(analysis)
(interaction)
(objectivity)
(test)
(data)
(experimenting)
(algorithm)
(control)
(optimization)
(applications)
(user)

Ajuntament de Barcelona
Barcelona activa

ISBN: 978-84-9850-181-0

UNIVERSITY BARCELONA BUSINESS

(urban)
(micro-organism)
(recycling)
(product)
(efficiency)
(virtual)
(design)
(customizing)
(device)
(standby)
(composition)
(connectivity)
(environment)
(driving)
(information)

20 CASE STUDIES OF
R&D&I COLLABORATION

UNIVERSITY
BARCELONA
BUSINESS

20 CASE STUDIES OF
R&D&I COLLABORATION

UNIVERSITY
BARCELONA
BUSINESS

Ajuntament de Barcelona
Barcelonactiva

In Barcelona, we are convinced that innovation is the key strategy for the future, at a city scale as well as at a Catalan, European and International level. And we are also certain that one of the main motors driving forward innovation is the transfer of knowledge between universities, research centres and industry, since these partnerships enable this knowledge to be transformed into new business initiatives.

However, a two-way relationship between the worlds of research and business is vital for this transfer to become a reality. We do not want the knowledge of this reality to be restricted to the usual clusters of experts in these fields; these people are precisely the ones who are already convinced of the importance of this partnership. This is the aim of the publication you are now reading: to disseminate the experiences of university-company partnerships, within the context of citizens, since it is people who ultimately make projects and initiatives prosper. And these people must find the conditions and opportunities they require in a city. For this reason the city of Barcelona is developing services and amenities (Barcelona Activa is the most emblematic and fruitful) and establishing and providing suitable spaces (of which 22@ is the most successful example to date).

I am sure that by leafing through these pages, you will understand what we refer to when we say that the future of Barcelona lies in becoming a city where knowledge, creativity and innovation go hand in hand. This is just another example of the initiatives that the City Council is promoting to face the challenges posed by today's society and to become more competitive in global markets.

Together we are continuing to make Barcelona a great opportunity, a magnificent city in which to work and live.

Jordi Hereu
Mayor of Barcelona

In recent years, the need to promote collaboration between public and private spheres of research has become increasingly important.

One such type of partnership is the transfer of knowledge with the aim of stimulating economic development and fostering innovation in industry.

It is for this reason that the City Council is pleased to present this publication, which aims to show specific case studies of partnerships between private research and companies that have given rise to highly innovative initiatives and products. One of the characteristics present in all the research groups and companies that have made this collaboration possible is a quest for innovation.

We therefore wish to help to further bring together universities and companies, to show how the research carried out in universities and educational centres, of increasingly higher quality, leads to the creation of a wide range of highly innovative products in diverse sectors.

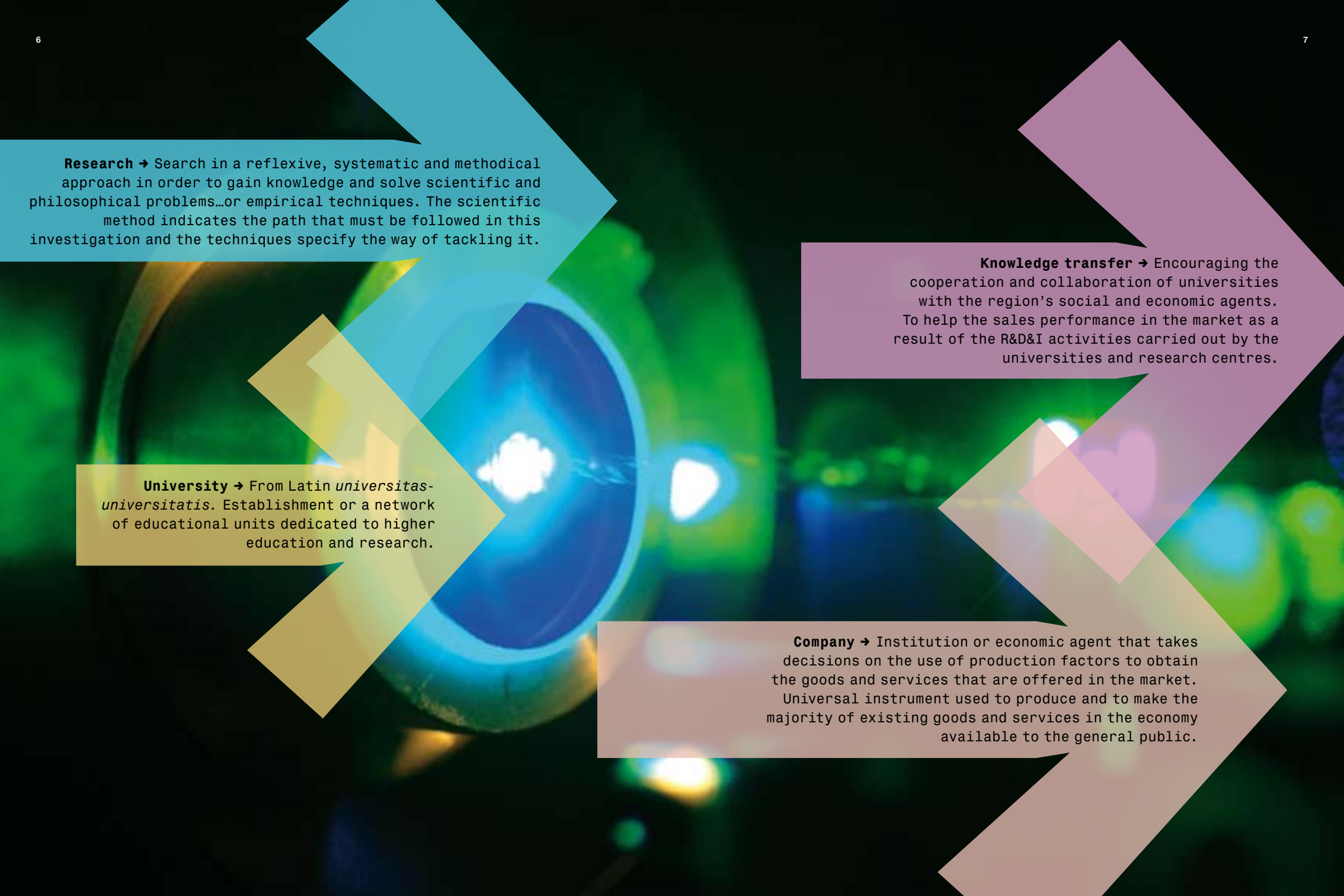
These examples aim to show how the transfer of technology and knowledge can be turned into corporate innovation, helping to boost entrepreneurial spirit and attract talent to our city, both in terms of researchers, professionals and future business leaders.

This book is published within the framework of the Barcelona Research and Innovation Programme, which aims to foster the promotion and dissemination of the skills and results of research that is carried out in the universities and centres in Barcelona and its metropolitan area.

We invite you to explore these pages.

Jordi William Carnes

Deputy Mayor of Treasury and Economic Promotion
and President of Barcelona Activa

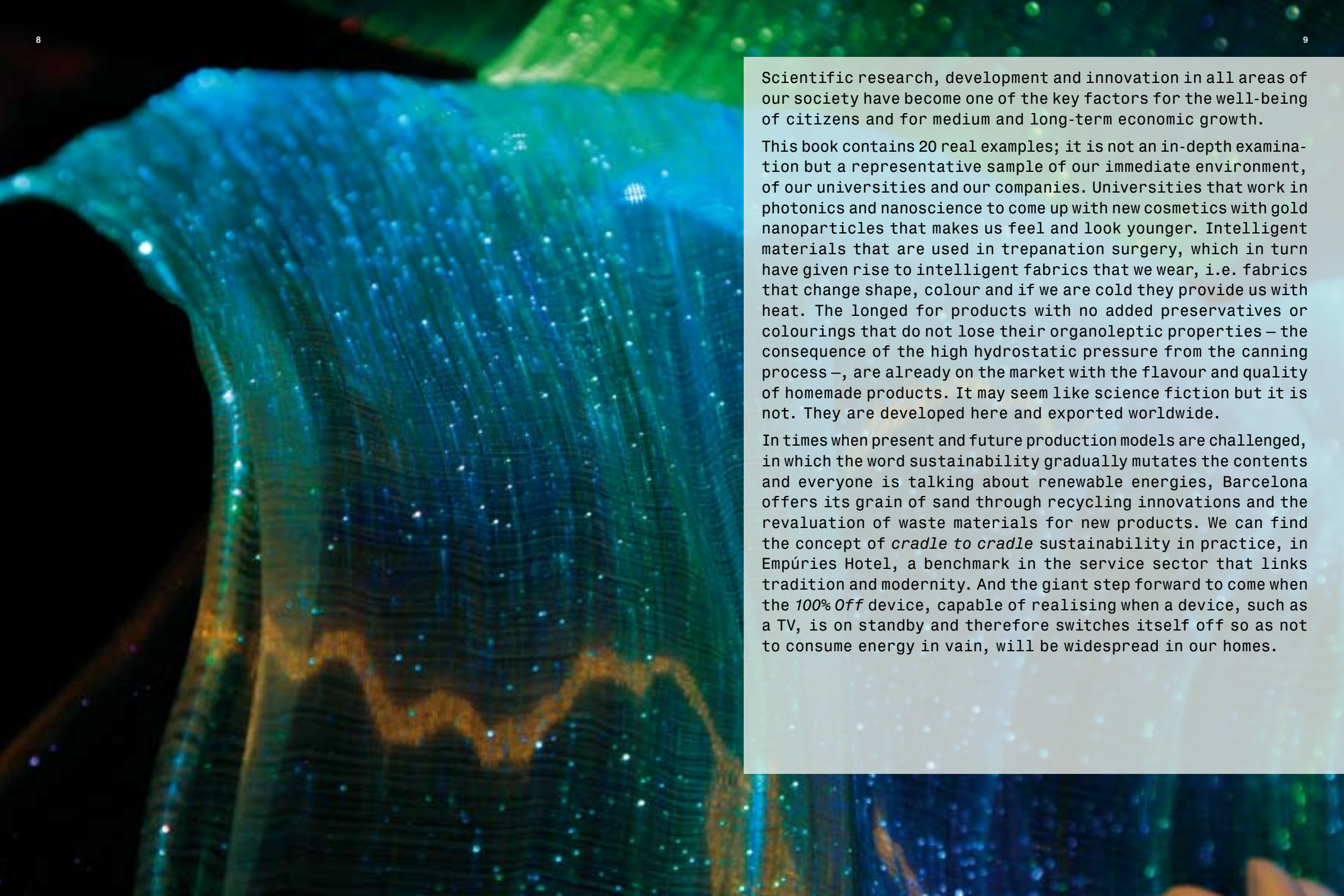


Research → Search in a reflexive, systematic and methodical approach in order to gain knowledge and solve scientific and philosophical problems…or empirical techniques. The scientific method indicates the path that must be followed in this investigation and the techniques specify the way of tackling it.

University → From Latin *universitas-universitatis.* Establishment or a network of educational units dedicated to higher education and research.

Knowledge transfer → Encouraging the cooperation and collaboration of universities with the region's social and economic agents. To help the sales performance in the market as a result of the R&D&I activities carried out by the universities and research centres.

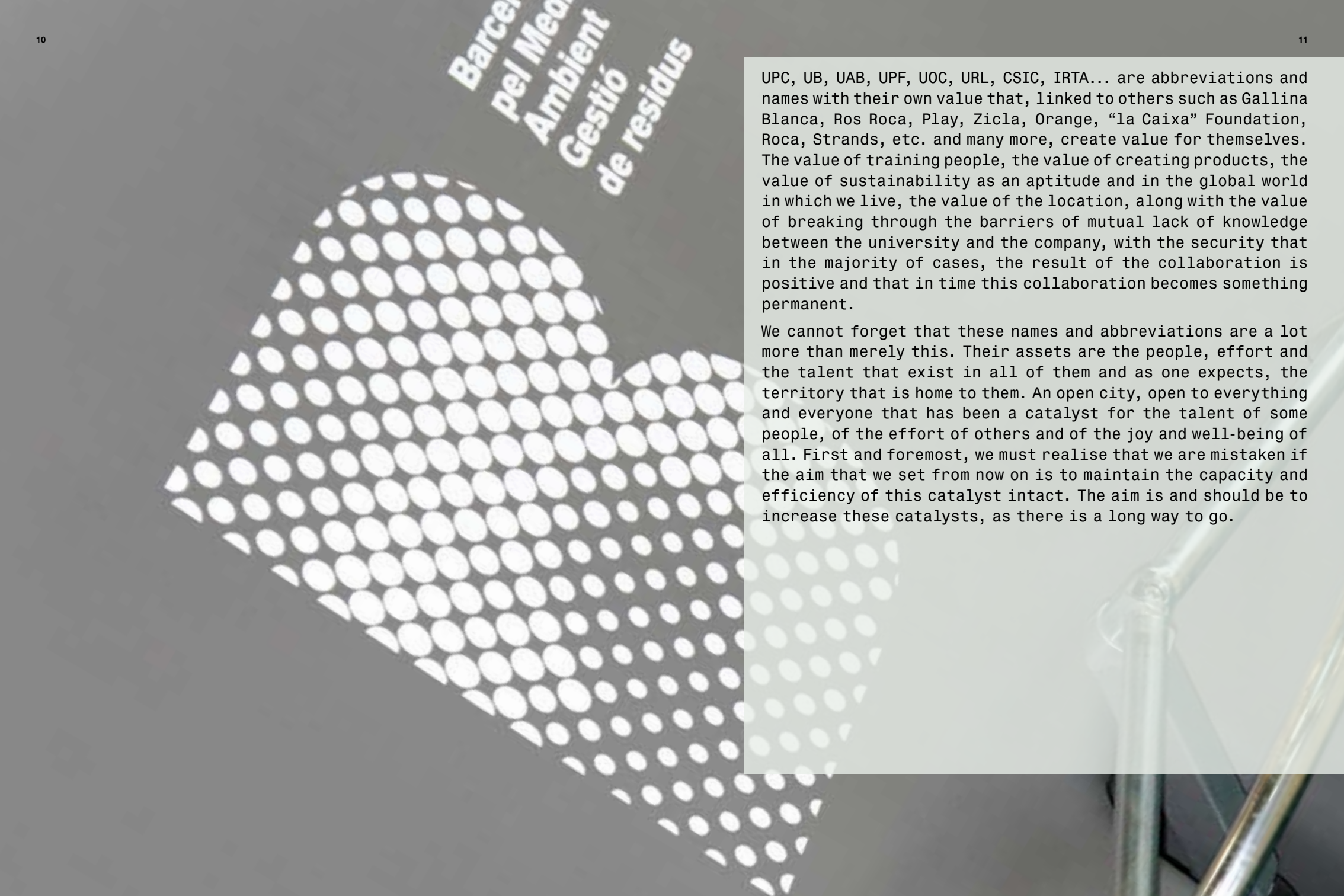
Company → Institution or economic agent that takes decisions on the use of production factors to obtain the goods and services that are offered in the market. Universal instrument used to produce and to make the majority of existing goods and services in the economy available to the general public.



Scientific research, development and innovation in all areas of our society have become one of the key factors for the well-being of citizens and for medium and long-term economic growth.

