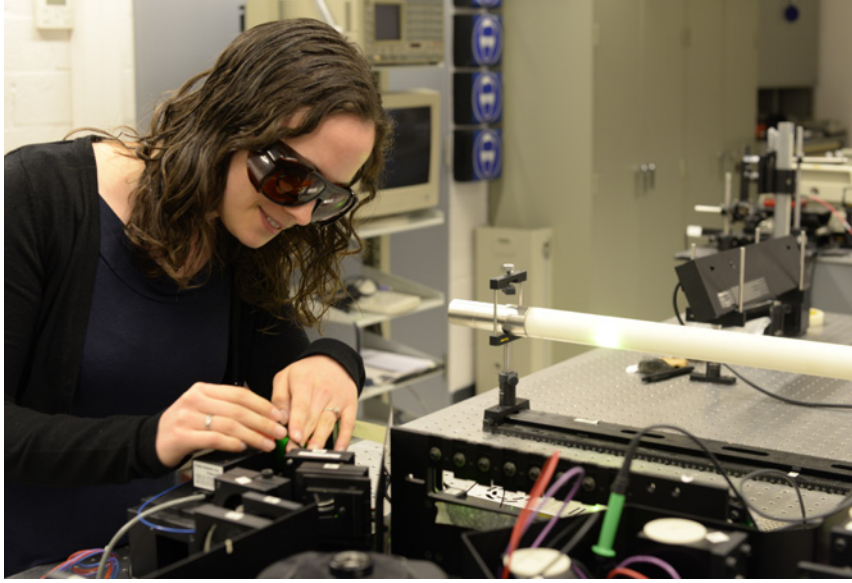
BREAKTHROUGH TECHNOLOGY FOR ELECTRIC CARS

Cars, trucks, motorcycles, but also planes are increasingly making the switch to electric propulsion. This trend is known as 'electrification' and the motivation behind it is almost always the same: the vehicle operates quieter, requires less maintenance, performs better and makes more efficient and flexible use of energy sources. It will come as no surprise then, that all the current players in the automotive market are looking for suitable electrical machines to achieve this electrification.

For a long time, such machines operated according to a standard design, but Magnax, a Ghent University spin-off, created a completely new machine that provides more power and torque (*the rotating force of an engine*, ed.) at the same weight. It took six years of research and development of the highly efficient axial flux technology. This entails that the motors no longer have to be manually fitted with bobbin wires, but that this can be done automatically. This was followed by another three years of prototyping and further development.

The result is a motor technology that provides three to four times more power density than traditional electric machines. This offers many advantages, ranging from less material use and iron loss to a more compact design. In other words, the production process becomes cheaper and more efficient. In no time at all, Magnax ensures better performance, more efficient use of energy sources, lower CO_2 emissions and thus a more sustainable world.

FOOD & AGRICULTURE



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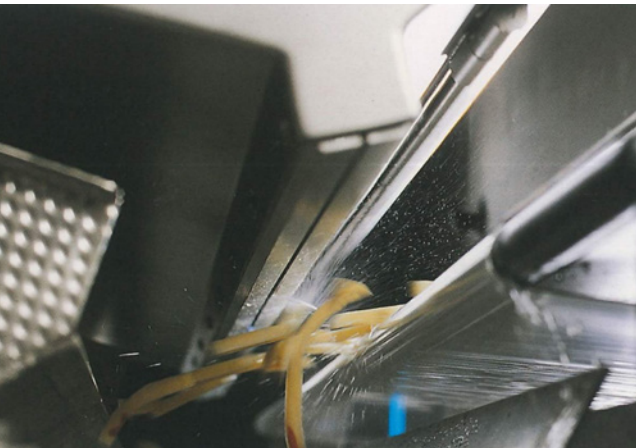
LIGHT TECHNOLOGY FOR BETTER FOOD SAFETY

Consumers are increasingly paying attention to the quality, safety and health of their food, in part because of the various scandals they have experienced in recent decades. Fortunately, research at the Vrije Universiteit Brussel (VUB) on photonics or light technology results in numerous applications that can help the food sector in the context of quality screening or the presence of harmful substances.

Light technology is used to remove stones, glass, twigs and other unwanted particles from food on a conveyor belt. In addition, researchers from the VUB developed an innovative laser scanner that detects harmful substances in food. These include acrylamide, a toxic substance that can be formed when fries are heated above 120 degrees, and mycotoxins, a poison produced by fungi that can occur in cereals, corn and nuts. The scanner works quickly and accurately, without affecting the healthy foods. In addition, light can also be used to detect fraud in the food chain and to check the quality of food packaging. In this way, light technology contributes to better food safety and a reduction in food waste.



NEW APPLE VARIETIES WITH INTERNATIONAL APPEAL

In the Hageland village of Rillaar, Better3Fruit, a KU Leuven spin-off, works hard to create new apple varieties. They do so by manually pollinating thousands of blossoms from apple trees each year and thus crossbreeding different species. The fruits of the pollinated flowers produce seeds, which eventually produce several thousand trees, one per variety. After an initial selection based on appearance, preservation and taste, Better3Fruit ends up with 100 varieties. A second selection follows, which focuses on yield and susceptibility to disease, in the end determining one top apple. The whole process takes about fifteen years, after which another five years are needed to commercialize the new breed.

But it is worth it. Better3Fruit's Kanzi® is the second largest club breed in the world – a club breed is a new, patented breed that can be marketed by a limited number of people or organizations. Kanzi® is only outdistanced by the Australian Pink Lady. With its new Morgana®, Better3Fruit is now aiming for a second triumph. Everything seems to be fine so far: the apple is beautiful, has a sweet taste, crunchy texture and preserves well. In addition, the variety is not very susceptible to diseases and thus guarantees good yields.

Kanzi® is a modern, 100 percent Belgian apple with a bright red colour, an excellent taste, texture and juiciness. In short, it fully meets the demands of our consumers. This apple has conquered the world at an unparalleled pace, as ten years after its market introduction it is already in second place in the long list of apples sold under a brand name. At European Fruit Cooperation, we produce and market Kanzi® through a global licensing system that creates added value for every link in the chain, from grower to consumer. It is an example of a product that was introduced on the world market thanks to the collaboration between university researchers and the Belgian and international business world. Belgian fruit growers benefit from this and at the same time, our innovative power is made apparent internationally, which in turn promotes further innovation and cooperation.

Ilse Hayen, CEO at European Fruit Cooperation

NEW FERTILIZERS BASED ON SURPLUSES

Flanders, like many other regions in Europe, is a hotspot of nutrients, such as phosphates and nitrogen compounds, which in our case stems from a combination of factors: the high import of feed and fertilizers, the intensive agricultural and food industry and the high population density. Today, large amounts of these nutrients end up in the waste and residual streams and are therefore lost.

In the context of the MicroNOD project of the University of Antwerp and Ghent University, bio-engineers together with the business world discovered that they can convert these surpluses into microbes and thus new fertilizers. They developed an innovative technology that will help the agricultural and horticultural sector to make the transition to a more sustainable, bio-based economy. The next step is to scale up the production of the so-called microbial fertilizers and thus make them ready for the market.

SUSTAINABLE SOIL REMEDIATION

Bio2clean, a UHasselt spin-off, focuses on the remediation of soil and groundwater pollution via phytoremediation. This term refers to the ecological remediation technology that uses plants and their microorganisms to remove pollutants through degradation, extraction, transformation or evaporation. Compared to conventional methods, this technique is cheaper, it does not disturb the soil and does not require transport of contaminated soil. As a result, it is much less harmful to the environment and has an extremely limited ecological footprint. There are also benefits in terms of quality of living environment, biodiversity and the services provided to people by certain ecosystems.

