1 Year in RESEARCH at Université de Bretagne Occidentale
Two key themes stand out in our research review for 2019: UBO’s European positioning and its growing standing as a centre of excellence for research and innovation. The first of these themes is clear to see in the successful bid by Sea-EU (The European University of the Seas) to join the first pilot of the European Universities Initiative which has been set up to strengthen the global appeal of our universities and promote a European identity among young people. Although this alliance was initially formed to facilitate mobility in Europe for students, lecturers, researchers and other university employees, Sea-EU serves as a flagship model for all departments and research units at UBO. This is because by 2022, this alliance will have developed a joint and long-term strategy for education, research and innovation, which will entail a much deeper level of cooperation between its members, dedicated joint governance structures, and administrative and resource management services. Our university’s European focus is also reflected in the encouragement given to our lecturer-researchers to take part in Horizon 2020. Specific examples of the genuine intention to strengthen UBO’s position within Europe in this spirit include: the support offered through the European Projects Platform (2PE) and Boost-Europe (Region of Brittany), information sessions for lecturer-researchers and doctors on submitting projects, and support for introducing and extending priority for sabbatical leave to lecturer-researchers preparing a submission to the ERC (European Research Council) or a joint H2020 proposal.

The second theme is encapsulated by both the many years over which generations of lecturer-researchers have embedded their work to develop a distinct UBO identity, i.e. 50 years of the Centre for Breton and Celtic Research (CRBC); and the shorter timescale in which Hyperion technology has been introduced at UBO. Looking to the future, this system will have a significant impact in the field of precision medicine. The CRBC (EA 4451/UMS CNRS 3554) was founded in 1969 by Yves le Gallo as a multidisciplinary research centre for historians, linguists, ethnologists and sociologists specialising in research in the field of Breton and Celtic culture. In 2019, many different audiences had the opportunity to discover the centre’s exceptional information resources and learn about the prolific publishing activity of UBO’s only research unit to have reached its 50th anniversary. Medical sciences and marine sciences are the most compelling indicators of our research and innovation potential, as recurrent literature reviews in recent years attest. The arrival of cutting-edge Hyperion technology is likely to lead to a revolution in the treatment and care of cancer patients. This technology makes it possible to analyse 40–50 markers in a tissue biopsy simultaneously, which will improve understanding of the tumour environment, guiding therapeutic choices, and help us to explore the wide-ranging promises of personalised medicine. By merit of its dual function as a tool for both basic and clinical research, Hyperion will be a major boost to INSERM Mixed Research Unit 1227 - B Lymphocytes and Autoimmunity (ILBAI), and deliver bespoke treatment to patients at the CHRU in Brest. To finish, I would like to say a big “thank you” to UBO’s administrative services for helping to create our Research Review for 2019.
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<td>IBNM Institut Brestois Numérique Mathématiques</td>
<td>IBSH Institut Brestois Sciences Humaines et Sociales</td>
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**Health**

**Agri-Environment Materials**

**Maths**

**ICT**

**Marine Sciences**

**Humanities and Social Sciences**

32 research units and 4 institutes supporting innovation and knowledge
It has been another productive year for research at UBO in all disciplines, including marine sciences, health sciences, sociology and mechanics. Focusing just as much on the study of local heritage as on international matters, UBO’s work has relevance for everyone, from politicians to the general public.

The Centre for Breton and Celtic Research (CRBC, EA 4451 - UMS 3554) is a multidisciplinary research unit which was established in 1969. Its team includes ancient and modern historians, Celtic and English language experts, ethnologists and sociologists who all specialise in topics and research in the field of Breton and Celtic culture. The CRBC also has a research library (UMS CNRS - UBO) which is unique in France and boasts more than 68,000 books, 2,300 reviews and over 100 collections.

The exemplary work the Centre’s teams carry out has earned it national recognition through the award of a CollEx label for collections of excellence in research. The label is valid for four years (2019-2022) and renewable.

The CRBC’s work has also been celebrated by an exhibition to mark 50 years of the research unit, and was praised by the president of the CNRS when he visited in October 2019.