This book contains 20 real examples; it is not an in-depth examination but a representative sample of our immediate environment, of our universities and our companies. Universities that work in photonics and nanoscience to come up with new cosmetics with gold nanoparticles that makes us feel and look younger. Intelligent materials that are used in trepanation surgery, which in turn have given rise to intelligent fabrics that we wear, i.e. fabrics that change shape, colour and if we are cold they provide us with heat. The longed for products with no added preservatives or colourings that do not lose their organoleptic properties – the consequence of the high hydrostatic pressure from the canning process –, are already on the market with the flavour and quality of homemade products. It may seem like science fiction but it is not. They are developed here and exported worldwide.

In times when present and future production models are challenged, in which the word sustainability gradually mutates the contents and everyone is talking about renewable energies, Barcelona offers its grain of sand through recycling innovations and the revaluation of waste materials for new products. We can find the concept of *cradle to cradle* sustainability in practice, in Empúries Hotel, a benchmark in the service sector that links tradition and modernity. And the giant step forward to come when the *100% Off* device, capable of realising when a device, such as a TV, is on standby and therefore switches itself off so as not to consume energy in vain, will be widespread in our homes.



UPC, UB, UAB, UPF, UOC, URL, CSIC, IRTA... are abbreviations and names with their own value that, linked to others such as Gallina Blanca, Ros Roca, Play, Zicla, Orange, “la Caixa” Foundation, Roca, Strands, etc. and many more, create value for themselves. The value of training people, the value of creating products, the value of sustainability as an aptitude and in the global world in which we live, the value of the location, along with the value of breaking through the barriers of mutual lack of knowledge between the university and the company, with the security that in the majority of cases, the result of the collaboration is positive and that in time this collaboration becomes something permanent.

We cannot forget that these names and abbreviations are a lot more than merely this. Their assets are the people, effort and the talent that exist in all of them and as one expects, the territory that is home to them. An open city, open to everything and everyone that has been a catalyst for the talent of some people, of the effort of others and of the joy and well-being of all. First and foremost, we must realise that we are mistaken if the aim that we set from now on is to maintain the capacity and efficiency of this catalyst intact. The aim is and should be to increase these catalysts, as there is a long way to go.

UNIVERSITY

Neurosurgery Unit
Santa Creu i Sant Pau Hospital
www.santpau.cat

Department of Morphological Sciences
Autonomous University of Barcelona (UAB)
www.autonoma.edu/medicina

Department of Medical Sciences
University of Girona (UdG)
www.udg.edu/depcm

(neurosurgery)

(hospital)

(diagnosys)

(radio-transparency)

CRANIAL LOOP

(precision)

(polymer)

(biocompatibility)

(holding)

BUSINESS

Neos Surgery
www.neosurgery.com

Novelties in the operating theatre

A surgical device for closing after craniotomies in less than one minute

Maximum precision robots, complex operations with minimum incision, and laser used in place of a scalpel are just some of the examples of the developments taking place in the field of surgery. In order to implant a new process in this field or offer a really novel product, it is essential to consider the improvements made in biocompatible materials and how they are used. This spirit was behind the creation of Cranial Loop, a device for holding the cranium in place developed by the company Neos Surgery with the collaboration and monitoring of the Neurosurgery Unit at the Santa Creu i Sant Pau Hospital, which has become an end-user, the Department of Morphological Sciences of UAB, and the Department of Medical Sicences of UdG.

SETTING OF THE BONE FLAP WITHOUT INSTRUMENTS IN LESS THAN ONE MINUTE

Cranial Loop is designed for closing after craniotomies – operations requiring the bone of the skull to be fractured in order to provide access to brain and allow the surgical intervention to be carried out. The device is used to anchor the bone once the operation is finished. It can be used manually without the need for any other instruments, enabling the surgeon to feel when it has been secured correctly.

Amazingly simple to use, Cranial Loop is inserted in each opening in the skull and the bone flap is completely anchored in place following a craniotomy in less than one minute.

The design, developed as the result of monitoring conducted by the Santa Creu i Sant Pau Hospital, and the material used allow the device adapts to the curve, shape and thickness on both the inside and outside of the skull and reduces the risk of damaging surrounding tissue to an absolute minimum.

Cranial Loop has an advantage over previous designs in the field of neurosurgery in that it does not require any instruments for use and is completely radio-transparent. This means it will not obscure the view in diagnostic tests such as x-rays, CAT and MRI scans. This is achieved by the fact that the device is the first cranial anchoring system made from 100% PEEK-OPTIMA ® polymer, a high-performance thermoplastic material enabling mechanical properties to be obtained comparable to those achieved with metal implants.

Cranial Loop does not block the view in diagnostic tests such as X-rays, CAT and MRI scans and therefore does not interfere with results

The company Neos Surgery is the result of collaboration between of two technological institutes: the ASCAMM Private Foundation and the Inasmet-Tecnalia Foundation

FROM THE COMPANY TO THE OPERATING THEATRE

Neos Surgery is the result of collaboration between of two technological institutes: the ASCAMM Private Foundation and the Inasmet-Tecnalia Foundation. The origins of this collaboration date back to 2003. Enjoying the participation of specialists in neurosurgery and private investors, the project has the aim of developing new products for the field of neurosurgery.

In order to do this, it is not only necessary to carry out technological validations but also those of a clinical nature. Thus, in the Cranial Loop instance, while Neos Surgery has taken responsibility for creating, developing and certifying it, UAB and UdG have validated its operation in testing with patients and human cadavers.

Neos Surgery is currently working on the development of products for spinal surgery and on devising complementary and more sophisticated elements for brain surgery.

UNIVERSITY

Technological Research Centre for Dependency Care and Autonomous Living (CETpD)
Polytechnic University of Catalonia (UPC)
Foundation of Sant Antoni Abat County Hospital (FHCSAA)

www.upc.edu/cetpd

(control) (data) (thermal) (processing)

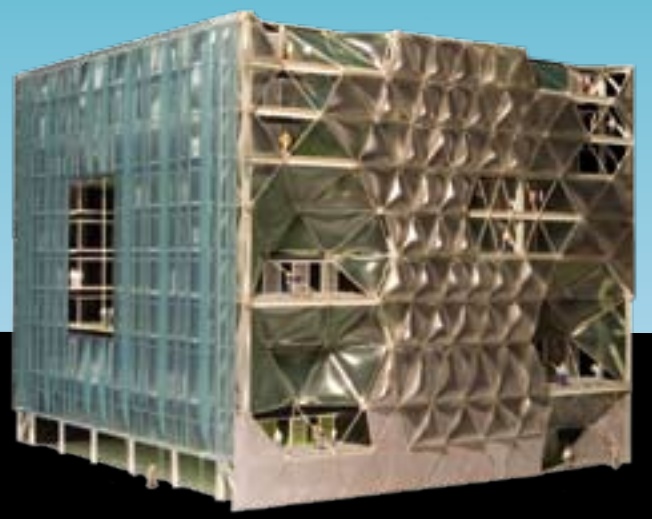
ROBOTIC SYSTEM FOR THE MEDIATIC BUILDING

(device) (optimization) (interaction) (space)

BUSINESS

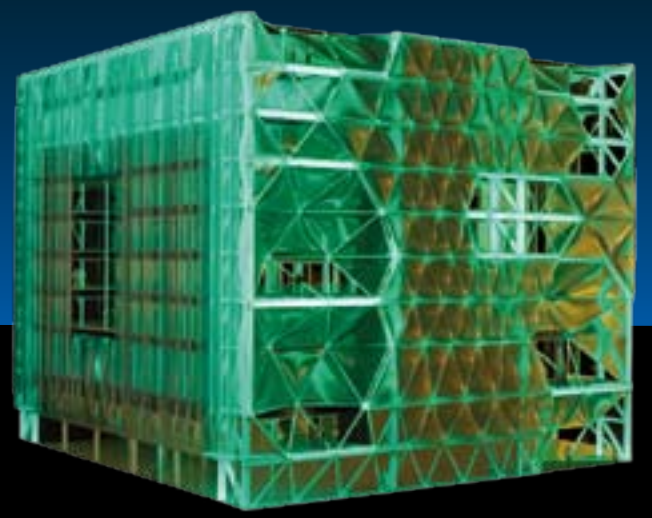
Cloud 9

www.e-cloud9.com



The office that reads minds

Robots to control comfort



Getting up to adjust the thermostat whenever it feels cold or going over to draw the curtain to shut out an annoying reflection on the computer screen are daily occurrences in offices everywhere. However, the latest developments in robotics and construction are making it possible to create smart spaces adapted to conditions that offer the highest level of comfort to workers without any need for them to intervene.

This is the philosophy underpinning the construction of the MediaTIC, an office block designed by Cloud 9, an architect studio run by Enric Ruiz Geli, with the aid of Technological Studies Centre for Dependency Care and Autonomous Living (CETpD).

IN SEARCH OF MAXIMUM EFFICIENCY

Unlike most other buildings, which consume vast amounts of energy, MediaTIC has been designed as a huge generator while optimising energy use at the same time. For instance, one of the façades of the building is made of ETFE, a material reminiscent of plastic bubble wrap that has some amazing properties: it can be inflated and deflated depending on thermal conditions; it can cover the building to protect it from the sun or absorb the light so as to keep it lit up all night. Both the façade and the office space have been equipped with multiple sensors to detect temperature, humidity and pressure, gathering data from outside the building in order to modify to the conditions present in its interior.

ONE ROBOT INSIDE ANOTHER

However, none of this would be possible without a central system designed to process data, gauge the needs of users and act accordingly. It is like a huge robot - the building itself – housing another robot inside, which is mobile, smart...and has the ability to take decisions.

This nanorobot has been developed with the collaboration of CETpD, a technological centre devoted to social robotics. This discipline places particular importance on the interaction of people and robots, and features the services of psychologists, doctors or multimedia experts engaged in studying the potential of bidirectional communication using voice recognition or sensors.

This robot also has the capacity to work out what the most comfortable conditions are for users without them having to express anything verbally, for instance, through the use of facial expression.

The system is designed to go on increasing the parameters it is capable of capturing and modifying. One of the future services currently under development is the ability to control the wellbeing of people with special medical needs. Medical equipment fitted with constant monitoring devices run by a system of sensors carried by the patient, which are becoming increasingly common (pulse meter, watches capable of measuring heart rate), will interact with the sensors in the building to enable it to send the information automatically to the nearest medical centre.

Even though it might seem like something out of the distant future, the engineers involved in the project stated that this technology really does exist today and that often the only thing needed for it to be out into place and running is to imagine specific new applications.

The central system for the MediaTIC building is a nanorobot designed to process data such as humidity and temperature and to modify internal conditions accordingly

The latest developments in robotics and construction are making it possible to create smart spaces that offer the highest level of comfort to workers without any need for them to intervene

MediaTIC building under construction. 22@ District

UNIVERSITY

Department of Cultural Anthropology and History of America and Africa
University of Barcelona (UB)

www.ub.edu/antropo

(senses) (ritual) (knowledge) (experience)

AMAZON SHOWER

(nature) (colour) (inspiration) (water)

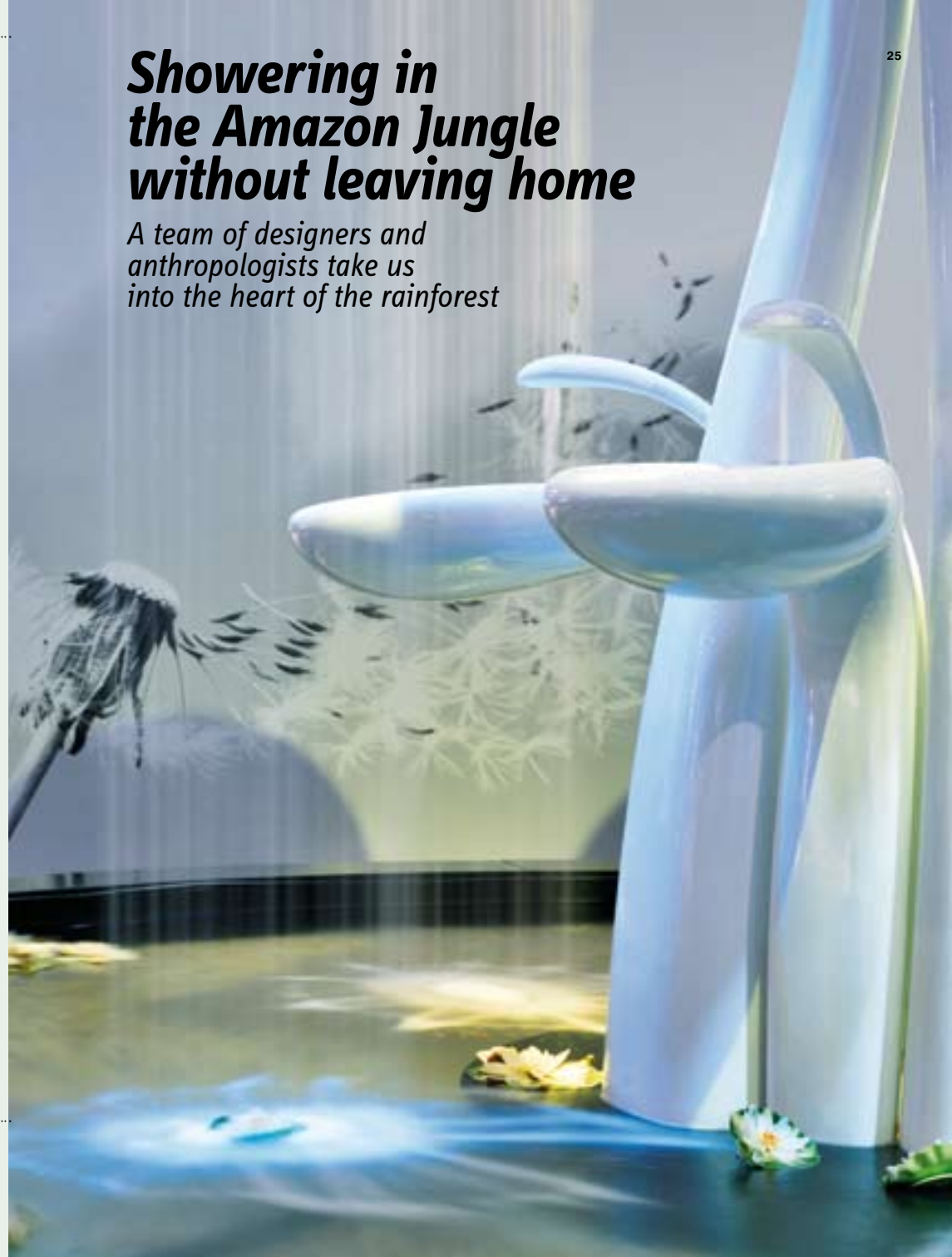
BUSINESS

Roca Sanitario
Roca Innovation Lab

www.roca.com

Showering in the Amazon Jungle without leaving home

A team of designers and anthropologists take us into the heart of the rainforest



The feeling of intense tropical rain on your skin, immersed in the colours, smells and sounds of the heart of the Amazon rainforest, is a pleasure that, in theory, is not available to people that live in the city. Combining these two extremes offers a different perspective that enables Roca to study new concepts, such as the Amazon shower.

