O Consórcio das Escolas de Engenharia
e ligação à atividade militar e I&D

O Consórcio em números

Alunos
1C 30044
2C 13147
3C 5503
48694

Graduados
1C 6089
2C 2977
3C 560
9626

Cursos
1C 107
2C 235
3C 169
511
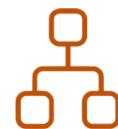
Departamentos 68

Centros I&D ~100

Projetos I&D financiados ~3300

Áreas-tipo	EEUM	FEUP	UA	FCTUC	IST	FCTNOVA
Engenharia Aeroespacial	X		X		X	
Engenharia Biomédica	X		X	X	X	X
Engenharia Civil	X	X	X	X	X	X
Engenharia de Automação Industrial/Sistemas			X			
Engenharia de Materiais/Polímeros /Têxtil	X	X	X		X	X
Engenharia de Micro e Nanotecnologias						X
Engenharia de Minas e Geo-Ambiente/Rec. Energéticos		X			X	
Engenharia de Telecomunicações e Informática	X				X	
Engenharia do Ambiente		X	X	X	X	X
Engenharia e Gestão de Sistemas de Informação	X					
Engenharia e Gestão Industrial	X	X	X	X	X	X
Engenharia Eletrónica Ind./Electrotécnica e Comput.	X	X	X	X	X	X
Engenharia Física/Física Tecnológica	X	X	X	X	X	X
Engenharia Geológica						X
Engenharia Informática/Computação/Computacional	X	X	X	X	X	X
Engenharia Mecânica	X	X	X	X	X	X
Engenharia Naval e Oceânica					X	
Engenharia Química/Biológica/Bioengenharia	X	X	X	X	X	X

Áreas-tipo	EEUM	FEUP	UA	FCTUC	IST	FCTNOVA
Antropologia				■		
Biologia				■		■
Biomateriais e NanoMedicina						■
Bioquímica				■		■
Ciência da Informação		■				
Ciências da Comunicação		■				
Conservação-Restauro						■
Design e Marketing/de Produto e Tec/e Multimédia	■		■			
Física				■		
Geologia				■		
Gestão de Cidades Sustentáveis e Inteligentes				■		
IA e Ciência de Dados	■	■		■		
Matemática /Matemátca Aplicada				■	■	■
Química /Química Aplicada				■		■
Tecnologia Agro-Industrial						■

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engenharia

Caminhos futuros

Onde?

- Tecnologias de proteção
- Sistemas de armamentos avançados
- Sistemas de comunicação e inteligência
- Infraestrutura militar
- Logística e suporte operacional

Como?

- Educação e formação
- Investigação & Desenvolvimento
- Parcerias com a indústria
- Consultoria e assessoria
- Sensibilização e divulgação

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Alguns exemplos
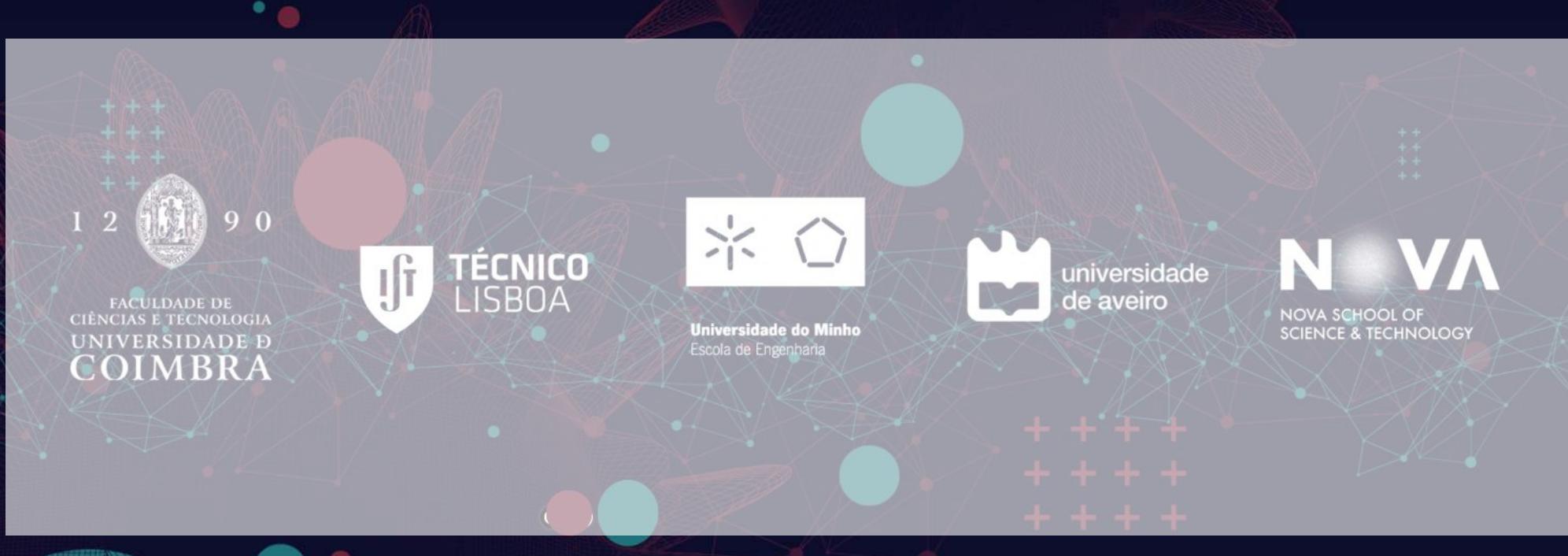
PITVANT - Programa de investigação e tecnologia em veículos aereos não tripulados

