

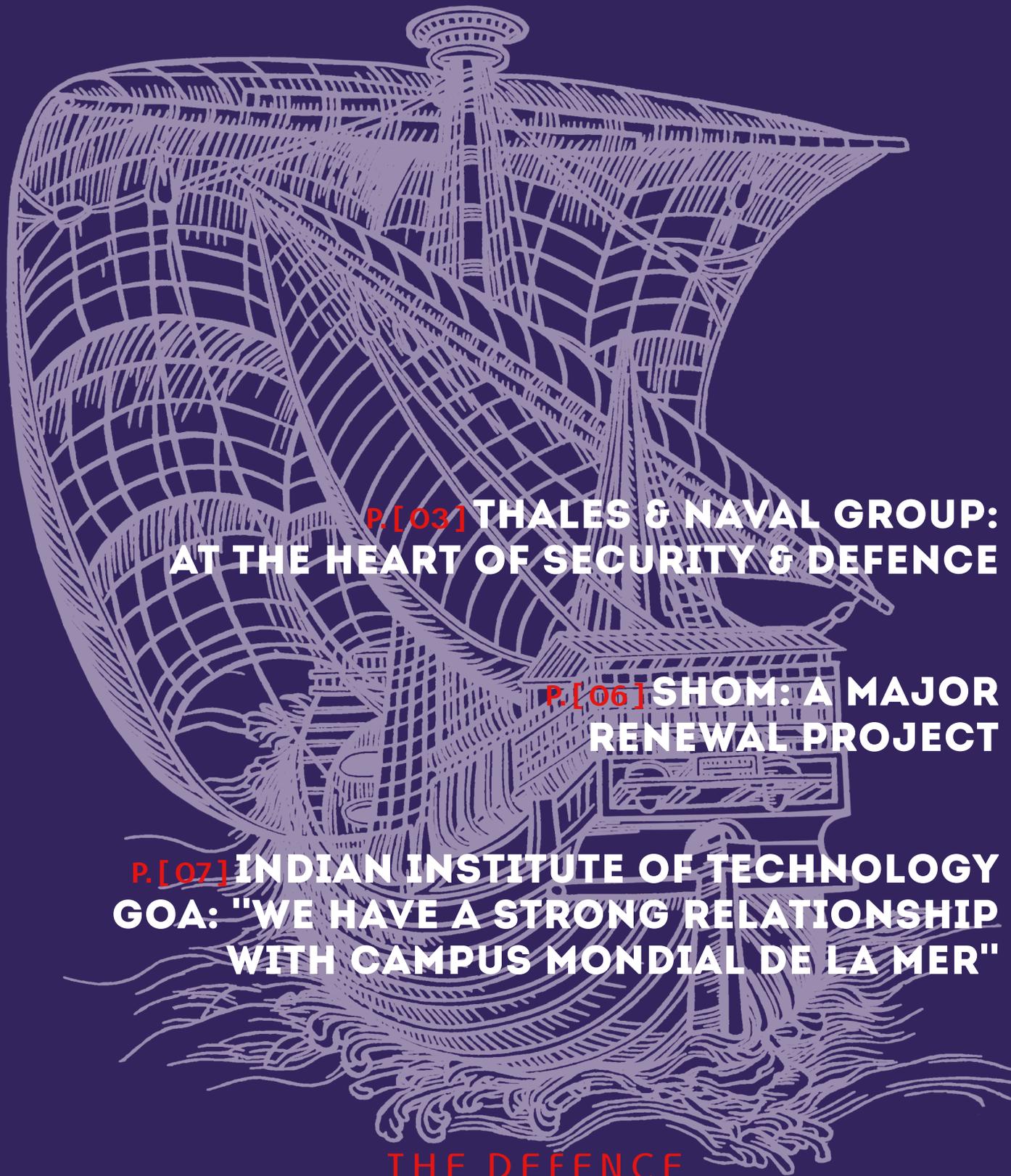
SONAR

CAMPUS
MONDIAL
DE LA
MER

4

May 2021

THE JOURNAL OF CAMPUS MONDIAL DE LA MER

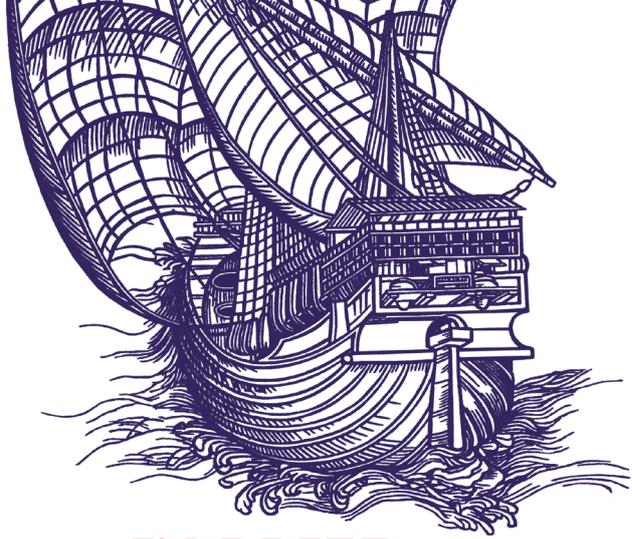


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GOA: "WE HAVE A STRONG RELATIONSHIP
WITH CAMPUS MONDIAL DE LA MER"**