As inspiration to arrive to this and other concepts, Roca conducted some real fieldwork in collaboration with the Department of Cultural Anthropology and History of America and Africa at the UB. They organised an expedition of members of staff from both the company itself and also the university in the heart of the Amazon rainforest and rural areas of tropical Brazil.

Establishing contact and trust and reaching a level of intimacy required for gaining an understanding of the inhabitants of the Amazon jungle is not a swift or easy task. Nevertheless, in this respect a profound knowledge of the surroundings and the local communities on the part of the UB research team made it a lot easier.

The entire design for the Amazon shower, created by Roca Innovation Lab, aims to reflect this experience during the time spent in the Amazon jungle – from its shape, inspired by young shoots and plants, to the colours representing a sky that is intense and at the same time constantly changing.

HYGIENE AND RITUAL

How is water used by these communities? What are their myths and legends? What is their natural habitat like? These are some of the questions raised at the beginning of this anthropological and ethnographical study focusing on examining the historic relationship of these peoples with water.

We do not only have showers when we are not really clean enough, nor do we only have a bath to relax. There is a ritual, therapeutic and even recreational dimension to water, which goes beyond the concept of hygiene *per se*. In the study conducted by Roca and the UB, the public and private dimension of water and its practical uses, such as washing or cooking, were taken into consideration. The aesthetic and moral rituals relating to the way contamination or hazards are dissipated were also observed. In our environment, these are equivalent to taking a hot shower at the end of a really exhausting, stressful day.

The way in which we relate to water and connect with nature as human beings are the key factors that were taken from the study

NEW LOOKS, NEW WAYS

Thus, just as we return from a trip bursting to tell everyone about our experiences and sensations, the knowledge acquired on the expedition was shared with the other members of the team in a number of brainstorming sessions.

One of the basic lessons learnt on the trip revolved around communication habits. They discovered that it is possible to relate to other people at a slower and less aggressive pace in an urban society like our own, where the lack of time and constant rushing around are problems that take on significant importance as we go about our daily lives.

Over and above the proposition of a simple change of colour or shape, the way in which we relate to water and connect with nature as human beings were decisive factors that serve as inspiration for the creation of new ideas by Roca.

ROCA INNOVATION LAB

One of the tasks of the Roca Innovation Lab, where conceptual designers work, is to develop new designs dealing with the problems in existing solutions viewed from other perspectives, and also analysing the needs of the user that have not been addressed so as to offer the most appropriate resources.

UNIVERSITY

Music Technology Group (MTG)
Pompeu Fabra University (UPF)

www.mtg.upf.edu

(invisible)
(change)
(wavelength)
(voice)

VOICE KALEIDOSCOPE

(representation)
(discover)
(experiment)
(didactic)

BUSINESS

Obra Social Fundació ”la Caixa”
Department of Environment and Science

www.laCaixa.es/ObraSocial

Can you see the voice (that is invisible)?

Understanding physics better by drawing the invisible

Teachers of schoolchildren of all ages know this only too well – explaining Physics phenomena, and their applications in real life, is not at all easy. With the aim of making this task less complicated and helping to discover how our voice waves work, the Music Technology Group at the UPF and "la Caixa" Foundation have created the KaleiVoiceCope.

The project, developed in the context of the exhibition *Nombres de bona familia* in the CosmoCaixa display area, is based on the KaleiVoiceCope software, through which visitors can see a graphic representation of the waves of their own voice and even modify them. Thus, a twenty-year-old can find out how his voice would sound if he were a baby or an old man, or if, instead of being a man, he were a woman. He can even change it into the voice of a clown or an extraterrestrial being.

THE GRAPHIC VOICE

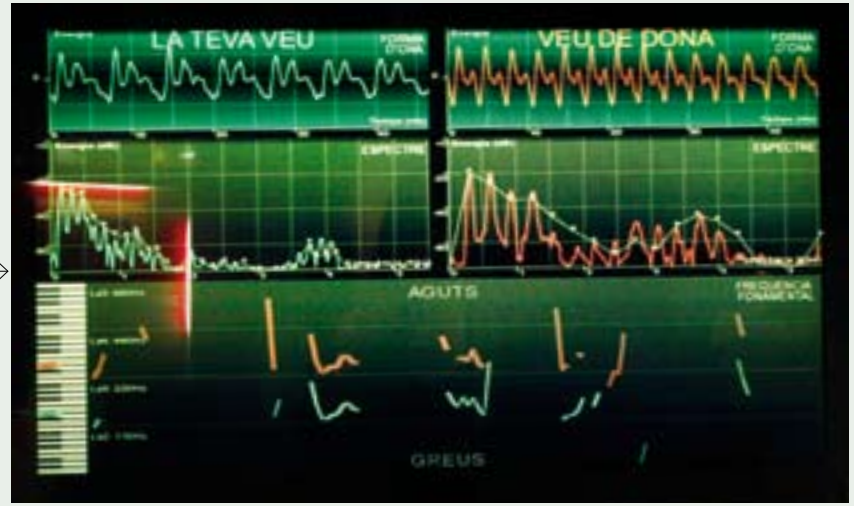
The way this kaleidoscope works is very simple: the voice enters the system through a microphone and the waves are shown in graphic format on the screen. When one of the distorters is selected, the screen shows the two comparative graphs while a speaker emits the real voice and the distorted version at the same time.

With this experiment, adults and children alike are made aware of the effect generated by their voice in the form of waves and the physical phenomena that take place, even though they are invisible, every time we speak.

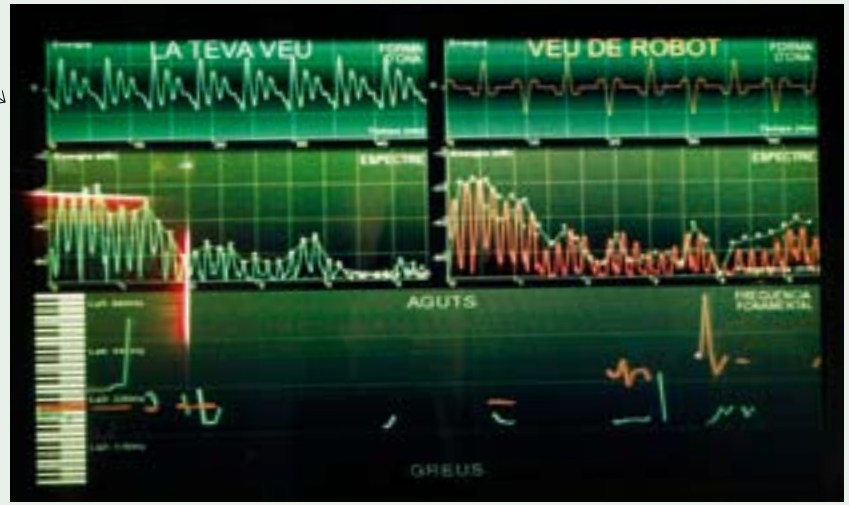
PLAYING WITH OUR VOICE

In the exhibition *Nombres de bona familia* , visitors can also find out what complex numbers are for by playing with their own voice.

Through the use of the so-called Fourier series, which use complex calculations, researchers are able to study and use waves to generate new emissions. Taking this as their starting point, a program was developed to show the waves diffused into the air by the voice using a graphic format, and succeeding in modifying them by changing their frequency or wavelength. In this way, the user can see the real waves produced by the voice compare with the modified version on the screen.



Original voice / Woman voice



Original voice / Robot voice

LISTENING TO OUR ANCESTORS

The mouth, pharynx, vocal chords and respiratory organs in our body determine the way our voice sounds. Based on a study of the differences between current human morphology and that of prehistoric man, "la Caixa" Foundation and the UPF hope to launch a new application that will allow us to hear how our voice would sound if produced by a Neanderthal man.

The Voice Kaleidoscope enables us to see the graphic representation of the waves of our own voice and to even modify them

UNIVERSITY

Department of Electronic Engineering
Polytechnic University of Catalonia (UPC)

www.eel.upc.edu

(elastic)
(conductive wires)
(printing)
(microelectronics)

ELECTRONIC INK IN TEXTILES

(data)
(electroluminiscent)
(tactile)
(fabric)

BUSINESS

Sensing Fabrics

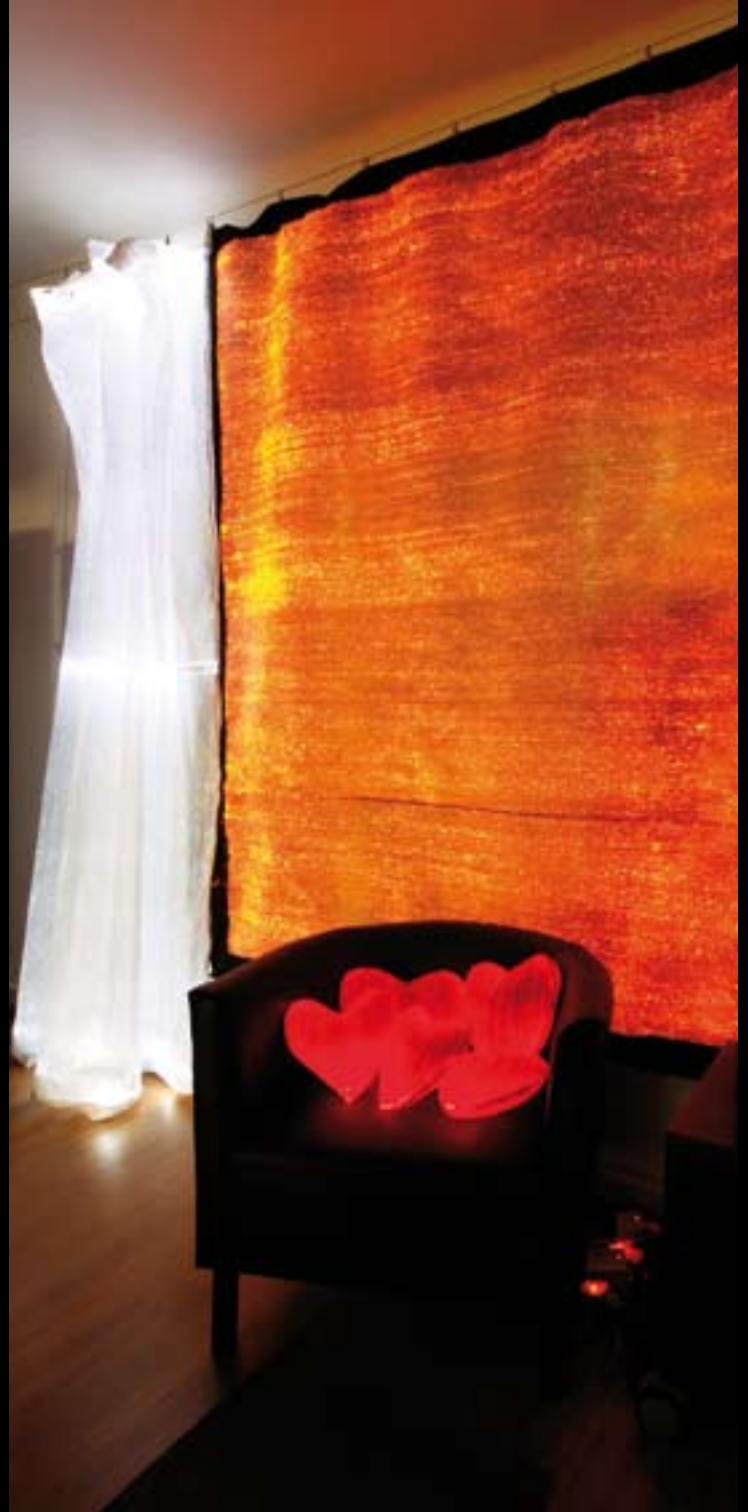
www.sensingfabrics.com

Smart textiles for an easier world

Textiles, microelectronics and communications come together to create amazing products

Those who once imagined the most fantastic machines in science fiction, certainly never expected that one day there would be fabrics enabling music players to be controlled, mobiles to be answered without taking your hands out of your pocket, portable keyboards for the computer or PDA, or the integration of the car controls in the upholstery. Today, thanks to the initiatives such as the collaboration between the company Sensing Fabrics and the Electronics Department at the UPC, the future has become a little closer.

These fabrics enable music players to be controlled, mobiles to be answered, a portable keyboard to be available for the computer and PDA, and to integrate the car controls in the upholstery



EVERYTHING ELECTRONIC INK IS CAPABLE OF DOING

The research carried out by experts in the field of textiles, microelectronics and wireless communications has culminated in the creation of a new technology that enables the difficulties to be surmounted with regard to the production of fabrics with conductor wire: electronic ink.

The conductor wire used up until now in textronics has been replaced by printed textile circuits with electronic ink capable of sensing, transmitting and acting (that is to say, performing a smart process) on any type of fabric, from an item of clothing to the upholstery of a car.

The range of possibilities for electronic ink in fabrics is very broad, starting with providing the fabric with sensory properties: pressure, tension, torsion, temperature, heart beat; transmission properties, supply, and performance data: emission of light, heat, sound, etc. It is even possible to combine several functions in the same item of clothing.

PRINTING IN COLLABORATION

The printing process can be carried out on any fabric, including elastic, which is then treated to give it a more even surface so that the ink can adhere properly and be spread more evenly.

In spite of this treatment, the company Sensing Fabrics and the Electronics Department of the UPC had to join forces to develop a system to encapsulate the ink, so as to prevent it from deteriorating and to protect the ink itself from cracking. Thanks to the research work done by the university, it was possible to monitor parameters such as humidity or temperature for maximum optimisation of results.

IN SEARCH OF GREAT IDEAS

Apart from this product, Sensing Fabrics also has versatile and robust electroluminiscent and heatable fabrics suitable for many applications just waiting to be proposed. Who is game enough to imagine one?

Conductive wires used until now in textronics have been replaced by printed textile circuits with electronic inks capable of feeling, transmitting and acting on any type of fabric

Model of a dress with electronic ink

UNIVERSITY

Agrifood Technology Research Institute (IRTA)

Regional Government of Catalonia

www.irta.cat

(biotechnology) (organic) (feeeding) (micro-organism)

BOVINE DISEASE DETECTOR

(pathology) (analysis) (preservation) (control)

BUSINESS

Aromics

www.aromics.es

Lleters de Catalunya

www.lleters.cat

and other companies

Whether sold in a carton, a bottle, or in a plastic pouch, milk is a major food product that has to reach consumers in perfect condition. This does not only mean ensuring maximum quality for the consumer, but also guaranteeing that the cows producing the milk enjoy optimum health and wellbeing.

It was with this in mind that collaboration evolved between various technological centres and European companies in this sector, including IRTA (Agrifood Technology Research Institute) run by the Regional Government of Catalonia, the biotechnology firm Aromics, located in the Barcelona Science Park, and the Catalan dairy cooperative. This team was responsible for developing a device that can detect bovine diseases in a way that is fast and non-invasive for the animals and, it is hoped, which can be installed on dairy farms.

FAST, SIMPLE AND LOW-COST

This new device is used to detect diseases such as infections of the mammary glands, intestinal infections such as paratuberculosis, or diseases that cause reproductive problems in animals, such as brucellosis. Unlike blood tests, which are more traumatic and invasive, or the long drawn-out biotechnological tests performed on the animal's milk, this system has the advantage of producing the result in just a few hours and at very low cost.