In Flanders, there are an estimated 85,000 grounds on which activities can be carried out that can cause soil contamination. An orientation soil survey has been carried out for half of these soils since the end of 2018. In the last twenty years, a total of 5,405 soil remediation projects have been submitted and declared compliant (source: Statistics Flanders). Bio2clean wants to continue to play its leading role in this.

SPECIAL CARBOHYDRATES FOR BABY MILK

Breastfeeding is the best nutrition a newborn can get at the start of his or her life. However, due to circumstances, some mothers cannot feed their baby in this way (long) enough. They then quickly switch to synthetic powdered milk, usually based on cow's milk, but that does not offer all the health benefits of human breast milk. In particular, human milk sugars, the so-called Human Milk Oligosaccharides (HMOs), are lacking. These special carbohydrates significantly strengthen the baby's health because they reduce the risk of bacterial or viral infections and contribute to the newborn's intestinal health, immune support and brain development.

The biotech company Inbiose, a Ghent University spin-off, developed a special fermentation technology to be able to produce these specific HMOs on a large scale. Thanks to its technology platform, Inbiose will eventually be able to develop almost any special carbohydrate in large quantities, and will thus make full use of the power of nature.

MOBILITY

© Tobias Cornille

CITIZENS MONITOR TRAFFIC IN THEIR STREET

Transport & Mobility, a KU Leuven spin-off, recently developed Telraam, a citizen science project in which citizens carry out traffic counts themselves. They install a small camera on the inside of a street-side window, which counts the number of pedestrians, cyclists, cars and the amount of heavy transport and which records the speed at which these are passing. On the Telraam website, anyone who is interested can consult the measurement results.

In this way, citizens have access to objective data to confront local authorities with the facts and open up a dialogue with them. It puts them at the helm of local mobility policies and gives them a means of pressure to enforce safer traffic with the government. This involves, for example, an adjustment of the direction of travel, the rearrangement of public spaces, a stricter maintenance of the maximum speed or more bicycle comfort. Transport & Mobility's tele-cameras are set up all over Flanders and even abroad.

ONLINE PLATFORM IMPROVES TRAFFIC SAFETY IN AND AROUND SCHOOLS

ABEONAconsult is a spin-off of Hasselt University, specializing in the development of smart products, software and services in the context of transport and traffic safety. Their project Route2School fits perfectly into their vision. It already advises more than 70 municipalities and schools in infrastructure challenges that come with a traffic-safe school environment. Route2School offers them a good view of the feeling of insecurity of students, parents, teachers and principals facing traffic. It collects this input, processes it into a digital school roadmap and then makes it available to the municipalities and educational institutions so they can develop improvement actions in a constructive dialogue.

But traffic safety problems are not simply solved with infrastructure works. There is also a need for better, scientifically based platforms that protect children against possible dangers and problems on their way to school. Therefore, Route2School simultaneously focuses on the development of an educational platform that is based on the specific situation of each child. This is the next step for the project, offering cities and municipalities not only an inventory of the problems, but also concrete and innovative solutions.

For my daughter and I, I find it crucial to feel safe while cycling to school. That is why we use Route2School so we can enjoy our daily journey together without worry.

Kristof Vints, resident of Beringen

INVOLVE ALL STAKEHOLDERS IN COMPLEX DECISION-MAKING

There are different models for complex decision-making in mobility, transport or logistics, but they take little or no account of the stakeholders who represent different interests and backgrounds. The outcomes therefore often lead to a great deal of discussion, which means that a final decision and implementation is missed.

Fortunately, a new methodology was developed at the Vrije Universiteit Brussel (VUB). MAMCA, short for Multi-Actor Multi-Criteria Analysis, involves all stakeholders at a very early stage. The method with associated software thus makes complex decision-making processes much more participatory, since each stakeholder can be involved in each phase of the process and introduce what is important to him or her. Stakeholders can for example co-create scenarios, they can be asked about their objectives and it can be determined what the impact of such scenarios on those objectives would be. This ultimately forms the basis for the development of a coordinated and supported vision.

MACMA has since been applied to nine European projects and numerous other studies, and has thus had an impact on mobility, logistics, urbanism, energy consumption and transport in more than twenty cities and regions at home and abroad. The method has, for example, been used to determine the pros and cons of different ways to supply cities with goods and food, and to assess future mobility scenarios within some European cities. In addition, the analysis tool has been used to design new energy systems that meet the needs and wishes of both citizens, network operators and all other stakeholders.

OPTIMAL TRANSPORT PLANNING THANKS TO ALGORITHMS

The transport sector is still struggling with the logistics of many of its systems. These require a series of manual operations, human interventions and frequent inspections. Current estimates show that a medium-sized transport company with a fleet of up to 300 trucks sometimes spends 150,000 euros a year on manually collecting data for daily planning. In addition, such companies face even higher costs due to inefficient planning, limited use of truck load space and driving empty vehicles.

DigiTrans, a spin-off from the University of Antwerp and imec, developed a digital solution that can be connected to all possible systems of order information, transport management or track and trace. The solution allows for using data in existing software, calling up actions and working with customizable optimisation algorithms.

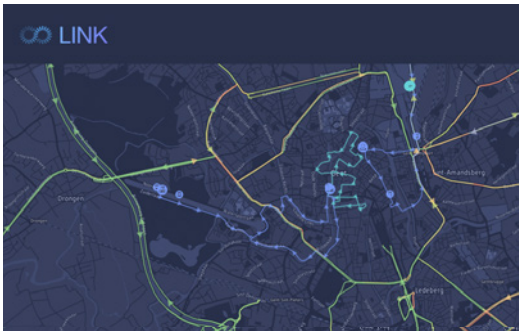
Thanks to this innovative technology, carriers and logistics operators can have their planning monitored by digital assistants, using their own data to their advantage. That way, DigiTrans ensures smarter use of means of transport, fewer errors and improved mobility.

STIMULATING INNOVATIVE MOBILITY

Anyone who goes on the road today knows that it does not always go smoothly, and that is putting it mildly. Small and medium-sized cities in particular struggle every day to make the flow of traffic compatible with the accessibility of shops and public institutions, and the liveability of the city. TMaaS, short for Traffic Management as a Service, wants to assist them in this.

Unlike current traffic centres, TMaaS is based on a fully digital and open platform. This means that it combines its own data with those of external ones in order to optimally inform and sensitise the end consumer. In addition, this platform can combine different datasets to create customized applications. In this way, cities and citizens get information that really interests them and that enables them to create urban mobility solutions and new business models together.

In this way, TMaaS stimulates open innovation in traffic management, whereby different stakeholders can intervene and contribute. This will not only lead to innovation, but also to more cooperation between cities, citizens and local businesses.



CIRCULAR ECONOMY

REJUVENATION CURE FOR ASPHALT

In Flanders, an estimated 51 percent of the asphalt is scraped off sooner or later with a special milling machine. If this asphalt is recycled, that is a significant financial and ecological saving on raw materials for new asphalt. That is why the asphalt sector and research institutes joined forces in UAntwerp's REjuveBIT project.

A first step in their sustainable approach is to apply rejuvenating agents to the old, brittle bitumen, the binder in asphalt, so that it regenerates and behaves like new bitumen. This increases the quality of the binder.