September 2008 - November 2015

PITVANT is a joint project between the University of Porto (UP) and Portuguese Air Force Academy (AFA). This research and development effort is supported by the Portuguese Defense Ministry.
The primary goals of this project are:

- Generation of operational know-how on UAS operations for the Portuguese military and security forces;
- Development of technological know-how on UASs, their subsystems, and UAS integration;
- Development of fully operational UASs;
- Definition, testing, and validation of UAS ConOps;
- Development of state-of-the-art UAV flight controllers for multiple and heterogeneous vehicles' operations;
- Development of mixed initiative control of heterogeneous vehicles over inter-operated networks.

The project began at the end of 2008 with a projected 8 year runtime. Currently the PITVANT project operation statistics count with a total of more than 700 flights and 320 hours of accumulated flight time.

SEACON – Sistema de treino, demonstração e desenvolvimento de conceitos de operação com múltiplos veículos autónomos submarinos

December 2008 - March 2011

The "system of training, demonstration and development of concepts of operation with multiple autonomous underwater vehicles" (Seacon) project aims at training, demonstration and development of concepts of operations with small size autonomous underwater vehicles.The "system of training, demonstration and development of concepts of operation with multiple autonomous underwater vehicles" (Seacon) project aims at training, demonstration and development of concepts of operations with small size autonomous underwater vehicles.

SEACON II

January 2013 - January 2016

This project's objective is the creation of a framework for cooperation between the partner institutions, embodied in the organization of the annual exercise Rapid Environmental Picture - Atlantic, in the evolution of SEACON vehicles and also the exchange of technical information. This is a project headed by the LSTS

NECSAVE

January 2013 - January 2017

This project aims to develop, test and evaluate tools and technologies to provide groups (swarms) of heterogeneous unmanned maritime vehicles of Network Enabled Capability (NEC). In this concept, vehicles and operators come and go and interact through inter-operated communication networks, and possibly intermittent, in scenarios where synergies are established that allow the group to do more than the sum of its parts. The project addresses these challenges through a multi-disciplinary approach that relies on advances in:

1. Dynamic networks of computer components;
2. Design of control architectures for distributed semi-autonomous agents teams;
3. Involvement of specialized human operators in the rings of planning and control;
4. Fault tolerance;
5. Communication networks tolerant connectivity interruptions. It is the project coordinator.

The European Defence Agency project led by the Faculty of Engineering, University of Porto.

Partners: Faculty of Engineering, University of Porto (leader), Administration of Douro and Leixões Ports, Portuguese Navy and Marine Oceanscan Systems and Technology of Portugal; Calzoni S.R.L. Italy; Complutense University of Madrid in Spain; Royal Military Academy of Belgium; and TNO in the Netherlands.