When the dairy farmers suspect the presence of one of these diseases, which have no effect on consumers but do affect the productive capacity and wellbeing of the animals, they can perform on the spot tests using a device the size of a shoe box.

The bovine disease detector allows dairy farmers to perform tests on animals in a quick and non-invasive way

The way it works is really simple: milk is poured into the detector, where the nucleic acids and infection-causing micro-organisms are isolated. The device will then proceed to alert the user to the existence of any disease. The next challenge currently being tackled is the miniaturisation of the nucleic acid-extraction process so as to fully automate the entire process on the actual dairy farms.

AN INTERNATIONAL PROJECT

Different parts of the device have been developed at technological centres in a number of European countries, coordinated from Barcelona by CRIC (Catalan Research and Investigation Centre). Participating in this project, known as Pathomilk, are technology companies, dairy farms, producers and distributors from the dairy sector and research centres in countries such as the UK, the Czech Republic, Greece, Italy, Portugal, Slovakia and Hungary.

Apart from CRIC, IRTA, Aromics and Lleters de Catalunya (producers of the milk brand Llet Nostra), also working on the project there is an important representation of Catalan industry including Industrias del Cadí, SAT Solius 1342 Cat and Vitaltech Ibérica.

UNIVERSITY

↓ Computer Vision Centre (CVC)
Autonomous University of Barcelona (UAB)
CIRIT (Inter-Ministerial Council for Research and Technological Innovation)
ACC1Ó (CIDEM/COPCA)

www.cvc.uab.cat

(reliability)

(data)

(test)

(lighting)

ACQUISITION AND SYNCHRONISATION SYSTEM FOR NIGHT FILMING

(objectivity)

(legal regulation)

(simultaneity)

(driving)

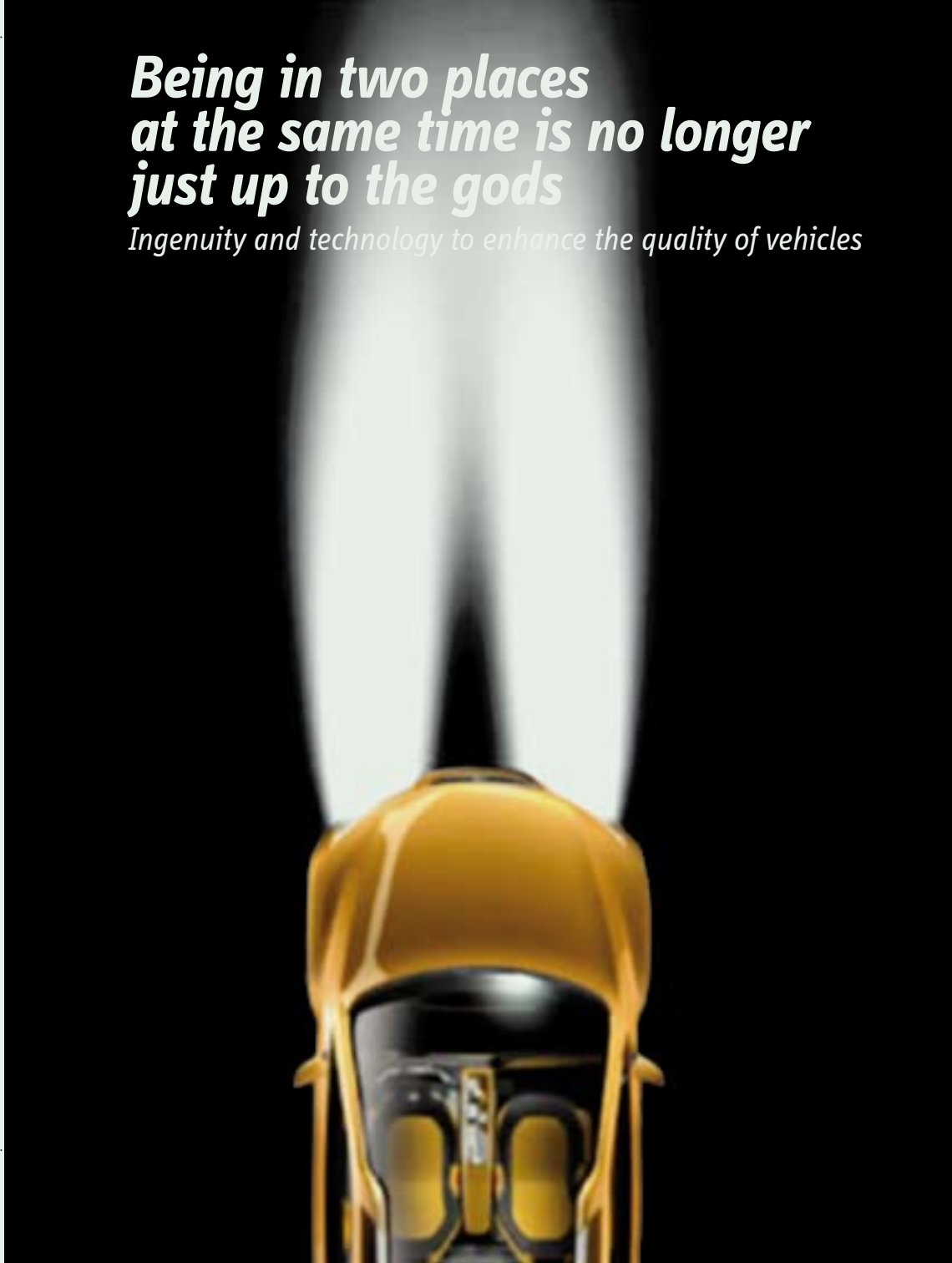
BUSINESS

↑ SEAT Technical Centre

www.seat.es

Being in two places at the same time is no longer just up to the gods

Ingenuity and technology to enhance the quality of vehicles



In a business world that is becoming more and more globalised and complex, the need for companies to improve their products through research is clear. SEAT car company is one such example. Thanks to the collaboration with the Computer Vision Centre (CVC), SEAT has developed the Acquisition and Synchronisation System for Night Filming, used to assess the vehicle's head light system.

This new tool combines ingenuity and technology to achieve what would otherwise seem like a magic trick: making two cars pass through the same place, at the same speed... and see it at the same time.

SEAT Ibiza – Single Reflector Headlamp

SEAT Toledo – AFS-Headlamp

The Acquisition and Synchronisation System for Night Filming allows two vehicles to be evaluated at the same point and with identical driving characteristics so as to obtain objective data

SUBJECTIVE IMPRESSIONS AND DATA

The tests for evaluating the lighting systems serve to guarantee compliance with the legal regulations and the performance of the lights. Since the emergence of the AFS system, which adapts the light to various parameters such as speed, traffic or the state of the road, dynamic tests are of paramount importance.

The classic method for conducting this test used to be based on dynamic tests, during which an expert checked the behaviour of the vehicle's headlights while moving on a test track.

Once the test had been completed, the driver would fill in a form recording his/her impressions on a number of aspects such as the homogeneity of the light, its flow and intensity, and how it lit up the immediate field of vision. Despite the huge amount of data collected, most of it was qualitative data based on subjective impressions that could be affected by external circumstances such as the driver's state of mind.

The need to improve the objectivity of the results obtained, based on numeric evaluation, is precisely the basis of the new Acquisition and Synchronisation System for Night Filming.

LET'S SYNCHRONISE OUR WATCHES!

What would happen if instead of successively evaluating vehicles we could compare and contrast them at the same time? The new system enables two cars to be evaluated at the same point and with identical driving characteristics.

With the new method, the cars are tested one after the other and filmed on video to obtain a graphic record of how they work so that this can be compared with unequivocal data. The camera is positioned at strategic places on the vehicle to achieve a film recording, which is as similar as possible in all cases.

The Acquisition and Synchronisation System for Night Filming, which has already been implemented at SEAT, makes use of new technologies to convert the dynamic tests of the vehicle into an objective work tool that is useful and easily accessed. This system makes it possible to compare and contrast not only the way two cars of the same model work, but also to establish comparisons with older models, or even with vehicles manufactured by other car companies.

The classic method for evaluating lighting systems was based on subjective impressions that might be affected by external circumstances

THE ADDED VALUE OF RESEARCH

SEAT has also other projects in collaboration with the university, such as the SEAT Chair of Sustainable Management and Design in the Car Industry at the Polytechnic University of Catalonia (UPC) set up in 2007, where relations are cultivated between the company and university to set up work teams capable of generating, disseminating and applying new know-how in the car sector.

UNIVERSITY

Institute of Microelectronics of Barcelona (IMB-CNM)
Spanish National Research Council (CSIC)

www.cnm.es

(microchip)

(identification)

(stimulus)

(composition)

ELECTRONIC SOMMELIER

(hint)

(texture)

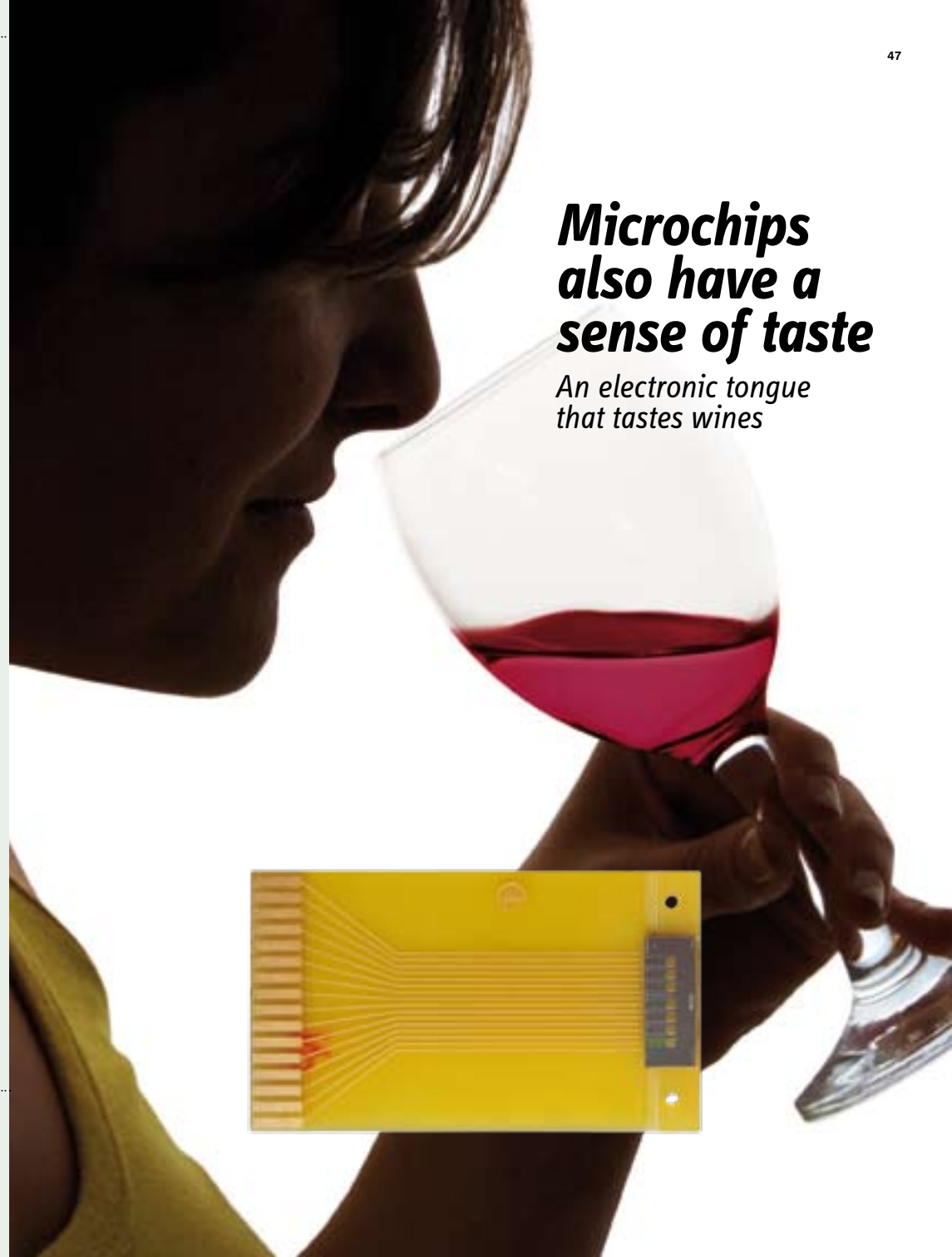
(flavor)

(taste buds)

BUSINESS

Catalan Institute of Vines and Wine (INCAVI)
Regional Government of Catalonia

www.incavi.cat



Microchips also have a sense of taste

An electronic tongue that tastes wines

Both wine connoisseurs and those of use that only have a glass from time to time know that tasting the wine is a pleasure that entails a great many different perceptions – texture, taste, aroma, colour, perfume and a number of subtle differences that only experts can hope to define completely. These differences depend on the chemical composition of the grape, and therefore, on aspects such as the soil where has been grown, the type of grape, the climate, the year, etc.

Without remotely wishing to replace the profession of wine taster, but with the aim of being able to identify and control some of the more significant characteristics of the wine, the Institute of Microelectronics of Barcelona (IMB-CNM), belonging to the Spanish National Research Council (CSIC), with the support of the Catalan Institute of Vines and Wine (INCAVI), has developed an electronic tongue, which, in its application to the wine sector, acts like a real sommelier.

TASTING WITH MICROCHIPS

The human perception of taste is related to the stimuli we receive on our taste buds and which enable us to differentiate between different tastes. The electronic tongue is a device capable of identifying the chemical components of liquids and of discriminating between the types of taste – sweet, salty, bitter and sour.

To do this, a sample is placed on chipboard made with microelectronic technology that will detect the chemical components and generate an electric response that can be measured, quantified and contrasted with models contained in the equipment's measuring systems. In the wine sector, this means that the electronic tongue recognises the type of grape and the vintage of the wine being analysed.

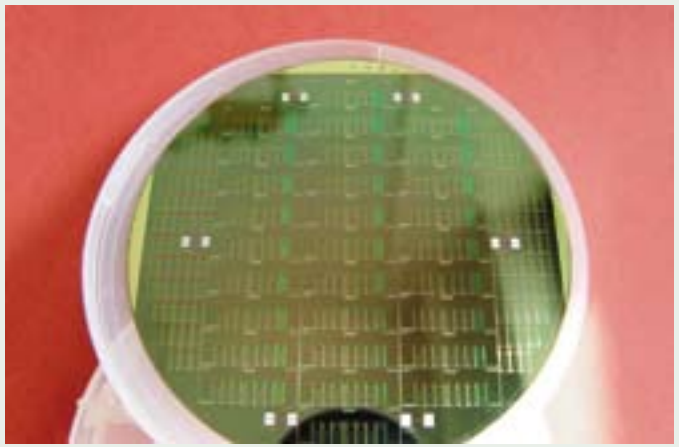
The device can work with both grape juice and wine and is governed by the classification criteria supplied by INCAVI. In the test conducted with grape juice from the 2005 harvest and the wine produced a few months later, the new measuring system was capable of determining the type of wine used in each case with success.

The electronic tongue has also demonstrated that it has a taste memory and is capable of learning, since the researchers working on the device are able to train it. By offering it various different samples, it is possible to generate a database that will enable new inputs to be classified later on.

