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EXPO 2015

THE GREAT EVENT

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research&innovation
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Levers of the future

Research and training will consolidate Italia's recovery, but there is a need for trust and social approval. Our scientific institutions continue to create chances to promote competitiveness, stimulating an active confrontation with businesses.

Expo 2015

Speech of the president of the Cnr

Luigi Nicolais

Various measures can be taken to counter the long-lasting economic crisis that has brought Europe to a standstill. These include the need to concentrate ideas and resources on policies which provide incentives for training, scientific research and technological innovation. This trend is also confirmed by multi-annual programmes such as Horizon 2020 identifying strategic macro-objectives – the science of excellence, industrial leadership and corporate challenges – and offering up future scenarios which bring with them wealth, well-being and progress. The idea is taking hold that you need to have know-how plus original, advanced and widespread technology, to organise networks of laboratories that are related and connected to the productive and financial system, and to raise the quality and the level of training and skills of staff. To promote these choices, however, it is also necessary to create a social consensus around the research activities; to have more faith in the researchers and give credit to the innovators. Fortunately, in our country, despite the large number of difficulties, we are starting to see positive signs along these lines. Among the many and varied testimonies, it gives me great satisfaction to point out what Cnr (National Research Council) recently achieved in Puglia and Lombardia which confirms the nationwide and multi-sector vocation of the organisation, as well as the importance of the commitment of institutions and local communities. In Lecce, in May, the work on the Cnr Nanotechnology centre, one of the biggest research facilities in Italia and Europe, was completed in the Campus Ecotekne of the University of Salento, for a total value of over 20 million Euros, dedicated to the development of nanotechnology and its application within the fields of science and manufacturing. The project, which was the result of a partnership between the Region of Puglia and Cnr, has its operational heart in Cnr-Nanotec, the institute based in Lecce, a multi-discipline research centre, leading the way internationally, with over ten thousand square metres of laboratories and facilities, and more than 200 researchers with different scientific profiles. The mission of this organisation is to develop research and create prototypes with intelligent materials by exploiting the potential of nanotechnology through a bottom-up approach (self assembling and molecular engineering of organic molecules, polymers and biomolecules) and top-down (latest generation nanotechnology/lithography applied to

PH: CNR

semiconductor materials). The application areas, for which an interesting development of technology and devices is envisaged, ranges from energy to construction, from diagnostics to communications and from safety to the environment. In the same month, more than a thousand kilometres away in Lecce, the work on the advanced technology centre in the University Polytechnic campus was completed. Once again, this is a strategic project shared and promoted by an entire community, both political and scientific, as well as business and financial. A project built on local talents and potential, but with a strong international emphasis. This is no small challenge: to boost high level training activities and research in the fields of health, rehabilitation, mechanics, optics as well as robotics, aerospace, construction and shipping. Both projects represent the most recent results promoted by Cnr for the creation of a backbone of innovation that passes through and revives, through the transfer of knowledge and skills, the competitiveness and growth size of the national production system. These initiatives, along with other projects already underway, speed up the creation and confirmation of innovative organisations, such as the technological clusters, for example, and involve requirements for high-level training and research. Last but not least, by intercepting the potential of territories, as well as market requirements, they direct and promote the modernisation and innovation of the social and productive fabric. In addition, they have a strong appeal for young people because they give them real opportunities for finding jobs and careers; as well as for the major players, both national and international, who receive a great many benefits: from the availability of advanced technological and scientific facilities to a widespread network of skills; from competitive satellite industries in terms of quality to the possibility of being more successful in accessing community public resources. Initiatives like these bode well for training and research as incentives in the future. ■ **-L.N.-**

Cutting-edge engineering

DICGIM
DIPARTIMENTO DI INGEGNERIA CHIMICA GESTIONALE INFORMATICA MECCANICA

A international centre of innovation in the heart of the University of Palermo

A landmark in advanced research of industrial engineering, computer science, but also of chemistry and applied mathematics. An indispensable interface for manufacturing companies and regional and national service providers. An innovation generator and vehicle for the intensive transfer of technology. The Department of Chemical Engineering, Industrial Engineering and Mechanical Information Technology (Dicgim) at the University of Palermo is the beating heart of research and consulting services catering to institutions and public and private bodies of Sicilia. A Department with a true vocation for innovation, with a common interdisciplinary fil rouge that links a myriad of sectors: from agribusiness to chemistry, from the administration and management of services to energy and fluid dynamics, from Ict to the mechanical and naval industry, to processing, from thermal and hydraulic machines to flight mechanics, to nanotechnology. The results achieved thus far have catapulted the Department into the spotlight of international research. The course curriculum of the Department unfolds in nine Bachelor's degree courses (Chemical engineering, Industrial Engineering, Industrial engineering and Computer science, Information Technology and Telecommunications, Mechanical engineering) and four Master's (Chemical engineering, Industrial engineering, Computer science, Mechanical engineering), that count, in total, more than two thousand students. But it is the educational model of the Dicgim that offers an increasingly international vision, through the Erasmus programmes available across Europe. Not to mention the continued efforts to foster relations with the business world. With the offer of internships at companies in the territory, but also national and international businesses. The University partnership with Fincantieri Group, made possible thanks to professor Cannizzaro, plays a key role in this field, offering a path of excellence within the Bachelor of Science degree in Mechanical engineering. 42 additional credits that offer students specific training in the field of Naval Engineering. The seven students selected in the academic year 2014-2015, for example, have had the opportunity to present their dissertation within companies, with an added value in terms of content and experience. The Department's flagship is the universe of applied mathematics, where research in the field of numerical analysis has already led to the creation and the design of competitive computational tools in the industry, using efficient and innovative models and numerical algorithms. The goal is to revolutionise the potential effects on engineering and the biomedical sectors. And then there is the team of flight mechanics, which is concerned with the design of "Male" (Medium Altitude Long Endurance) drones, and "U-Wig's", or very low altitude drones that exploit the advantage of reductions in ground-effect resistance. Without forgetting the research projects on guidance systems, navigation, control and "Obstacle Detection and Avoidance" that allow independent flight in safe conditions, even in turbulent air and in the presence of obstacles. In the mechanical field, instead, the Department is working on new goals for the marine industry, through two prestigious projects for vessels with wing support. The two studies, conducted with Ustica Lines, were financed by Miur as part of the Pon R&C 2007-2013. Finally, there is the great new frontier of nanotechnology, which has an impact on strategic innovation sectors: the applied chemistry lab, for example, is developing nano-structured batteries that can deliver performances far superior to those of standard marketed batteries. **-C.S.-**

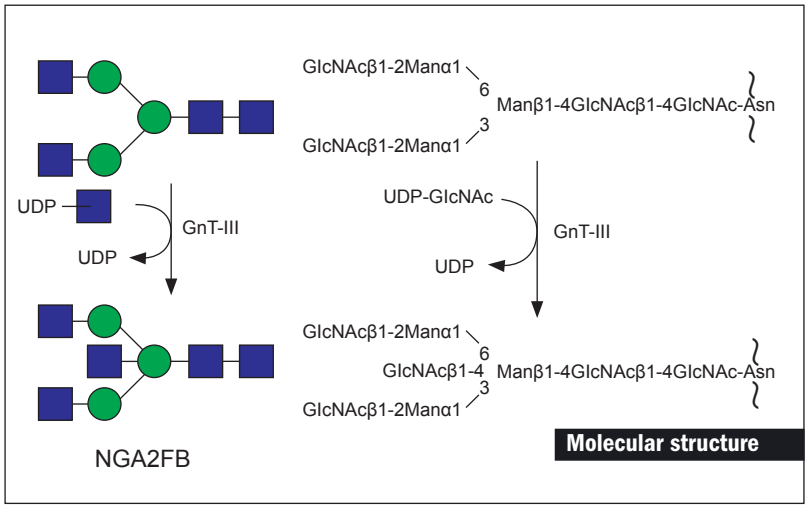
PH: UNIVERSITY OF PALERMO

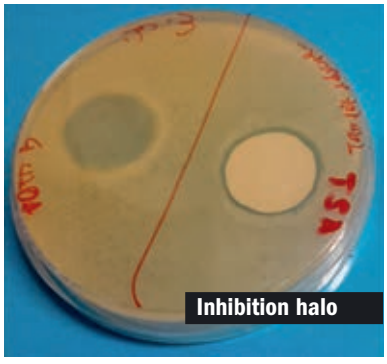
HF01 Prototype

Scientific studies for health and nutrition

The results of a groundbreaking project on Molecular Diagnostics

In the collaboration and interaction with businesses beats the throbbing heart of all research hatched at Ipcb in Catania. Revolutionary achievements have been reached from a scientific point of view and in terms of their application within the framework of the Pon Dia-teme (Pon01_00074) project pursued in collaboration with a number of companies in the bio-medical sector. New phthalate-free, polyester-based plasticizers for Pvc, hyper-branched poly-silicones with low or zero emissions, polymeric materials with antimicrobial action of nano-particles of silver and ionic liquids containing imidazole salts for the manufacture of catheters and other medical devices such as band-aids and medicated gauze. Not to mention the preparation of polymers for "drug delivery systems" capable of controlling drug release kinetics, and thus decrease the number of daily dosing and minimise unwanted side effects in the treatment of chronic eye diseases. Block co-polymers with controlled architecture (obtained via Atrp) allow the release of daily doses of cortisone drugs of a few micrograms for several months. But the pride of the Institute, which has now conquered the leadership at an international level, is the Molecular characterisation of the structure of glycans from glyco-proteins present in biological fluids, through innovative techniques and mass spectrometry. To the extent that the studies of Ipcb in Catania on the glycemic content of cerebrospinal fluid in patients affected by Alzheimer's has made it possible to locate one of the possible causes of the disease. The results obtained lead to the hypothesis that an increase in a particular glycan typical of brain tissue is responsible for increased production of β-amyloid, whose accumulation is the primary cause of Alzheimer's disease. The increase of this "N-glycan" in the cerebrospinal fluid, if identified in the early stages, opens the way for the early diagnosis of this disease. While the enzyme that produces it could become the target for the development of a new drug for the treatment and prevention of Alzheimer's. Finally, there is the bulk of research conducted by Ipcb in the field of nutrition with the Pon Shelf-Life project (Pon02 _ 00451_3361909); promoter of the project is the Agro-bio Technological and Environmentally-friendly Fishing district of Sicilia, which aims at protecting and preserving the quality and nutritional properties of products and of new fruit-based formulations. Under the lens, the articulated and complex system of food-material-environment: packaging was produced made of breathable and biodegradable materials to package products "ready to use" that allow to increase the shelf-life by up to 15 days. In addition, the use of multilayer polymeric materials with high barrier effect made it possible to reach a shelf-life of fruit-based products of up to one year. **-C.P.-**