Projects Running

- **PREMIUM**

  - **Prediction models for implementation of munition health management**
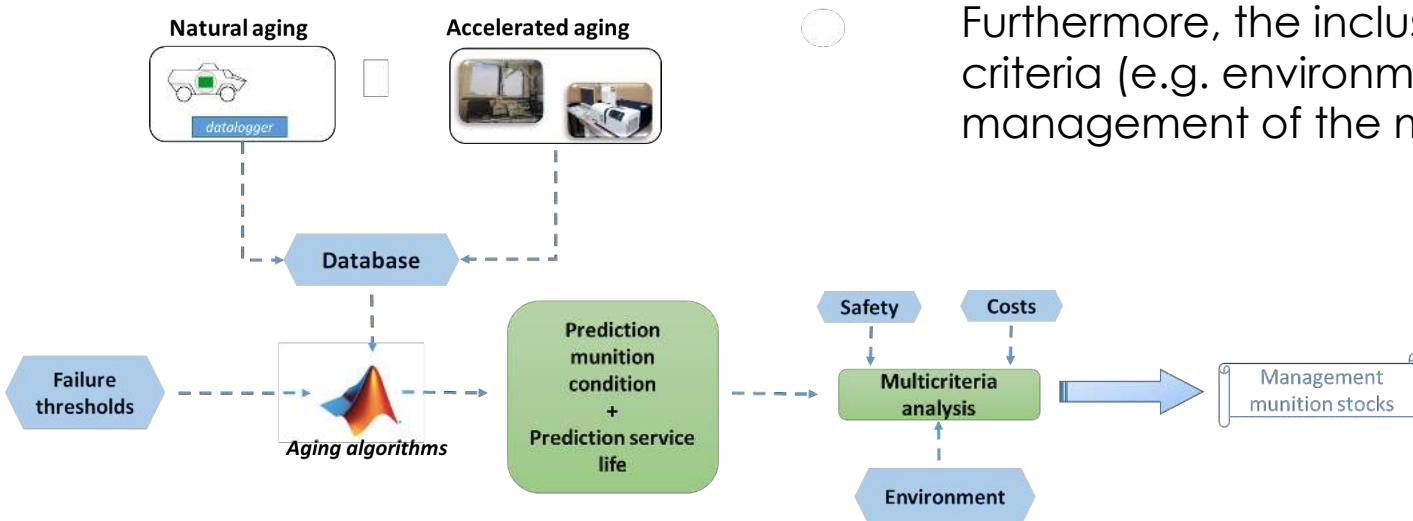
The European project PREMIUM aims to improve the management of ammunition stocks through algorithms that can predict their health condition in real time.

A complementary methodology is proposed that uses the environmental data to which the ammunition is subjected (e.g. temperature, relative humidity) to determine, with the employment of algorithms, in real time, its status. Furthermore, the inclusion of other important criteria (e.g. environment, cost) will assist in the management of the munition stocks.

➢ **Alternative disposal path for energetic materials**

Recycling
for co-detonation with
civilian explosives

Incorporate gun powders , TNT, or gun powders+TNT in emulsion explosives

MILITARY TECHNICAL ACADEMY

SCIENTIFIC RESEARCH CENTER FOR CBRN AND ECOLLOGY

TNO innovation for life

SAFRAN
Herakles

Fraunhofer
ICT

[dstl]

Dstl is part of the Ministry of Defence
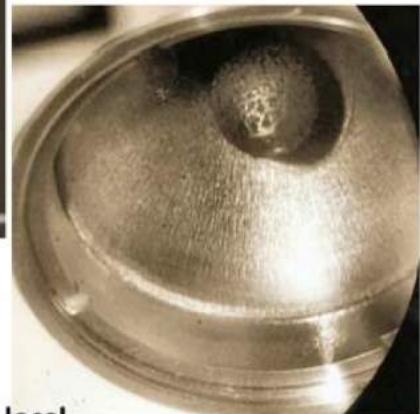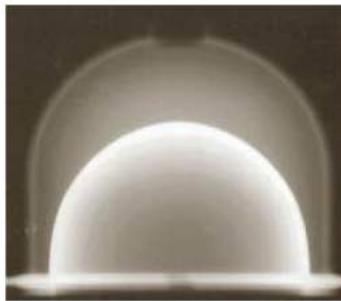
Jet Formation:

origination & growth of local perturbations caused by convective & oscillating Instabilities