NO IMITATIONS ACCEPTED

The device has also proved to be efficient in determining other qualities, with a very small margin of error, such as acidity and the content of alcohol and sugar in the wine. Furthermore, its recognition capability also enables false wines to be identified.

The electronic tongue can be used for quality control, particularly in those companies that, on account of their large productivity, require technical aid to optimise these processes.



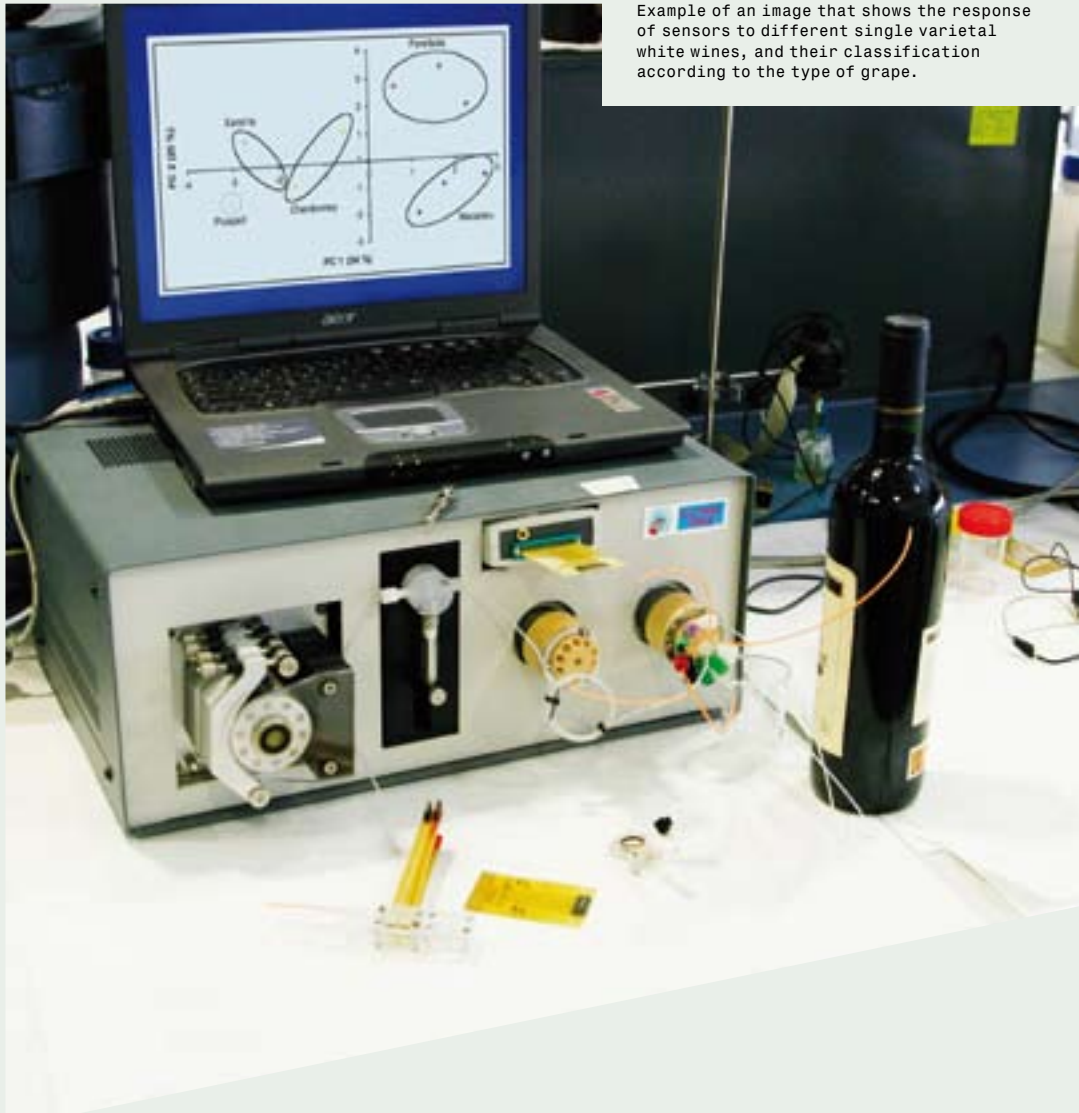
The support where the multisensors are fabricated is made of silicon and contains many multisensors.

FAR-REACHING PERSPECTIVES

Because of its characteristics, the electronic tongue opens up a path for application in other fields such as water tasting and purification or the analysis of new soft drinks.

The electronic tongue is a piece of equipment that is capable of identifying the chemical components of liquids

Applied to the wine sector, the electronic sommelier can be used for quality control, particularly in companies with high rates of productivity



Example of an image that shows the response of sensors to different single varietal white wines, and their classification according to the type of grape.

Clean Room. Institute of Microelectronics of Barcelona (IMB-CNM)

UNIVERSITY

Specific Research Centre for Business Improvement and Innovation (CERpIE)
Polytechnic University of Catalonia (UPC)

http://cerpie.upc.edu

(efficiency)
(manipulation)
(ergonomics)
(accessibility)

BCN REFUSE BIN

(polyethylene / polypropylene)
(mould)
(urban)
(recycling)

BUSINESS

Ros Roca

www.rosroca.com

Implemented by:
Barcelona City Council
Urban Services and Environment
www.bcn.cat/neta

Taking out the rubbish, now it's even easier

The new bins are more accessible, silent and efficient

Rubbish bins are such an integral part of the urban landscape that it is hard to imagine them looking any different. Nevertheless, Barcelona has taken a giant step forward with its plan to introduce some containers that are more convenient and silent, more efficient to make, and accessible to everyone. The city is pioneering the development of refuse containers adapted to fulfil all these requirements.

A BIN FOR EVERYONE

The first 100% accessible-bin, called the Barcelona Model, is a product manufactured by Ros Roca taking into account the study on ergonomics and force conducted by the Specific Research Centre for Business Improvement and Innovation at the UPC.

It concerns a side-loading bin appropriate for a typical Mediterranean city with a high population density, requiring so little effort that it can be used by 99% of the population.

The new side-loading bin is appropriate for cities with high population density and requires so little effort that it can be used by 99% of the inhabitants

Accessibility for various types of user is achieved through a design that distinguishes between the areas reserved for users and vehicles, by means of a change in height and two asymmetric lids – a smaller, lighter one for pedestrians, and another larger one for the refuse vehicle (RCV). The pedal moving the mechanism is smaller and rounder than the current one so as not to hinder its passage along the curb and to avoid any damage from hitting against cars. Furthermore, these receptacles also have guides anchored to the pavement to stop them from being moved by hand and ensuring their perfect alignment.

The lid can be opened in three different ways: manually by means of a handle, pushing of a pedal or with a lever, which makes it easier for people in a wheelchair to manipulate. Furthermore, the new bin also has signs that can be understood by the blind.

RESPECTFUL MANUFACTURING PROCESS

The Barcelona Model is the product of a detailed study to improve efficiency in the manufacturing process. Whereas with previous models the techniques used required greater energy consumption, such as rotomoulded or thermoformed polyethylene containers, this bin is made by injecting high-density polyethylene and glass-fibre-reinforced polypropylene.

These materials enable the use of metal in the structure to be reduced to a minimum, i.e. to the side closing mechanism and the pedal, thus facilitating the recycling process and lowering costs.

A PROJECT WITH A GREAT MANY VOICES

Various organisations and companies have joined forces to develop the new Barcelona Model Refuse Bin. Apart from the company and the UPC, also participating in the project is the studio Angelini Design, responsible for providing a shape for the model. For its part, the technological centre ASCAMM (Catalan Association of Mould and Die Industries) has given advice on the design and validation of the mould and injection process, an important responsibility since it concerns one of the largest six European moulds capable of manufacturing bins weighing up to 72 kg.

This model is the product of a detailed study to improve efficiency and reduce energy costs during the manufacturing process

UNIVERSITY

Thermal Spray Centre (CPT)
University of Barcelona (UB)

www.cptub.com

(temperature)

(liquid nitrogen)

(coating)

(surface)

LIN COOLING

(cooling)

(aeronautics)

(overheating)

(process)

BUSINESS

Air Products

www.airproducts.com
www.carburos.com

An armoured skin to guard against extremes

A new technique in aeronautical coatings

Thermal spray is a technology that enables coatings to be created in order to provide good protection against extreme temperatures, wear and corrosion

The passengers on a plane never cease to be amazed when the pilot informs them in mid-flight that the outside temperature is a few dozen degrees below zero. If we consider that the materials comprising the aircraft are subject to extremely high temperatures during landing, it is not difficult to conclude that aeronautical equipment should be protected against drastic changes in temperature, in addition to the wear and corrosion that such changes in temperature contribute to.

This is why CPT (Thermal Spray Centre), together with Air Products has studied the situation and conducted research about a new thermal spray process known as Lin Cooling (Liquid Nitrogen - N_2 –Devices), which allows the surface properties of the components to be enhanced without any modifications to their internal structure or intrinsic characteristics.

EXTREME SITUATIONS

Thermal spray is a technology that allows coatings of different thicknesses to be created from materials offering good protection against extreme temperatures, wear and corrosion, chosen for their specific properties for application over functional elements.

However, base materials, known as substrates, often do not withstand the changes in temperature that occur during the coating process (processes where it is possible to reach temperatures of 15,000ºC, whereas the substrate cannot exceed 180ºC). For example, in the case of nickel-based superalloys or light alloys (titanium, aluminium, magnesium), their properties vary or cracks appear in the coating being applied to their surface as they undergo structural transformations that weaken the materials.

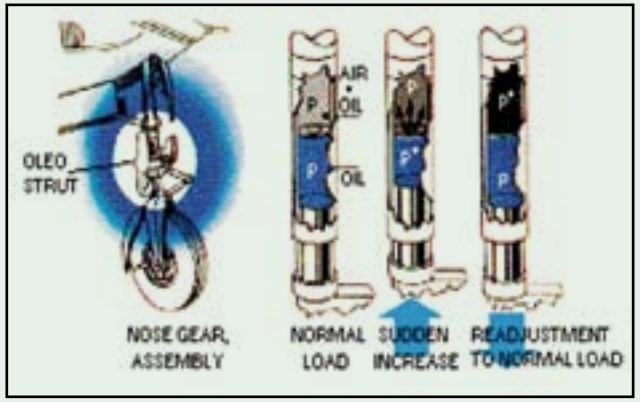
COOLING THINGS DOWN... WITH N_2

The multinational company Carburos Metálicos, now owned by Air Products, and CPT have been working together since the nineties on thermal spray-related projects in various sectors, including aeronautics.

When the problems arising from the substrate overheating were detected, research was begun to find an alternative to cooling processes involving air and carbon dioxide (CO_2): the solution was liquid nitrogen.

The main challenge to overcome was that the ambient temperature limited the effectiveness of air-cooling. Despite solid carbon dioxide being able to reach the cooling temperature, it still showed certain drawbacks during a coating process that had to be done in segments, owing to the fact that it was not possible to cool the substrate adequately enough, and this led to the coating being weakened. That's how the solution was found in liquid nitrogen.

Lin Cooling is a technique that is applicable to all types of thermal spraying processes to prevent base materials from exceeding the temperature established by regulatory standards



When manufacturing landing gear components, the aeronautical industry uses cooling system during thermal spraying, such as that provided by the Lin Cooling technique.

A NEW TECHNIQUE BRINGING PRECISION TO THE VERY LAST DEGREE

Availing itself of CPT's research findings, Air Products developed the Lin Cooling System. This technique can be applied to all types of thermal spraying processes to prevent the base materials exceeding the temperature established by regulatory standards.

The process works in the following way: before starting, a nitrogen atmosphere is created around the part. The studies found that since this gas is inert, it prevents the material from oxidising and enhances the properties of the coating. Thermal spraying commences once the temperature is low enough. The cooling power of the nitrogen makes enables the thermal spray to be applied continuously over the entire part.

The improvements made to the original device are due to the continuous assessment made by CPT. They have led to the comprehensive development of this technology, which is now being marketed with great success.

UNIVERSITY

Environmental Science and Technology Institute (ICTA)
Autonomous University of Barcelona (UAB)

http://icta.uab.cat

(ecologic) (comprehensive) (recycling) (sustainability)

EMPÚRIES HOTEL

(tourism) (cultivation) (environment) (composter)

BUSINESS

Eco Intelligent Growth

www.ecointelligentgrowth.net

Sustainable holidays

A guest house achieves symbiosis between tourism and ecology

In recent years, the public debate on whether it is possible to combine tourism and sustainability has gradually grown in importance. The reform project for the Empúries Hotel, located in the region of Alt Empordà, indicates that it is possible thanks to extensive research, large doses of ingenuity, and a comprehensive concept of sustainability.

RECYCLING IS NOT EVERYTHING

We often forget that ecology is not based only on recycling waste, but that it is also important to study other aspects such as energy consumption, the life of the materials and their impact on the environment. The essence of sustainability is based on the idea that the best waste product is the one not generated, since it can be re-introduced into the productive process with a similar or better quality than the one it had the first time around. This process is known as “upcycling”.

Taking into account everything that contributes towards making the ecological footprint more efficient, the company Eco Intelligent Growth, in collaboration with the UAB and the team from the guest house itself, has turned Empúries Hotel into a real laboratory for sustainability to become a reference for the sector.

The Environmental Science and Technology Institute at the UAB, on the one hand, was in charge of studying the ecological impact of the materials used at Empúries Hotel, carrying out an analysis of the life cycle in a pilot building and an analysis of materials and energy, through the MEFA (Material and Energy Flow Analysis) system. On the other hand, the research carried out by engineers from Eco Intelligent Growth included erecting and also using the building plus dismantling it in the future, the balance between consumption and the generation of waste and their penetration in the environment.

Recycled plastic cup, made from corn

Recycled bin liner, made from potato starch

A market garden has been planned to use the rubbish generated by the guest house, converted into fertiliser by means of a composter, which provides the restaurant with a range of fresh produce

THE BEST OF EACH HOUSEHOLD

Construction is not the only thing that has been taken into account. Another point in the study examines the mobility, accessibility for the guests of the facilities and products and services on offer, which must be consistent with the philosophy of the guest house.

In this respect, a market garden has been planned to use the rubbish generated by the guest house, converted into fertiliser by means of a composter, which provides the restaurant with a range of fresh produce to add to its menu. In those cases in which it is not possible to be self-sufficient living off the produce of the kitchen garden, as is the case with meat, purchases are made locally to keep energy consumption under control. Empúries Hotel has even begun to produce a special type of bread with a traditional cereal from the area.

The kitchen garden, together with the vegetable-fibre roofs and permeable pavements, helps water infiltration, an aspect that has received a great deal of care to prevent the drains from becoming saturated.

CONSERVATION, RESTORATION AND GOOD DESIGN

In reforming the building, priority was given to the re-use of materials and conservation of structures that were in good condition, along with the restoration of all types of objects that had been converted into furniture. Inside the guest house, interior design was given maximum care, with the aim being to guarantee the quality of the air by avoiding paints with chemical additives, and non-environmentally-friendly varnishes and glues.

A nice careful design makes it possible for the whole guest house to breathe a pleasant atmosphere and leaves it really clear that the organic produce can also be beautiful and complex.