A total of five test sections have been constructed in Flanders, each carried out by other contractors using different rejuvenating agents and asphalt mixtures. That way, the project thoroughly tests the new materials that are already being experimented with in our neighbouring countries in the Flemish context, in particular on quality and on ecological and economic added value. In case of favourable results, Flanders will be able to make more and better use of old asphalt. This reduces the ecological footprint of the asphalt mixtures and helps the sector to contribute to more sustainable road construction.

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REVOLUTIONARY TECHNOLOGY TO RECOVER RESIDUAL HEAT

Significantly higher gas prices than before, rising CO_2 taxes and legal restrictions: industrial companies are facing these kinds of challenges. They thus have much to gain from energy efficiency by valorising industrial residual heat. It is exactly this source of energy that all countries have in abundance. This is how it was stated in the Energy Efficiency Market Report that the International Energy Agency published in 2016. What if we had more access to this untouched potential?

Qpinch has already taken a big step forward. The Ghent University spin-off developed a revolutionary technology to recover industrial residual heat. Inspired by the so-called ATP-ADP cycle, the mechanism of a cell that captures and releases energy, Qpinch created an innovative, chemical water pump. It scaled up the principles from microscopic to industrial level and is able to recover much of the energy that is now lost in industrial processes. Important effects of this are lower CO_2 emissions and lower production costs.

Qpinch's breakthrough technology contributes greatly to Climate Action, but also to the viability of the world's largest energy consumers. It is a win-win for the economy and the environment.

Erik Verdeyen, Chief Evangelist at Qpinch

ENVIRONMENTALLY FRIENDLY CEMENT SUBSTITUTES

Cement remains a widely used product worldwide, but it comes with an ecological price. Its production is responsible for eight percent of the total CO_2 emissions. Fortunately, researchers from KU Leuven succeeded in developing a production method in which 50 to 70 percent less CO_2 is released, without their ecological cement replacement having to compromise on material properties.

In addition, their product is made from residues of the metal industry, such as copper slag and iron slag, which were formerly considered as waste. Now they get a useful reassignment: as a new binder, equivalent to the traditional cement.

In collaboration with partners from the metal industry and with producers of cement and building materials, the researchers succeeded in scaling up the concept from the laboratory to the industry, thus opening the way to commercialization.

CIRCULAR (RE)BUILDING COMING CLOSER

The construction sector is responsible for almost 40 percent of our total waste production. In addition, raw materials are becoming increasingly scarce. Sustainable (re)building is therefore not a fad, but a pure necessity. It implies an optimisation of both the energy consumption and the reuse of building materials.

Scientists from the Vrije Universiteit Brussel (VUB) together with some front runners from the construction industry, proved that circular renovation can indeed be done, by renovating eight former student rooms on the university campus according to those environmentally friendly and low-waste principles. Their Circular Retrofit Lab is the first, large circular renovation project in Europe and proves that everything can be (re)assembled, be adaptable and reusable while providing a minimum of demolition waste.

The pilot project currently serves as a classroom and office space, but also as an experimental place to develop even more circular concepts in a collaboration between students, researchers, designers and construction partners. With the latter, new business models are being developed with which they can offer circular construction products and installation techniques as a service. In the future, the lessons learned from the Circular Retrofit Lab will serve as inspiration to renovate another 300 units of the former student rooms in the same circular way.

WASTE MANAGEMENT REDUCES GREENHOUSE GAS EMISSIONS

Using the promising name BASTA, researchers from UHasselt focus on the conversion of biomass streams into biochar, a stable carbon-rich substance that is used as a soil improver. This can be very useful in contexts such as manure processing, and in cultivation both on open field and on an artificial substrate soil. By processing the biomass waste streams, the volume and processing cost of the waste decreases, and a great social benefit is immediately created in the form of a reduced emission of greenhouse gases and ammonium. With biochar, one can also check the suitability of marginal soils for biomass and crop production in open-field cultivation.

Furthermore, BASTA is working on a support tool that can optimise the market potential and the positive environmental effects of biochar, and that can identify its profitable and socially desirable applications. The project will also organize workshops to learn how to use the tool and thus recognize the opportunities that biochar offers for new, economic value chains and potential sequels.

SMART CITIES

BETTER PREPARED FOR HEAVY RAINFALL

During heavy rains, cities often face specific problems: due to the high amount of concrete and asphalt the water can barely escape, the sewers become saturated and flood, and there is a lack of greenery to absorb the water and allow it to evaporate. Water nuisance can therefore cause serious damage to the urban environment.

The European project FloodCitiSense focuses on monitoring rainfall and floods, and actively involves citizens. It uses affordable sensors and web-based technologies, and aims to develop an early warning system that will allow urban environments to respond better and faster to floods.

Specifically, a so-called urban living lab brings together all the actors and tests and develops the necessary tools, ranging from a mobile app to report heavy rain and water nuisance, low cost rain gauges that they assemble and test, to a web app to consult the data on rainfall and water nuisance. Not only do timely forecasts contribute to good measures against water nuisance, improved simulations and the urban hydrological response are equally important. Local stakeholders, researchers, regional and local administrations, industrial partners: they are all involved.

In Brussels, the Vrije Universiteit Brussel (VUB) set up such an urban living lab and worked closely with a citizens' initiative on water, with the *Staten Generaal van het Water* in Brussels, and with public actors such as the *Brusselse Maatschappij voor Waterbeheer, Leefmilieu Brussel* and VIVAQUA, a Belgian intercommunal for the production and distribution of drinking water. In the Brussels Region, meanwhile, about twenty rainfall sensors have been installed, which transmit data via a public Low Range Low Power network to a central server. FloodCitiSense is also active internationally, via urban living labs in Rotterdam and Birmingham. The project ended in the summer of 2020, after which each urban living lab will investigate how the developed tools can be incorporated into the workings of the stakeholders in the city.

REAL-TIME INFORMATION ON CROWDS

Information about the size and density of masses of people can be invaluable at large-scale events and in crowded cities. The benefits lie not only in the commercial sphere, but also in terms of security and personnel policy. For example, a crowd sometimes moves abruptly, in the direction of a popular artist performing on another stage, and without detailed information it is very difficult for the emergency services to instantly make the right decisions. Today, they use cameras, but those images are difficult to interpret in the case of, for example, smoke or light flashes. Often, they also contain privacy-sensitive information.

The *MensenMassaMeter*, developed by scientists from the University of Antwerp and imec, offers a solution. It delivers real-time images of, among other things, the number of people present and the movements of the crowds without using privacy-sensitive data. After all, the technology is based on sensors and not on cameras or smartphones. The so-called human mass meter sensors, which are placed in the surroundings, exchange wireless signals and measure the disturbances due to a group of people walking between the sensors.

The aim is to further expand this innovative technology with additional information. In a subsequent phase, the M*ensenMassaMeter* can then be used widely, at busy festivals, in large event halls or in cities.

In order to be able to respond quickly and in a timely manner to a crowd, one must permanently have objective, real-time data that supports the decision-making process. Ideally, a system warns us when critical values for the numbers in a crowd and its density are reached, so that we can take the necessary actions.

Anton Dierickx, Deputy Head of Public Order at the local Antwerp police

EVERYTHING SMART WITH 100 PERCENT STRETCHABLE SENSORS?

By combining silicone rubber and liquid metal, researchers from UHasselt were able to come up with a manufacturing process for durable electronic circuits that can stretch like an elastic band. Such circuits greatly overclass traditional, non-deformable devices in terms of integration. After all, circuits and sensors that can bend and stretch more than 100 percent, can be imperceptibly integrated into, for example, textiles or human skin, de facto on any flexible or soft surface.