THE DEFENCE



SONAR #4

CAMPUS
MONDIAL
DE LA MER

IN BRIEF

SERCEL DEFENSE: INDUSTRIAL EXPERTISE FOR THE SECTOR

Sercel has already been active in the defence sector for more than 30 years, and is now offering “bespoke services, with a dedicated business engineer” under the **Sercel Defense** brand, notes **Christophe L’Her**. He is head of the Brest site, which specialises in underwater acoustics. With its focus on acoustic communications and positioning, innovative sensors, passive acoustics and custom cables, as well as its marine test centre in Lorient, “Sercel offers expertise, solutions and industrial tools, and seeks to develop further in France and internationally.”

www.sercel.com/services/Pages/SERCEL-DEFENSE.aspx

CLS SECURES TRIMARAN 3 CONTRACT

“While Toulouse is synonymous with French aerospace, Brest is where VIGISAT was assembled by CLS, a subsidiary of the National Centre for Space Studies (CNES),” notes **Vincent Kerbaol**, head of CLS in Brest. “VIGISAT is the main French station for receiving and analysing high-resolution satellite radar images,” he explains. Thanks to VIGISAT’s ocean surveillance capability, CLS has secured a four-year service contract with the French Navy for satellite data analysis in support of State action at sea and maritime defence.

www.cls.fr & www.vigisat.eu

FOREWORD



Olivier LEBAS, Vice-Admiral, Commander of the Atlantic Maritime Zone, Commander of the Atlantic Maritime District and Maritime Prefect for the Atlantic.

THE CITY OF BREST AND THE FRENCH NAVY ARE BOUND TOGETHER BY 400 YEARS OF COMMON HISTORY. EVER SINCE CARDINAL RICHELIEU DECLARED BREST A MILITARY PORT IN 1631, THE CITY HAS DEVELOPED IN RESPONSE TO THE NAVY’S VARIOUS REQUIREMENTS. FRANCE’S MILITARY ARSENAL HAS ALWAYS BEEN ABLE TO RELY ON BREST’S DYNAMISM TO ATTRACT THE QUALIFIED PERSONNEL REQUIRED AND WELCOME THEIR FAMILIES. EVEN TODAY, THE COMPANIES THAT GENERATE THE BIGGEST NUMBER OF JOBS IN BRITTANY’S MARITIME SECTOR ARE THE CONSTRUCTION AND REPAIR FIRMS SERVING THE NAVY, FOREMOST AMONG WHICH ARE NAVAL GROUP AND THALES.

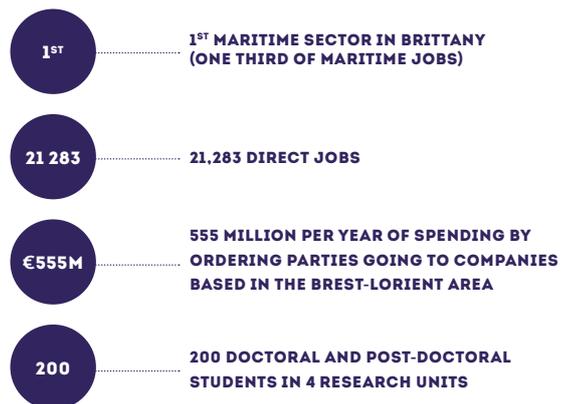
If we include the Brest-Lorient defence base outside the city limits, the area’s defence ecosystem supports 50,000 people. It is a major player in maritime innovation thanks to its academic network, its four research units, its 400 teacher-researchers and postgraduates and its various innovation chairs. Research has been pursued in several main areas: vessels of the future, cybersecurity, autonomous underwater systems, maritime surveillance and information, acoustics - and more besides.

The shipbuilding industry - both civil and military - is currently experiencing a phase of true technological disruption, with better-

performing, cleaner and more highly automated vessels. This radical change has only been possible thanks to a significant push to modernise not just the production tools used in construction, but also the service infrastructure, the energy networks and the telecommunications for the Brest naval base. For vessels, this work is being led by the Brest Fleet Support Services Directorate (**DSSF Brest**), which is the biggest prime contractor in Finistère, and for onshore infrastructure by the Defence Infrastructure Department at Brest (**ESID**). At a more virtual level, cybersecurity, which has been acknowledged as a key paradigm for the past decade or so, now permeates the heart of defence systems design. This brings resilience in the face of growing threats from cyberspace. Finistère’s military, students, researchers, engineers and leading manufacturers are thus all working towards a shared ambition: for the area to be recognised, both in France and around the world, as a leading maritime innovation hub.