PH: CNR – IPCB

Research excellence

The Cerisi project is at the basis of a laboratory for materials and structures testing

The Cerisi's structural strengthening project, for an investment of about 22 million Eur funded by the Ministry of Education with Pon 2007-2013 funds, thanks to the Scientific Director Prof. Eng. Eugenio Guglielmino, involved the construction of a laboratory of excellence for the testing of large-size materials and structures. Cerisi lab already operational with effect from the end of May 2015, will be a point of strength at the scientific and technological national and international level and will become an exclusive landmark for tests on large components and structures used in civil, mechanical and naval construction. Cerisi lab can integrate into territorial and environmental monitoring systems that already exist at international level, in order to exchange data and planning of coordinated actions in the specific area of interest. Furthermore, Cerisi lab, together with Eurolab laboratory, will be able to operate with advanced equipment within the physical modeling of seismic engineering problems through tests on seismic isolators and dissipative devices for large structures, fatigue tests for bridge cables, thus integrating with other networks of laboratories on an international scale. It will also be able to operate within the geotechnical characterization of the land providing a wide range of services. The approach of Cerisi lab is systemic, interacting in an integrated and multidisciplinary way, providing for the involvement of researchers and equipment belonging to the following areas of expertise: Earth Sciences, Geotechnical, Structural Engineering and Naval-Mechanical Engineering. The University of Messina, within each area, has acquired over the years considerable resources in terms of know-how, relationships and equipment. These resources will be further increased and enhanced through the Cerisi lab, which will offer a multidisciplinary approach. Even with the new supply of research equipment, the University of Messina will be able to compete in the markets, attract talent and foster the development of the local territory through a model based on the meeting of public-private excellence involved in an integration logic of the "Knowledge Triangle" (Research - Higher Education - Innovation). Cerisi lab will translate the significant upgrading of science and technology in applications aimed at providing services to public and private entities involved in various ways and on different scales in the problem of seismic safety, land management and the mechanical and naval components, with tangible economic and employment benefits for the various entities and the local territory. **-E.G.-**

PH: UNIVERSITA' DI MESSINA

Turning a car into a hybrid-solar vehicle

The project, created at the University of Salerno, has passed the first selection of Horizon 2020

The project to transform a normal vehicle into a hybrid-solar one, saving energy, money and cutting emissions is Italian and comes from Salerno. A working group of the University of Salerno, led by Gianfranco Rizzo, coordinator of the in mechanical and management engineering courses, has built the HySolarKit project: this will enable a Euro 3 vehicle to become a Euro 4, thus gaining access to the limited traffic zones. For those normally driving in cities, the savings can reach 20%, with an estimated cost of the kit of approximately three thousand euro. After some years of work, and thanks to a first financing by the Ministry of Education, a hybridization system for front wheel drive cars has been patented and implemented: it involves the insertion of electric motors on the rear wheels and an additional Lithium battery, which turns the car into a 4x4 hybrid. A cable plugged into the diagnostics port (Obd) is connected to the control system which controls the electric wheels. "The system – explains Rizzo - does not require any additional sensors, has no impact on the driving style and does not touch the original control unit, which could result in the loss of the guarantee". The integration with the photovoltaic happens via high-performance, flexible panels covering the hood and the roof; these are produced by the Italian brand Enecom. This way, the vehicle can operate in either electric or hybrid mode, preserving in this case the autonomy and performance of the original vehicle: indeed, with a plus in acceleration provided by the electric motors, and with an advanced control of the vehicle thanks to the four-wheel drive. The auxiliary battery can be recharged both by the rear wheels (regenerative braking) and by the solar panels, which can provide more than 1 kWh per day. The realization of the first prototype, mounted on a Fiat Punto, showed no special criticality of operation. The spin-off eProInn Srl was founded to successfully present this project to the phase 1 of the Horizon 2020 program (Sme Instrument). The proposal enjoys the advice of CiaoTech, the collaboration of Actua, a spin-off of the Politecnico di Torino holding a patent for integrating the engine to the electric disc brake, by Landi Renzo, a leading manufacturer of Cng and Lpg systems, working to a hybridization project (Hers) complementary with HySolarKit, and the interest of Chinese and Maltese investors. Preliminary market research showed a good attitude of the potential users to purchase the kit and the integration with the photovoltaic. The Salerno researchers presented their studies in numerous international forums and received several awards. Rizzo is also one of the promoters of the "Mobidic - Digital Mobility Center" project, an initiative for the establishment of a high-technology industrial center on sustainable mobility in Campania. **-G.R.-**

PH: UNIVERSITÀ DI SALERNO

Solar-hybrid Fiat Punto car

Lights in sight

A new season in the technology of Led lighting

Tube lamps, recessed lights, spotlights, light strips, mesmerising dimmer-adjustable light globes with an unparalleled installation flexibility. Light sources that are functional and aesthetically appealing, both for residential and industrial use, but especially able to reduce power consumption anywhere between 70 to 90% compared to traditional light sources, with an impressive duration of fifty thousand hours: Led lighting in a word, which is already revolutionary in itself. But the kind offered by the Parisi Group is even more special. "Our Led lamps have an energy efficiency higher than that of the most popular brands: our 10 Watts generate the 100 watt of the past, whereas a 16-watt bulb from major brands in the industry will produce 80, just to give an example. And these are real consumption values, the ones we declare, not nominal, because the consumer needs to receive real information, which often is not the case", tells us President Maurizio Parisi, founder and long-time manager. The Parisi brand is a benchmark in the dried-fruit industry and Maurizio Parisi has undertaken a long an rich entrepreneurial path, always inspired by solid work ethics, by passion for his line of business and sharing goals with employees. "I branched out from the family business to invest

PH: ELISA CASANOVA

Maurizio Parisi and Tung Ka Ki

in other sectors: Led lighting in my opinion is the most promising". And indeed, Led lighting has developed a lot in recent years, thanks to its countless advantages over classic lighting systems with fluorescent lamps. First of all, the considerable energy savings that makes it possible to create unique light effects and environments, thanks to the customisation and combination of products that suit a particular kind of furnishing or the amount of light desired. What other benefits are associated with Led lighting? The absence or drastic reduction of maintenance costs because of the duration of these light sources not comparable to that of traditional lamps. The instant and effortless cold switch - as low as - 40°C – and insensitivity to moisture and vibrations. The installation flexibility of the light; the direct emission of coloured light without filters, a full spectrum of colours, vibrant, saturated and pure and the minimum heating of the illuminated objects. The benefits also concern the environment: this kind of lighting is mercury-free, provides clean light, because free of IR and UV components, and implies a lower use of renewable and non-renewable energy sources. At this point, the question comes natural: what in particular distinguishes the Led lighting of the Parisi Group? Maurizio Parisi clears that out for us: "ParisiLed branded products are manufactured by a state-of-the-art Asian company, with which I came into contact through Tung Ka Ki, my trusted adviser and business manager, who has extensive experience in the field. This is a company with the highest quality standards, with 75 thousand employees, including 300 researchers, who monthly, if not weekly, introduce new and more efficient products on the market". A business that makes use of the latest generation machinery to produce certified Led light sources, which are subjected to very strict controls. A company that uses high-quality diodes rated AA+ and that makes use of components, such as chips, from the best global brands. In short, the Parisi Group offers an excellent Led product that is spreading on the Italian market with the help of an organised sales network: "We aim at companies and professionals who grasp the potential of our products, which are not only ecological, hi-tech and beautiful to decorate any living space, but are offered at the best price on the market," says Parisi. ParisiLed lamps, manageable even with your smartphone, have endless fields of application: from bar counters and pubs, to gardens, from discos to private residences, from factories to offices. During our interview, Tung Ka Ki went through a lot of effort to show us that, illustrating how each type of lamp available in the wide range of ParisiLed products works. Tung highlighted the intensity of light, features, remote management, morphologies, typologies, customisability, as well as the solidity and high quality of the raw materials, the latter obvious to the naked eye. "What we have is a lighting system applicable even in flower pots and glasses", Parisi points out, who concludes: "Our range, forgive me the pun, is a bit 'the enlightenment of lighting', as it inaugurates a new era in the name of savings for the customer and the best technology". **-E.MARZORATI-**

Research infrastructure

The centre for advanced superconducting device testing at the University of Salerno

