

**MCAST
RESEARCH & INNOVATION
EXPO 25**

The 7th MCAST Research &
Innovation Expo
13th - 14th November 2025



MCAST

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**MCAST
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FOREWORD



MCAST

MESSAGE FROM THE PRINCIPAL



Mr Stephen Vella

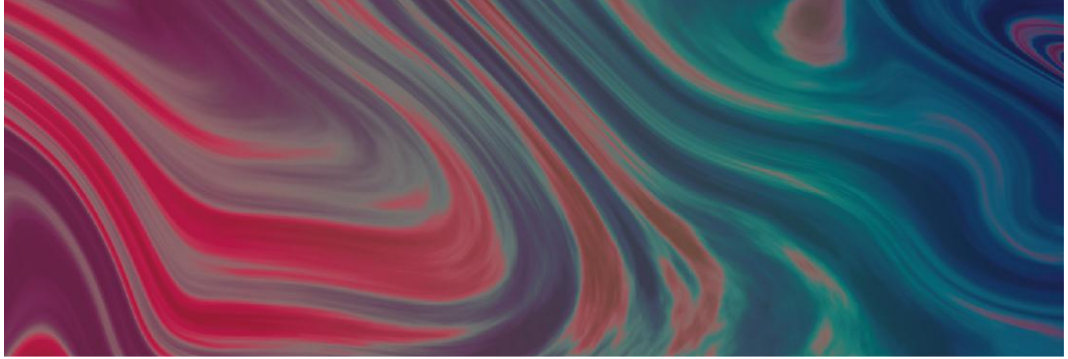
Principal and CEO of MCAST

Welcome to the 7th edition of the MCAST Research and Innovation EXPO, a celebration of creativity, collaboration, and the power of ideas. This event brings together researchers, students, and industry partners each year to showcase how innovation shapes our future. The EXPO has become a cornerstone of MCAST's academic calendar, a space where curiosity meets real-world impact.

This year's edition focuses on short, impactful presentations highlighting our community's diversity and depth of research. From interdisciplinary innovations that break traditional boundaries, to study in education, social sciences, and policy that drives positive change in how we learn and live, our presenters embody the spirit of inquiry that defines MCAST.

We will also explore business, media, arts, and cultural perspectives in research, showcasing how creativity and enterprise intersect to transform ideas into opportunities. In technology, healthcare, and the human experience, we see how cutting-edge developments improve lives and expand possibilities. And through sustainable research across education, energy, and environment, we reaffirm our commitment to a greener and more responsible future.

At MCAST, research and innovation are not just academic pursuits but the engines of progress. They connect our students and staff with industry, empower them to tackle real challenges, and encourage them to think boldly and act responsibly.



Each project presented today reflects that mission: to bridge knowledge with application and transform potential into meaningful impact.

I want to thank all our researchers, contributors, and collaborators for their dedication and creativity and the Centre for Applied Research and Innovation team for their continued passion and hard work in making this event possible.

Let this EXPO be an inspiration, a reminder that innovation begins with curiosity, collaboration, and the courage to reimagine what's possible.