KEY FIGURES*

* figures taken from the ADEUPa report “Impact économique de la Défense” (January 2020)



FEATURE REPORT: THE DEFENCE



THALES ET NAVAL GROUP:

©Naval Group

AT THE HEART OF SECURITY AND DEFENCE

THESE TWO HI-TECH DEFENCE SPECIALISTS LEAD THE FIELD WHEN IT COMES TO INNOVATION, TECHNOLOGIES AND MAINTAINING STRONG RELATIONSHIPS WITH THE ARMED FORCES OF FRANCE AND OTHER COUNTRIES. HERE, THEY BRING US THEIR EXPERT OPINIONS ON CURRENT DEVELOPMENTS IN THE FIELD. **MARIE-JOSÉE VAIRON**, DIRECTOR OF THE THALES SITE AT BREST, AND **ÉRIC BALUFIN**, DIRECTOR OF THE NAVAL GROUP BREST SITE, TOOK PART IN THIS JOINT INTERVIEW.

WHAT ARE THE MAIN ACTIVITIES OF THALES AND NAVAL GROUP AT THEIR BREST SITES?

M.-J. VAIRON: Thales has had a presence in Brest since 1963, with almost 1,800 staff working on defence systems, cybersecurity and digital services. The defence systems developed in Brest include electronic warfare systems for combat aircraft such as the **Rafale and Mirage 2000**. The design, development and systems integration of maritime patrol and surveillance systems (ATL2 upgrade, **Force Multiplier**) and of reconnaissance systems (for **ALSRs**¹) are all carried out in Brest, too. Thales also provides a naval electronic warfare system (for **Horizon vessels** and **FREMM**²-class frigates, **FDIs**³, **Barracuda** and **SNLE-class submarines**⁴), as well as an airborne system (for the **ARCHANGE** programme and for **Tiger** and **NH90** helicopters) and a space-based system. Added to that are anti-submarine warfare systems, including airborne sonar systems such as the **FLASH** dipping sonar system, and mine countermeasures, in particular the **MMCM** programme. All these solutions are accompanied by significant levels of client support and services

ÉRIC BALUFIN: Naval Group employs around 3,000 staff in Brest. Our core role is the maintenance in operational condition (**MOC**) of surface and submarine vessels for the French and foreign navies. The vast majority of our activities support the French deterrent force: we maintain four **SNLEs** in Brest and on the Île-Longue, three **FREMM** frigates based in Brest and 87 **Tripartite**-class minehunters, which clear and secure the path for submarines.

CYBER ATTACKS ARE BECOMING INCREASINGLY COMMON. IS THIS A MAJOR SECURITY ISSUE FOR YOU?

M.-J. V.: The group is currently investing EUR 3 billion a year in R&D – rising to EUR 5 billion by 2023 – while stepping up its development in the digital sphere, with cybersecurity a permanent sine qua non for any sort of digital transformation. Each and every interconnection of data or point of data collection, storage or processing represents a potential point of entry for cyber attacks. The acquisition of Gemalto was a major boost for the group strategy, and it allowed us to develop a comprehensive solution to secure the whole of the critical decision-making chain within a digital environment.

É. B.: It's an issue for everyone right now. Cyberspace has become a frontline, in the battle for influence as well as when conducting operations in the field. Our concerns are twofold: first, for our own activities, as cybersecurity is a fundamental issue for us as an operator working in a highly sensitive environment; and secondly, for our clients, as cybersecurity has led to considerable changes in our working methods and needs to be built into our activities.

WHAT STRATEGIES ARE YOU PUTTING IN PLACE TO COUNTER CYBER ATTACKS, BOTH FOR YOU AND FOR YOUR CLIENTS?

M.-J. V.: Thales ensures end-to-end digital security and includes it in its solutions from the development stage onwards – security by design. The main actors internally are the networks of chief information security officers (**CISOs**) for our internal infrastructures and the cyber champions for our own products, as well as Thales cyber experts working in our security operations centre (**SOC**) and our computer emergency response team (**CERT**). They can intervene right from the tender phase and throughout the duration of the project. A global coordination system is in place, and the information systems department has specific resources at its disposal to carry out audits plus awareness-raising and training programmes.

É. B.: We have an approach for designing new ships called 'cyber by design' to respond to developing threats and to integrate bespoke cyber systems for naval operations, including for the next **FDI** frigate due in 2024. As a systems integrator, we also offer and deploy solutions and services to improve cyber capacity and to monitor the cyber status of vessels in operation. We use two internal tools to support our clients: an integrated digital support operational centre (**COSIN**), which has specialists in contact with both the Navy and cybersecurity experts so it can offer the most appropriate solutions; and a **CERT** to manage threats and respond to any attacks against either ourselves or our clients. This **CERT**, based near Toulon, is one of 400 internationally recognised teams of its kind.

YOU ARE MEMBERS OF CAMPUS MONDIAL DE LA MER: WHAT IS YOUR VIEW OF THIS ORGANISATION?