In this way, this manufacturing process called Silicone Devices realizes a new genre of smart objects. Following promising results with accessible production for non-experts, the process is currently being further developed for industrial scale and for commercial applications. This is happening in the context of a VLAIO spin-off innovation mandate, specifically designed by Flanders Innovation & Entrepreneurship (VLAIO) to get postdoctoral researchers to carry out a project in close collaboration with the business world.

SMART MONITORING OF INSULATION QUALITY IN BUILDINGS

When renovating buildings, it is essential to know what factors have an impact on the actual energy consumption of those buildings and how a renovation can improve them. Smart Internet of Things applications can make contributions in this process.

The KU Leuven spin-off VersaSense develops all kinds of sensors that allow users to monitor any industrial machine via the Internet in the blink of an eye, without specific IT knowledge. CHARP KU Leuven develops intuitive tools for construction specialists. With united forces, the two managed to quickly and easily equip buildings with wireless sensors that are securely connected to an online data analytics platform. In this way, the actual energy performance of the buildings can be measured and analysed in real time.

For VK Architects & Engineers who carried out a large-scale renovation, for example, these sensors on both sides of roofs and exterior walls measured the surface temperatures and heat flows for two weeks, without the need to run cables. Based on the measurements, the agency was able to map the actual insulation quality of the buildings in question. The engineers gratefully used that input to better predict how much energy they could save with their project.

SMART TRAFFIC LIGHTS FOR BETTER MOBILITY

Having a green light three times in a row on the way to work: it is enough to make you think that your karma is excellent. But when it is up to Ghent University investigators, karma will soon have little to do with it.

Today, traffic lights already use custom algorithms to take into account the morning and evening rush hours, or even planned exceptions such as large public events. Ghent University's Observer project has taken the next step and has created smart traffic lights. These observe the current traffic situation and respond to it conveniently. For example, they can take notice of unforeseen circumstances, such as an ambulance that urgently needs to cross the intersection or additional traffic caused by an accident. In this way, the smart lights contribute to a smoother flow, better air quality and less noise nuisance.

The data collected by the Observer project is also made available in real time as open data in accordance with the Smart Flanders Open Data Charter. This is in line with the Mobilidata program that the Flemish government launched last year. Several Flemish authorities, supported by imec, pooled their efforts to collect and make available large and diverse amounts of data on many forms of mobility. In this way, the government can not only optimise its own policies, but also give residents, entrepreneurs and app developers the opportunity to get started with this wealth of mobility data. For example, this could lead to a navigation app that tells you how fast you should drive to avoid having to wait for a red light, or to a traffic light that gives cyclists a green light faster in case of rain.

CULTURE AND SOCIETY

FAST AND CHEAP MAPPING OF PLOT BOUNDARIES IN EAST AFRICA

In more than 150 countries, land rights are not or hardly maintained in a land register, making it impossible to determine the owner and the boundaries of plots. This leads to legal uncertainty and often to disputes. That is why the EU project its4land, in which KU Leuven was one of the partners, developed methods that map land rights faster, cheaper and easier. It did so specifically for East Africa and it involved the local community.

The situation in Africa differs from country to country. For example, many Rwandan farmers own small tracts of land, while many Kenyans outside the cities lead nomadic lives, leading to more dynamic land rights. Within its4land, software has been developed that converts hand-drawn maps into metric maps that a computer can process. This allows the locals to draw a map themselves indicating which areas they are traversing. The project also deployed drones with cameras to make aerial images of the selected regions. The data is available within 24 hours to the local community so they can, on the spot, help draw up maps with plot boundaries for their region.

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APP OFFERS RESIDENTS A TIME MACHINE

Recently, Antwerp residents can travel back in history for several centuries thanks to the *Tijdmachine Sint-Andries* app. Researchers from the City History Center of the University of Antwerp collected historical maps, photographs, drawings, data from the tax administration and much more from the Sint-Andries district. They joined forces with Zamia, a company which developed it all into the application.

Quite a few people are already familiar with apps that show in one click what a street or square look like today. The *Tijdmachine Sint-Andries* app works in a similar way, but adds an extensive historical dimension. For the years 1584, 1796 and 1898, users can request information about a specific house and the name, occupation and gender of its occupants.

The project has been tested in the Antwerp Smart Zone, an area of 2.7 km^2 where the city of Antwerp, in collaboration with research institutions and other partners, is shaping its ambitions to be a digitally innovative city. Moreover, the *Tijdmachine Sint-Andries* app is part of the Time Machine Europe project, in which more than 500 universities, archives and other institutions from almost all European countries test the most innovative technologies. They do so with one inspiring goal: to map and unlock Europe's rich historical and cultural heritage in unprecedented ways.

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NEW, SOCIALLY RELEVANT DESTINATION FOR CHURCHES

In many parish churches in Flanders, the number of worshippers is declining sharply and a closure route is imminent. Fortunately, researchers in architecture and art from UHasselt want to give the buildings a second life as a socially relevant place. They are looking at the possibilities of giving churches a new destination, for example as a cultural space or youth centre. In terms of urban planning, the churches also prove to be very suitable for the public heritage of a district or village. For example, a church can be a very good place to house a town hall, school or library.

The researchers do not engage in this thought experiment alone. They start participatory projects with the church board, the city or municipality and the local residents, and together with them, they examine whether and how they can play a role in the future management of the churches. They often aim for continued public use, which ultimately results in the greatest benefit for the residents, whether they are religious or not.

SPORTS COMPASS FOR CHILDREN

When children choose a sport, they rarely base their choice on what they are good at or like to do. They go dancing or play football because a friend does so or because their parents have good memories of it. But after a while, they often find that they do not succeed or that they simply do not like the sport. They start looking for an alternative or quit playing sports altogether. It is a pity, because that can lead to a lack of physical activity and even have a negative impact on their self-esteem.

Sportkompas wants to do something about this. The orientation tool, based on scientific research by Ghent University, helps children aged eight to ten make a good choice of sport. Because when they make a choise based on their own abilities and motivation, they experience more fun and enjoy the progress they make in their sport. This contributes to their well-being and to a permanently healthy lifestyle.

In *Sportkompas*, children enter what they like and perform a number of movement exercises. Based on this, they find out which sport suits them best and they find it easier to discover the right sports club in their own municipality. A more targeted influx into those clubs ultimately results in fewer drop-outs and more motivated, skilled athletes.

***Sportkompas* is a much-needed concept that detects talent and encourages lifelong exercise.**

Bruno Van de Walle, sports teacher at Campus De Tandem in Eeklo

BEHAVIOUR AS WELL AS CONTEXT PORTRAYED

What do people do? This is the key question for behavioural researchers, but often they only gather the opinions, intentions, attitudes and stories of their test audience. They do not know what the audience is really doing. Hbits changes that. The spin-off from the Vrije Universiteit Brussel (VUB) is a pioneer in time management research and uses its modular research platform MOTUS to study human behaviour through an objective approach.

Today, more than ever, people are leaving traces, through their credit and customer cards, Facebook updates, apps, wearables and sensors. It is a source of very meaningful information, because it shows how families, employees, consumers or other groups actually behave. However, there is a limitation: the context in which these people act largely remains out of sight. It is precisely this context that hbits does portray by combining questionnaires, behavioural registration and communication in a tailor-made and largely automated research flow.

That way, hbits helps marketeers, HR managers, policy makers and scientists to gain better, more objective insights into human behaviour. Quality of life, fulfillment, motivation and satisfaction are paramount. For example, the Flemish government commissioned hbits to investigate the use of time and workload of Flemish teachers. It considered, among other things, the timing and place of the work and the satisfaction the teachers experience.