Eco Intelligent Growth, in collaboration with the UAB, has turned Empúries Hotel into a real laboratory of sustainability becoming a reference for the sector

UNIVERSITY

Office of Learning Technologies
Open University of Catalonia (UOC)

http://learningtechnologies.uoc.edu

(reading) (students) (exercises) (device)

CAMPUS 3G

(virtual) (connectivity) (updating) (flexible)

BUSINESS

Orange

www.orange.es

A university in your pocket

Internet-linked electronic ink devices

Advances in e-books and their implementation in education and universities may mean that in a few years' time students will no longer leave class with their schoolbag full of books, but with a discreet electronic ink device instead.

The e-book can still not be said to have entirely ousted the traditional printed book. In fact, all the signs point to the inevitable coexistence of both formats without one completely superseding the other.

Nevertheless, the advantages and versatility of the digital format are key to explaining the long road stretching out before it.

ONLINE COLLABORATION

The Open University of Catalonia (UOC) began to work with the Orange telecommunications company within the framework of the My Way learning project. The purpose of this collaborative effort is to develop a system that enables students at UOC to make the most of the electronic ink devices and their capabilities, such as the possibility of either having a large quantity of information available in a small and manageable device or permanent connectivity.

Research on the e-Book was already a priority at both Orange and UOC, when the company proposed to the university the idea of taking it one stage further: aside from preparing books and manuals for downloading, by providing the devices with a connection capability, students would always have access to updated content including notices, exercises, the syllabus and countless other applications in real time.

By staying constantly online, UOC students will have the virtual campus at their disposal at all times.

FLEXIBLE, OPEN AND WITH A GREAT FUTURE AHEAD

With the e-Book, content is flexible and can always be updated at any time. It does not require a bookmark, because it remembers the last page that was read – you do not need to remember where you saw that really interesting quotation, because there are search engines embedded in the documents and it is also possible to incorporate videos, which greatly enhances its teaching value. And with an Internet connection, the possibilities are endless.

In spite of everything, there is still a certain amount of reluctance to use these devices, which is why current research work in this field is centred on achieving soft or flexible screens that can make the experience even more similar to reading paper books.

Today, with the future challenge of offering more and more open content, e-Books equipped with 3G technology seem set to vie for space with printed versions from the best stocked libraries.

An e-Book does not require a book mark; instead it comes with search engines embedded in the documents and can incorporate images

Enabling the electronic devices with 3G technology allows UOC students to update all content in real time

UNIVERSITY

Technological Innovation Centre for Static Converters and Activators(CITCEA)

Polytechnic University of Catalonia (UPC)

www.citcea.upc.edu

(standby)

(enertronics)

(electricity)

(device)

100% OFF

(environment)

(household)

(disconnection)

(consumption)

BUSINESS

Good for You, Good for the Planet

www.gfy-gfp.com

The red light that never goes out

Smart switch for appliances on standby

You turn off the TV with the remote control but the little red light still stays on. Is it still using electricity? The answer is yes: Barely visible, the standby lights in hundreds of household appliances not only consume electricity but also contribute to increasing CO_2 emissions on a global scale. The 100% Off device developed by the company Good for You, Good for the Planet together with CITCEA (the Technological Innovation Centre for Static Converters and Activators) at UPC, is designed to put an end to this unnecessary waste of energy.

100% Off can measure electricity consumption to determine whether an appliance is active or on standby and, in the latter case, will cut the power supply so that the device is completely switched off

SMART SWITCH

Most televisions, ovens, printers, sound systems and countless other electrical appliances continue to consume energy even when they are not working and increase domestic electricity bills by 12%. The Good for You, Good for the Planet system is like a conventional plug incorporating a smart disconnecting switch controlled by a processor. The processor can measure electricity consumption to determine whether an appliance is active or on standby and, in the latter case, will cut the power supply so that the appliance is completely switched off.

In keeping with its own objective, the processor also switches itself off to avoid any residual consumption. To turn the appliance back on, you just press what the company terms the "green button" to re-connect the power supply. The circuit is then closed, doing away with the need for a remote control that continues to consume power when on standby. This makes 100% Off the only smart system that eliminates all standby electricity consumption...including its own.

100% Off is based on an algorithm developed by CITCEA-UPC and patented by Good for You, Good for the Planet, and can be used with both the latest generation of appliances and also those we already have in our homes, by means of a device that is similar to the electrical adaptor we are all familiar with.

INVENTION PROCESS

Awareness by the general public of the need to reduce electricity consumption and of energy efficiency was one of the reasons behind the company's decision to develop a system to help users see how much power they were consuming and learn to make more rational use of it. The original project was presented in CITCEA-UPC, part of the Electrical Engineering Department at UPC offering services for innovating, researching and developing prototypes in the field of mechatronics and enertronics, i.e. using electronics to control mechanisms and electrical power supplies to enhance efficiency and performance.

During the initial conceptual design stage, it was clear that the original project – a switchboard to register the individual consumption of various appliances – would not be feasible since it was not possible to create a product the general public could afford. However, advantage was taken of the knowledge generated to develop 100% Off.

The company continues working to develop products that can help protect the environment and make our lives more sustainable.

The switch is based on an algorithm developed by CITCEA and patented by Good for You, Good for the Planet. It can be used with the latest generation of appliances and also with those we already have in our homes

UNIVERSITY

Molecular Engineering Group of the Chemical Institute of Sarrià (IQS)
Ramon Llull University (URL)

http://gem.iqs.url.edu

(formula)

(organic synthesis)

(laboratory)

(molecules)

GENERIC DRUGS

(market)

(know-how)

(fabrication)

(patent)

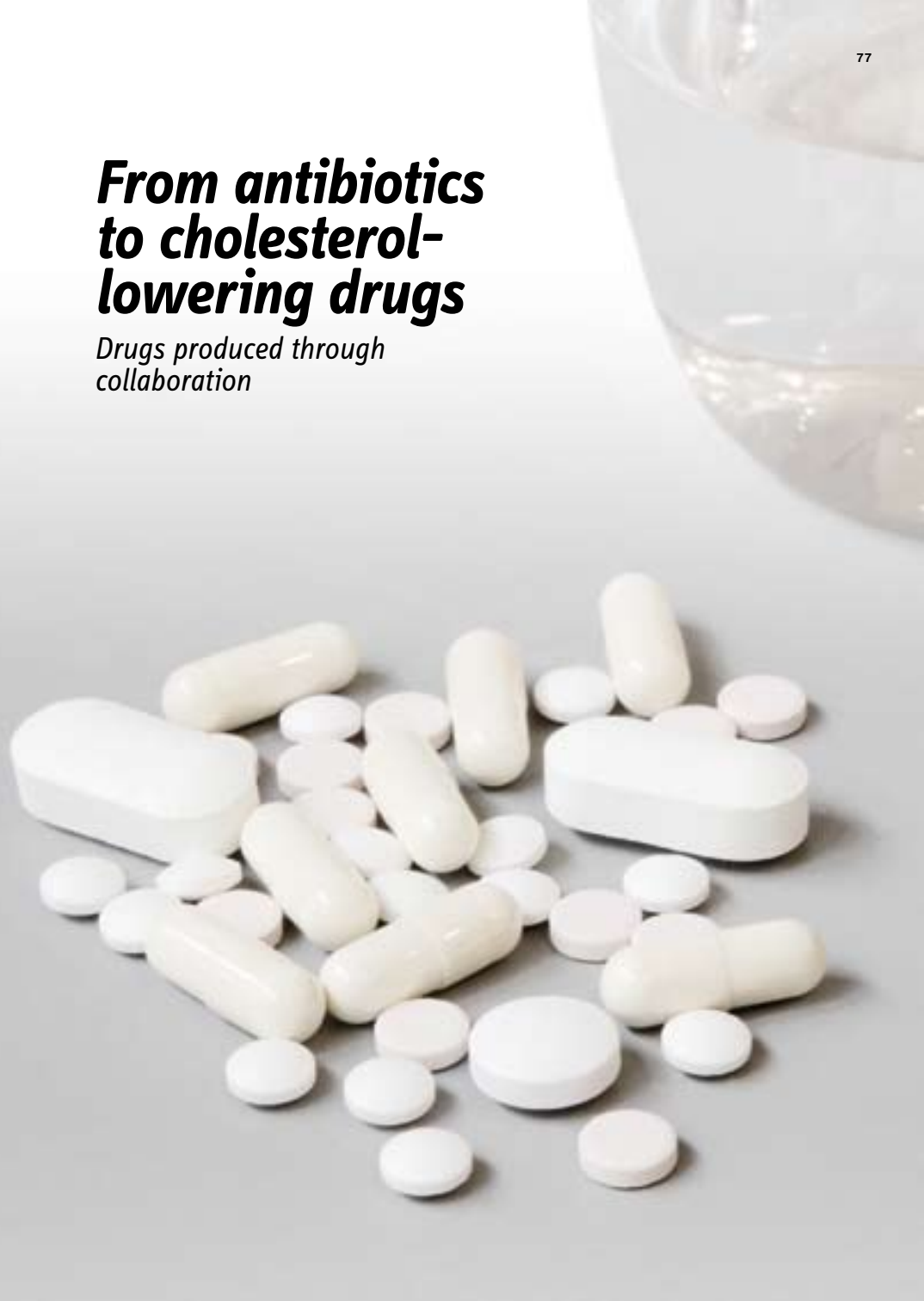
BUSINESS

Ercros

www.ercros.es

From antibiotics to cholesterol-lowering drugs

Drugs produced through collaboration



In recent years, a number of drugs have started to appear on the market without the backing of a commercial brand. Consequently, today we can find branded and unbranded medicines sitting side by side on chemists' shelves, increasing the range of products that were available so far.

PATENTS WITH AN EXPIRY DATE

When the patent runs out on a product, other manufacturers have the opportunity to produce it. The costs involved in creating the brand disappear with generic drugs, which can lead to a reduction in price. However, given that the consumers are familiar with brands, companies making and selling generic versions need to develop other ways of lowering costs in the process so as to become truly competitive. This is therefore a complex situation, where the emphasis is on cost, product safety, and the impact on the environment.

In 2000, Ercros, a company manufacturing active pharmaceutical ingredients, initiated relations with IQS (the Chemical Institute of Sarrià) to acquire knowledge. On the one hand, Ercros provides the manufacturing capability and industrial know-how, while IQS contributes with the knowledge of organic synthesis, a process used to create organic chemical molecules in a programmed way so as to improve the formula and offer the necessary value added to obtain products of the same quality as those marketed under a brand name, at more affordable prices for the consumer and with good returns for the company.

THE FRUITS OF EMPATHY

Any collaborative effort between various organisations needs time to adapt and find a common language, particularly when they belong to the academic and industrial fields. For this reason, a group was set up with offices at IQS, formed by two doctors from the company and another from the institute. This group has the aim of working together to achieve new common goals.

The project has come up with twelve products that have all now on the market, ranging from antibiotics to cholesterol-lowering drugs, which are sold in 80 countries, such as Spain, the United States, Japan or Saudi Arabia. Additionally, six patents for procedures have been obtained.

The project has resulted in twelve products that are now on the market

Ercros provides the manufacturing capability and industrial know-how, while IQS contributes with the knowledge of organic synthesis to enhance the production of generic drugs

UNIVERSITY

ICFO – Institute of Photonic Sciences
Polytechnic University of Catalonia (UPC)
Regional Government of Catalonia

www.icfo.cat

(light)

(plasmonics)

(laser)

(fotochemical)

GOLD COSMETICS

(nanoparticles)

(skin)

(cosmetics)

(gold)

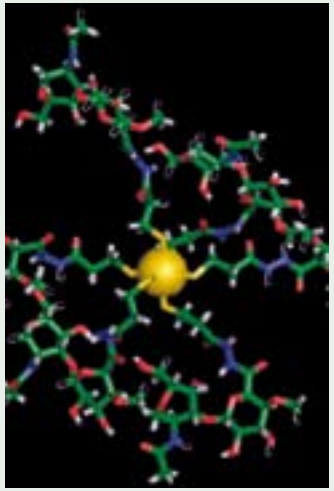
BUSINESS

Endor Nanotechnologies

www.endornanotech.com

Science fiction cosmetics for real life

The use of photonic nanoparticles revolutionises the beauty products sector



Halfway between grandmother's old tricks, such as bathing in olive oil to have a radiant skin, and plastic surgery, it is clear that the cosmetic industry is constantly being asked to develop beauty solutions that are effective and as non-invasive as possible.

The company Endor Nanotechnologies, specialising in the medical and cosmetic applications of nanoparticles, is developing a proposal, with the aid of ICFO (Institute of Photonic Sciences), a specialist in laser and its photomedical and photochemical effects, that will combine light and metal nanoparticles in an effort to revitalise the skin.

RESULTS THAT SHINE OF THEIR OWN ACCORD

Rejuvenating the skin using plastic surgery arouses a great deal of reluctance and is not within reach of everybody. On the other hand, the alternative using the cosmetics known to us does not usually give us results that are sufficiently noticeable.

Thanks to plasmonics, the science that studies the photonic properties of the nanostructures of noble metals such as gold and silver, it has been possible to develop a cosmetic application that shines of its own accord.

AT HOME AND AT THE CLINIC

The cosmetic, with the gold nanoparticles, is applied to the skin like a normal cream. However, the skin is then submitted to a source of laser light that activates the rejuvenation processes in the skin.

One of the strengths of this technology is that it can be used both in medical environments, where a more powerful laser will be used, and also in the home, where a very low-powered source can be used, which will thus remove any risk of accident. The results will also be more rapid or progressive depending on the type of application used.

But, how does this cosmetic work? In the technology developed by Endor Nanotechnologies together with ICFO, the gold nanoparticles absorb light and, owing to their properties and shape, they become nanosources of heat thereby propitiating biochemical processes that stimulate the revitalisation of the skin.