M.-J. V.: I think Campus mondial de la mer successfully promotes Brittany on the global stage. The current health crisis has given us a new perspective in our awareness of marine resources, and we need to keep a watching brief to capture this new dynamic. As a meeting place for scientists, economists, academics and industry representatives in the region, the Campus provides them with support for building relationships, enhancing how they draw together and share local initiatives.

É. B.: Campus mondial de la mer brings people together and supports them in the fields of innovation and research, and the energy it invests has allowed an effective regional strategy to be developed. All the various economic, academic, scientific and state actors have come together behind a common objective of development and outreach.

1: Light surveillance and reconnaissance aircraft - 2: European multimission frigates
3: Defence and intervention frigates - 4: Nuclear-powered ballistic-missile submarines

ORION: THE REGIONAL CLUSTER LED BY THE DGA

THE **ORION CLUSTER** WAS SET UP BY THE **FRENCH DEFENCE PROCUREMENT AGENCY** DGA AS AN INNOVATION ACCELERATOR FOR THE **FRENCH NAVY**, WITH FOUR PROMISING PROJECTS ALREADY SELECTED.

Orion, the Organisation for Naval Operational Research and Innovation, was launched in 2019 shortly after the creation of **AID**, the Agency for Innovation in Defence. **Jérôme Perrin**, director of **DGA Techniques navales**, explains that its aim is "to set out a truly regional innovation network". **Orion** was the second cluster to be established by the **DGA**, the first being in Toulon. It brings together the **French Navy**, **Technopôle Brest-Iroise**, the **ENSTA Bretagne**

(a multidisciplinary graduate and postgraduate engineering school) and **Ecole navale** (the French naval academy). "**Orion** has a philosophy of open innovation, involving direct dialogue with companies and research facilities that are not necessarily defence specialists." Through presentations, project assistance, carrying out experiments and integrating different innovations, "**Orion** offers companies privileged contact with and proximity to the **DGA** and **the Navy**." One example of a current project involves **TDF Group** and concerns long-distance communication between the French mainland and vessels on deployment using very long-range antennas.



www.defense.gouv.fr/dga & www.cluster-orion.fr

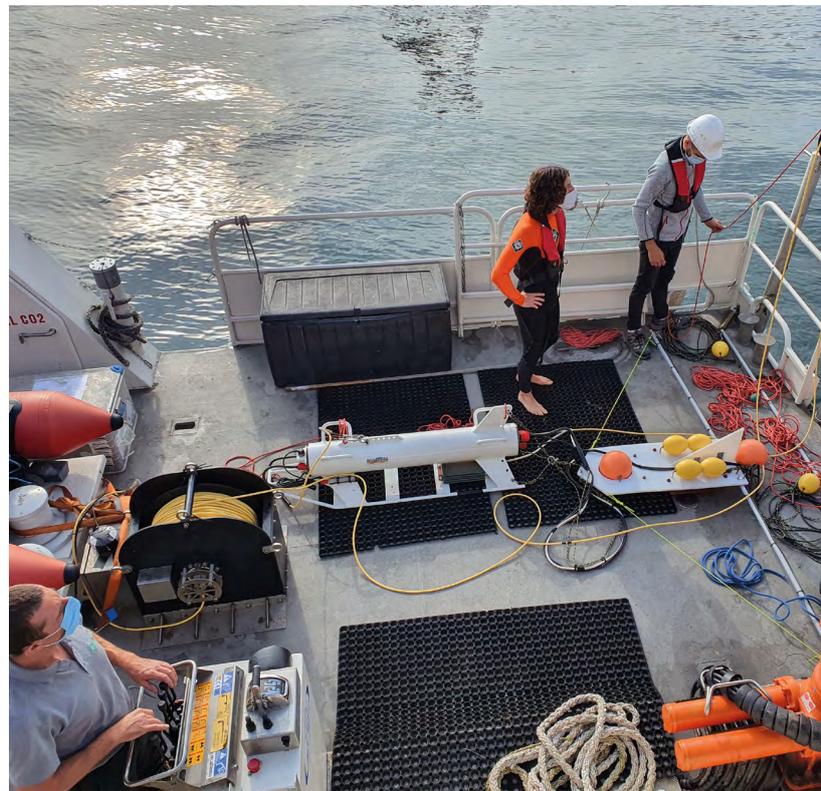
"FACILITATING DIALOGUE WITH THE ARMY"

IN ONE OF THE FIRST PROJECTS TO BE CARRIED OUT VIA THE **ORION** CLUSTER, **MAPPEM GEOPHYSICS** IS DETECTING BURIED OBJECTS FOR THE **FRENCH NAVY**.