Innovative materials and technologies have a hard time establishing themselves on the market, as they have to compete with products that have pretty much become standardised and require substantial investments. However, their development is encouraged by the existence of research infrastructures that make available the most advanced technologies. This is the case of superconducting materials, which do not heat up with the passage of current and, because they can carry a much higher current density than the one delivered by traditional materials, offer far-reaching perspectives in the field of power electronics. This allows you to have smaller and lighter devices or to form magnetic fields that are inconceivable with other technologies. However, the conditions of operation at very low temperatures of superconductors determine heavy cryogenic costs that have limited their use to cases where the performance that these devices yield would not be achievable with traditional technologies. This occurs in health care for magnetic resonance imaging, which today is the main market for superconductors. Quite interesting are also its applications to research, such as for international projects (Iter), whose goal is to produce an "unlimited" and "clean" energy source through the fusion of hydrogen plasma via magnetic confinement, where the use of superconducting materials is the only means to a positive energy balance. In the same way, the use of superconducting magnets in large accelerators for sub-nuclear particle physics is an absolute necessity. In order to develop such applications, though, it is essential to have infrastructure for the testing of cables and superconducting devices, which is currently lacking on a global scale. To meet this need, the Pon Research and Competitiveness of the Ministry of Education, the University of Salerno, along with the main players in national research in physics, such as the National Institute of Nuclear Physics, Enea and the Cnr through the CRdC in Napoli, have drawn on the vast resources of the Eu's structural funds to create Nafassy (National Facility for Superconducting Systems). Nafassy is a test centre for superconducting power devices, which is able to compete on an international level. The Centre features a cryogenic power processor, high current power units and the Enfasi magnet, unique given its characteristics, in order to carry out tests of superconducting cables at high current in high magnetic fields and based on temperature. Apart from the ripple effects on research, Nafassy aims at being a key centre for national and European industry that wants to develop superconducting devices that need the technologies available in the facility for their tests. **-S.P.-**

Cryogenic processor


Enfasy Magnet


Nafassy Laboratory

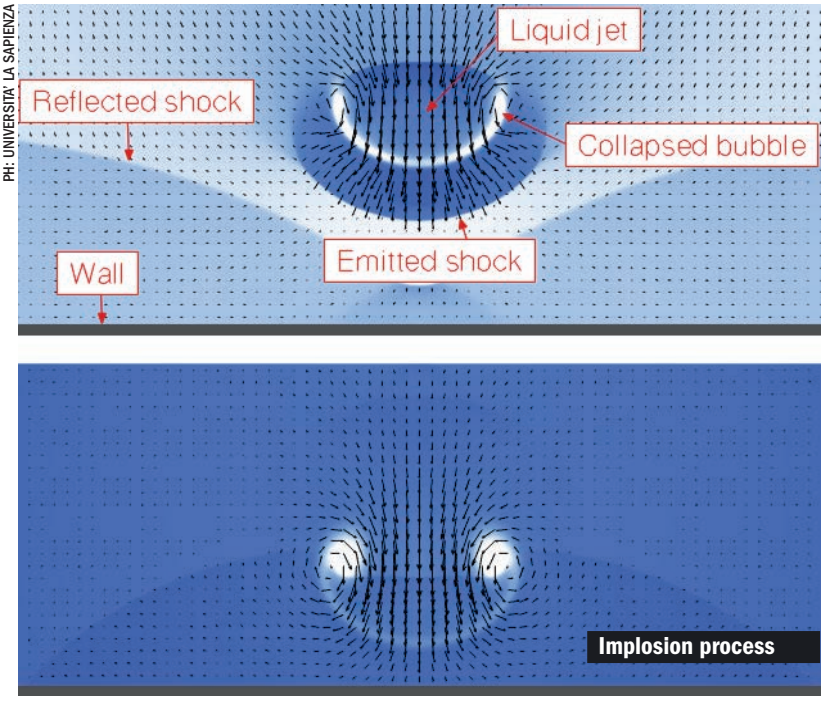

Power unit

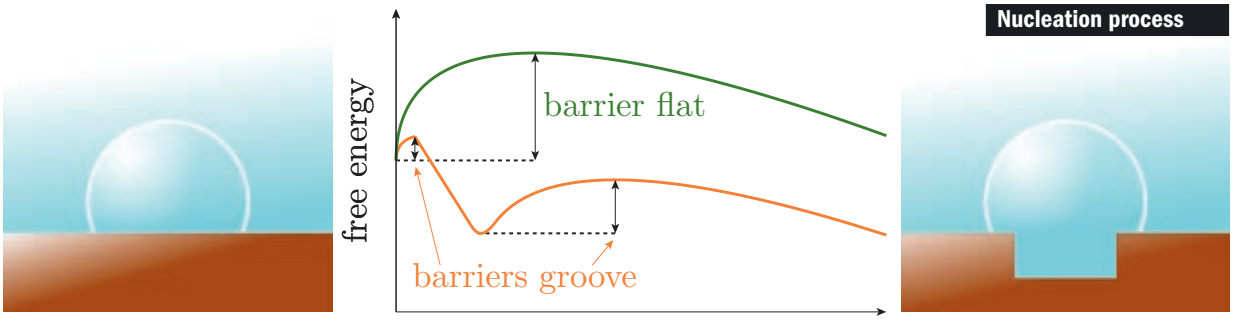
The extraordinary life of bubbles

Understanding cavitation mechanisms through the Bic project

Similarly to what happens when you put a saucepan of water on to boil, bubbles can form in a liquid even when the pressure is lowered to under the vapour tension mark. The liquid in fact "breaks up" to form cavities containing its vapour, from whence the name of the phenomenon: cavitation. The nucleation of cavitation bubbles occurs on a nanometric scale but can also produce effects on far bigger scales, such as damage to hydraulic turbines measuring over a metre. This is because, when moving to a zone of liquid under higher pressure the bubble collapses and generates peaks of temperature and pressure, possibly exceeding 4000°C and one thousand atmospheres. What is more the implosion induces shock wave emissions and sonoluminescence, clinically very useful to ablate diseased tissues, or chemically to synthesize innovative materials. The Bic "Cavitation across scales: following Bubbles from Inception to Collapse" project, is headed by Prof. Casciola in the Mechanical and Aerospace Engineering Department at Rome La Sapienza University and is funded by Erc (European Research Council, 2 and a half million Euro in 5 years). The scope is to understand the complex cavitation mechanisms by a theoretical/numeric and experimental study, following the bubbles from inception to collapse so as to foretell the effects on their surroundings. Many liquids, like water, can resist extremely high tractions (negative pressures), at 1,200 atmospheres, before cavitating. Nucleation (heterogeneous nucleation) is however facilitated by the presence of impurities or defects, reducing resistance to only a few atmospheres. When the cavitation bubble collapses near to an object (like a ship's propeller) or a wall (like the one in a dam), it generates a violent blow followed by a jet of liquid travelling at high speed which impact onto the latter incurring damage to their surface. Whether the primary cause of damage is due to the blow or to the jet is yet to be cleared. There are still many aspects of cavitation waiting for an explanation and the Bic project aims to throw light on the extraordinary life of bubbles. **-C.M.C.-**

PH: UNIVERSITA' LA SAPIENZA





Artificial olfaction

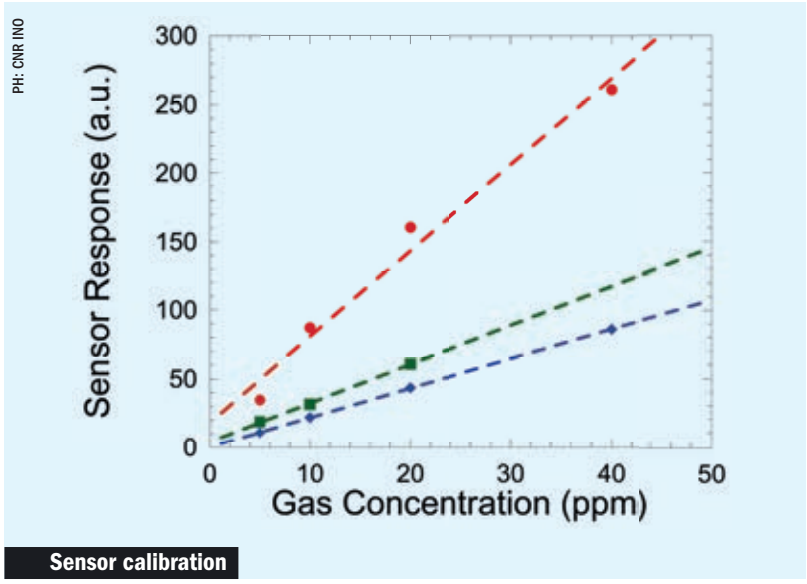
The Snoopy project: a new instrument to fight illegal traffic of people

Illegal immigration is a key issue in the field of security, inducing investment in resources for projects/coordinated actions on a domestic, European and worldwide scale. In particular, the most effective approach to discover people hidden in vehicles or trailers is by using trained dogs, but in spite of excellent results, using dogs does have its drawbacks, especially when a large number of vehicles or trailers must be systematically inspected. And so new technologies have to be developed, able to work 24 hours a day 7 days a week alongside the dog units.

On the other hand, to reach results comparable with trained dogs olfaction is a techno-scientific challenge still subject to research. In this scenario the scientific centre, Parco Scientifico, in Brescia plays a leading part through cooperation between Brescia University and the Cnr (National Research Council) Istituto Nazionale di Ottica (Ino-National Optical Institute), thanks to the nanotechnology developed over the last few years. Work began in 2003, with the help of the European Community and Muir (Ministry of Education, University and Research). Research was focused on developing nano-structured materials used to produce gas/vapour sensors, subsequently analyzed in the laboratory. The use of said nanotechnologies in the security sector within the European Snoopy project (Sniffer for concealed people discovery), is still currently under study.