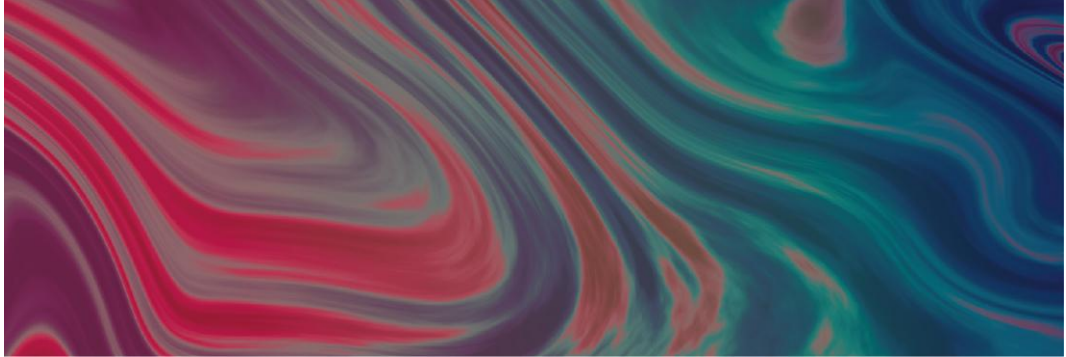
THE R&I EXPO ORGANISING COMMITTEE



Dr Tatjana Chircop

MCAST Deputy Principal for Research and Student Academic Management

Dr Tatjana Chircop is the Deputy Principal for Research and Student Academic Management at MCAST. Her main areas of expertise are youth and community studies, vocational education (VET) and performing arts. Leading a team of researchers at the college, she has worked on researching challenges that students find in their educational journeys as well as innovative pedagogical tools which enhance learning, such as gamification. She has also led the initiative to introduce the role of student mentors at MCAST with the student mentoring service now having become an integral part of the services the college offers. In her current role as Deputy Principal for Research and Student Academic Management, she oversees the Applied Research and Innovation Centre (ARIC), the MCAST Library and the Registrar's Office. Within ARIC, a number of Master's programmes are delivered, including the Master in Research Methods and the Master by Research, as well as the professional Doctorate programme. Over the years, she has also been involved in teacher training at MCAST, most recently through the innovative Master's degree in Vocational Education Applied Research 4.0. Prior to joining MCAST, Dr Chircop was a professional musician with the Manoel Theatre Orchestra and the National Orchestra and taught violin and pianoforte performance at the Johann Strauss School of Music. Subsequent roles included those of learning support assistant and community development worker. Within MCAST, Dr Chircop was a lecturer and later a Director of the Institute of Community Services, Head of the Foundation College and Deputy Principal for Arts and Social Sciences. Dr Chircop graduated with a BA Hons in English (University of London), a BA Hons in Youth and Community Studies (University of Malta), a MA in Youth and Community Studies (Brunel University), a Master in Intercultural EcoManagement of Schools (Università Ca Foscari), a Post-Graduate Certificate in Vocational and Educational and Training (MCAST) and a PhD (Brunel University).



Dr Lorna Bonnici West

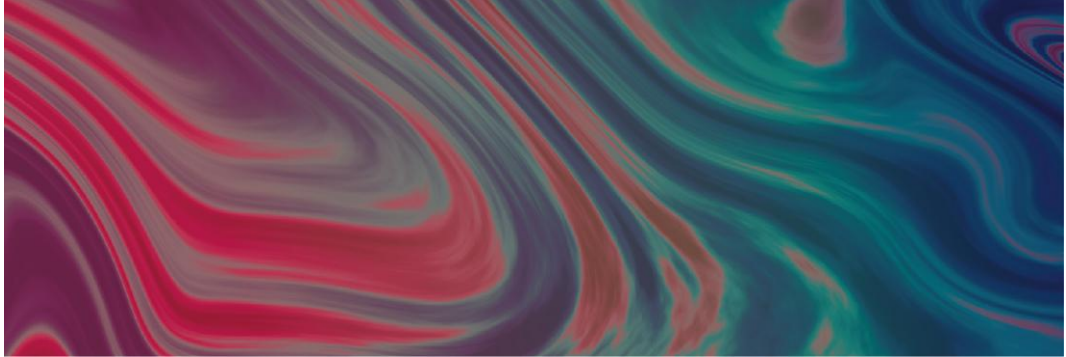
*MCAST Director for Research and Innovation
Applied Research & Innovation Centre (ARIC)*

Dr Lorna Bonnici West is the Director for Research & Innovation at MCAST, instigating scientific research excellence initiatives across the organisation, in collaboration with a group of highly professional and proficient colleagues at ARIC. Dr Bonnici West, together with the ARIC colleagues, has been instrumental in steering research groups and themes, driving and supporting the adoption of research initiatives by institute academic staff and has been highly active in supporting research teams in the writing of research proposals for different funds.



Prior to her engagement at MCAST, Lorna worked as a principal clinical pharmacist at Mater Dei Hospital. Since January 2020 she joined MCAST as a Senior Research Officer supporting the Institute of Applied Sciences. Dr Bonnici West also holds the post of Visiting Senior Lecturer with the Department of Clinical Pharmacology and Therapeutics at the University of Malta.