© Benjamin Deroche
A unique strike force against cancer

In Greek mythology, the Titan Hyperion was gifted with incredible strength. In a similar way, for UBO and the CHRU in Brest, Hyperion mass cytometry technology will act as a unique strike force in the sphere of state-funded cancer research.

With this system, it is possible to observe the specific characteristics of each cancer with unequalled precision. Hyperion imaging mass cytometry measures the expression of more than 40 different biomarkers in a single biopsy simultaneously whereas currently, practitioners are limited to two. The device has the same capacity as a single biopsy whereas currently, practitioners have not yet been explored, especially as research carried out by the CEMCA* (UMR 1227) on chelates will further optimise its potentiality. Hyperion will help researchers understand why a treatment is effective in one patient but not in another. Clinicians will therefore be able to adapt treatments and move towards personalised and precision medicine, meeting the needs of each patient individually.

This system opens up the possibility for analyses which have not yet been explored, especially as research carried out by the CEMCA* (UMR 1227) on chelates will further optimise its potentiality. Hyperion will help researchers understand why a treatment is effective in one patient but not in another. Clinicians will therefore be able to adapt treatments and move towards personalised and precision medicine, meeting the needs of each patient individually.

An example of state-of-the-art precision medicine technology, Hyperion was installed at the LBAI* (UMR 1227), at the CHRU in Brest in September 2019. Costing around 1 million euros, the system has been financed primarily by researchers and the SHU, while some support also came from the CHRU in Brest in 2019. The Hyperion system is designed to allow researchers to explore new targeted treatments, for cancer in particular.

A unique event in France on nissology

Islands are specific environments that intrigue scientists, inspire artists and bring societies together. Inhabited since ancient times by communities that have developed specific ways of life based on their geography and the resources available to them on land and at sea, today they embody the past but must also evolve constantly to meet major economic, environmental and social challenges.

October 2019, saw an entire week dedicated to the study of islands, Îles 2019, which was sponsored by Yannick Lahens and Yann Tiersen. It was structured around five key themes: innovating, living, protecting, networking and creating. Through a multidisciplinary scientific symposium in Brest, joint workshops in Ouessant, field trips to the islands of Molène and Sein, lectures and discussions, geography cafés and events on the theme of islands in Brest and Ouessant, scientific networks were forged between the sciences, culture and society. All sessions were open to the general public, strengthening the spirit of participation the organisers hoped for.

Just like nissology (the scientific study of islands), most meetings and discussions were multidisciplinary and focused on the intersection between environmental and social issues, in line with UBO’s areas of research. These events, which had an international flavour, were organised by UBO, the Fondation de France and the Association des Îles de Ponant, in conjunction with 52 partners from local communities, civil society and the private sector. Students from UBO were closely involved and more than 4000 people took part.

ÎLES 2019

Over the course of 40 or so themed sessions and fringe events, the conference looked at how advances in science and technology might address the issues and challenges facing tomorrow’s society, placing a particular focus on mechanics and marine engineering. Delegates were also able to discuss innovations in education for teaching different specialisms within the field of mechanics. This biennial event was organised by the IRDL* (UMR 6227), with the support of the Association Française de la Mécanique and in partnership with UBO, UBS*, ENSTA Bretagne* and ENIB*

French Conference on Mechanics, held at UBO in 2019

Around 1000 delegates from 22 countries* came to UBO’s Faculty of Science and Technology in August 2019, for the 24th French Conference on Mechanics.

* Algeria, Brazil, Canada, Chad, Chile, China, The Comoros, France (including Guayana and Guadeloupe), Gabon, Germany, Japan, Madagascar, Morocco, Poland, Romania, Russian Federation, Singapore, Singapore, Switzerland, Tunisia, United Kingdom, USA, Vietnam
* Institut de Recherche Dupuy de Lôme (IRDL, UMR 6227) - UBO - ENSTA - UBS - ENIB
* UBS: Université de Bretagne Sud
* ENSTA Bretagne: École Nationale Supérieure de Techniques Avancées Bretagne
* ENIB: École Nationale d’Ingénieurs de Bret
Every year, G7 parliamentary speakers meet in parallel to the G7 heads of state. Between 5 and 7 September 2019, the ocean and its future were the focus of discussions between the seven parliamentary leaders in Brest.