This project, coordinated by Brescia University, is based on a synergic integration of technologies and know-how developed at the Brescia Polo Scientifico (University and Cnr), with materials, components and solutions processed by consortium partners: Rome Tor Vegata University (Italy), Airbus Group (Germany), C-Tech Innovation (Great Britain) and Center for Security Studies – Kemea (Greece). The object is to develop a portable instrument (Snoopy's nose) to discover people hidden in vehicles or trailers by sniffing characteristic odours such as sweat. The working mechanism is inspired by mammalian olfaction, where various receptors send electrical stimuli to the brain which interprets them according to the olfactory experience gained. Snoopy's nose is similarly based on a group of sensors and a pattern recognition algorithm that processes signals from the sensors and classifies them according to the database of memorized odours. Integration protocols between dog units and Snoopy's nose will be studied at the end of the project to consolidate the technological proposition with current inspection methods. **-A.P.-**

PH: CNR INO



Sensor calibration

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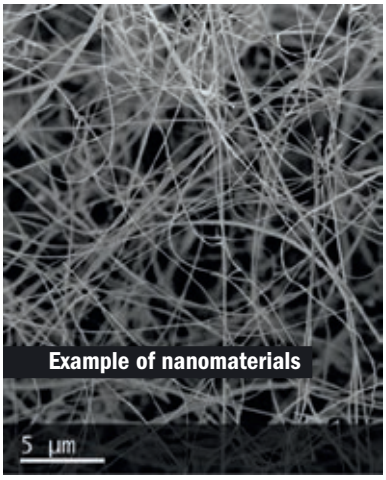
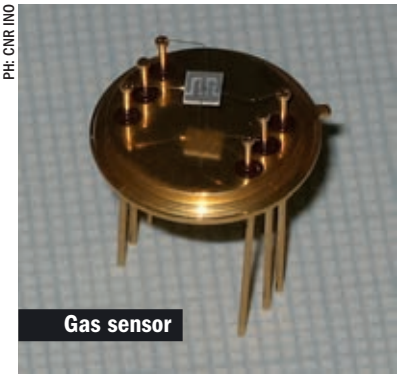


Example of nanomaterials

PH: CNR INO



Gas sensor

A safe and eco-friendly mobility

Technologies and solutions to prevent accidents and reduce consumption

The research project DriveIN2 coordinated by Fiat Chrysler Automobiles (Pomigliano Technical Center) had as its partner the Istituto Motori (Engine Institute) of the National Research Council, the Fiat Research Center, the Universities of Napoli, Salerno and Catanzaro, the University Suor Orsola Benincasa and some of Smes of this sector. Funded under the National Operational Programme for Research and Competitiveness 2007-13, the project DriveIN2 defined methodologies, technologies and solutions within the interaction between driver and vehicle

for the prevention of road accidents and to reduce fuel consumption and emissions. The designed solutions were tested in virtual simulation environments and with prototype vehicles. The focus of the research was devoted to the driver and his driving behavior; the activities focused on the identification of methods and techniques for the direct and indirect monitoring of variables of the vehicle and of variables of the driver's behavior, in order to highlight the anomalies and to conduct targeted actions supporting road safety and environmental protection. A strong point and fundamental aspect of the project was the multidisciplinary approach. Among the activities performed, we mention the application of data fusion & data mining techniques for the combined analysis of variables relating to the monitoring of the operator's driving style, in order to seek the maximum efficiency of the vehicle data. An experimental campaign of acquisition was created, with instrumented vehicles on real roads, aimed at the analysis and representation of instant and average profiles of the fuel consumption and of the regulated emissions, with the relative geolocation of the vehicle on the road network. Emissions test were equally carried out on a chassis dynamometer, with cars driven by an automatic system (robot driver). Such activities, coordinated by the Istituto Motori in collaboration with Fiat Chrysler Automobiles obtained highly significant results in a context of Smart-mobility. Another fundamental activity was the analysis of the driver from a psychological point of view, to identify the variables that affect the level and the quality of the attention during the driving activity; the monitoring of the psycho-physical conditions and / or the monitoring of any alcohol of drug influence. The DriveIN2 project is integrated in the context of Smart-mobility and has been mentioned as best-practice in the National Plan for the Intelligent Transportation Systems (ITS) approved by Ministerial Decree n. 44 of 12 February 2014. It also won the Smart Communities Prize at the 2014 Smau in Napoli, where the Sym-Panda was much appreciated: it is the first prototype to securely test the driver's monitoring devices on a real road. The Sym-Panda is a right-drive Fiat Panda with a simulated driving position on the left: halfway between a simulator and the prototype vehicles. It allows to test solutions for the monitoring of the driver which, regarding specific variables of the driver (fatigue, level of alcohol, etc.) would be dangerous to directly perform on the road, in an uncontrolled environment. **-A.F.-**

Fiat Panda

A new production chain concept in the green economy

Transform food industry waste into new products for animal feed and renewable energy

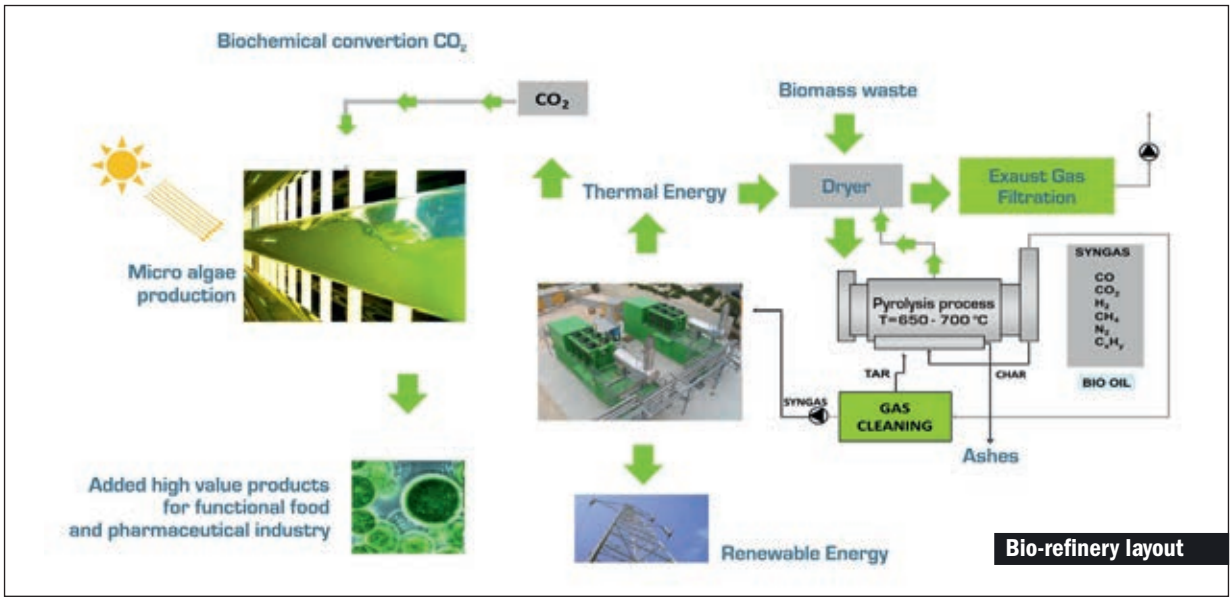
A new production chain between research and enterprise has been created from the exploitation of biomass-related biomolecules and energy and innovation in the animal feed and zootechnical production chain. Yesterday waste, then by-products, today a resource. Bring together the primary production enterprises with the nightmare of having to dispose of their scraps was the goal to involve the principal Sicilian food farming production chains. The production chain system has generated a new way of perceiving what can be done with olive and citrus fruit productive processes. Thanks to the synergy between the Consorzio di Ricerca Filiera Carni (meat production chain research consortium) and Messina University, where research has the habit of finding solutions for a region made up of enterprises open to innovation and for the animal feed industry, a dialogue was immediately established to create new products such as olive, orange and lemon extracts, together with molasses and other by-products derived from extraction processes, all comprised in new animal feed formulas. "New feedstuffs from innovative technologies, generated by the food farming production chain and established by a data sheet for the zootechnical feed market, replacing those imported, with benefits of both an economical as well as environmental nature and creating satisfaction in the feed industry by being less dependent on non-EU countries" – declares Gianni Di Pasquale of Mangimi Di Pasquale and partner in the project. Bio4bio is strongly focused on these feedstuffs, affording young people with higher education on new technologies for new products with positive repercussions on the animal supply chain, determinedly aimed at qualifying them in the field of food safety, therefore new professions also in step with environmental protection. The low temperature drying system set up for the project by Agrumigel together with Officine di Cartigliano SpA, is to protect the nutritional component essential for producing innovative formulas. These feedstuffs are used in cattle, pig, sheep and goat diets, after the nutritional quality has been carefully analysed, and have been transformed into components with high nutritional value by Consorzio Ricerca Filiera Carni through its state-of-the-art technological systems, comprising an attentive granulometric analysis. "Today, thanks to the innovative technologies in the PanLab laboratories at Messina University, it is possible to provide services to enterprises who intend to qualify, certify and promote new products by investing in innovation and be able to open up to new foreign markets with the assistance of Consorzio di Ricer-

PH: UNIVERSITÀ DI MESSINA

Vincenzo Chiofalo

Chemical laboratory

Low energy consumption dryer



Bio-refinery layout

ca Filiera Carni, a certification organization with laboratories accredited by Accredia for food food production chains", declares Vincenzo Chiofalo at Messina University. Exploiting the residual biomass energy in the food farming compartment is another strategic aspect of the Bio4bio project. The Bio-4bio project management has been assigned to Plastic Alfa, a company operating in the Green Economy sector (also through the 'Vedogreen' platform), which is developing a new business model qualifying the latter as "system integrator" for projects focused on the development of state-of-the-art technologies in the energy/environment/food farming sectors. Plastic Alfa has created a thermo-chemical degradation process for this project, based on cutting edge pyrolysis technologies. The woody cellulosic biomass matrix, such as olive pulp or pits, is converted at high temperatures (included between 400°C and 650°C), without oxygen: transforming the solid matrix into gaseous reaction products (gasification), liquids (pyrolysis oil) and solids (char). The gasification composition is analyzed for the volume and hydrogen, methane and hydrocarbons formed during the course of the woody cellulosic matrix degradation reaction, using an online gaschromatograph. The gas is purified by condensation processes set up by Catania University to then be used in power generation systems. The gasification condensation process separates pyrolysis oil, an extremely interesting mixture for producing both biofuel and fine chemicals as well as compounds potentially valid for producing biopolymers. Cnr (National Research Council), a partner in the project, is assigned with the refining process in the gasification and liquid stages. "The goal of the Bio4bio project – declares Falqui, R&D Project Manager at Plastica Alfa – is to also develop a biorefinery by CO_2 biochemical conversion through algae growth processes. Micro algae are unicellular vegetable organisms with a rapid growth potential. They are one of the most interesting microbial systems in the biotechnology sector for renewable energy (biofuels), in the field of sewage purification, but above all in producing dietary supplements, animal feed products, chemicals and pharmaceutical products. The presence of algae in fibres, proteins, mineral salts, polyunsaturated fatty acids, comprising carotenoids, polyphenols and vitamins, has triggered off a growing demand from the market. Plastica Alfa is developing micro algae growth processes and innovative photo bioreactors to guarantee a high process performance and reduced production costs. Applications for biogas plants producing biomethane are currently being developed. In this case the CO_2 separated from the process would be absorbed to feed the algae systems. **-L.F.-**