Dr Bonnici West graduated in Pharmacy from the University of Malta in 2000. She read for a Master of Science degree in Clinical Pharmacy at the Robert Gordon University, Scotland, graduating in 2006, and was awarded a scholarship by the Malta Government Scholarship Scheme to read for a PhD at the Robert Gordon University, Scotland, graduating in 2015. In 2016, she was awarded a post-doctoral grant under the Reach-High Scholars Programme Scheme, part-financed by the European Union, European Social Fund.

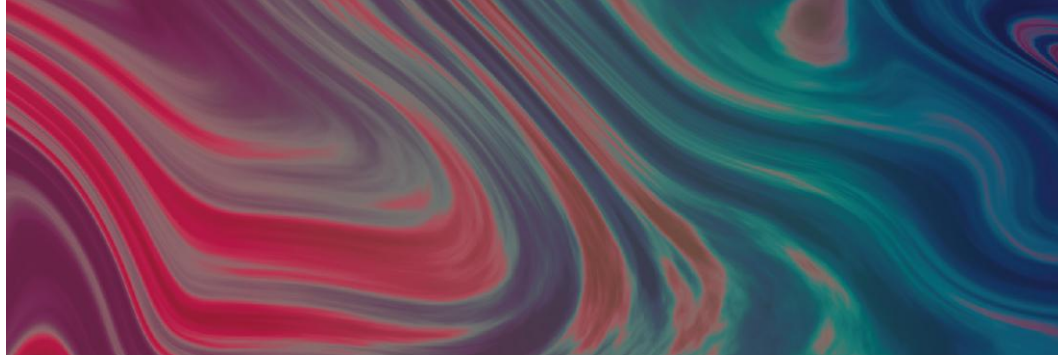


Dr Judita Tomaskinova

*MCAST Deputy Director for Research and Innovation
Applied Research & Innovation Centre (ARIC)*

Dr Tomaskinova graduated in Environmental Management from the Matej Bel University in Banská Bystrica (Slovakia). Her associate professorship thesis, which was submitted within the sphere of applied and landscape ecology (at Mendel University in Brno, Czechia), dealt with the integrated management and supply of cultural ecosystem services in selected protected areas in the Maltese Islands. Her Ph.D. dissertation was in environmental management, specifically about the assessment of integrated protected area management and environmental education, and was written in collaboration with Dr Sean Prendergast (Peak District National Park, UK). As a background, she has more than 25 years' experience in the field of education, research management and project management. Judita has worked at the Slovak Museum of Nature Protection and Speleology for over fifteen years, and went on to hold a senior academic position at Matej Bel University in the Slovak Republic for over ten years. She subsequently moved to the Maltese Islands and worked as a Senior Researcher for the ReNature project within the MCAST Institute of Applied Sciences, and as a Research Project Manager within the Research Support Services Directorate at the University of Malta.

Her areas of research interest are broadly focused on the management of protected areas around Europe; ecosystem services; soil respiration in the context of climate change; phytoremediation; life-cycle assessment (LCA); environmental education, and education for sustainable development.