To inform their thinking, the politicians spent a morning at the Bibliothèque La Pérouse, a documentation centre for the ocean in Plouzané run by UBO, IFREMER* and theIRD*. Researchers from UBO, presented their work and joined discussions on three themes: micro-plastics in the ocean, with Ika Paul-Pont from LEMAR* (UMR 6537); global climate change with Stefan Lalonde from LGO* (UMR 6538); and ocean governance with Denis Bailly d’Amure* (UMR 6308).

UBO’s president, Matthieu Gallou, emphasised that “UBO’s purpose is to place itself at the cutting edge of marine and coastal research. Our work focuses on the significant challenges facing the whole of humanity, particularly in relation to current and future climate change”.

At the end of two days of discussions and visits across Brest, the G7 parliamentary speakers signed a joint declaration emphasising the vital role innovation and scientific research play in preserving our oceans.

*IFREMER: Institut Français de Recherche pour l’Exploitation de la Mer
*IRD: Institut de Recherche pour le Développement
*Laboratoire des Sciences de l’Environnement Marin (LEMAR, UMR 6537, UBO-CNRS-IRD-IFREMER)
*Laboratoire Géosciences Océan (LGO, UMR 6538, CNRS-UBO-UBS)
*Aménagement des Usages des Ressources et des Espaces Marins et Littoraux (AMURE, UMR 6538, UBO-IFREMER-CNRS)
*UMR: Unité Mixte de Recherche (joint research unit)
**HOUTERMANS AWARD**

In 2009, Barcelona was the venue for Goldschmidt, the foremost international conference on geochemistry. At the conference, Stefan Lalonde, a CNRS researcher at Géosciences Ouest (UMR 6538) received the Houtermans Award. This award from the European Association of Geochemistry is bestowed annually to a young researcher who has made an outstanding contribution in the field of geochemistry within 12 years of starting their doctoral studies. Professor Kurt Konhauser of the University of Alberta in Canada presented the award. He had particular praise for Stefan Lalonde’s fundamental research on ocean and atmospheric oxidation in the Precambrian period. The young researcher has explained what the study of ancient marine sediments can teach us about the evolution of the composition of seas and the atmosphere over billions of years. His research has attracted enough attention to be featured on the cover of the prestigious Nature Geoscience review and to be the subject of an article for the general public in the Canadian publication The Walrus. As further evidence of the excellence of this research internationally, Nature Communications has also accepted an article on the subject. One of the contributors is Bryan Killingsworth, a post-doctoral researcher who received a Marie Sklodowska-Curie Actions Fellowship when he was working on Stefan Lalonde’s team in Brest between 2016 and 2018.

*Laboratoire Géosciences Océan ILOG, UMR 6538, CNRS–UBO–UBSI*

Marie Sklodowska-Curie Actions Research Fellowship, a funding scheme established by the European Union and the European Commission to support research in the European Research Area (ERA).

**RESEARCH LEAD**

Before joining GETBO (EA 3878) in August 2018, Catherine Lemarié spent 12 years developing research projects on venous thrombo-embolic disease. This condition is a major public health concern because of its frequency (incidence rate of between one and two cases per 1000 inhabitants per year) and its seriousness (10% mortality at three months and 30% at five years in the case of pulmonary embolisms). The processes involved in blood clot formation are beginning to be well understood. Currently however, little is known about the processes that lead to recurrence of the disease, even though this affects more than 6% of patients once treatment stops. Catherine Lemarié’s projects focus on filling the gaps in knowledge in this area by developing original models for studying the recurrence of venous thrombo-embolic disease. This research is conducted in close collaboration with clinical scientists from GETBO and will strengthen links with INSERM’s immunology and genetics units.