MAPPEM Geophysics, which specialises in marine electromagnetics, has been conducting experiments as part of the **Orion** cluster. "We've developed a working demonstrator to detect objects buried under the seabed" reports **Jean-François D'Eu**, CEO of **MAPPEM Geophysics**. "The demonstrator was rapidly assembled thanks to funding from the **Defence Innovation Agency**, which proved a fundamental asset in obtaining results so that we could showcase and market our solution." Already an indispensable provider of seabed imaging with applications for geophysics, offshore wind, oil and gas and dredging, **MAPPEM Geophysics** is now broadening its field of activity through the **Orion** cluster: "This is a unique opportunity for exchange with all members: **SMEs** and major firms specialising in defence, education institutions, the **Technopôle Brest-Iroise**, the **French defence procurement agency (DGA)** and the **French Navy**. Working with them has allowed us to better identify our operational requirements, and further projects are already underway."



www.mappem-geophysics.com



©Mappem

PÔLE MER BRETAGNE ATLANTIQUE: INNOVATION GETS A DEFENCE BOOST

PÔLE MER BRETAGNE ATLANTIQUE SUPPORTS CUTTING-EDGE INNOVATION IN THE BLUE ECONOMY, AN AREA OF INTEREST FOR THE DEFENCE. BOTH ARE WORKING ON A TWIN-TRACK INNOVATION WITH BOTH CIVILIAN AND MILITARY APPLICATIONS, WHICH ENJOYS SUPPORT FROM A WIDE RANGE OF LOCAL COMPANIES.



www.pole-mer-bretagne-atlantique.com/en/

Frédéric Renaudeau, defence adviser at **Pôle Mer Bretagne Atlantique**, lists the many innovations which can be used by the military and civilians alike: "Aerial or underwater drones can undertake surveillance as well as maintenance, while foils can be used both for racing yachts and for RIBs transporting commandos". This is the focus of the twin-track innovation, financed by the **French Ministry of Armed Forces** to support projects with strong potential and developed by **SMEs**. "The arrangement simultaneously allows the armed forces to harness disruptive, agile, rapid innovations and businesses to access orders from public bodies in France and internationally." There are many areas to explore - including digital, the environment, nanotechnology, materials and detection. **Pôle Mer** has been commissioned by the Ministry to bring together the armed forces and innovative **SMEs**. For this, it relies on defence innovation clusters established by the **French Defence Procurement Agency (DGA)**, including the **Orion** cluster. "More than 60 **Pôle Mer** companies are already involved, and this number is constantly growing."



FRANCE CYBER MARITIME

ESTABLISHED IN BREST IN NOVEMBER 2020, FRANCE CYBER MARITIME AIMS TO DEVELOP A FRENCH SECTOR OF EXCELLENCE IN MARITIME CYBERSECURITY, WHICH IS A MAJOR STRATEGIC ISSUE BOTH NATIONALLY AND INTERNATIONALLY. WE TALK TO THE **DIRECTOR OF FRANCE CYBER MARITIME, XAVIER REBOUR.**

HOW WAS FRANCE CYBER MARITIME FORMED?

X. R.: The process goes back to CIMER¹ in 2018, with Resolution 46 indicating that France should address cybersecurity issues in the maritime sector. This paved the way for the creation of a governing body and coordination centre for maritime cybersecurity. Hence **France Cyber Maritime** was established to set up the new centre and to coordinate the work of the various public and private actors from the maritime and cybersecurity sectors. A further aim was to raise our profile internationally.

WHY THE SPECIFIC FOCUS ON CYBERSECURITY IN THE MARITIME SECTOR?

X. R.: The maritime sector has suffered several attacks over the past few years, not least the attack on Maersk: that affected 4,000 servers and led to losses of USD 300 million. Some 90% of global trade is conducted by sea and passes through ports. The maritime sector has certainly been strongly committed to digital transformation, and it now needs to address maritime and port cybersecurity. The requirements of the sector are of course highly specific: a ship's systems cannot be secured in the same way as those of a factory, for instance.

WHY CHOOSE BREST?

X. R.: Because the city applied to host our association and

centre, and because the area is so suitable. It provides the right resources and facilities and a rich economic, industrial and academic landscape, with a focus on both the maritime sector and cybersecurity. And while **France Cyber Maritime** is headquartered in Brest, its mission is national and overseas in scope.

WHAT ARE THE NEXT STEPS?

X. R.: Between now and the summer, we will be setting up a maritime computer emergency response team (**M-CERT**), with support from ANSSI². Our centre will effectively provide "first aid" for maritime cybersecurity, responding to emergency calls, arranging for any immediate measures required and directing our 'patients' to a reliable cybersecurity provider, offering monitoring, analysis, alerts and information. In parallel, we are working as part of a sector of excellence in maritime cybersecurity, and thanks to our members (we already have around 20), we will be setting out our offer of services. Surveillance, training and awareness raising, R&D, maintenance and activity sessions - we are already developing our various working groups.

1. The French Interministerial Committee on the Sea.

2. The French National Agency for the Security of Information Systems.



TRAINING FOR MARITIME CYBERSECURITY EXPERTS

A NEW BESPOKE **POST-MASTER'S DEGREE IN CYBERSECURITY FOR MARITIME AND PORT SYSTEMS** IS NOW AVAILABLE IN BREST, OFFERING A HIGHLY SPECIALISED TRAINING PROGRAMME IN A RAPIDLY DEVELOPING FIELD.