Micro algae producing system

PH: UNIVERSITÀ DI SALERNO

Pietro Campiglia

From waste to resource

When synergy between university and enterprise becomes an engine to drive innovation

Within the boundaries of the Third Mission, that is to say processes and activities connected with technological transfer, Salerno University is continually committed towards consolidating interaction between the scientific community and the world of enterprises, with the primary goal of interfacing the two sectors on reciprocal opportunities for development and connection. The Hi-Life (Health products from the Industry of Foods) project is a very apt example, based on close cooperation between research workers in the Salerno, Messina, Roma and Pisa Universities and enterprises in the food (Agrioil and AgrumiGel), cosmetic (Magaldi Life), pharmaceutical (Hering) and technological (Avantech) sectors, located in the convergent Regional territories. The most significant waste in the Mediterranean area is derived from processing dairy and cheese, olive oil and citrus fruit products typically having bioactive molecules. The project mission is to recover and exploit farm to food industrial waste and transformation materials to develop health products, of a functional food, cosmeceutical and nutraceutical nature. The purpose of Hi-Life is in fact to lend a substantial contribution towards keeping humans in good health and prevent various pathologies. The choice in itself of the Hi-Life acronym stands to evidence the classification of this project in the protection and promotion of human health and well-being sector and to this end the Hi-Life research group has drawn up a programme of combined actions for the three farm to food production chains under study, comprising – in the initial stage - the work of recovering industrial waste products and – in the final one - that of developing innovative formulae for controlled isolated active substance conveyance and release. Hi-Life has worked to create new business models in the production chain through close contact between areas producing the raw material, technological research and development areas and areas using the developed products and technologies, achieving multi-directional advantages: from promoting well-being, health and prevention, to reducing environmental impact, up to creating new professional figures. What is more, the project created an innovative technological upgrading model for all the participant enterprises during its course, implementing transfer of the developed technologies to Sme in the relevant sector This model, which could be used as a concrete case study, could also be used as the starting point for the creation of an "inter-regional centre for the health products compartment", or rather a network integrating scientific excellences in the world of research with the productive know-how of the enterprise, with a view to innovation in activities and improvement in reciprocal performances.

-P.C.-

Optimal growth in a controlled environment

Zephyr technology will improve plant stock preparation for forest restoration

The Zephyr project coordinated by the prof. Bartolomeo Schirone, a leading forestry scientist (according to the recent evaluation of Italian universities - Vqr), is now in its last phase of the realization. This growth chamber presents eco-sustainable devices realized by 10 different private companies and public universities spread in 10 different EC Member States. Solar panels power the prototype and a robotic arm enables the distant operator to make nursery operations. Watering, air-conditioning, and Led lights are controlled by wireless sensors to tailor the growth cycle to the plant requirement. The efficiency tests exceed all our expectations - says prof. Donato Chiatante past-president of Società Botanica Italiana and leader of the research group at Università dell'Insubria where the prototype Is tested. The Zephyr prototype will be on display for public viewing in the square "Città di Lombardia" on days 20-21 of October 2015 under "Feeding the future now" (an initiative of Regione Lombardia related to Expo 2015 event). Scientists testing the prototype agree that its use will boost the efficiency of plant stock preparation. Furthermore, the growth in Zephyr prototype seems to improve seedling resilience to global changes. For all these reasons Zephyr prototype is under scrutiny by the Società Italiana di Restauro Forestale (Sirf/Sere) for its potential use in a EU landscape restoration. **-D.C.-**

PH: UNIVERSITÀ DELLA TUSCIA

Camera di crescita in container

Journey into the animal genome

The new frontier of food safety

It is no longer science fiction, but actually possible: to put molecular biotechnology to the service of food safety. It's what the Department of Agricultural Sciences and Forestry of the University of Palermo does, which, thanks to the project "Promotion of dairy-cheese production in Sicilia, through molecular, chemical and nutritional genome applications", hard at work studying a revolutionary system for the genetic traceability of typical products. The research team under Baldassare Portolano, scientific head of the project, has been engaged for years in the development of applications for the molecular genetic traceability of dairy products. Now researchers at the University of Palermo are able to scan the entire genome of an animal, looking for specific Dna sequences for each breed studied. The comparison of Dna extracted from cheese with the one coming from different races yields answers about the authenticity of the productions and as such, helps unravel any fraud or counterfeiting. An analysis that gains in accuracy and reliability, while raising the quality level of products intended for human consumption. "A complex work, made possible thanks to the strong human and technological wealth of knowledge available to the Agricultural Sciences and Forestry Department", says Portolano,

Baldassare Portolano

who has used the platform "Illumina" to carry out the sequencing of whole genomes, yielding information that can prove useful to associations, government agencies and businesses. **-L.BULIAN-**

PH: MATTEO GELATTI

Primo Tortini

Cosmetic Creators

Beauty products and medical products for the five continents, from the traditions of the Parma area

The region of Parma is known throughout Italia and the world for its many excellent exports: Giuseppe Verdi and Parmesan cheese were born here, just to give two examples. But perhaps not everyone knows that this region, for at least a few centuries, has been home to important traditions in perfume production. Just think of the Violetta di Parma: the essence preferred by Napoleon Bonaparte's wife, Maria Luisa d'Austria, which was produced here. The strength that years of experience in the local territory bring also stands behind Cosmoproject, a well-established company which invents, produces and distributes cosmetics throughout the world. Primo Tortini, founder and present day leader, has his heart and background in chemistry. Before starting the company in 1993, he already had twenty years of experience behind him, and it is precisely his love for chemistry that is the basis of all the great work carried out here, in the countryside north of Parma. For the 160 employees involved, the chemistry lab is a sort of "company within the company", as the owner himself describes it: "We are creators of cosmetics. Here research is essential; there is continuous sampling. The market consistently demands new products and we focus precisely on this dynamism. For me, it's enough to provide one piece of data: from the start of the year up to today, in less than six months, we have already worked on 420 new projects". In part, these are requests from clients, but the majority are new products, designed by the company itself, that are then offered to various clients to test to their liking. "We mainly work for third parties – sometimes for large international companies –even if some products are under our own brand, such as Beauty Spa for beauty products and Terme di Salsomaggiore. In other cases, we control the entire production chain, from packaging to distribution". In cosmetics, Cosmoproject produces every type of essence, though for the past dozen years there has been a cutting edge product at the basis of production. "We have developed a multi-functional product that combines care cosmetics and decorative cosmetics – Tortini explains -. Basically it is a cream emulsion that visibly improves the skin: it's not simple makeup, it immediately perfects the skin's surface. Starting from this principle, we consider all dermatological aspects of cosmetics, also creating products for a clientele that has only a few minutes in the morning to attend to their face. And don't assume this is only a female clientele. There is also an important sector of creams for men, such as aftershave and hair wax, that recently has had an important revival. Then, we also consider all the trends in "green" cosmetics: – natural or eco-friendly, if you prefer – in this area we are greatly concerned with how gentle a product is and with minimizing packaging". In every sector, essentially, what Cosmoproject makes is special, original products that arise from the great research coming out of their laboratory. "Our chemistry is refined: I make difficult products in particular; it's what makes me happiest", Tortini candidly confesses.

In addition to cosmetics, for many years the company has also made medicinal products in the various classes set forth by law. "Products for topical use fall into this category: for washing intimate areas, for treating damaged skin, and for restorative products. And within this area we speak of creams, liquids and pastes, practically all products possible". For Cosmoproject, medicinal treatments are still a niche in terms of their overall production (today it makes up around 10% of the company's 25 million euro turnover), but it is a sector that arose just a few years ago and which is in steady growth with very interesting prospects. The same is true abroad, where all of the company's activity is experiencing constant and significant growth. "It should also be mentioned that for the cosmetics sector, the "Made in Italy" mark is definitely an important and sought-out characteristic – the president highlights-. Currently, we export about a quarter of our turnover abroad: a number that is growing, mainly to the rest of Europe (we have a strong presence in Germany, Sweden and Spain), even if recently we have been expanding to the Far East, from China to Korea. Being an Italian company definitely helps us: it's a sort of trademark – both in terms of chemical experience as well as creativity on a chromatic level – that many appreciate. In addition, many foreign companies even choose to come and produce here with us, in Parma, putting the "Made in Italy" mark on their own products as a sort of extra quality guarantee of quality".