Catherine Lemarié was appointed as research lead at the Institute National de la Santé et de la Recherche Médicale.

*Groupe d’Etude de la Thrombose de Bretagne Occidentale (GETBO, EA 3878)*

*HDR: Habilitation à Diriger des Recherches (Higher Doctorate with accreditation to supervise research)*

**JONATHAN GULA**

Discovered small-scale vortices below the ocean surface

**RESEARCH LEAD**

Jonathan Gula has accepted an article on the submersible research project, which was published in Geophysical Research Letters. The article, titled “Discovery: In an article showcasing a successful joint Franco-American project, which was published in Geophysical Research Letters, Jonathan Gula, lecturer-researcher at LOPS (UMR 6538), and his colleagues have demonstrated the existence of small-scale eddies below the surface of the ocean. This fundamental discovery will make a significant contribution to oceanography.

The ocean is populated by eddies. On the surface, these vortices are very energetic, relatively wide, and have been well documented by satellites observing the ocean surface. Below the surface however, the interior of the ocean is also populated by smaller vortices which can survive there for several years and travel for several thousand kilometres without being destroyed.

New observations, using seismic imaging, have revealed the presence of such eddies in the Gulf Stream, off the coast of America. These observations were obtained by emitting seismic waves on the ocean surface with an airgun, and then recording the acoustic reflections, which are influenced by variations in temperature and salinity in the water column.

The eddies were then reproduced using a high-resolution digital model of the ocean. These simulations point to a robust generation mechanism for these vortices. When the Gulf Stream interacts with an underwater mountain, the friction between the flow and the base generates a trail of small-scale vortices. As they form, these eddies mix with the waters around the underwater mountain and transport them to other regions of the Atlantic Ocean.

*Laboratoire d’Océanographie Physique et Spatiale (LOPS, UMR 6538, CNRS–ifremer–IRD–UBO)*

**Jonathan Gula**

Discovered small-scale vortices below the ocean surface

**DISCOVERY**

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*Laboratoire Géosciences Océan ILOG, UMR 6538, CNRS–UBO–UBSI*

**Laboratoire d’Océanographie Physique et Spatiale ILOGP, UMR 6538, CNRS–ifremer–IRD–UBO**

**STEFAN LALONDE**

Received the Houtermans Award

**HOULARMANS AWARD**

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His research has attracted enough attention to be featured on the cover of the prestigious Nature Geoscience review and to be the subject of an article for the general public in the Canadian publication The Walrus. As further evidence of the excellence of this research internationally, Nature Communications has also accepted an article on the subject. One of the contributors is Bryan Killingsworth, a post-doctoral researcher who received a Marie Sklodowska-Curie Actions Fellowship when he was working on Stefan Lalonde’s team in Brest between 2016 and 2018.

*Laboratoire Géosciences Ocean ILOG, UMR 6538, CNRS–UBO–UBSI*

Marie Sklodowska-Curie Actions Research Fellowship, a funding scheme established by the European Union and the European Commission to support research in the European Research Area (ERA).