U.PORTO
FEUP FACULDADE DE ENGENHARIA
UNIVERSIDADE DO PORTO

1290
FACULDADE DE
CIÊNCIAS E TECNOLOGIA
UNIVERSIDADE Ð
COIMBRA

TÉCNICO
LISBOA

Universidade do Minho
Escola de Engenharia

universidade
de aveiro

NOVA
NOVA SCHOOL OF
SCIENCE & TECHNOLOGY

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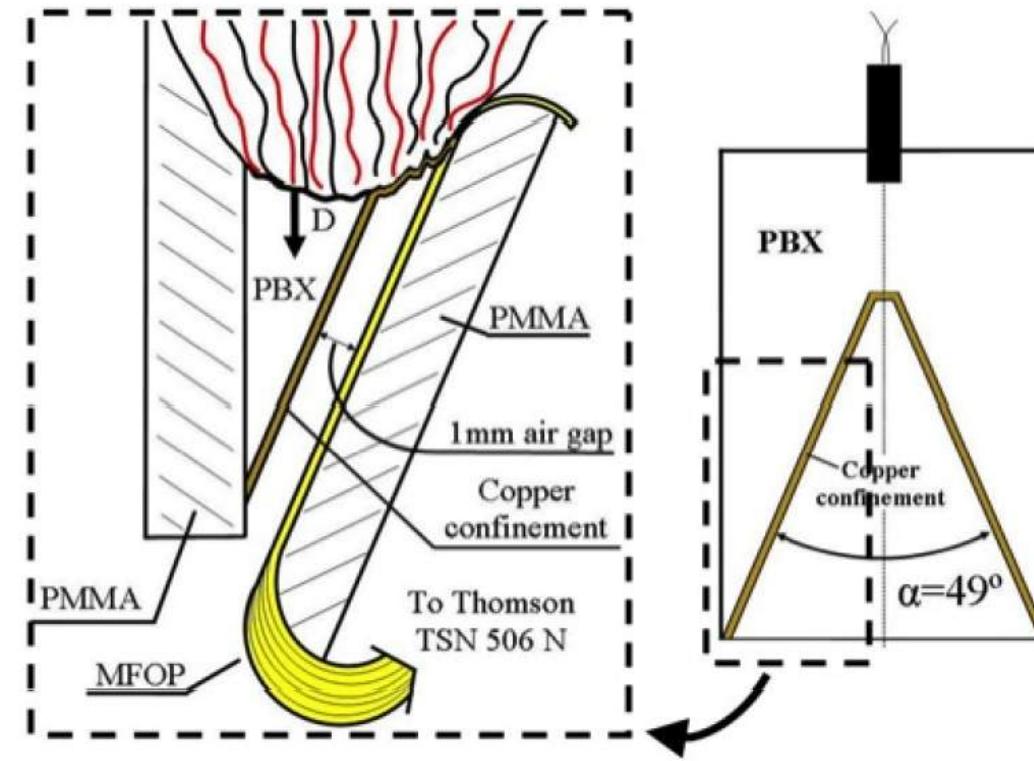
Collaboration with PT Defense

TÉCNICO LISBOA

Collaborative R&D areas

- Digitalization & Cybersecurity
- Telecommunications
- Robotics
- Autonomous vehicles (air, land, ocean)
- Marine technologies
- Aeronautics and space
- Biomedical Engineering
- Radiology
- Logistics and supply chains

…..

Collaboration Highlights

- Master courses (association)
- Exchange of lecturers
- Joint MSc. Thesis
- Joint PhD thesis
- Collaborative R&D Projects
- Research/service agreements
- Consultancy

PluriProtech

Development of clothing solutions for active protection and comfort

BARRIER EFECT
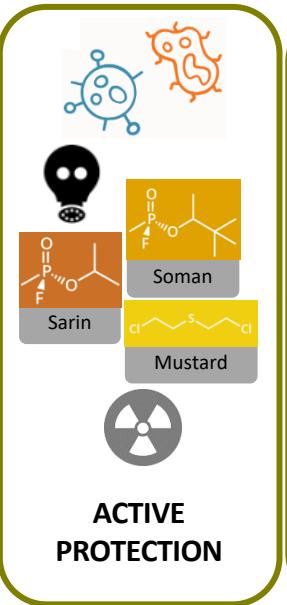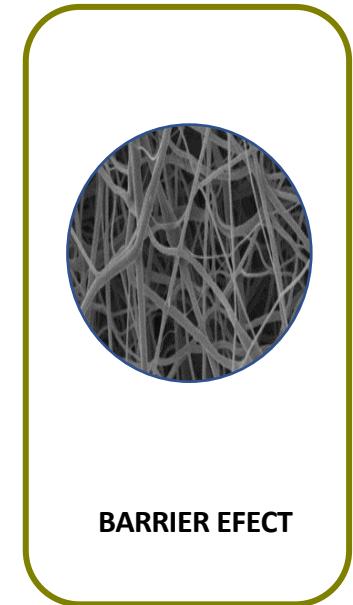
- CB threat proofing
- Comfort