The ARIC Senior Research Officers Team



Dr Maria Cardona

*MCAST Senior Research Officer
Applied Research & Innovation Centre (ARIC)*

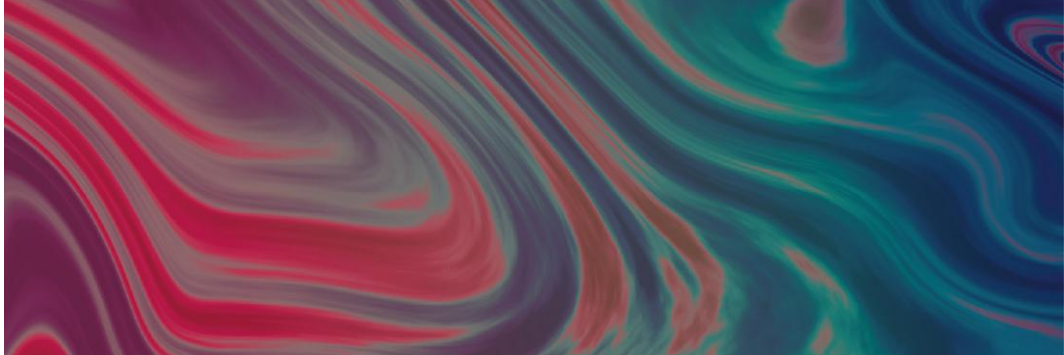
Dr Maria Cardona graduated from the University of Malta with a BSc (Hons) in Chemistry and Biology, an MSc in Chemistry and a PGCE in Science. She earned her PhD at the University of Padova, Italy, researching chemical systems that mimic natural cellular processes, and was later awarded a prestigious Marie Curie Individual Fellowship for postdoctoral research at the University of Malta on unconventional materials that expand when stretched. She has experience in the pharmaceutical industry and has taught at secondary, post-secondary and undergraduate levels. Beyond her professional life, Maria is actively involved in voluntary work in areas related to social justice and in bridging science and faith, and in her leisure time, she enjoys hiking and spending time with her family. Since 2019, she has served as Senior Research Officer at the Applied Research and Innovation Centre, where she is currently supporting research within the Institute of Applied Sciences. Research at the Institute of Applied Sciences spans nursing, chemical technology, environmental analysis, agriculture, and aquaculture, reflecting its multidisciplinary focus.

Dr Clara Chetcuti

*MCAST Senior Research Officer
Applied Research & Innovation Centre (ARIC)*

Clara is an English-language teacher by profession, and by passion, she is an avid reader, dancer, and painter. She has been awarded a General Bachelor's in English and International Relations and has read for a Master in Contemporary English Literature and Criticism, both with the University of Malta, which in turn led to her interest in avant-





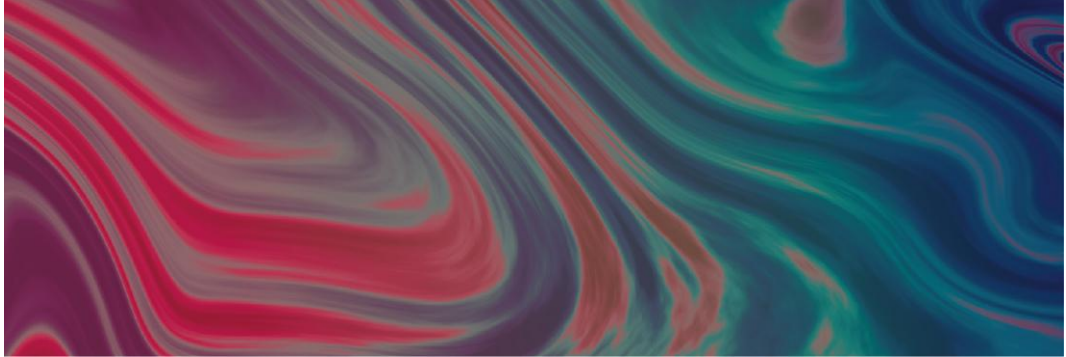
garde literature and art forms as precursors of Electronic Literature. Her PhD thesis, also carried out with the University of Malta and tracing the genealogies of Electronic English Literature, has brought her into contact with programming as a viable mode of literary expression, and led to her subsequent theoretical interest in Python and a short Professional Diploma in Digital Marketing. Clara also holds a Cambridge Certificate in Teaching English to Adult Speakers of Other Languages (CELTA) as well as a Postgraduate Certificate in Education (PGCE). Throughout her career, she has been privileged to exchange knowledge with a truly global student body in the ELT classroom for 14 years. She has competed in over 9 Model United Nations simulations, winning personal and team awards at each one. Co-founding and managing the voluntary organisation, the Malta Model United Nations Society (MaltMUN) for 6 years is considered one of her proudest achievements, together with publishing scholarly papers with CounterText (Edinburgh University Publishers), the Electronic Book Review (online) and the Electronic Literature Directory (online). Clara has also served for 2 years as Director of Studies for a start-up English Language School, and is now looking forward to fostering the spirit of collegiality she has already found in her MCAST colleagues as Senior Research Officer.