**LIA SIEGELMAN**

Received an L’Oreal–UNESCO Rising Talents Award for Women in Science

Lia Siegelman, a doctoral student at LEMAR (UMR 6539), has received one of 30 French L’OREAL–UNESCO FWIS* grants for women in science. Her research has relevance for SWOT*, the future Franco-American international space mission. NASA is interested in observing specific ocean fronts from space because of their role in climate regulation – they are thought to control exchanges of carbon, heat and nutrients between the deep ocean and our atmosphere. These “small-scale” ocean fronts (measuring about 20km wide) are fairly modest on the scale of our planet and as such are thought to control exchanges of carbon, heat and nutrients between the deep ocean and our atmosphere. These “small-scale” ocean fronts (measuring about 20km wide) are fairly modest on the scale of our planet and as such are thought to control exchanges of carbon, heat and nutrients between the deep ocean and our atmosphere. These “small-scale” ocean fronts (measuring about 20km wide) are fairly modest on the scale of our planet and as such are thought to control exchanges of carbon, heat and nutrients between the deep ocean and our atmosphere. These “small-scale” ocean fronts (measuring about 20km wide) are fairly modest on the scale of our planet and as such are thought to control exchanges of carbon, heat and nutrients between the deep ocean and our atmosphere. These “small-scale” ocean fronts (measuring about 20km wide) are fairly modest on the scale of our planet and as such are thought to control exchanges of carbon, heat and nutrients between the deep ocean and our atmosphere. These “small-scale” ocean fronts (measuring about 20km wide) are fairly modest on the scale of our planet and as such are thought to control exchanges of carbon, heat and nutrients between the deep ocean and our atmosphere. These “small-scale” ocean fronts (measuring about 20km wide) are fairly modest on the scale of our planet and as such are thought to control exchanges of carbon, heat and nutrients between the deep ocean and our atmosphere. These “small-scale” ocean fronts (measuring about 20km wide) are fairly modest on the scale of our planet and as such are thought to control exchanges of carbon, heat and nutrients between the deep ocean and our atmosphere. These “small-scale” ocean fronts (measuring about 20km wide) are fairly modest on the scale of our planet and as such are thought to control exchanges of carbon, heat and nutrients between the deep ocean and our atmosphere. These “small-scale” ocean fronts (measuring about 20km wide) are fairly modest on the scale of our planet and as such are thought to control exchanges of carbon, heat and nutrients between the deep ocean and our atmosphere. These “small-scale” ocean fronts (measuring about 20km wide) are fairly modest on the scale of our planet and as such are thought to control exchanges of carbon, heat and nutrients between the deep ocean and our atmosphere. These “small-scale” ocean fronts (measuring about 20km wide) are fairly modest on the scale of our planet and as such are thought to control exchanges of carbon, heat and nutrients between the deep ocean and our atmosphere. These “small-scale” ocean fronts (measuring about 20km wide) are fairly modest on the scale of our planet and as such are thought to control exchanges of carbon, heat and nutrients between the deep ocean and our atmosphere. These “small-scale” ocean fronts (measuring about 20km wide) are fairly modest on the scale of our planet and as such are thought to control exchanges of carbon, heat and nutrients between the deep ocean and our atmosphere. These “small-scale” ocean fronts (measuring about 20km wide) are fairly modest on the scale of our planet and as such are thought to control exchanges of carbon, heat and nutrients between the deep ocean and our atmosphere. These “small-scale” ocean fronts (measuring about 20km wide) are fairly modest on the scale of our planet and as such are thought to control exchanges of carbon, heat and nutrients between the deep ocean and our atmosphere.
A University at the Centre of CONTEMPORARY CHALLENGES IN RESEARCH

2019 has seen UBO address key contemporary issues, including precision medicine, particularly for the treatment of cancer, and the transfer of personal data. Our research programmes most definitely reflect the concerns of modern society.

**BECOMES IEEFELLOW**

Professor Mohammed Benbouzid of the IRDL (UMR 6027) has achieved the prestigious grade of IEEE Fellow for his contributions to diagnosis and fault-tolerant control of electric machines and drives. He has received particular recognition for his research on detecting and diagnosing faults in energy conversion chains, and on developing resilient and optimal command and control strategies. It is thanks to his work, which first began in 1996, that the IRDL’s Energy Systems and Thermal Processes research hub (PTR4) is recognised as a national and international centre of excellence.

**AWARD**

The IEEE Nuclear and Plasma Sciences Society has bestowed its Richard F. Shea Distinguished Member Award for 2019 on Dimitris Visvikis, INSERM research director at LATIM (UMR 1101). The ceremony was held in November, in Manchester, during the IEEE’s annual conference on medical imaging. The award recognises Dimitris Visvikis’ major contribution to, and the significant role he has played in, both the society and the field of medical science. The jury also commended his involvement in the IEEE publication Transactions on Radiation and Plasma Medical Sciences as its first editor-in-chief.