ACTIVE PROTECTION

Sarin
Soman
Mustard

- Degradation or inactivation of CBRN threats

SUSTAINABILITY

- Durability
- Reuse

PluriProtech

Multilayer Structure

1st layer:
Waterproofing coating
Camouflage fabric
Active agent coating

+

2nd layer:
Lining

Reduced number of layers and/or final weight, maintaining filtration capacity and active protection
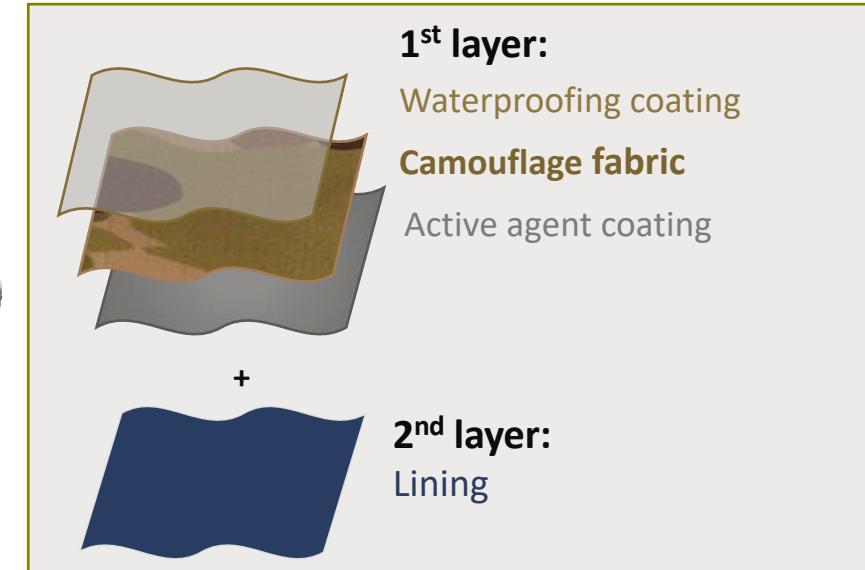
- 100% Anti microbial erradication;
- 99,9% Particles filtration;
- 99,9% Neurotoxin gases retention;
- 60% Mustard gas.

Latino group   TINTEX NATURALLY ADVANCED   EXÉRCITO

Escola de Engenharia
Universidade do Minho

2C2T
Excellence in Textile Research

ELECTROMAGNETIC SHIELDING

ANTI-SPY BOX

ELECTRONIC ENCLOSURE

REAL CASE PRODUCT DEMONSTRATOR

BOSCH CAR MULTIMEDIA S.A.

Projeto "ALIR_mcs – Advanced Lightweight Impact Resistant: materials, components and structures"

- **Parceiros:** X Aero Systems SA (líder); Critical Materials SA.; Estado Maior do Exército; INEGI; Universidade de Aveiro (CICECO)

- Data de início: 2016-12-01; Data de fim: 2019-11-30

- Referência: POCI-01-0247-FEDER-017751

- Orçamento Consórcio: 1.208.000 €; Orçamento (UA): 142.767 €

- **Short Abstract: "O projeto ALIR_mcs – Advanced Lightweight Impact Resistant: materials, components and structures, visa conceber uma solução compósita de baixo peso com capacidade de resistir a solicitações de impacto de baixa, média e alta energia. Pretende-se que esta solução venha a obter a certificação aeronáutica civil (EASA CS-VLA), de modo a poder aplicar-se a aeronaves não tripuladas."**

- **Links do projeto:**

- **https://www.compete2020.gov.pt/destaques/detalhe/Proj17751-ALIRmcs**

- https://www.ciceco.ua.pt/?menu=219&language=pt&tabela=projectosdetail&projectid=679

Título do projeto: E2PT: Equine ElectroPeloTherapy: Desenvolvimento de equipamento eletrónico para reabilitação física de equinos na aplicação transdérmica de pelóides terapêuticos