COVID-19

GLOBAL STUDY INTO THE IMPACT OF THE CORONAVIRUS ON MS PATIENTS

All over the world, multiple sclerosis patients and their doctors have questions about the impact of the coronavirus on their disease. How could an infection affect their therapy? Is it better to put their treatment on hold, or is that more dangerous than getting infected with corona?

An international study hopes to be able to provide answers to these and many more questions as soon as possible. The project will collect and analyse data from MS patients from five different continents, to provide more clarity on whether these types of patients are more susceptible to the coronavirus and on what impact this may have on the course of their disease.

Liesbet Peeters, BIOMED researcher at UHasselt, will lead the study. “We collect our information via existing databases and a very user-friendly platform where we can gather all data from both the healthcare professionals and the MS patients themselves. In a second phase, we have to combine that data. Only then can we arrive at insights that can save lives in the short term.”

ACCURATE PREDICTOR OF THE NUMBER OF INFECTIONS

Will the capacity of our intensive care units remain sufficient? Can the Belgian healthcare sector cope with the pandemic? What does a solid exit strategy consist of? These are questions that can only be answered if all uncertain data about the virus and the number of contaminations are countered by very accurate figures and mathematical models. Such models, which predict the number of infections and the coronavirus peak, are of crucial importance in these uncertain times of crisis.

“The number of recognised infections is only the tip of the iceberg,” says Kurt Barbé, biostatistician and mathematician at the Vrije Universiteit Brussel (VUB). “It depends on the testing capacity, and on the fact that many COVID-19 patients with mild symptoms do not realise they are infected and that the number of people who can be infected by one carrier is an extensible value.”

Since the start of the outbreak in Belgium, Professor Barbé has published daily Facebook updates of a mathematical model he developed that analyses available hospitalisation data. The results turned out to be extremely accurate, so that his model is now also used by colleagues in Italy and the Netherlands. The professor is also a member of the corona consortium set up by

top scientists from the universities of Hasselt, Antwerp, Ghent and Brussels to join forces. The academics who use specialised models to predict how the virus will spread, provide extra support to professor Niel Hens, biostatistician at UHasselt and the University of Antwerp, who is part of the scientific committee that, among other things, assists the government in developing strategies to implement the necessary coronavirus measures and to phase them out again.

EUROPEAN STUDY ANALYSES COVID-19

RECOVER, short for Rapid European COVID-19 Emergency Research response, is a unique project that combines fundamental biological knowledge with social and clinical research in order to understand and address COVID-19. Targeted medical research will not only provide insight into the nature of the virus, it will also reveal the best strategies for limiting its further spread. The project presents scientific knowledge that clinical experts, health authorities and policy makers can use to protect public health and save lives. The efforts are in line with studies that are currently being conducted worldwide.

The University of Antwerp coordinates RECOVER, which receives funding from the European Union within Horizon2020. It builds on the previous investments made by the European Commission in targeted clinical research in epidemic outbreaks, and on the European PREPARE project, also coordinated by the University of Antwerp, which focuses on clinical research in primary healthcare and hospital care. As a result, RECOVER could fall back on a solid network and took a quick start.

This happened officially on 10 March 2020 with a meeting in Amsterdam attended by the partners of the consortium, the European Commission, the European Centre for Disease Prevention and Control (ECDC) and the European Medicines Agency (EMA). The consortium is now taking steps to combat COVID-19 through research into the impact of the disease, a study to understand the transmission of the virus within families and the effect of interventions to limit that transmission, a study to understand whether and how children contribute to the spread of the virus, and finally, recommendations for protecting the health of those fighting the virus.

HOW AN ANIMAL VIRUS TEST CAN REVEAL MORE THAN A HUMAN ONE

How do you know if you have been infected with the coronavirus or rather a common cold virus? It can make a world of difference, not only for the patient, but also for their environment. Ghent University professor Hans Nauwynck developed a test to see which virus your animal is infected with, something the current coronavirus tests for humans cannot tell you. The latter can only show whether or not the patient is infected with COVID-19. If the result is negative, naturally the question arises what else it could be. Professor Nauwynck's test offers an answer to this. "We analyse all virus particles; we look at the entire virome," he explains. "Our test tells us not only whether an animal is infected or not, but also with which virus. We do not have to rule out anything in advance, which makes it all the more reliable."

As a veterinary virologist, Professor Nauwynck is currently still conducting plenty of tests on animals, including cats. He hopes to be able to apply the technology to humans soon. "We are already discussing this with UZ Gent, but it still takes some steps to adjust the test. The production standards for use on humans are much higher. For example, the swabs that are used for testing have to be produced in a cleanroom and we have to find financial donors for this production process. That easily takes six months."

Professor Nauwynck is also collaborating with Professors Bruno Verhasselt and Linos Vandekerckhove on a sensitive and specific serological test that detects antibodies against COVID-19. "Anyone who has been infected has specific coronavirus antibodies in their blood and those make you immune. In the case of severe symptoms, a test is often carried out anyway, so we are sure that those people are affected. But there is also a large group who show only mild or no symptoms at all. It is very important to have them on the radar as well. This way, we can monitor the spread of the coronavirus and decide who may or may not leave their home. It will also help to determine who should be prioritised for vaccination. Seropositives do not need to be vaccinated. Seronegatives, on the other hand, must be given priority."

ANTIVIRAL AGENT AGAINST COVID-19

A cure for the coronavirus: just about the holy grail everyone is currently looking for. This also applies to the teams of VIB-Ghent University professors Xavier Saelens and Nico Callewaert. They were already able to make significant progress in their quest: they identified an antibody that can prevent the binding between the spike protein of COVID-19 and human cells, and thus prevent the infection of those cells.

The virus needs that specific protein, present on its surface, to enter a human cell and cause infection. New findings from various teams of the VIB-Ghent University Center for Medical Biotechnology, in collaboration with the University of Austin (Texas, USA) and the German Primate Research (Göttingen, Germany), now show that in the laboratory, the antibody can render the virus harmless, and thus could offer protection against COVID-19.

Unlike vaccines, such an antiviral provides immediate protection against the virus without requiring an active immune response. Antivirals like these are particularly interesting for the elderly, for persons with a weakened immune system and for health workers or people who may be exposed to the virus. Especially the most vulnerable people often react weakly to vaccines and may produce lower levels of antibodies to effectively ward off a virus attack.

“Thanks to a collaboration with the lab of Johan Neyts of the REGA institute at KU Leuven, we were able to demonstrate that our antibody strongly suppresses the SARS-CoV-2 virus replication in hamsters,” says Professor Saelens. These animals are susceptible to the virus that causes COVID-19.

Nevertheless, it is important to indicate that the development of the antibody still has to go through several phases. “We have to fine-tune its production. That is one of the many aspects of this project that my colleague Nico Callewaert focuses on. We receive support from the experts of VIB Discovery Sciences in this endeavour. They help us at this stage of our research to incorporate the needs of pharmaceutical production processes. This clinical development path progresses very well. We are hopeful to see the start of the first in man study with our antibody early in 2021.”

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QUEST FOR VACCINES AND ANTIVIRALS TO COMBAT SARS-COV2

At KU Leuven's Rega Institute, researchers are persistently searching for antivirals that can help COVID-19 patients overcome the disease. They are studying the way in which the coronaviruses known so far evolve and see if they can find a target on which to attack the virus.