**At the cutting-edge of personalised medicine for the treatment of cancer**

The European cofund ERA PerMed’s objective is to align national research strategies, promote excellence, and strengthen the competitiveness of European stakeholders in personalised medicine. Under its 2019 call for projects, LATIM (UMR 1101) and GGB (UMR 1078) have just obtained funding for research on gastric cancer as members of a European consortium with three other teams (Italian the project initiators-, Greek and German). Gastric cancer is a complex disease. It is the fifth most common cancer in the world and the third most deadly. Gastric cancers are very heterogeneous and affect twice as many men as women. Chemotherapy combined with surgery is the usual treatment for stage II and stage III gastric cancers, however, the efficacy of these treatments is still limited for many patients. It is therefore essential to develop a new approach that focuses on identifying new predictive markers, by taking account of every patient’s psycho/sociological and cultural environment. Teams in Brest, led by Laurent Corcos from GGB and Ghislaine Rolland-Lozachmeur from LATIM, are advocates of the idea that communication style, the extent to which a patient accepts treatment, and the interaction between clinician and patient can influence responses to treatment. These differences result in gaps in compliance, i.e. the match between patient behaviour and the treatment offered. Although it is particularly challenging, the integration of biological and psycho/sociological information offers compelling potential for identifying links between disease-specific biological characteristics, patient perception and prognosis.

As part of its 2019 fundraiser, the Brest Rotary Club has actively supported the research of Dr. Arnaud Uguen, a senior lecturer at UBO within the LBAI (UMR 1227) and a medical practitioner at the CHRU in Brest. His research focuses on pathological anatomy and cytology, i.e. the study of tissues and cells and their anomalies, particularly in the context of cancer. Funds of €90,000, raised by the Rotary Club, have been used to buy a digital slide scanner with brightfield and epifluorescence imaging modalities. This dual function greatly increases the number of parameters that can be analysed simultaneously on the same cell or tissue. The scanner can also be used for digital analysis of preparations, which will help improve accuracy in morphological analysis, provide new multi-parametric images containing an abundance of information on the interactions between tumour cells and their environment, and generate artificial intelligence applied to the associated images and data.

This technology will therefore provide new insights which can be used to characterise diseases more effectively. By anticipating how the disease progresses and how a patient responds, or not, to treatment, there is also potential for developing personalised medicine for the treatment of cancer.
**New chair in maritime archeology at UBO**

The Chair in Maritime Archaeology and Interdisciplinary Environmental Research (AdMerE) was established at the end of 2019 for two years and is shared between UBO and INRAP.

It involves three of our university’s departments (IBSHS*, IBSAM*, IUEM*), four research units (LEMAR*, LETG*, LOG*, GGB*, CRBC*) and the European Research Center for Virtual Reality at the ENIB®. It is coordinated by Yvan Paillet, head of research at INRAP and an archaeologist known for his work on coastal societies. He has led archaeological digs on the island of Molène and written a paper which was presented at UBO in July 2019.

**Strengthening Policy on SOCIAL AND ECONOMIC PARTNERSHIPS**

Commercialising research is a major focus for UBO. In 2019, projects processed by the Research, Innovation and Commercialisation Department (DRIVE®) represented a total of just over €614 million. Overall, 293 contracts were signed, including 207 for services, worth a turnover of more than €268 million, and 27 for joint research worth more than €1 million.

In addition, eight patent applications, primarily in the field of healthcare, were submitted by researchers from LLSBA® (UMR 1227), LÉNI® (EA 4580) and LATIM® (UMR 1101). LEMAR® (UMR 6539) also submitted two patent applications for ocean science.

A number of UBO’s laboratories have formed partnerships and signed contracts with businesses, providing them with financial and financial support for developing and applying their research. For example, Lab-STICC® (UMR 6285) has established a beneficial partnership with Thales and obtained significant results at LATERAL, the joint laboratory.

The EQUASA® platform, which is attached to the ESIAB® and the LUBEM® (EA 3882), is also carrying out relevant work on the characterisation of food contaminants, the analysis of microbial communities and the production of biological material.