-A.MAZZOTTI-

The trail of knowledge

UNIVERSITÀ DELLA CALABRIA

Unical faces the challenges of internationalisation and innovation

Internationalisation. Innovation. Technology transfer. The great triad of the bulwark of knowledge located in the heart of Southern Italia: the University of Calabria - Arcavacata Campus (www.unical.it). A cutting-edge academic and scientific hub that has more than 30 thousand students, 805 full professors and 380 adjunct professors; 14 departments, three centres of excellence, two graduate schools, one of the largest libraries of Southern Italia; a palaeontology museum, a natural history museum and a botanical garden; 692 technical and administrative staff members. Numbers that highlight the role of this institution, which reaches far beyond the regional borders, and the confidence with which it looks to the future. The University of Calabria, in fact, steadily aims at strengthening its identity and the positive trend of foreign enrolments (young students from as many as 61 countries attend the university) but, none the less, the enhancement of its graduates, often involved in fulfilling professional and entrepreneurial experiences in every part of the world. The strengths of Unical are also its Orientation activities (Entry, Progress and Placement), the school-college-work path, to which the University of Arcavacata ensures special focus, and the commitment to equal opportunities for students with disabilities. The latter, in particular, significantly represented by a programme for the blind, which covers a large portion of the university grounds. The throbbing heart of the Campus of Arcavacata is the residential centre, with 2500 beds and five cafeterias, which serve 1 million meals per year. Completing the Campus' organisation and functionality are a Health Centre, with an emergency call service, a post office, a parking lot with 5,000 car spaces, soccer fields, tennis and basketball courts, a gym and a shuttle service. Flagship of the University of Calabria, finally, are the Auditorium Theatre (over 500 seats), which hosts arts events every year and plays of the highest level, two cinema halls (250 seats each) and two amphitheatres. The University also includes a nursery that houses about 100 children. A strategic asset of the University of Calabria is formed by technological innovation, on which the University has invested a lot, in the belief that it is the key to promote the link between science and business, progress and employment. A goal that is actively pursued by the Liaison Office (Lio), an office that provides support to research and that promotes technology transfer, making significant efforts in this direction, especially thanks to the TechNest business incubator. Important are also the University communication activities, because excellence, which Unical expresses both on a scientific and academic level, and in terms of the services it provides to students, is something to communicate actively in the day-by-day. To achieve this goal, Unical airs its productions on the digital terrestrial channel 685 "UnicalChannel", the University web radio "Ponteradio", a weekly newsletter that is sent to over 1,500 subscribers, and the scientific and cultural dissemination magazine "Stringhe", the only publication of this kind at a national level.

PH: UNIVERSITÀ DELLA CALABRIA

A view of the University of Calabria

Scientific competence to support the local territory

Engineering, technical instrumentation progress made at Catania University for enterprises

The academic staff at the Civil Engineering and Architecture Department (Dicar) unites over a hundred professors, sharing interests in civil engineering and environment, design of new and rehabilitation of existent architecture and development of innovative systems in the field of civil structures and infrastructures. Dicar has its own research laboratories, covering a wide sphere of interests, for its work of teaching, research and third-party service provider. In particular, the services offered to the territory through the third-party system comprise problems that include quality control on materials used in civil engineering and architectural works, as well as the works themselves and manufactured products, laboratory hydraulic tests, using physical models of port and coastal facilities, geotechnical tests, land and sea surveys as well as environmental diagnosis and analysis. Dicar furthermore provides services in the field of territorial planning and hydro-geological instability and is also creating a new and efficient laboratory in the new Technological Centre at Catania University to conduct control and qualification tests on construction materials, durability of manufactured products and materials, road and geotechnical tests and for monitoring and analysis of environmental-related quality parameters. **-R.E.M.-**

PH: UNIVERSITÀ DI CATANIA

Tank generating wave motion

OU-I 2015

REPORT

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Safeguarding the cultural heritage

High technology and targeted training at the center of the protection of the artistic heritage

PH: UNIVERSITÀ DI PALERMO

The District of High Technology for Innovation in the Cultural Heritage of Sicilia, approved by the Ministry of Education with the decree of 07/08/2013, is a Temporary association for a purpose with the following partners: University of Palermo, University of Catania, Cnr, Coirich Scarl, Instm, Csgi, Pitecnobio, Engineering Ingegneria Informatica S.p.a., Hitec2000 srl, Ids & Unitelm LTD, Sidercem srl and Syremont S.p.a., and is based at Palazzo Chiaramonte – Steri, in Palermo – the headquarters of the University of Palermo. The District works in the fields of research, advanced training and services for the conservation, enhancement, use of the cultural heritage, both emerged and submerged, indoor and outdoor, supporting businesses, enhancing the excellences, stimulating the competitiveness, promoting the entrepreneurship in the field of the cultural heritage through the creation of spin-off and start-up, delivering services, attracting private and public funding. The competences of the District involve the development of innovative materials of nanostructured type, the implementation of survey methodologies, the use of diagnostic techniques integrated on portable systems for in-situ analysis and laboratory instrumentation. Amongst these, the Raman and Ftir vibrational spectroscopy, techniques using X-rays, imaging techniques, X-ray and neutron tomography, scanning and transmission electronic microscopy and THz waves, innovative detection techniques, 3D and virtual representation and innovative Ict solutions. The District conducts its research activities through three projects, which were presented out of the National Operational Programme for Research and Competitiveness of the Ministry of Education, i.e.:

Project Tecla
(Pon 03PE_00214_1) - Nanotechnology and nanomaterials for the cultural heritage.
The project aims at exploiting the potential of nanotechnology to create innovative materials and nanomaterials for the consolidation, protection, cleaning and fruition of the cultural heritage.

Project Delias
(Pon 03PE_00214_2) - Development and applications of innovative materials and processes for the diagnostic and restoration of the cultural heritage.
The project aims at developing new materials, innovative processes, analytical methods and new instruments for the diagnosis and monitoring of the cultural heritage and integrated instrumentation
for the identification and monitoring of underwater archaeological sites.

Project Neptis
(Pon 03PE_00214_3) - Ict solutions for the "augmented" use and exploration of the Cultural Heritage. The project aims at creating of a prototype of an integrated system to realize services and applications supporting the fruition of routes, sites and cultural heritage through the use of advanced Ict technologies.

The District is also active in the field of higher education with the Project: **"Researchers and experts of high technology and of technological innovation applied to the cultural heritage sector"**. The training project intends to create highly specialized professionals in nanotechnology and nanomaterials with specific interdisciplinary knowledge and in the field of outdoor and indoor musealization and cultural heritage marketing. It plans the realization of University Masters, the provision of postdoctoral scholarships and to attend national and International PhDs. **-G.P.-**


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PH: MATTEO MONTALDO

From left to right: Giorgio Stefanelli and Carlo Della Piana

When prevention is a business

Supplements are conquering new markets

Consumer health always as the top priority, continuing to improve the quality of the company's flagship products and pursuing a strategy to achieve international growth. This aptly sums up the antidote to the economic crisis of Amnol Chimica Biologica, a company of the Wtb Group that specialises in skin cosmetic products, supplements and medical devices with a high quality standard. "In the last decade, and even more so, since 2010, several multinationals have entered our market", says Amnol's Ceo Giorgo Stefanelli, at the head of the company along with President Carlo Della Piana. Amnol was set up in Novara in 1978, heavily geared towards pharmaceuticals, and specialises in a type of niche supplements. "Our success was to understand the need to add variety to diets, contributing elements that exist in nature and that the body needs in particular physiological conditions", says the Ceo. "In the early 90s, in an industry dominated by the use of synthetic molecules, we thus decided to concentrate on nutraceutical and dermaceutical products, with a special focus on phlebology and the lymphedema conditions". Amnol is today one of the European operators of dermocosmetics featured on the European information platform Cpnp, the "Cosmetic products notification portal". "Unfortunately, we don't have the same regulatory clarity yet for the broad spectrum of supplements", Stefanelli points out. "For this reason, we are working together with industry associations to define specific legislative proposals, as highlighted by our presence, along with Federsalus, at the Park of biodiversity of Expo 2015". Even Amnol's business expansion plan - a company that today distributes throughout Italia thanks to two warehouses and a team of about 90 scientific informants - starts off from the Mediterranean area, where problems tied to blood circulation, due to the hot climate, are more frequent. The goal is to bring the share of turnover generated by exports from the current 5% to 25% within three years. "The plan is already in progress - explains Stefanelli - a second person will soon join the team, with the precise aim of boosting internationalisation. Since 2014, we have also started to explore the Usa market for a disease such as the diabetic foot, to which we have dedicated a series of high-performing products. This business plan goes hand in hand with collaborations with other companies active in the same fields of specialisation and with a size similar to ours". And, in parallel, with relentless focus on the search for new partnerships and technologies, conducted thanks to the support of the universities of Novara, Ferrara, Genova, Catanzaro and Napoli. Stefanelli's careful approach, however, also involves the company's financial management: "I am focusing on making the company more healthy on a financial level and in terms of its cash-flow - the Ceo concludes - our turnover has thus remained consistently over 5 million Euros, while we have strengthened our profit margin and assets. And we are increasingly independent of financial aid from banks". **-S. ALPARONE-**

PH: G.A.I.A.