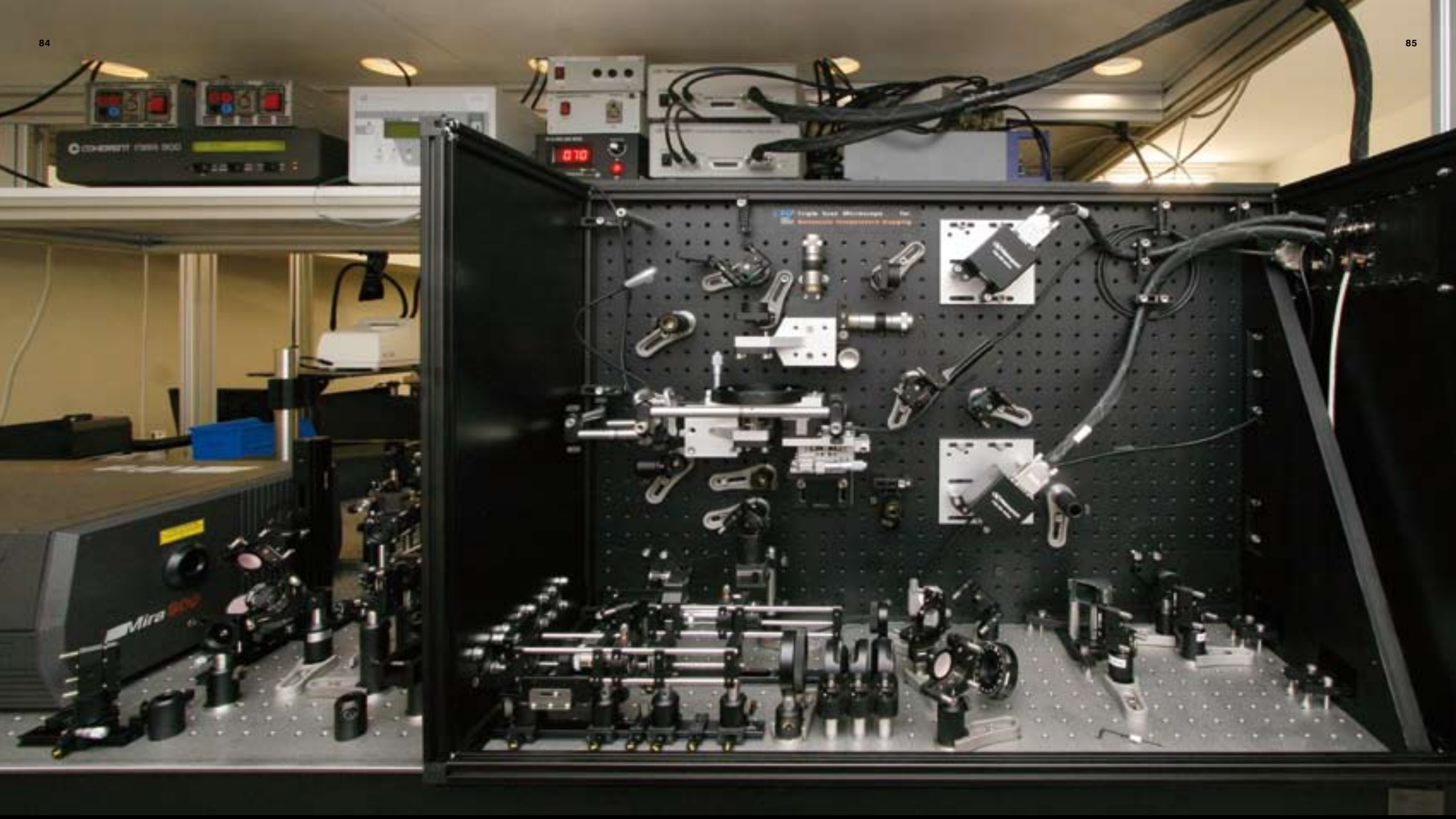
JOINING FORCES

A key factor in the development of this product is the ability to control the photothermal properties of the nanoparticles. This sphere of knowledge, which is one of ICFO's strong points, has allowed Endor Nanotechnologies to improve the properties of the particles.

The product broadens the range of possibilities in the field of plastic surgery and, for this reason, Endor Nanotechnologies continues working on the development of new variants derived from this technology.

Cosmetics using gold nanoparticles are applied to the skin, which is then submitted to a laser light to activate the rejuvenation processes

One of the strengths of this technology is that it can be used in the home



Thermal nanoscopy, ICFO – Institute of Photonic Sciencies

UNIVERSITY

ELISAVA School of Design
Pompeu Fabra University (UPF)

www.elisava.net

(form)

(versatile)

(foldable)

(function)

PICOROCO
PAPASAN CRADLE

(family)

(comfort)

(intuition)

(robustious)

BUSINESS

Play

www.casualplay.com

Lending a hand to urban parents

Team work for a warm, practical product

It is often said that the city is an asphalt jungle, which, instead of animals, has cars, motorbikes and pedestrians in a hurry to reach their destinations. Probably one of the groups that suffer the most in this jungle is that of the parents that have to cart pushchairs, nappies and dummies about every time they take their children to playschool, to the beach or merely out for a walk.

In an attempt to make these daily odysseys more enjoyable, the company Play, in collaboration with ELISAVA, has developed an innovative papasan cradle, in the context of its Masters in Product Design, that is easy to fold up.

LOADS OF PROBLEMS AND ONLY TWO HANDS

The concept of the papasan cradle arose as a result of observing how urban mothers and fathers integrate their children in their daily movement. The initial idea was a small, lightweight papasan cradle that would work with a similar design to self-erecting pop-up tents. The device is made up of two parts: a foldable structure and a versatile baby carrier allowing the parent to carry the child both on their back and also in front. In addition, it also includes a hood made of thermochromic material, which tells the parent how long the child has been exposed to the sun.

The self-erecting papasan cradle is designed not only to be practical, but also to be a warm, enjoyable product which, thanks to its shape, is reminiscent of a flower that is about to open.

NO SOONER SAID THAN DONE

The product development stage, guided by a tutor from the university and a representative from Play, evaluated the aspects that had been improved in the project and the standards that apply to children's products. Regarding this point, the company submitted some prototypes to the CIM Foundation, the centre for production technologies, to define how the form the product should take.

Once the process had taken its course, Play designed the final product, a procedure involving the time and effort of the designers, who put some final touches to the formal and structural aspects to ensure that it complied with the regulations. The final result, the papasan cradle, remained faithful to the idea of a device that was easy to open. It is also a product that is intuitive and practical – it opens in just two movements, and is robust and stable.

INVOLVING THE COMPANY

At ELISAVA, collaboration agreements are created, like the one signed with Play, with companies that are interested in the design process and in obtaining results.

This is the root of success in this case, which arose out of a good idea and has managed to reach the production and marketing stage.

The concept of the papasan cradle arose as a result of observing how urban mothers and fathers integrate their children in their daily movement

UNIVERSITY

Audiovisual Technologies Group (GTAV)
http://gps-tsc.upc.es/GTAV/

Visual Image Processing Group (GPI)
http://gps-tsc.upc.es/imatge

Optical Communications Group (GCO)
www.tsc.upc.es/gco

Polytechnic University of Catalonia (UPC)

(processing)

(television)

(image)

(real time)

IMMERSIVE 3D VIDEOCONFERENCING

(user)

(telepresence)

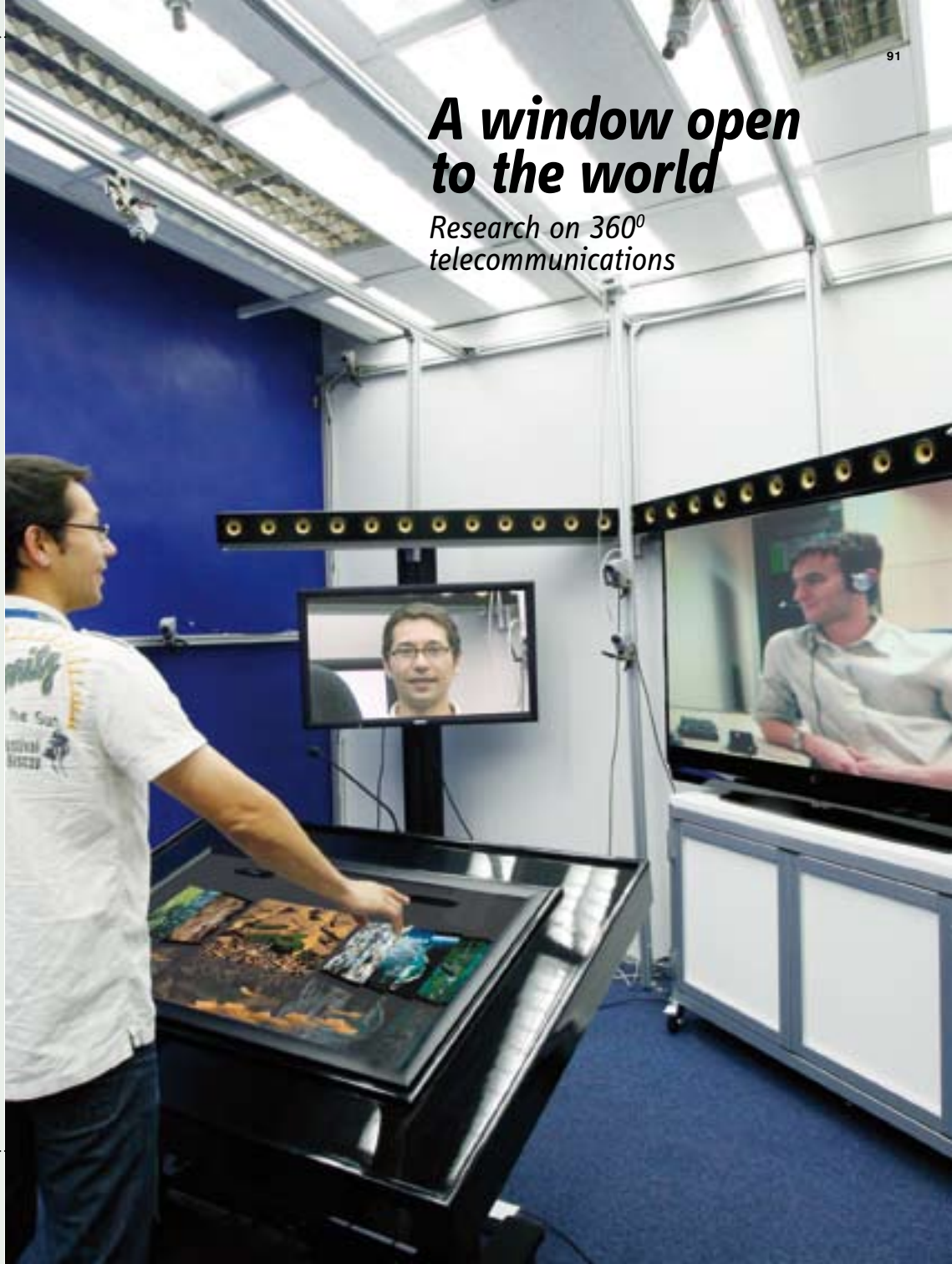
(communication)

(360º)

BUSINESS

Telefónica I+D

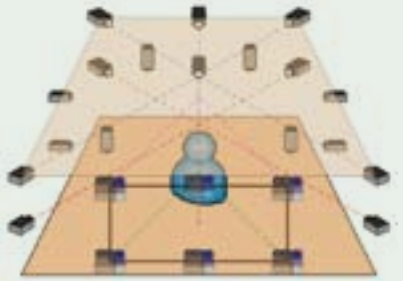
www.tid.es



A window open to the world

Research on 360º telecommunications

Telefónica I+D has been collaborating with UPC on improving the visual quality of 3D images in real time



Sitting down on the sofa and turning on the TV or working in front of the computer is often a solitary action that could very soon become a way of spending the afternoon surrounded by distant family and friends, even those on other continents...just like opening a window and finding yourself on the other side of the world.

Within the framework of the CENIT Vision project, financed by the Ministry of Industry, Tourism and Trade and CDTI (the Spanish Ministry of Science and Innovation's Centre for Industrial and Technical Development) and managed by Telefónica I+D, immersive videoconferencing technology has been developed in conjunction with UPC to reproduce the physical sensation of presence and the perception of reality.

A three-dimensional figure is gradually built up in real time by means of cameras set up around the person

LIGHTS, CAMERA... ACTION!

This videoconferencing technology process begins with the creation of the user's image in 3D. A three-dimensional figure is gradually built up in real time by means of cameras set up around the person. The front-facing cameras obtain high-quality relief images to reproduce the user's face, while the other cameras offer a complete 360º view that allows the person and the surrounding space to be seen from various angles.

For the work in capturing and processing the video, among others, Telefónica I+D was aided by GTAV (Audiovisual Technology Group) and GPI (Image and Video Processing Group), both from UPC. More specifically, Telefónica I+D and the groups from UPC have been working together on the research and development of new algorithms that go beyond the state of the art to achieve their aim of improving the visual quality of 3D images in real time.

SPEED LIMITS ON INFORMATION SUPERHIGHWAYS

But, can such a large volume of images and data be transmitted with the current state of communications infrastructure? The development of new telepresence systems and services faces a number of significant technological challenges such as delays in the net, access networks and multipoint communications.

The Vision project also carries out research activities at different points in the telecommunications system to resolve these limitations stemming from 3D videoconferencing. Telefónica I+D and other partners and research centres, including GCO (Optical Communications Group) at UPC, are working on this point so as to bring about the network of the future.

3D TECHNOLOGY IN YOUR LIVING ROOM

The creation of new three-dimensional multimedia content is making the most of innovative 3D visualisation systems. In this respect, Telefónica proceeded to screen a 3D video clip of the music group Pastora, which was shown in several cinemas in the city of Barcelona. This is just another test that goes to show that 3D TV may soon be a reality.

UNIVERSITY

Special Research Centre
Food Technology Plant (CERPTA)
Autonomous University of Barcelona (UAB)

www.cerpta.com

(food)

(preservation)

(UHT)

(facilities)

SOUPS WITH GREATER NUTRITIONAL VALUE

(taste)

(properties)

(formula)

(product)

BUSINESS

Gallina Blanca

www.gallinablanca.com

For the love of a good soup

Innovation in preservation processes for soups and broths

Gallina Blanca is providing the formula for making the products and CERPTA is contributing with the technical know-how and facilities for testing preservation treatments without the need to stop factory production

Many foodstuffs for widespread consumption reach the public with a promise: no artificial colouring or preservatives. However, not even the highest quality products can keep their good condition without being submitted to certain processes to ensure that they will not go off or lose their properties on the long journey from the production facility to the kitchen. Constantly improving these processes is key to the relationship that began six years ago between Gallina Blanca and the Autonomous University of Barcelona (UAB) CERPTA, the Special Research Centre at the Food Technology Plant, which has already given rise to products that are being distributed in Spain and Portugal.

IN GOOD TASTE

Process a soup or broth involves ultra-high temperature (UHT), also known as ultrapasteurisation, sterilisation treatments enabling them to retain their hygienic and nutritional properties for several months without the need for refrigeration. The collaboration between Gallina Blanca and CERPTA has allowed the study of the variables of time, temperature and type of machinery to which the product should be submitted so as to achieve optimum conditions for conservation and to prevent the soup or broth from losing its consistency before consumption. However, the joint effort is not restricted to ultrapasteurisation; has also enabled preservation techniques to be taken one stage further and create a product with the same freshly-made taste and with enhanced nutritional value.

Conventional sterilisation treatments subject products to temperatures of around 120ºC for 30 minutes, with a noticeable effect on the properties of the product. UHT treatment, instead, is a procedure that applies 140ºC for a few seconds, which produces better results without affecting the nutritional properties and stability of the product in such a negative way.

These tests are conducted by CERPTA personnel at the Food Technology Plant facilities. Thus, while Gallina Blanca provides the formula for the products, CERPTA has the technical know-how required and the facilities where treatments can be tested without having to stop production.

ALWAYS ON TRACK

The research carried out by Gallina Blanca is focused on short and medium-term applications, either concerning the creation of new products or the improvement of those already in existence. For this reason, relations with CERPTA and other universities have turned out to be a way of obtaining a direct line to the cutting-edge innovations being developed in the scientific world with a view to selecting those that can be applied in this sector.