Once again, LATIM (UMR 1101) has hosted several joint research projects, demonstrating its expertise in health technology. In January 2019, the Consumer Electronics Show (CES) in Las Vegas, Evolucare and Ouest Valorisation signed an exclusive and global license agreement for the OpHAI® algorithm which was developed by LATIM (UMR 1101). OpHAI® is a software solution for computerised screening of diabetic retinopathy. It will be developed commercially through a joint venture with ABOD, a long-standing partner in joint research. In December 2019, the ANR selected LATIM’s AdMIRe® project as a joint laboratory, and provided funding for developing research with commercial partners. The project’s focus is on distributed deep learning for classifying multimodal, uncertain and rare data in ophthalmology.

**Translational research serves as a link between basic and clinical research, placing the individual at the centre of its interests. Its focus is on finding practical applications for the latest groundbreaking discoveries. To this end, multidisciplinary teams of researchers and clinicians committed to this process maintain a flow of knowledge between the patient and basic research and basic research and the patient.**

In less than two years, the project team at LATIM* (UMR 1101) has developed a device for patients with serious respiratory difficulties which monitors the volume of air inhaled and exhaled without the use of invasive treatments.

LATIM has been working on the use of cameras that provide a reliable assessment of the movements of an object in 3D for some years. Previously, researchers had used an algorithm to plot a curve of patients’ respiratory movements to vary the pulse amplitude of the particle accelerator used in radiotherapy.

Following discussions within the unit, it soon became clear that there was merit in trying to transfer this technique to other areas, such as non-invasive respiratory monitoring in critical care. The rationale was that it might be possible to measure and examine variations in a patient’s respiratory volume on each inhalation, without using invasive equipment. Respiratory volumes provide essential information which is often overlooked when monitoring patients presenting with breathing difficulties, due to a lack of measuring instruments.

**A new chair of excellence for secure data transfer in smart objects**

The Internet of Things will see an increasing number of sensors, actuators and smart devices connecting the physical world to the Internet. This development is relevant to both industry (factories of the future, transport, etc) and the general public (healthcare, household goods, home automation, etc). Through these technologies, vast quantities of data are stored, recovered and transferred seamlessly between the physical and virtual worlds, raising many questions about how to make such exchanges secure.

At the start of 2019, the Institut Brestois du Numérique et des Mathématiques (IBNM* established a new chair of excellence. This research programme will strengthen cooperation between Lab-STICC® (UMR 6285) and LMBA® and run for four years.

The chair will be coordinated by Roland Gaulier, a lecturer-researcher at Lab-STICC*. Its objective is to improve systems for protecting data transfers and detecting breaches. Innovative solutions are needed to improve the security of telecommunications involving smart objects, in both the domestic and industrial spheres.

The first priority in secure data transfer is the unique identification of the object connected to the network. After this, the focus is on both secure data exchange and robustness with regard to transfer errors. To these ends, researchers from the IBNM® chair will work on developing algorithms, implemented in the physical layer where signals are transmitted for the first time. The aim is to create a protective bubble around the smart object, to prevent intrusions and data leaks.
UBO honed its international strategy throughout 2019 by developing scientific and strategic partnerships and institutional initiatives. The University also joined a number of European research projects (2 INTERREG and 4 H2020) and supported student mobility through SEA-EU and Erasmus+.

The University of West Brittany became a European university through the SEA-EU Transnational Alliance, in June 2019. This alliance of six partner institutions is co-ordinated by the University of Cadiz. Its other members are: University of West Brittany, University of Gdansk (Poland), University of Malta, University of Kiel (Germany) and University of Split (Croatia).

UBO becomes a European University through the SEA-EU alliance

SEA-EU aspires to be a space of European mobility for students, lecturers, researchers and other university staff, fostering interdisciplinary and intercultural exchange.

A central role in Future Oceans 2 for sustainable oceans

The IMBER Future Oceans 2 conference took place in Brest between the 2 and 17 June 2019.