In addition, they are testing, on behalf of the Bill & Melinda Gates Foundation, 15,000 active substances in existing medicines, or medicines that are under development, for their effectiveness against the coronaviruses. The Leuven CD3, short for Center for Drug Design and Discovery, and the pharmaceutical company Johnson & Johnson make thousands of these ingredients available to the Rega Institute.

At the institute, they also focus on developing a vaccine. That is the best weapon to protect us from COVID-19 in the future. Since Chinese researchers put the virus's genetic code online, dozens of research groups around the world have been given the signal to make every effort in developing such a vaccine. The KU Leuven researchers use a technology based on the vaccine against yellow fever. They have already developed several prototypes of a vaccine that they have extensively tested on hamsters. Even one dose of the vaccine provides almost complete protection against SARS-CoV2 lung infection in hamsters. Before the vaccine can be administered to humans, it must now be produced by a facility that has the necessary accreditation for this. Subsequently, the clinical studies can be started, in which the prototype of the vaccine is tested on healthy volunteers. Afterwards, the tests will be expanded to thousands of people. After that, another scaling up to billions of doses is needed to ensure that the entire world population can be vaccinated. For that reason alone, it is good that such a much-needed vaccine is being sought after simultaneously in different parts of the world.

BETTER DETECTION OF COVID-19 PATIENTS WITH ARTIFICIAL INTELLIGENCE AND CT SCANS

COVID-19 affects the lungs in a specific way and this is visible on a CT scan. This type of scans can even detect patients with COVID-19 in the early stages who still test negative in the laboratory. That is why a worldwide project is now underway to refine and automate diagnosis via CT scans.

The technology company icometrix, a spin-off from KU Leuven and the University of Antwerp, joined forces with the Vrije Universiteit Brussel (VUB), UZ Brussel, KU Leuven, UZ Leuven, UZ Antwerp and hospitals and organisations around the world in an international initiative to use artificial intelligence (AI) to combat COVID-19. The researchers want to make the best possible tool for radiologists that accurately detects and labels the affected lung tissue.

A nice dataset of scans annotated by radiologists is already available, mainly through Flemish hospitals, and that set continues to expand. Specialists from the participating hospitals also assist icometrix, which is developing a version for understanding lung scans based on its online software to analyse CT scans of the brain.

The result of the multinational cooperation is called icolung. This AI algorithm provides a rapid, objective evaluation of the type, pattern and extent of lung pathology on chest CT images to aid in the assessment, triage and follow-up of COVID-19 patients. When the global healthcare system is overwhelmed by the wave of hospitalised coronavirus patients, this leads to excessive workload and a shortage of resources and beds in intensive care units. Triage via icolung can help relieve that increasing pressure and allocate the necessary resources through a fully automated assessment of the degree of involvement per lung lobe.

Icometrix is developing all this pro bono because it wants to contribute in these times of crisis. It quickly got the agreement of its board of directors to go for it. Since then it has been a race against the clock, also to collect more annotated scans. These can further increase accuracy.

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EASIER AND SAFER LUNG RESEARCH IN COVID-19 PATIENTS

Regular lung examinations are fundamental in the follow-up of COVID-19 patients, but they are challenging for medical staff. Doctors must wear sterile clothing to enter the patient's room and completely change clothes and wash their hands before the subsequent examinations.

To reduce that workload and at the same time improve safety, researchers from FlandersMake@UAntwerp developed a system that enables lung research without direct contact with the patient. It consists of a number of digitised stethoscopes that can remain on the patient's body and are all connected to a computer in the medical staff's consultation room. A big advantage of this is that a team of doctors can listen and evaluate the patients together. They can even compare results over time and assess patients' progress more objectively, all of this without having direct contact with them.

In addition, the system is simple to construct and consists of inexpensive, readily available equipment such as microphones, small computers and sound cards. People with experience in the field of technology and computer networks can easily rebuild it and assist hospitals with its installation. The system not only has the potential to help during the current COVID-19 pandemic, it also enables solutions in other places, such as nursing homes. In addition, it improves the diagnostic quality of lung examinations and helps patients with respiratory diseases.

Tests with the system are currently underway at the University Hospital Antwerp (UZA), where a pilot project was initiated on 15 April 2020 with different intensive care beds. It is offered as open source to support physicians worldwide.

IMPORTANCE OF DATA IN THE COMBAT AGAINST COVID-19

Will we be able to stop the spread of COVID-19 by closing schools and letting everyone work from home? What consequences do these measures have for our economy? How well are people managing to actually change their behaviour?

These are all questions that the EpiPose consortium wants to help answering. The consortium is led by UHasselt and has the UAntwerp as its Flemish partner, while also working with international partner institutions. It wants to assist governments in properly determining the nature of the coronavirus measures and in monitoring their social and economic impact. For this, they will receive three million euros in European funding from the Horizon2020 project.

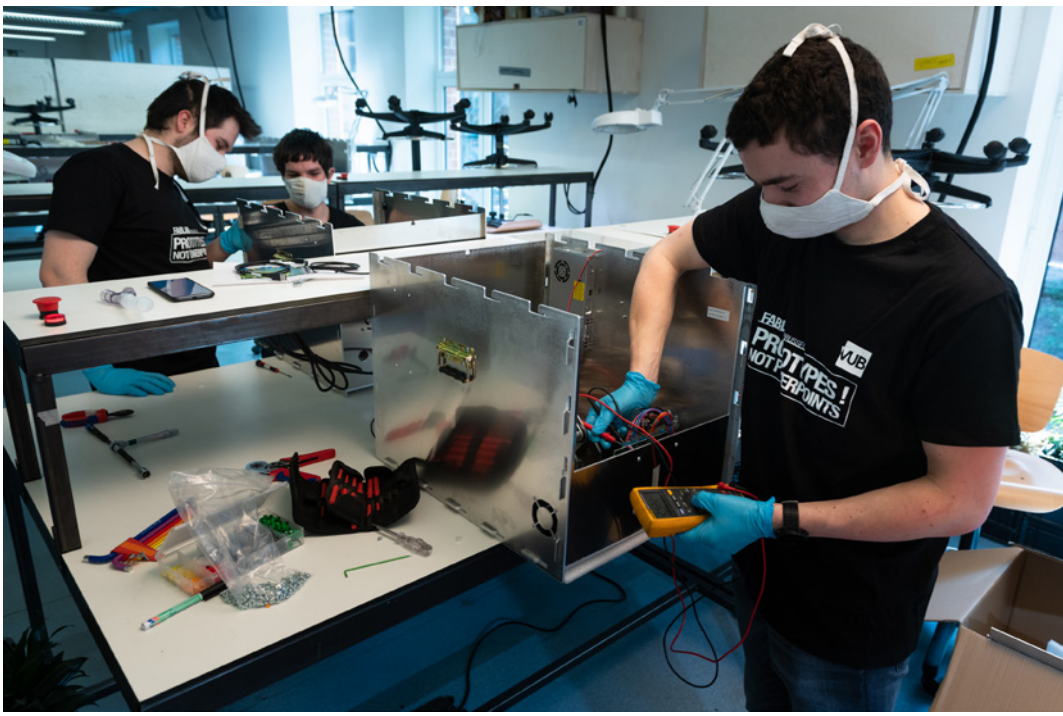
“To stop the further spread of COVID-19 in our country and the rest of Europe, we had to take measures,” says Professor Doctor Niel Hens, coordinator of EpiPose. “But in order to correctly estimate its effectiveness and its consequences, our consortium wants to collect all knowledge about the virus and its spread and make this information easily available. That way, researchers worldwide can more easily make predictions based on all available data, on which governments can then rely.”