Copromoção: Exatronic, Univ. Aveiro (**GEOBIOTEC**), Fac. Med. Vet. Lisboa, ERT, Equinvest
Duração: 20 meses (a decorrer; orientado para GNR)

Breve resumo: O Projeto E2PT (Equine ElectroPeloTherapy) tem como objetivo geral constituir-se como um projeto inovador de investigação e desenvolvimento de um novo sistema de terapia, que garanta as condições de ergonomia e biomecânica dos membros do cavalo, para que de forma localizada, permita a aplicação de pelóides terapêuticos na prevenção e tratamento de lesões tendinosas e ligamentosas. As tecnologias críticas a desenvolver, testar e demonstrar pelo consórcio E2PT centram-se ao nível das seguintes áreas chave:
- Desenvolvimento e validação de novas terapias médico-veterinárias (peloterapia e iontoforese);
- Novos dispositivos eletrónicos veterinários;
- Novos têxteis técnicos condutores;
- Valorização e uso dos recursos endógenos naturais (geomateriais).

website: www.exa4life.pt/e2pt/

Título do projeto: E-SiCure2 - Enhancing security at borders and ports

 (Duration: 36 months; Universidade de Aveiro - **I3N**)

Summary: For several decades, international agreements like the Nuclear Non-proliferation Treaty, have been conspicuous in securing international order and peace, in that particular case by curbing the diversion of civil uranium into military uses. However, increasing geopolitical complexity and the multiplication of non-state hostile organizations (leveraged by globalization and social-networking), have urged a mass-deployment of screening systems, capable of detecting chemical, biological, radiological and nuclear threats.

Our main objective is to develop a semiconductor-based sensing device, capable of delivering a space-resolved signal of a source emitting both neutrons and X-rays, enabling fingerprinting of threatening materials. Such a technology would largely outperform existing screening capabilities, namely through synchronous neutron and X-rays detection, and also allowing both active and passive interrogation modes. The final outcome will be an improvement of our detection capability and efficiency by widening the family of sensed materials, as well as decreasing inspection times and false-positives.

Web page: https://www2.irb.hr/korisnici/capan/esicure2/index.htm

Flyer (printable): https://www.nato.int/nato_static_fl2014/assets/pdf/2021/3/pdf/210301-sps-flyer-esicure.pdf

Twitter: https://twitter.com/e_sicure

VesselAI: Enabling Maritime Digitalization by Extreme-Scale Analytics, AI and Digital Twins

Ricardo Gonçalves, Principal Investigator (PI)
European Commission: € 5 998 877,50
1/01/21 → 31/12/23
Award date: 28/07/20
Coordinated by **ETHNICON METSOVION POLYTECHNION e a** Universidade NOVA de Lisboa/UNINOVA

The EU-funded VesselAI project plans to develop a framework that facilitates the modelling and prediction of ships' behaviour. Using digital twin technology, the framework will efficiently fuse and assimilate huge amounts of data, enabling highly accurate modelling as well as design and operation optimisation of ships and fleets under various dynamic conditions. VesselAI will also tap into the potential of artificial intelligence, cloud computing and high-performance computing, encouraging deeper digitalisation in the shipping industry.

[Shuttle drone for launch and capture in cooperative and non-cooperative scenarios (CAPTURE)](#)

Bruno Guerreiro, Principal Investigator (PI)

This project addresses several scientific and technological challenges towards the use of shuttle drones to perform launch and capture maneuvers of other vehicles or objects. A first scenario is considered where the shuttle drones cooperate with the vehicles to be launched or captured to enable the design of specialized vehicles for a given task, for instance, having fixed-wing drones with long endurance, while enabling the vertical take-off and landing of these vehicles with shuttle drones. A second scenario involves the launch and capture of objects or other drones, that may not cooperate with the shuttle drones, either passive or actively. In this case, the shuttle drones may act as a security measure to remove drones or objects from restricted areas that may actively avoid being captured. Addressing these scenarios raises interesting scientific and technological challenges, including: optimal and cooperative planning of trajectories for a team of heterogeneous vehicles; cooperative, hybrid, and distributed control for critical rendezvous maneuvers; cooperative and distributed estimation of the motion of the shuttle drones, other vehicles, and the surrounding environment; as well as dealing with estimation, control and planning strategies based differential games for the non-cooperative scenario.