Dr Alfonso Siciliano

*MCAST Senior Research Officer
Applied Research & Innovation Centre (ARIC)*

Dr Alfonso Siciliano is a marine scientist with over 10 years of multidisciplinary experience in research, consultancy, and commercial projects across academic institutions, government, and private companies. He holds a BSc in Biological Sciences and an MSc in Marine Biology and Ecology from Italy, and a PhD in Marine Biology from the University of Canterbury, New Zealand. His research focuses on applying cutting-edge technologies and modelling to marine biology and ecology, utilising tools such as GIS, drones, 3D modelling, and programming to advance ecological understanding. He investigates ecosystem functioning and species interactions using experimental multi-factorial designs for surveys, monitoring, and



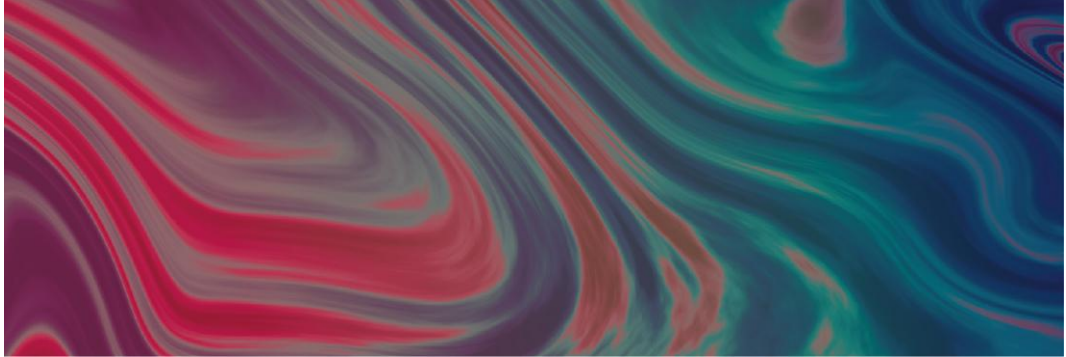
experiments, complemented by morphometric and fractal analyses. Dr. Siciliano is skilled in statistical analysis, quantitative ecology, and ecological modelling, and has practical experience in scientific diving and underwater photography.

Dr Marco Montalto

*MCAST Senior Research Officer
Applied Research & Innovation Centre (ARIC)*

Dr Marco Montalto is a senior research officer at the Applied Research and Innovation Centre (ARIC), supporting research within the Institute for the Creative Arts (ICA). He holds a Master’s degree in the Science of Performative Creativity (M.S.P.C.; UM) and a Ph.D. in Cognitive Science (UM). For his Master’s thesis he revisited the unfairly neglected topic of ‘centricity’ and use of ‘the centre’ in the context of human performativity. His PhD thesis was the first local study investigating human mirror neuron system (MNS) behaviour and gave original contributions to the nascent field of dance neuroscience. Employing tools such as near-infrared spectroscopy (NIRS) and electroencephalography (EEG), expert and novice human participants were monitored during expert and novice action observation. Although not joining the human-MNS sceptics’ bandwagon, results did indicate that such a potential system in the human seemingly can only be triggered by prior effective training. When he is not conducting research, he is usually occupied with photography or busy reading.





Dr Francis Delicata

*MCAST Senior Research Officer
Applied Research & Innovation Centre (ARIC)*

Dr Francis Delicata holds a PhD in Neuroscience from Aston University, UK, with over 9 years of academic research experience. His work has focused on brain physiology in various states of health and disease, particularly on conditions such as addiction, epilepsy, and dementia, investigating their underlying mechanisms. Utilising his experience in securing research funding and participating in European and international projects, he supports research initiatives at the Institute of Engineering and Transport (IET). IET projects cover a wide range of topics, including aerospace and aviation, AI in industry, alternative energy, autonomous technologies, semiconductors, and additive manufacturing.