VENTILATION EQUIPMENT THAT CAN BE PRODUCED QUICKLY AND EASILY

During the peaks of the COVID-19 pandemic, doctors and nurses fight day and night with the aim of maximising the capacity of the intensive care units. If at a given moment there are more patients than beds with ventilation equipment, then the care system will really run into problems. To anticipate this, researchers, doctoral students and students from Industrial Sciences at the Vrije Universiteit Brussel (VUB) have developed prototypes of a simple and fast-to-produce respirator in their FabLab. In a record time of only a few days, they built a ventilator adapted to the needs of COVID-19 patients.

They started from a design by the American Massachusetts Institute of Technology (MIT) and input from Johns Hopkins University, and consulted closely with UZ Brussel. They are part of a national and international network and are in direct contact with colleagues from academia and the business world. These provide continuous feedback on their design and suggest improvements where necessary. Fablab received the indispensable support of Flanders Make and the business world, and produced the first 50 pre-series devices in collaboration with Audi Brussels. Volvo Trucks and DAF Trucks supplied wiper motors.

The first respirators were ready for testing in mid-April 2020. FabLab continues to share the knowledge acquired via open source with interested parties in other countries, where there is a great shortage of respirators and where production possibilities are limited.



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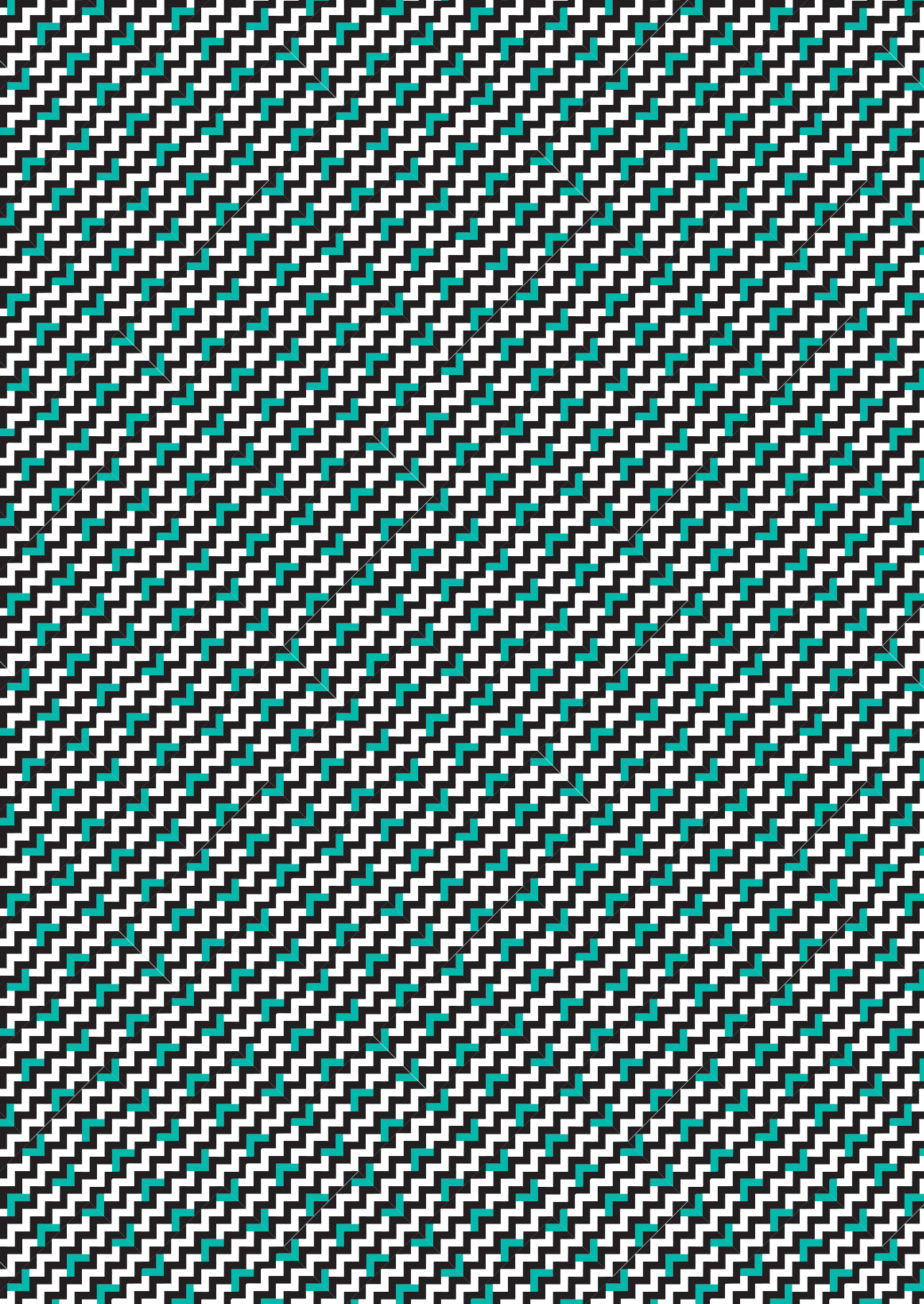

THE TTOS, THE POINT OF CONTACT FOR COLLABORATION WITH THE RESEARCH WORLD

The technology transfer offices (TTOs) stimulate the exchange of knowledge and technologies of the Flemish universities with industry and society. Through the joint initiative TTO Flanders, the TTOs offer a unique portal to this knowledge and thus build a bridge between science and industry.

The TTOs deal on a daily basis with:

Business development
The technology transfer officers and business developers of the Industrial Research Fund (IOF) act as a direct point of contact for companies.

Research collaboration
The universities meet the R&D needs of companies through different types of collaboration.

Intellectual Property Management
The TTOs protect intellectual property and license university technologies.

Support of regional development
The TTOs are closely involved in the start-up and management of incubators and science parks.

Creation of innovative spin-offs
The TTOs guide researchers in translating innovative research results into a fully-fledged company.

Access to incubation and seed capital
The TTOs assist in finding funding for innovative research projects at an early stage of development.

Promotion of entrepreneurship and innovation
The TTOs provide training and coaching, and develop network initiatives and technology clusters.

TECH
TRANSFER
OFFICES
FLANDERS

KEY FIGURES

18,288

Number of researchers on February 1, 2020 (in FTE) [1]

212

Number of granted patents, 2019 [2]

1,483

Number of active patent families in portfolio, 2019 [3]

381

Cumulative number of spin-offs established, 2019 [4]

+10,000

Number of employees at the spin-offs, 2019 [5]

7,332

Number of new research contracts, 2019 [6]

€134,720,905

Income from contract research with the private sector, 2019 [7]

€157,310,557

Income from European programmes, 2019 [8]

123

Number of business developers, 2020 [12]

PER RESEARCH DOMAIN

9
Cleantech & Energy

11
Engineering

3
Exact and Applied Sciences

10
Food & Agriculture

41
Health

20
ICT & Electronics

5
Logistics & Mobility

19
Materials & Chemistry

5
Social Sciences and Humanities

8

Number of science parks, 2019 [9]

10

Number of incubators, 2019 [10]

3

Number of pre-incubation structures, 2019 [11]

Sources

[1] VLIR - Personnel statistics on February 1, 2020
[2] ECOOM
[3-4-5-6] TTOs
[7-8] Income statements universities
[9-10-11-12] TTOs