Taking the theme of ocean sustainability for the benefit of society: understanding, challenges, and solutions, this was IMBER’s second open science conference. About 800 international researchers from various disciplines attended. IMBER’s aim is to identify the effects of global change on the ocean and the most important biological and physical aspects of the ocean’s role in this transformation.

The conference was based around three interlinked themes:• Understanding and quantifying the state and variability of marine ecosystems.
• Improving scenarios, predictions and projections of future ocean-human systems at multiple scales. • Improving and achieving sustainable ocean governance.

In addition to delivering a review of scientific progress in these three areas, the conference prompted many inter-and trans-disciplinary discussions and provided a forum for strategically mapping future lines of research.

UBO joins Europe in the UN Decade of Ocean Science

In June 2019, UBO joined IFREMER*, the CNRS* and the EMB* in organising the EUROCEAN 2019 conference on marine science policy. This year, discussions focused on the European contribution to the United Nations Decade of Ocean Science for Sustainable Development (2021-2030). By actively taking part, UBO has demonstrated its commitment to a sustainable future in which oceans and coasts will be essential factors.

Due to this international recognition, UBO has been accepted as an observer at the next COP*. In November 2020, representatives from the University will attend COP 26 in Glasgow - a critical moment for International policy on climate.

A constructive partnership with Ibn Zohr University

On 14 and 15 March, the Centre for Education at Agadir’s Faculty of Medicine hosted a symposium organised by Lab-Lee (SEA-EU) and Ibn Zohr University’s faculties of law, economics and social sciences in Agadir and Ait Melloul (Morocco). Lecturer-researchers and professionals met to discuss the topic of ‘housing and vulnerability: a comparative study of France and Morocco’. Their starting point was the fact that regardless of location, Morocco, France or elsewhere, men and women must have a “roof” for protection in life.

Housing is an essential medium in the life of society with societal, sociological, political, family, and economic implications. The issues surrounding housing are therefore vast, and make access to accommodation a major concern.

Introducing 3TR, the most extensive immunology project to be funded through IMI2

In October 2019, LBAI* (UMR INSERM 1227) joined the 3TR project on ‘Taxonomy, Treatment, Targets and Remission’ – the most extensive immunology project ever funded through IMI2 – and the fourth round of European funding LBAI has obtained in five years. This large-scale research project, involving the public and private sectors, will provide new information on the factors that determine whether or not a patient responds to treatment for seven autoimmune, allergic and/or inflammatory diseases: systemic lupus erythematosus (SLE), rheumatoid arthritis, multiple sclerosis, ulcerative colitis, Crohn’s disease, asthma, and chronic obstructive pulmonary disease (COPD).

3TR will give researchers access to an unprecedented volume of clinical data and biological samples taken from more than 50,000 patients across 60 clinical trials. All the data produced during the project will be collated on a centralised data management platform based on machine learning and dynamic mechanistic methods. By involving medical associations, in close partnership with patient groups, 3TR will also play a role in swiftly transferring relevant knowledge and project outcomes to clinics. The ultimate aim is to discover and verify stratification biomarkers to improve patient management and care, introducing a scientific justification for the choice of treatment, based on scientific evidence rather than the traditional approach of clinical trials. The goal of this new approach is to increase the success of treatment, reduce the risks of side effects, cut healthcare costs and, first and foremost, improve quality of life for patients.

Renowned, interdisciplinary experts from 69 academic and industrial partner institutions in 15 European countries are working on 3TR. The project will receive more than €80 million in funding over the next seven years, from IMI2, a joint venture of the European Union and the European Federation of Pharmaceutical Industries and Associations (EFPIA). LBAI (UMR 1227) is one of the consortium’s three French academic representatives and the only one to work on analysing the data generated. With its partner, the CHRU in Brest, it will play a role in recruiting patients and including them in clinical trials.

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**3TR: “Taxonomy, Treatment, Targets and Remission” - identification of the molecular mechanisms of non-response to treatments, relapses and remission in autoimmune, inflammatory and allergic conditions.**

*IMI: Innovative Medicines Initiative