The only programme of its kind in Europe, this qualification is provided by **IMT Atlantique** (Institut Mines-Télécom Atlantique Bretagne-Pays de la Loire) along with the **Ecole navale** (the French naval academy), the **ENSTA Bretagne** (a multidisciplinary graduate and postgraduate engineering school) and the **ENSM** (French Maritime Academy). It fulfils "a dual civil and military role", explains **Yvon Kermarrec**, head of the specialist course at **IMT Atlantique**.

"The cybersecurity post-master degree course addresses some major strategic issues. IT forms an integral part of all civilian and military vessels: it drives sophisticated steering assistance systems, and it is also vital for ports and shore-based control centres. These systems are vulnerable to cyber attacks, which can affect both vessels and port infrastructures, sometimes putting them out of action." These are existing threats, and the new degree will be of interest to all actors in the maritime sector, including the French Navy and shipowners, as it can help them to protect vessels and ports and to anticipate and deal with cyber issues. This postgraduate qualification (6 years after the baccalaureat) is intended for both engineering graduates and professionals.



DIATEAM "WE'RE AHEAD OF THE COMPETITION"

Diateam's founder and CTO **Guillaume Prigent** explains that its simulator, "a platform that replicates computer and industrial architectures to prepare for and ward off cyber attacks", establishes the company as France's specialist provider of cybersecurity solutions. This 25-strong company from Brest includes a dedicated software development team and, on the security side, a 'red team' of professional hackers in charge of scenario development. Set up in 2002, **Diateam** is already a leading player in France and is well known across Europe. The company is part of **Brittany's Pôle d'Excellence Cyber** (Cyber Excellence Cluster), and is working with the **French Ministry of Armed Forces** as well as major transport, energy and telecommunications groups to train up their teams. **Diateam** has recently joined **France Cyber Maritime** and is seeking to develop at an international level.



Picture: M.Buis © Armée de l'air



SHOM: A MAJOR RENEWAL PROJECT

BY 2027 THE PROGRAMME FOR FUTURE HYDROGRAPHIC AND OCEANOGRAPHIC CAPACITY (CHOF¹) PLANS TO BUILD TWO VESSELS AND FOUR DRONE SYSTEMS - PLUS PAYLOADS.

THE SHOM (FRENCH HYDROGRAPHIC SERVICE) IS ENTERING A NEW ERA OF GROWTH AND IMPROVED RESPONSIVENESS. HERE LAURENT LOUVART, HEAD OF THE **CHOF DEFENCE PROCUREMENT PROGRAMME**, EXPLAINS MORE.

WHAT IS SHOM'S MISSION?

LAURENT LOUVART: Ever since we were established, our role has been to serve the maritime community. Our work focuses on three main areas: safe navigation; support for the defence sector (through deterrence and protecting our sovereign maritime and submarine spaces); and expertise in describing the maritime environment. We aim to provide an exhaustive description including the topography, nature of the seabed, water temperature, salinity, density, mixing of water bodies, plus movements on the surface and below it (swell, breaking, sea levels, etc).

WHY REPLACE SHOM'S HYDROGRAPHIC EQUIPMENT?

L. L.: We will not be replacing the large vessels, the *Beautemps-Beaupré* and the *Pourquoi pas ?*, but we will be adding two new-generation hydrographic vessels. These will replace the Navy's ageing *Laplace*, *La Pérouse* and *Borda* vessels, which Shom operates and which were brought into service between 1989 and 1990. The new vessels will be larger, at around 80-90m, and thus able to operate

further afield and for longer. We plan to use alternative means of meeting new requirements, for example knowing all the dimensions of the terrain and disseminating this knowledge, increasing our range in terms of geography and depth.

WILL YOU BE INTRODUCING ANYTHING NEW?

L. L.: Yes, we have a very ambitious programme which takes account of developments in this area, including new technologies. Drones are one example: their work can be highly detailed, they have a greater autonomous range, and they acquire data constantly. This means they can produce denser descriptions, more regularly, for all areas. We plan to use aerial, surface and submarine drones. These will in turn create new job roles and enable us to acquire new skills.

DOES THIS NEW EQUIPMENT MEET A PARTICULAR NEED?

L. L.: Little is known about 85% of our oceans! And that's not counting the fact that some seabeds change naturally due to human activity. Material deposits are exploited, submarine communications

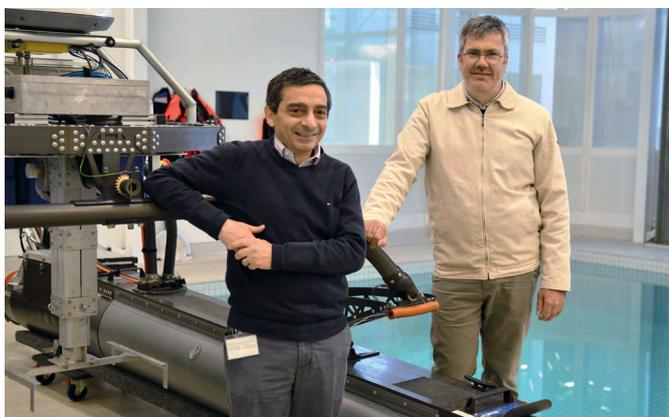
and other cables are installed, and coasts are managed and monitored: there are so many possible activities that can affect the seabed. This is the only large-scale programme the **Ministry of Armed Forces** is undertaking to modernise information gathering in the marine environment.