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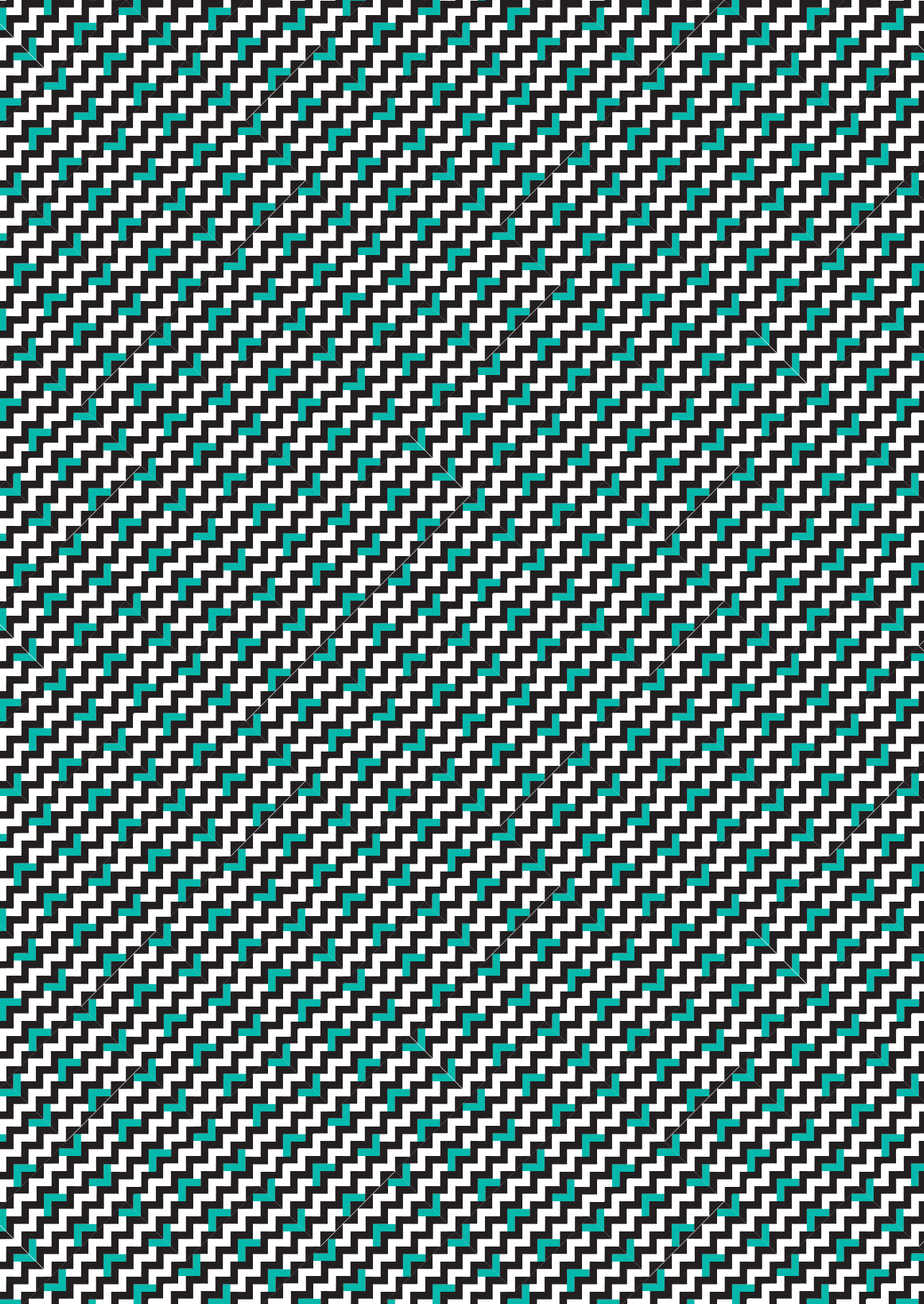

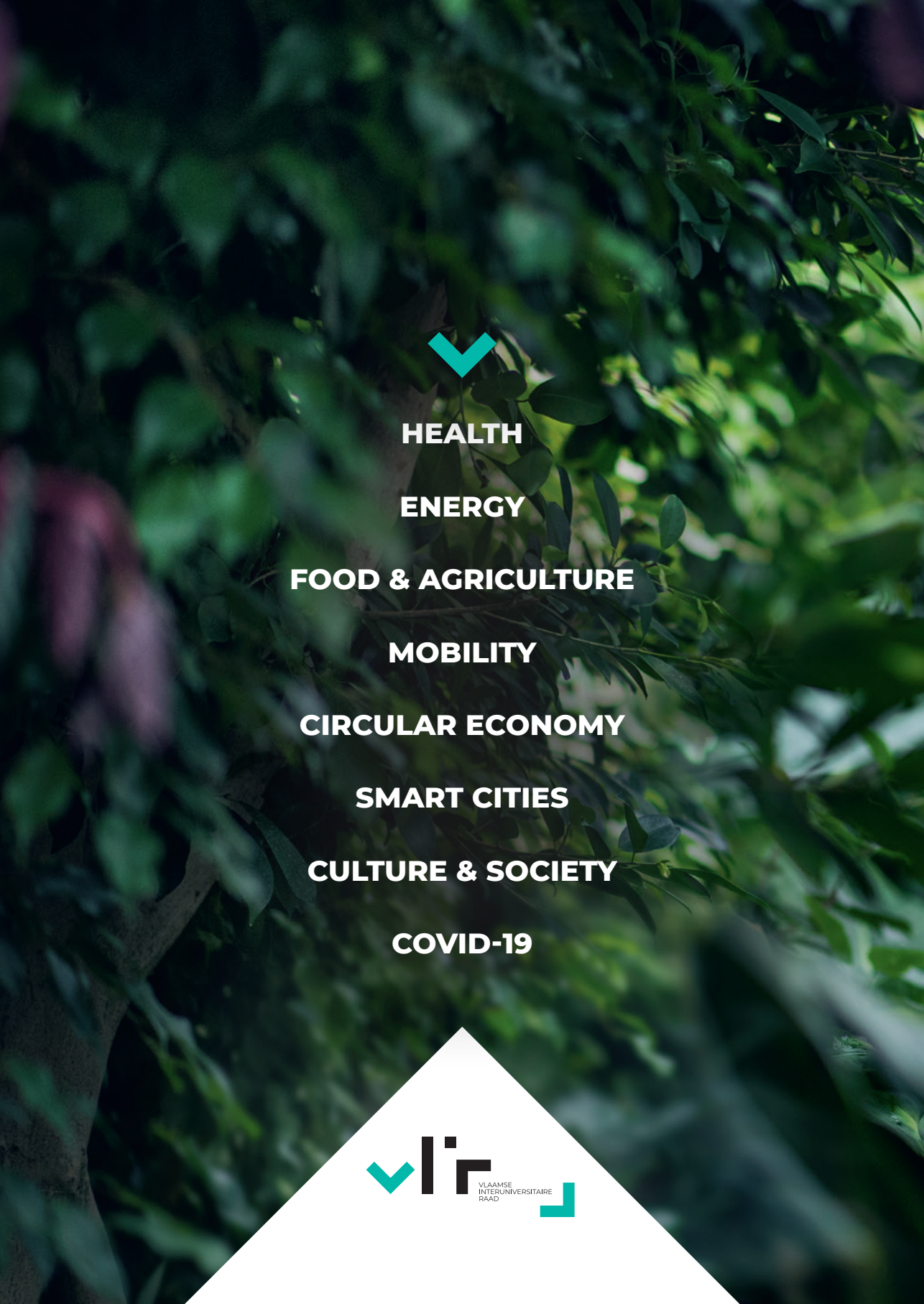
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