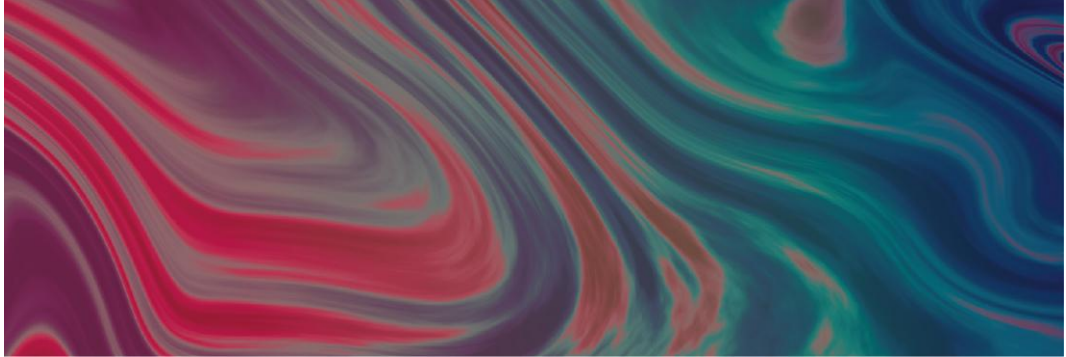


Dr Massimo Pierucci

*MCAST Senior Research Officer
Applied Research & Innovation Centre (ARIC)*

Dr Massimo Pierucci holds a degree in Biological Sciences and more than fifteen years of research experience in the field of neuropharmacology and neurophysiology. During this period, he had the opportunity to supervise and co-supervise Undergraduate, Master and PhD students, offering both experimental and theoretical guidance, as well as gaining lecturing experience while teaching biological subjects at the Department of Psychology of the University of Malta. This experience has enabled Massimo to promote, support and structure research endeavours through the Institute of Community Services, thereby fulfilling his role of Senior Research Officer. The Institute has recently seen an uptake of different research activities, with projects spanning from sport, social and education research and taking into consideration the vocational education mission of the Institute.





The ARIC Post-Award Team



Ms Graziella Scerri

*MCAST Project Manager
Applied Research & Innovation Centre (ARIC)*

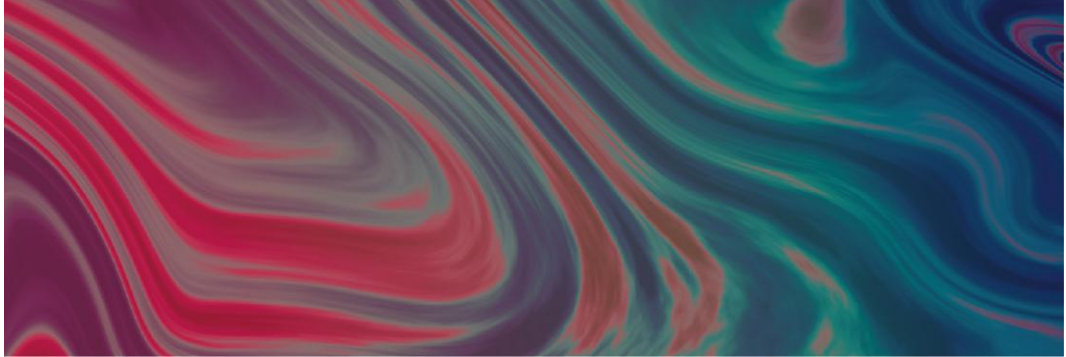
With over four years of experience as a Post-Award EU Project Manager within the ARIC (Applied Research & Innovation Centre) department, I specialised in the coordination, management, and delivery of EU-funded research and innovation projects. My professional background includes prior roles in social wellbeing and various managerial positions, where I developed a strong foundation in team leadership, stakeholder engagement, and community-focused initiatives. I have a keen interest in how projects evolve from concept to implementation and thrive in environments that foster collaboration and strategic networking. My work is driven by a commitment to impact-focused outcomes and building sustainable partnerships across sectors.