WHAT IS THE SCHEDULE FOR THE CHOF PROGRAMME?

L. L.: We have already reached the test phase: a **DriX** surface drone made by the company **iXblue** was tested in late 2020, and an underwater drone which can dive to 6,000m will be tested this year. We will collaborate with local and international businesses so we can present our programme to the **Ministry of the Armed Forces** in early 2022. We will then draft tender specifications and calls for tenders. The plan is for the first vessel to be operational for 2027-28.

1: CHOF is a programme developed by the French Ministry of Armed Forces and managed by the French Defence Procurement Agency (DGA), and comes under the current Military Programme Law.

INFO+ <https://www.shom.fr>



"AUSTRALIA HAS A DIFFERENT RESEARCH CULTURE"

BENOÎT CLÉMENT, PROFESSOR AT ENSTA BRETAGNE, SPENT TIME IN AUSTRALIA IN 2020 FOR A PROJECT ON CONTROLLING AUTONOMOUS UNDERWATER VEHICLES. FURTHER COLLABORATION IS PLANNED.

Professor Clément relocated with his whole family to spend eight months at **Flinders University** in Adelaide. For **Benoît Clément**, working with Australia "resulted from a combination of factors - meeting various people, a personal desire to travel and a favourable geopolitical climate. I discovered a different way of working, but one which is close to ours: **Flinders University** is like a specialist engineering institution but with all the multidisciplinary benefits of a university." His research focuses on automatic control in robots: "I'm aiming to make conventional control methods work alongside more sophisticated methods involving optimisation, machine learning, etc. The idea is to build flexibility in via the artificial intelligence, so the systems can adapt automatically to an environment or a mission." This work brought **Benoît** together with **Professor Karl Sammut**, his Australian counterpart and a close collaborator. **Flinders University** and **ENSTA Bretagne** are planning more opportunities to work together on research, teaching and training: "We'll develop our relationship further to increase interaction and exchange."

INFO+ <https://blogs.flinders.edu.au/fit/2020/08/10/visit-deepens-partnership-with-ensta-bretagne/>





INDIAN INSTITUTE OF TECHNOLOGY GOA: “WE HAVE A STRONG RELATIONSHIP WITH CAMPUS MONDIAL DE LA MER”

IIT GOA AND CAMPUS MONDIAL DE LA MER, WHICH SIGNED A MEMORANDUM OF UNDERSTANDING (MOU) LAST YEAR, ARE GOING TO WORK CLOSELY TOGETHER IN THE FUTURE. THE FOCUS HERE WILL BE ON IIT GOA - AN INSTITUTE OF NATIONAL IMPORTANCE DIRECTED BY **PROFESSOR B. K. MISHRA**.

WHAT IS IIT GOA AND WHAT ARE ITS MISSIONS?

PROFESSOR B. K. MISHRA: IIT Goa is a publicly funded organisation governed by the Indian Ministry of Education. Its mission is to prepare students to play a leading role in the sustainable development of Goa and the nation as a whole. It will strive to become a unique institution of higher learning reflecting diversity and inclusion, offering state-of-the-art education, research, and training in science and technology to make an impact on society, the environment and global challenges.

WHAT LOCAL ECOSYSTEM IS IT PART OF?

B. K. M.: IIT Goa emphasises marine science and technology as a thrust area of research given its proximity to the ocean. The local ecosystem involves a renowned national laboratory (the National Institute of Oceanography or NIO), shipping industry (Goa Shipyard Limited), and other academic institutes.

WHAT KIND OF RELATIONSHIP DOES IT ENTERTAIN WITH CAMPUS MONDIAL DE LA MER?

B. K. M.: We have a strong relationship with Campus mondial de la mer. A delegation of our faculty members, which I led, visited France in January 2020. The visit included signing a Memorandum of Understanding (MoU) with various institutions in Brest including **Ecole navale**

(French naval academy), **Shom** (French hydrographic service), **ENSTA Bretagne**, the **University of Brest** and **Naval Group**. It was coordinated by Professor **Manell Zakharia** from Ecole navale on the French side and was supported by the Indo-French Centre for the Promotion of Advanced Research (IFCPAR). Currently, joint research and development activities, including final year student internships, have been initiated while discussions between other signatories to the MoU and research groups from engineering programmes at IIT Goa are underway. Needless to mention, if not for COVID, some other activities would have taken place in 2020.

WHY DID YOU SIGN A MOU WITH CAMPUS MONDIAL DE LA MER AND WHAT DO YOU EXPECT FROM IT?