Landfill and energy recovery

Management of waste materials

Bio.Lea.R
LIFE+09/ENV/IT/101

The new technique of recirculating leachate has reduced the environmental impact of landfills and increased the production of biogas

The issue of waste and disposal systems has undoubtedly a big political and social importance within high growth rate societies. Despite the clamoured need of a waste management through recycling and reuse, a residual fraction still has to be landfilled. The Bio.Lea.R. project (Biogas Leachate Recovery) created by Gaia (www.gaia.at.it) – the corporation of 115 Asti municipalities that built and operates four plants and nine eco-stations for waste recovery, treatment and disposal – with the Politecnico di Torino, has experienced the unconventional management of a landfill for non-hazardous waste as a bioreactor. In the traditional "dry tomb" management of dumps, the entry of liquids is limited to reduce the production of leachate. In bioreactor landfills, instead, the humidity percentage within the waste is increased through the recirculation of leachate, or of waste water, thus bringing in solution the components to decompose and the very microorganisms responsible of the degradation of waste. This way, the microbial activity is stimulated and the organic substances present in the waste are degraded more quickly. The expected results are: more electricity produced, reduction of post-management times and, consequently, less expenses for the recovery of biogas, with better economic and environmental balances. The environmental impact is reduced mainly through the production of more biogas in the first years after the closure of the landfill; it can be exploited in a more efficient way, subtracting greenhouse gases emissions. Studies and experiments in laboratory scale seem to encourage these hypotheses. Thanks to the co-financing of the Life+ program of the European Commission (Life + 09 / ENV / IT / 101), a location of the Gaia landfill in Cerro Tanaro was equipped with a recirculation system of the leachate, a system of biogas collection and a continuous monitoring system of the characteristic parameters. At the same time, the Politecnico di Torino reproduced in laboratory the same conditions that occur at the landfill: the results gave a 20% increase in the biogas production, and a progressive decrease in the concentration of pollutants in the recirculated leachate. At the moment, the observable parameters on a real scale show that in some collection wells there was an increase of production, while the topographic monitoring prove a more evident settlement in the points of leachate recirculation. However, it should be taken into account that a long time is required in of waste biological degradation processes before coming to reliable conclusions. The data are constantly updated on the site www.biolear.eu where an application can be downloaded to interactively read the results. **-F.G.-**

Space technologies at the service of agriculture

Thanks to the Nibs project, the results achieved by public and private research centres of Basilicata may improve the agriculture of Countries worldwide

Ideal hinge between Europe and the Mediterranean, known especially for its habitat rich in natural resources, Basilicata is also a land rich with knowledge and advanced technologies in the space industry. There is a whole lot of space, here. Thanks to a significant concentration of public research centres (National Research Council, University of Basilicata, Space Geodesy Centre of the Italian Space Agency, Enea), and large private companies (E-Geos, Eni, Fiat), the region is at the forefront of the earth observation sector and is one of the founders of Nereus, the network of European regions that employ space technologies. It is in this region, for example, that data from European satellites that use Sar technology (Synthetic Aperture Radar) for over twenty years (and up to the latest coming from the Italian Cosmo-SkyMed constellation) have been acquired and distributed worldwide. The TeRN Technology District has been operating in this region since 2005, a fine example of a partnership between Smes, public administrations and research agencies, which develops innovative space technologies for the protection and prevention of natural hazards. Through the Nibs project, aimed at the internationalisation of the local space industry, many of the solutions designed in Basilicata, and in particular those aiming at modernising agricultural production, have been successfully applied in other Italian regions (see examples of products produced in the Lazio region in the figure) and abroad. Starting from the analysis of data from the new generation of geostationary and polar satellites, it was possible to develop effective and innovative solutions to improve agricultural practices and production and to make them sustainable. These include the forecast of agro-meteorological parameters to predict extreme events that are potentially harmful to crops (hail, frost, etc.) and the early detection of risk factors related to the possible development of pathogens (like the infamous and annoying Xylella) with monitoring of the evolution and spread of infestations. Or support to crop planning/rotation, the effective management of vineyards with assistance in the decision-making process, based on data recorded in remote on the irrigation, fight against pests and diseases, harvesting and soil management. Moreover, thanks to an innovative model that allows the estimation of soil moisture at root level from satellite observations, the space technologies sector of Basilicata contributes to research on the sustainable use of water resources worldwide. And that's not all. From space, thanks to algorithms processed in Basilicata, you can continuously assess, independently and objectively, the status of use of agricultural areas and use the data to determine the farmers' eligibility for European funding. **-G.G.-**

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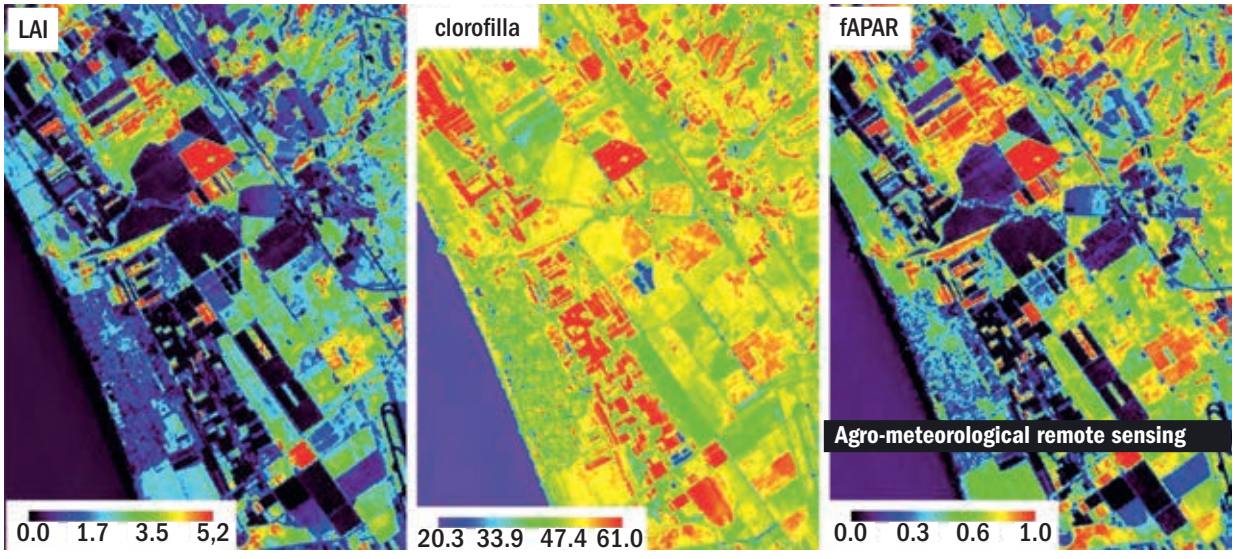


Habitats to rescue

From the Incoronata wood, the way to preserve biodiversity

The ambitious aim is to "create the conditions to release the Incoronata wood from an ecological and cultural isolation which may compromise its precious flora and fauna heritage". The president of the park that lies in northern Puglia, Franco Landella, indicates the goal of the Bosco Incoronata Life Project, presented to the European Commission by the Management of the park, the city of Foggia, in partnership with the non-profit organization "Centro Studi Naturalistici" which also supervised the design of the project, and the University of Foggia, and which has been approved and funded with more than a million euro in 2010. At the center of the initiative lies the conservation of the habitat of the park and the increase of the biodiversity of Sci ta landscape, with its forests and its pastures, but also the awareness and the participation of the local community, extremely important aspects for the protection of the species, essential conditions for a correct environmental management". The project involves, therefore, concrete actions IT9110032 "Valle del Cervaro - Bosco Incoronata". This green space, in fact, includes several habitats of Community interest, some of which were identified as priority right by the "Habitat" Directive of the Eu itself, from the Mediterranean grasslands to the plain wood, remnant of the lowland forests that once covered the Tavoliere delle Puglie. "One of the goals in the long term - explains Mr. Landella - is the conservation and restoration of this wonderful testimony of the historic Capitanata of conservation which, says Carlo Dicesare, the project manager, "have the purpose of reversing the fragmentation and erosion of habitats of Community interest, particularly the plain forest, the riparian wood that grows along the banks of the Cervaro creek and the Mediterranean steppe pastures that once characterized large areas of the Capitanata involved in the transhumance activities". The fauna of European interest, such as amphibians, reptiles and bats, is the target of interventions in order to improve their habitats and to increase their number. How? The aim is to create a breeding center for amphibians and reptiles, an artificial bat roost and some 500 bat boxes in the wooded areas. Finally, a full synergy between the conservation plan and the information, educational and networking campaigns included in the project. Also because "the forest, whose testimony has come down to us also thanks to its link with the millennial the sanctuary dedicated to the Madonna near Incoronata (Black Crowned Virgin Mary) - concludes Mr. Landella - is not only an important natural habitat, but also the oldest historical monument of our community dedicated to transhumance". **-M.M.-**

PH: M.CALDARELLA

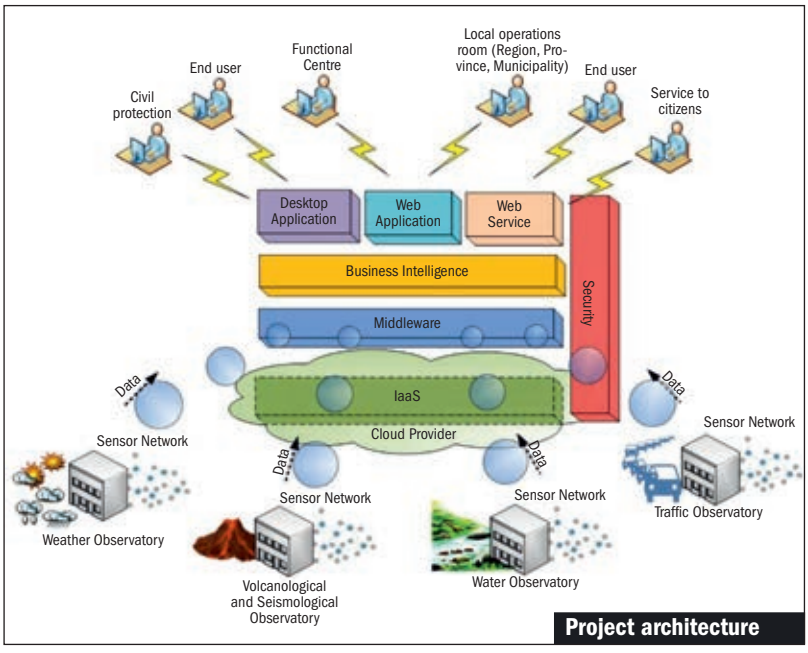
The Cervaro creek with a gallery forest

An integrated system of sensors in cloud environment for multi-risk management

Well under way in Sicilia is the Sigma project for managing natural and industrial risks