Mr Scania Ravi

*MCAST Finance Manager
Applied Research & Innovation Centre (ARIC)*

Scania Ravi serves as the Post Award Finance Manager for Research and Innovation (R&I) Externally Funded Projects at MCAST, with over 15 years of experience in financial administration. Holding both a Bachelor's and a Master's degree in Finance and Project Management-related disciplines, Mr Ravi brings a strong foundation in financial oversight, compliance, and strategic financial planning to complex research environments. Specialising in post-award financial management, Mr Ravi ensures robust financial governance across a portfolio of externally funded research projects. This includes budget monitoring, financial reporting, risk





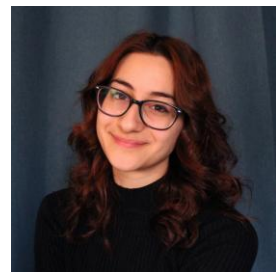
mitigation, and ensuring compliance with institutional and funder-specific regulations. Mr Ravi works closely with principal investigators, research support teams, and external stakeholders to optimise financial performance and support the successful delivery of research outcomes

The ARIC Design and Development Team

Ms Lisa Theuma

MCAST Researcher
Applied Research & Innovation Centre (ARIC)

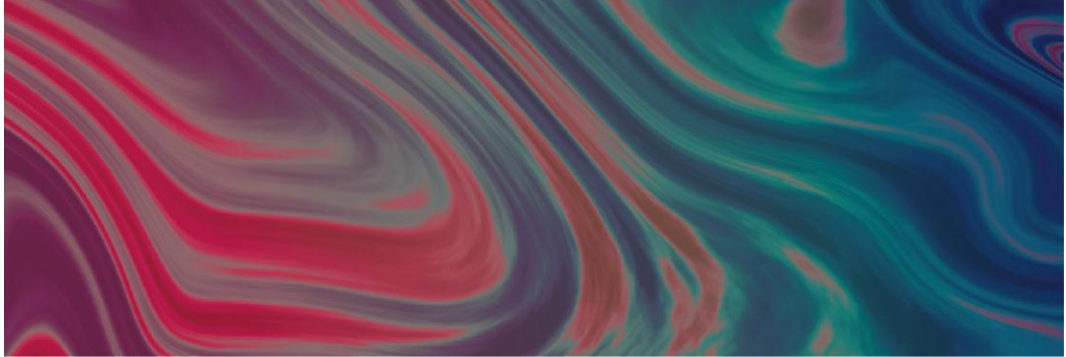
Ms Lisa Theuma, with a passion for learning and exploration, has consistently involved herself in investigating the various fields within the vast world of game art and design throughout her education and aspires to cultivate her knowledge through her work. Lisa acquired her Bachelor's in Game Art & Visual Design from MCAST's Institute for the Creative Arts, and has set her sights on strengthening her skills and building innovative learning experiences, thus taking on the role of Ed-Tech Researcher. Lisa aims to apply her creativity to future research projects and support their development within the Applied Research & Innovation Centre, ultimately providing entertaining and educational experiences for others.



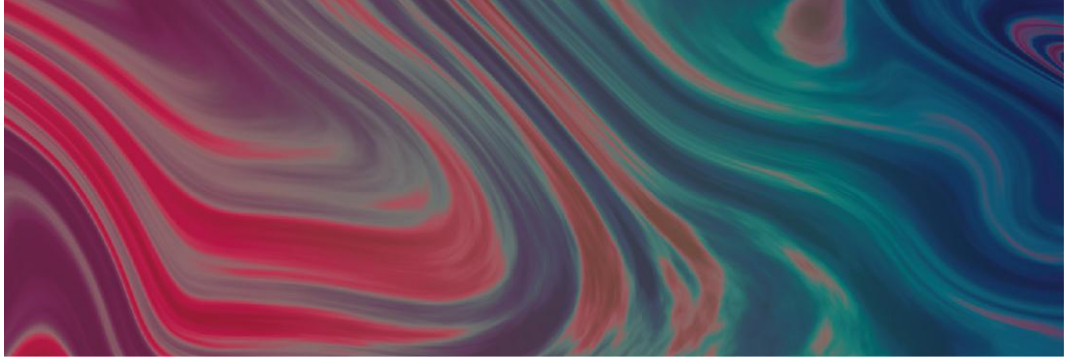
Mr Emman Nocilla

MCAST Researcher
Applied Research & Innovation Centre (ARIC)

Mr Emman Nocilla is a Full-Stack .NET Developer with a Bachelor's degree in Software Development from MCAST and over eight years of experience in software engineering and emerging technologies. At the Applied Research & Innovation Centre (ARIC), he has contributed to the R&I Expo, the Waterline initiative, and applied qualitative



research projects, providing technical expertise and innovative solutions to multidisciplinary teams. His work also includes exploring immersive technologies through VR and AR applications using Unity and OpenXR, aimed at enhancing research and educational experiences. Alongside his research contributions, Mr Nocilla has served as a Unity lecturer at MCAST, mentoring students in game development and interactive media. Certified in Microsoft Azure, he combines technical excellence with a passion for advancing digital innovation in education and research.