As a result of the collaboration between Gallina Blanca and the CERPTA, products have now been placed on the market and are being distributed in Spain and Portugal

Sterilisation Plant. Special Research Centre Food Technology Plant (CERPTA)

UNIVERSITY

Artificial Intelligence Research Institute (IIIA-CSIC)

Spanish National Research Council (CSIC)

www.iiia.csic.es

(on-line)

(statistics)

(applications)

(algorithm)

MY STRANDS, BUSINESS SOLUTIONS AND MONEY STRANDS

(habits)

(content)

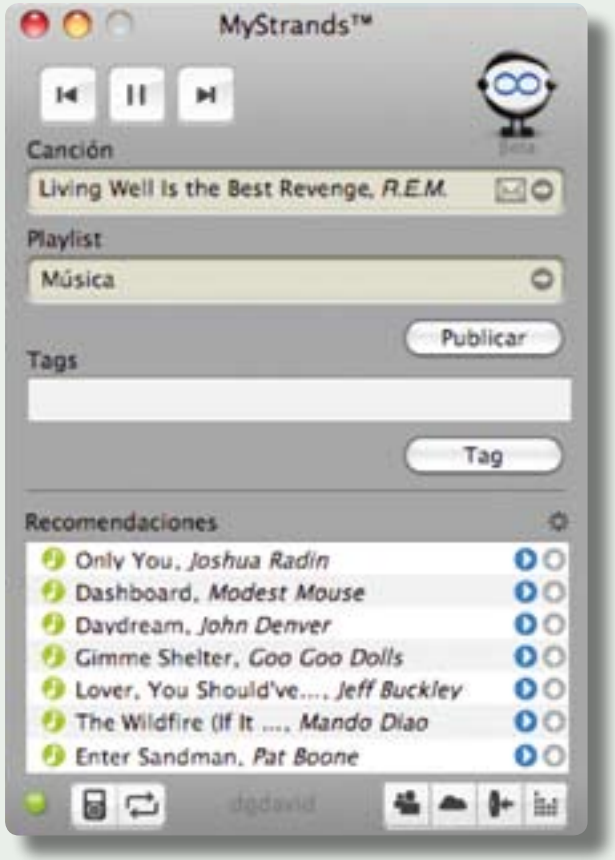
(customizing)

(software)

BUSINESS

Strands

www.strands.com



I am what I do, hear, see...

A software with customised recommendations

It is often said that we are what we do, not what we say. Taking this as their starting point, the company Strands, in collaboration with the Artificial Intelligence Research Institute of the Spanish National Research Council (CSIC), has developed a software program that allows recommendations to be offered that are tailor-made for each user.

The software analyses the events generated by the users online concerning a product, content or piece of information using statistical analysis, artificial intelligence and complex filtering algorithms. As a result of this technology three applications have been created: My Strands, Business Solutions and Money Strands.

HABITS THAT SPEAK LOUDER THAN WORDS

My Strands is a social network in which the user receives personalised recommendations for music and video, and can find out the actions taken online by their own contacts.

The novelty lies in the type of data used as a baseline for the process. Instead of asking the user to create a profile with their own preferences, the system asks them for access to their music libraries, where information is picked up intact from their individual models of consumption. My Strands analyses this date very effectively, since it does not do so solely on the sales data obtained for a specific product, but based on real actual use.

Another software application is Strand Business Solutions, a business-to-business tool designed for companies that are not big enough or do not have the necessary infrastructure to make individual or specific recommendations for each customer. This application offers these companies a personalised solution for reaching their customers and advising them on which products are more in keeping with their habits.

One of the latest applications to be developed is Money Strands, a software program that allows personal finance to be managed over the Internet in a simple way. Money Strands, always with the consent of the customer, has access to and registers their economic information so as to be able to make recommendations of a financial nature, group expenses together in categories, and to compare their specific case with segments corresponding to other Internet users.

AUTONOMY AND COLLABORATION

As a company, Strands was created, at the same time in the USA and in Barcelona, Spain, as a spin off, i.e. as an extension of the Artificial Intelligence Research Institute (IIIA-CSIC).

Thanks to the agreement signed between the various organisations, the CSIC provided infrastructure during the initial stages of the project and Strands created a grant for PhD students at the IIIA. It was at that time that members of the company, together with the Artificial Intelligence Research Institute (UDT-IA) created the base code for developing the technology that has led to successful cases such as the three products referred to above. Strands now acts independently, although the company still collaborates on a continual basis with the IIIA.

My Strands, Business Solutions and Money Strands are based on comparing users and standards of behaviour, with the aim of making personalised recommendations in music, finance and product sales

Strands was created as a spin off, that is to say, as an extension of the Artificial Intelligence Research Institute (IIIA-CSIC)

UNIVERSITY

Process and Material Design and Optimisation Centre (DIOPMA)
University of Barcelona (UB)

www.diopma.org

(polymer)

(elasticity)

(household)

(recycling)

URBAN VERMICOMPOSTING

(plastic)

(composter)

(robustious)

(mix)

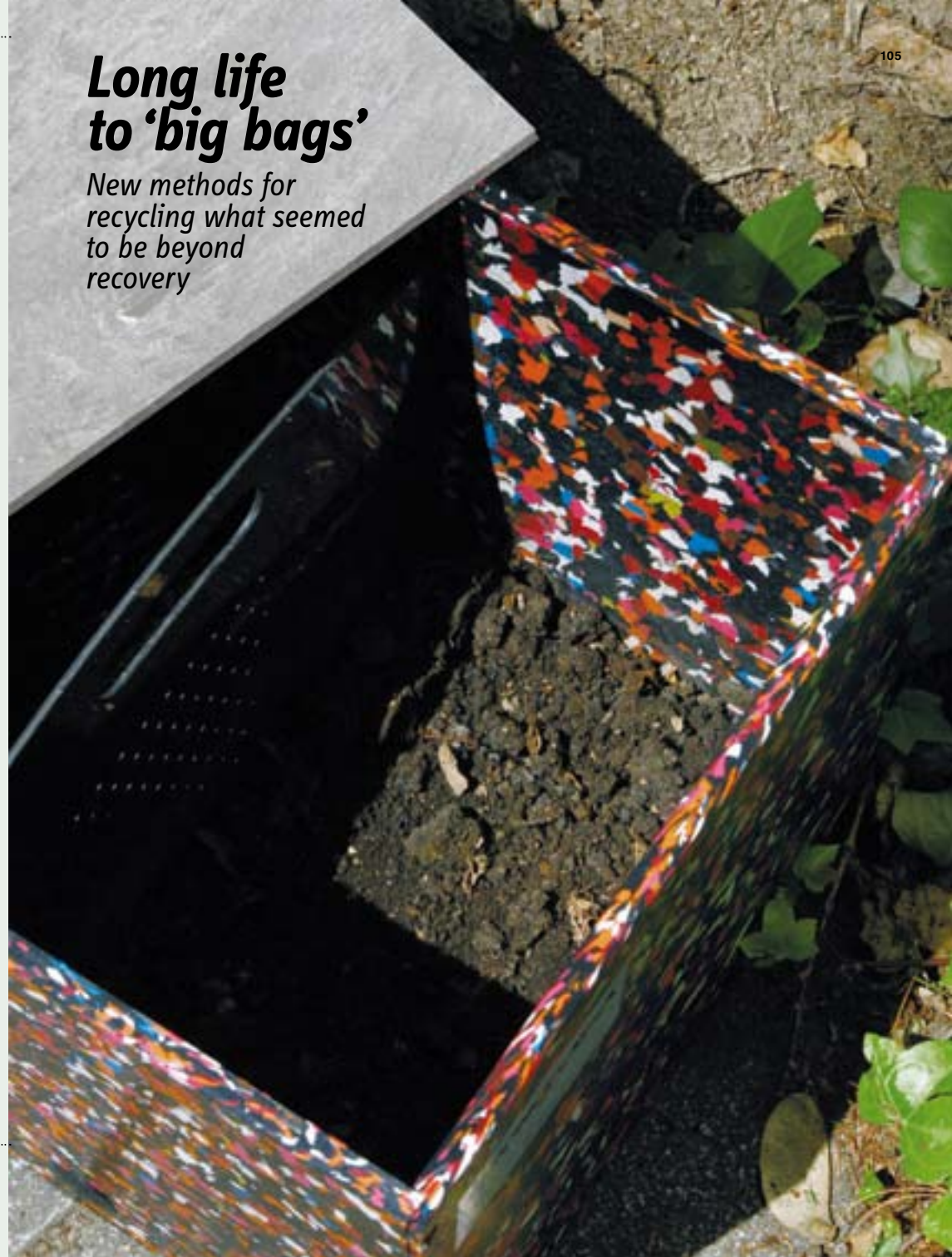
BUSINESS

Zicla

www.zicla.com

Long life to 'big bags'

New methods for recycling what seemed to be beyond recovery



For years now the recycling of household waste has been growing more and more fashionable and, to a greater or lesser degree, each home now has a place for different types of rubbish. But what do we do with that waste that is so difficult to recycle that it seems completely irretrievable? This is the case of the 'big bags' (rubbish bags) made of a mixture of materials that were impossible to separate using known industrial methods…until now.

The collaborative effort between the consultancy firm Zicla and Diopma at the University of Barcelona (UB) has blossomed into a material made from the waste from 'big bags' with which it is possible to make an urban can o'worms, or vermicomposting bin.

NEW LIVES FOR OLD MATERIALS

The main problem with 'big bags' is that the product is a mix of a number of materials that are difficult to crush. They break up and the elements they are made of, such as rims and handles, get caught up in waste-disposal units.

The main problem with 'big bags' is that the product is a mix of a number of materials that are difficult to crush. They break and get caught up in the waste-disposal units

For this reason a new type of machinery was used to chop up the bags and enable the fragments to pass through a fusion, extrusion and press system using a mould. The first product to result from using this process was some plastic tiles, which, apart from the aesthetic drawbacks, cracked and were initially too brittle.

WINNING COMBINATIONS

The joint research of Zicla together with Diopma revealed that this material could be improved by reformulating it with the addition of a softer thermoplastic like the one used in greenhouse plastics or wood sawdust.

The result of mixing the remains of 'big bags' with softer plastics is a material that not only looks better but is also more manageable, with competitive production costs.

The tiles made with this new material have been directed towards decorative items and urban furniture and other ornamental substances are being added such as scraps of methacrylate or nutshell to make them more suitable for use and with more interesting finishes.

A COMPOSTER ON EACH BALCONY

The company Zicla, together with the Terra Foundation, has designed a can o'worms (vermicomposting bin) from tiles made with materials from rubbish bags and greenhouse plastics. This type of composting bin offers city dwellers the possibility of recycling organic waste by converting it into plant fertiliser.

MANY CHALLENGES AHEAD

The materials that apparently cannot be recycled form the focus of the research conducted by companies, universities and industries. In this respect, using both innovative and traditional technologies, Zicla creates new materials from the remains that cannot be retrieved for conventional recycling plants using commercially viable processes.

Zicla has harvested one of its greatest triumphs on being able to alter the molecular structure of some heavy metals to form stable new materials that can produce cements and concretes for construction work, when mixed with other products.

The vermicomposting bin has been designed using the material taken from rubbish bags and greenhouse plastics for the domestic recycling of organic waste

DIRECTORY

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Office of Research and Innovation
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www.ott.csic.es

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www.fbg.ub.es

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ARTIFICIAL INTELLIGENCE RESEARCH INSTITUTE (IIIA-CSIC)
Spanish National Research Council (CSIC)
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Campus de la UAB /
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www.iiia.csic.es

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c. Jordi Girona, 1-3 /
08034 Barcelona
T: (+34) 93 401 64 40
http://gps-tsc.upc.es/GTAV/

COMPUTER VISION CENTRE (CVC)
Autonomous University of Barcelona (UAB)
CIRIT (Inter-Ministerial Council for Research and Technological Innovation)
ACC1Ó (CIDEM/COPCA)
Sector: ICT, Production Technologies
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08193 Cerdanyola del Vallès
T: (+34) 93 581 18 28
www.cvc.uab.cat

DEPARTMENT OF CULTURAL ANTHROPOLOGY AND HISTORY OF AMERICA AND AFRICA
University of Barcelona (UB)
Sector: Anthropology
c. Montalegre, 6-8. Facultat de Geografia i Història /
08001 Barcelona
T: (+34) 93 403 77 73
www.ub.edu/antropo

DEPARTMENT OF ELECTRONIC ENGINEERING
Polytechnic University of Catalonia (UPC)
Sector: ICT, Production Technologies
Av. Diagonal, 647. Planta 9a. /
08028 Barcelona
T: (+34) 93 401 66 51
www.eel.upc.edu

DEPARTMENT OF MEDICAL SCIENCES
University of Girona (UdG)
Sector: Bio, Medicine
Facultat de Medicina. Campus de Montilivi / 17071 Girona
T: (+34) 972 41 96 18
www.udg.edu/depcm

DEPARTMENT OF MORPHOLOGICAL SCIENCES
Autonomous University of Barcelona (UAB)
Sector: Bio, Medicine
Facultat de Medicina.
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08193 Cerdanyola del Vallès
T: (+34) 93 581 18 74
www.autonoma.edu/medicina

ELISAVA SCHOOL OF DESIGN
Pompeu Fabra University (UPF)
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08002 Barcelona
T: (+34) 93 317 47 15
www.elisava.net

ENVIRONMENTAL SCIENCE AND TECHNOLOGY INSTITUTE (ICTA)
Autonomous University of Barcelona (UAB)
Sector: Environment
Edifici C. Campus de la UAB /
08193 Cerdanyola del Vallès
T: (+34) 93 581 29 74
http://icta.uab.cat

ICFO – INSTITUTE OF PHOTONIC SCIENCES
Polytechnic University of Catalonia (UPC)
Regional Government of Catalonia
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Av. del Canal Olímpic, s/n. /
08860 Castelldefels
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www.icfo.cat

INSTITUTE OF MICROELECTRONICS OF BARCELONA (IMB-CNM)
Spanish National Research Council (CSIC)
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MOLECULAR ENGINEERING GROUP OF THE CHEMICAL INSTITUTE OF SARRIÀ (IQS)
Ramon Llull University (URL)
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OFFICE OF LEARNING TECHNOLOGIES
Open University of Catalonia (UOC)
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08035 Barcelona
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OPTICAL COMMUNICATIONS GROUP (GCO)
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08034 Barcelona
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PROCESS AND MATERIAL DESIGN AND OPTIMISATION CENTRE (DIOPMA)
University of Barcelona (UB)
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www.diopma.org

SPECIAL RESEARCH CENTRE FOOD TECHNOLOGY PLANT (CERPTA)
Autonomous University of Barcelona (UAB)
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www.cerpta.com

SPECIFIC RESEARCH CENTRE FOR BUSINESS IMPROVEMENT AND INNOVATION (CERpIE)
Polytechnic University of Catalonia (UPC)
Sector: ICT, Production Technologies
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08028 Barcelona
T: (+34) 93 401 07 09
http://cerpie.upc.edu

TECHNOLOGICAL RESEARCH CENTRE FOR DEPENDENCY CARE AND AUTONOMOUS LIVING (CETpD)
Polytechnic University of Catalonia (UPC)
Foundation of Sant Antoni Abat County Hospital (FHCSAA)
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Polytechnic University of Catalonia (UPC)
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THERMAL SPRAY CENTRE (CPT)
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08028 Barcelona
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VISUAL IMAGE PROCESSING GROUP (GPI)
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http://gps-tsc.upc.es/imatge

To find other research centres in the Barcelona metropolitan area, take a look at the **Barcelona Research and Innovation Map**, www.bcn.cat/innova

Companies and entities in the publication

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www.carburos.com

AROMICS
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CATALAN INSTITUTE OF VINES AND WINE (INCAVI)
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ECO INTELLIGENT GROWTH
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SENSING FABRICS
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