B. K. M.: Campus mondial de la mer is a very active consortium of different stakeholders in the maritime community. It is well connected to both the French industry and higher educational institutions. IIT Goa, on the other hand, is quite keen on expanding its research and technology development activities in marine science and technology. We have already initiated a strategic partnership with our local industry - **Goa Shipyard Limited** (GSL). Hence we consider Campus mondial de la mer as a very important and strategic partner for the benefit of both French and Indian stakeholders. We are also interested

in launching joint Master or PhD degree programmes in related areas with our MoU partners. The MoU with stakeholders in Brest is important to help realise the potential of Goa as a major centre for research activities in marine science and technology.

HOW ARE YOU GOING TO WORK TOGETHER?

B. K. M.: We plan to initiate bilateral movement of faculty, students and research staff to begin with. We also envisage joint development of technologies and solutions for the maritime industry. And we will hold a session on marine science and technology-related activities in India for the understanding of our French partners, which will also help build our relationship. As of now, an online workshop with interested signatories is being planned in 2021 in cooperation with **Ecole navale** in various marine science and technology-related areas like underwater vehicles, in which IIT Goa has a strong presence. It is also worth mentioning that IIT Goa has a joint project running with **INRIA**, Rennes. All these activities and our experience with **GSL** on technology development will be highlighted during **Sea Tech Week® 2022**, where India will be the guest of honour.

BIOPLASTICS FOR FISHERIES

CAN BIOPLASTICS SAVE THE FISHING INDUSTRY? THEY MIGHT HELP, ACCORDING TO AN EU PROJECT CALLED **INDIGO**, WHICH STANDS FOR **INNOVATIVE FISHING GEAR** FOR OCEANS. THE **UNIVERSITÉ BRETAGNE SUD** (UBS) IN LORIENT IS TAKING PART IN THIS PROJECT, WHICH ENVISAGES BIODEGRADABLE PLASTIC NETS AND SEEKS SUITABLE RECYCLING STREAMS.



According to a study published in Science in 2015, between 5 and 13 million tonnes of plastic ends up in the oceans every year. Nets, traps and other fishing gear make up 27% of the marine litter washed up on our beaches and are especially detrimental to marine animals. But could bioplastics provide the solution to this growing pollution problem? Researchers from UBS are already studying this possibility as part of the INDIGO project

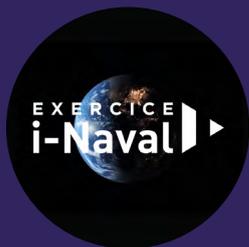
IS BIOPLASTIC FANTASTIC?

The family of bioplastics is large and diverse, covering polymers that are biobased, biodegradable or both. Morgan Deroiné, research engineer at the UBS CompositIC research platform, explains: "The term bioplastic refers to both a material's origin and its end of life." There are three main categories: biobased and biodegradable, biobased and non-biodegradable, and non-biobased but biodegradable. "For INDIGO we favour biodegradable plastics. We're interested in their end of life in the marine environment - if they're also derived from biomass, so much the better" Hence the first challenge for the project teams is to develop plastics which do not take centuries to break down at sea: "Biodegradation in salt water is a very slow process, slower than in a composter or in the ground. Lots of parameters need to combine for it to work." The teams have recently come up with an initial formulation, and should produce

two prototypes with it by the end of the year: a fine-mesh fishing net and an aquaculture net for mussels.

MEETING INDUSTRY EXPECTATIONS

INDIGO has two main aspects, one of which is preventative: raising awareness in the fisheries sector and among the general public. "We are working to identify recycling streams for used fishing gear. Alongside this, Ifremer has developed a citizen science app called **Fish & Click**." Anyone who finds fishing gear while out walking or diving can report it. The second aspect is curative, developing biodegradable nets for fisheries and aquaculture use. The two planned prototypes will be studied to see if they meet the specific needs and expectations of industry professionals, who will be consulted as part of the project. "Using nets made from biodegradable plastic would effectively bring the product's life cycle into line with its useful life, which is usually short." The nets will then be tested for biodegradability and ergonomics. "We've been amazed how interested the fishing community is in this project: many people are keen to test the nets." This is a great illustration of why INDIGO, bringing together ten partners from France and the UK, is so important.



i-Naval

30 September 2021 in Toulon, France

The i-Naval operation will highlight fifteen projects selected to be integrated into an operational scenario including 4 sequences: life on board, reaction to a cyber incident, rescue at sea and collaborative naval combat. In addition to the demonstrations, representatives from the French Ministries of Research and Innovation, the Armed Forces and the Secretary General for the Sea will be on hand to pitch on their innovation strategies.

More information on <https://i-naval.fr>



Ocean Hackathon® 6

5-7 November 2021 in 18 cities worldwide

Ocean Hackathon® is a 48 hours non-stop challenge to develop a prototype with a team and to think about its use, using various digital data related to the sea. A call for challenges is launched a few months before the event to identify projects on which the teams will position themselves in each of the 18 participating cities. At the end of the weekend, one team will be elected to take part in the international pitching competition at the end of 2021 in Brest and may win one of the prizes offered by our Ambassadors.

More information on www.ocean-hackathon.fr

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