Natural disasters and those induced by technology that have occurred in recent decades and have highlighted the increasing vulnerability of society. In this context, the integrated system of sensors in cloud environment for Advanced Multi-risk Management (Sigma), a project funded by the National Operational Programme (Pon) "Research and Competitiveness 2007-2013", is a multi-tiered architecture developed by the consortium of participants (Selex Es, Antech Spa, Censis, Cinfai, Cnit, Cnr, Delisa Sud Srl, Engineering Ingegneria Informatica Spa, Istituto Nazionale di Geofisica e Vulcanologia (Ingv), Insirio, Neodata Group Srl , STMicroelectronics, University of Catania, University of Messina, Xenia). The system integrates and processes data from heterogeneous sensor networks (weather, volcanic, seismic, rain water, land and sea traffic, environmental, etc.), in order to enhance systems to control and monitor both environmental and industrial production factors. Through the use of different technologies in the Ict field, it is possible to acquire and distribute data and information in real time, allowing for the effective management of different risk scenarios. Once it detects a situation of risk within the process of industrial production and/or territorial control, Sigma also provides support for the preparation of action plans, developing and integrating the data from the affected areas in order to be able to deliver useful information to the population and the competent authorities. The main points under development within the Sigma project are: 1) development of a prototype of an integrated system for controlling, monitoring and managing high-risk processes, both natural and industrial; 2) development of a prototype training system for the staff responsible for the management of emergencies; 3) adaptation, development and expansion of one or more Cross-Functional Risk Centres in Sicilia; 4) adaptation, development and strengthening of local Operations rooms (Region, Province, Municipality) for surveillance of the territory; 5) integration of data from different institutions in Sicilia and/or across Italia; 6) development of dense networks of multi-parametric monitoring in sensitive areas; 7) development of mobile satellite terminals for the connection between the means in movement and the control centres; 8) development of Ict systems for the dissemination of correct information to the population and the competent bodies. Based on the above points, the Sigma project stands at the forefront in the development of technologies for the monitoring and management of multi-risk scenarios. **-P.M.-**

PH: INGV

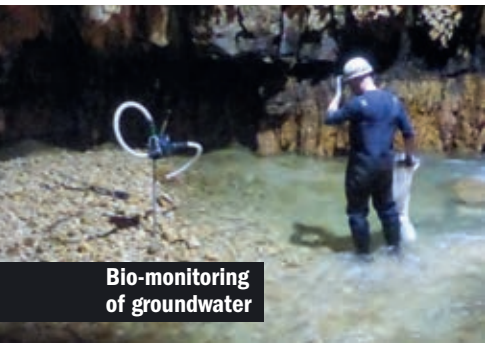


Project architecture

The treasure of groundwater

Introducing the new package to protect the biodiversity of underground water ecosystems

A simple and user-friendly software that allows you to assess the state of conservation of biodiversity in groundwater and "measure" its level of integrity. This, in a nutshell, is the objective of Aqualife. Underground waters account for more than 97% of fresh water on the planet, are the most important resource of water and harbour a diversity of endemic species that to many is completely unknown, but of immense value. These environments are sensitive to alterations caused by human activities such as spills of pollutants that penetrate into the subsoil, excessive groundwater withdrawals, changes in the river bed and hydraulic and forestry regulations. At present, European legislation establishes obligations for the environmental monitoring of a body of groundwater, but does not recognise and include bio-monitoring systems. How do we preserve the integrity of these ecosystems? How can we determine their environmental quality through their biodiversity? Aqualife has the answer to those questions! The five-year project, co-financed by the European programme Life, is aimed at testing an innovative and easy-to-use system of indicators for assessing the biodiversity of ecosystems dependent on groundwater. A project package will be produced and disclosed consisting of descriptive cards of the subterranean environments; keys to identify indicator species; software for the use of those indicators with built-in tutorials. The "Aqualife Package" will be available to the personnel of environmental management and monitoring institutions. **-A.M.-**



Bio-monitoring of groundwater

PH: GRAN SASSO LAGA PARK

Progetto LIFE12BIO/IT/000231 AQUALIFE

A safe protection for animals

Acoustic sensors to protect species

Traffic accidents involving animals are on a rise: a real threat to biodiversity - as well as to the safety of motorists - that project Life Strade (Life11BIO / IT / 072), co-financed by the European Commission, is trying to tackle. The project started in 2013 and has a duration of four years; it involves the Regions of Umbria, Toscana, Marche and the provinces of Perugia, Terni, Grosseto, Siena and Pesaro-Urbino, with the development of an innovative prevention system aimed to protect wildlife and to increase security on the roads subject to this phenomenon. It is a set of infrared sensors able to detect animals approaching the road: in this case, the technology transmits the information to an electronic control unit that triggers an alert signal to the drivers, asking them to reduce speed. Finally, a doppler radar sensor checks whether the vehicle is actually slowing down: if this is not the case, it operates an acoustic deterrence to ward off the animals. "This way, we will be able to maintain the environmental connectivity by preventing the risk of accidents and avoiding the habituation of animals and drivers", says the project coordinator, Annette Mertens. The entire control system is performed via a modem that sends real-time emails reporting the activation of the different components. "The preliminary results for the first 8 plants, out of the 15 planned, are very encouraging". **-A.M.-**

An acoustic system

PH: SIMONE RICCI

PH: A. DE FAVERI

Audouin's gull

Recomposing nature

The challenge of the new Life project for protecting the islands in the Arcipelago Toscano

The Mediterranean islands are areas with a high level of biodiversity, complex systems where isolation has promoted the evolution of rare species, the so-called "endemic species", located in restricted areas. If, on the one hand, this complexity may facilitate the continuity of relations between the various components of an ecosystem and hence, sustain its stability, on the other hand, these habitats when subjected to heavy perturbation can disastrously degenerate and need ever longer recovery times. Unfortunately the threats to the native species are very different and many have human origins. Among these, invasive alien species which rapidly colonise the new areas into which they have been introduced by man are one of the main causes for the loss of certain forms of life with the inevitable loss of biodiversity. The European Commission, thanks to the Life programme, supports setting up interventions to preserve the habitats and protected species and has funded a project for the protection of the Isole dell'Arcipelago Toscano. Various institutes which are involved in nature conservation, the Parco Nazionale Arcipelago Toscano which is the leader, the Istituto Superiore per la Protezione e Ricerca ambientale, the Corpo Forestale dello Stato and the Università di Firenze – Biology Department, are participating in the project which has the goal of requalifying the territories of Pianosa, Elba, Giannutri and Montecristo. In particular, it deals with interventions aimed at protecting certain species of sea birds such as the Scopoli's shearwater, the Manx shearwater and the Audouin's gull all of which are endemic to the Mediterranean. Other actions are aimed at protecting the typical habitats of these islands: the holm oak woods, the fields of ephemeral plants used to poor soil, small flooded areas and temporary ponds which form in the rainiest seasons, plant combinations on the sand dunes and the endemic plants which live on the rocky coastlines just a few metres from the sea. In Giannutri the work team attempted to substitute the Sour Fig, an exotic plant which was introduced for ornamental purposes and which has transformed entire stretches of the rocky coast of the island, with native vegetal species. In Pianosa, interventions have been made to remove certain alien species such as the black rat and the eucalyptus to recover the original animal and vegetal communities. In Montecristo, the Mediterranean bush land and the centuries old holm oaks are protected by the grazing of wild goats which, despite being of marked scientific and cultural importance, can result in the most sought after vegetal species vanishing. Finally, on the Isola d'Elba the only sand dune area on the Archipelago is being preserved against coastal erosion and excessive visitors whilst an historic Audouin's gull nesting ground has been bought by the Park and protected from the ungulates which were introduced. The final objective is to recompose the pieces of a large mosaic to conserve one of the greatest "hot spots" of biodiversity in the Mediterranean. **-F.G.-**

Images for health

New technological solutions for the patient

Everything starts with a careful diagnostic examination, which allows the specialist to find confirmations of the analysis of the single clinical case or which reveals important details, not conceivable without an excellent clinical image. Health and care start from the diagnostics by images: this is why the Esaote group - led by Ceo Karl-Heinz Lumpi – has been committed for thirty years on an international scale to the development of products and noninvasive imaging solutions: ultrasonography, dedicated magnetic resonance and Information Technology for healthcare are the main areas that Esaote has focused on, to provide systems aiming at enhancing lighter, more accessible, less expensive methods, non-invasive for the patient, while ensuring a high-quality performance. The history of Esaote begins in 1982, when it was launched as a start-up within a large Italian group with State participation (IRI-Finmeccanica). It was then privatized in July 1994 - through an innovative buy-out management. Since then, it has rapidly grown to become one of the ten players in the global diagnostic imaging industry. With a turnover of over €262 million in 2014 (of which 65% earned on foreign markets) and 1,250 employees (50% of whom are based outside Italy), the Group is present with its own production and research units in Italia, the Netherlands and China, and - through its subsidiaries and an international distribution network - in over 60 countries. Today, China is the first export market for Esaote, having surpassed in importance of Germany and the United States; with a turnover of more than 40 million in 2014, it represents more than 15% of the Group activities. The heart of Esaote's activities is of course R&D, on which the Company has massively invested over the years, ensuring continuous technological innovations, alongside a close synergy with the medical community, which has allowed to obtain pioneering results regarding for example the dedicated magnetic resonance and devising new solutions in the field of ultrasounds. The research and development activities - in which Esaote invests about 8% of its turnover and engages 20% of its staff - are concentrated in particular in the development of new products and clinical applications, but also to increase the focus on the time-to-market and to improve costs, continuously listening to the customers' needs. Since 2014, under a new management, the Group has launched a series of initiatives to further specialize its production sites, strengthen its presence on the international markets and improve the efficiency of all operative and management processes in order to meet the needs of its customers in a prompt and effective way. In an increasingly competitive and changing market, Esaote accepts the challenge with enthusiasm, expertise and a great team work: the essential prerequisites to produce results and technological edge. **-M.D.-**

Karl-Heinz Lumpi

PH: ESAOTE

Ultrasound machine

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