The ARIC Administrative Team

Ms Krista Buhagiar

*MCAST Senior Administrative Officer
Office of the Deputy Principal for Research and Academic
Management*

Krista Buhagiar is a Senior Administrative Officer and Personal Assistant to the Deputy Principal for Research and Student Academic Management at MCAST. She has been part of the institution for eight years, beginning her career in Human Resources before transitioning to the Deputy Principal's office. Her role has enabled her to develop strong administrative and organisational skills, while working closely with leadership has strengthened her adaptability, problem-solving abilities, and collaborative approach. Krista is committed to continuous learning and is eager to apply new knowledge to her day-to-day responsibilities.



Mark Titley

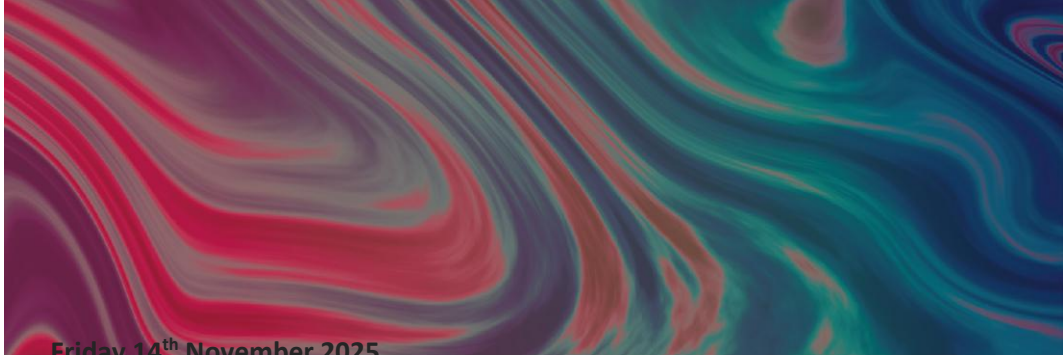
*MCAST Administrative Officer
Applied Research & Innovation Centre (ARIC)*

Mark Titley has been an administrative officer at MCAST for the past seven years, serving in the Applied Research and Innovation Department. Collaborating with senior management and senior research officers has greatly contributed to his professional growth. Mark has previously worked in the aviation sector as a cabin crew member for 22 years, and he has a deep passion for all things related to aviation.

PROGRAMME HIGHLIGHTS

Thursday 13th November 2025

08:30 – 09:00	Welcome Coffee and Registration	
09:00 – 09:30	Opening Speeches	
09:30 – 10:30	Research Fellows Presentations	
10:30 – 11:00	Coffee Break	
11:00 – 12:30	Session 1 – Research Presentations & Panel Discussion	
	<i>Track 5 – Sustainable Research Across Education, Energy, and Environment</i>	
12:30 – 14:00	Lunch Break	
14:00 – 15:45	Session 2 – Research Presentations & Panel Discussion	
	<i>Track 3 - Business, Media, Arts, and Cultural Perspectives in Research & Track 4 - Technology, Healthcare, and the Human Experience in Research</i>	
15:45 – 16:30	<i>Networking coffee with the SRO</i>	<i>Networking coffee with the Research Fellow</i>
16.30	Closure	



Friday 14th November 2025

08:30 – 09:00	Welcome Coffee and Registration
09:00 – 09:30	Welcome Speeches
09:30 – 10:30	Workshops
	<i>Details to be confirmed at a later stage</i>
10:30 – 11:00	<i>Coffee Break</i>
11:00 – 12:30	Workshops
	<i>Details to be confirmed at a later stage</i>
12:30 – 13:30	<i>Lunch Break</i>
13:30 – 15:30	Session 1 – Research Presentations & Panel Discussion
	<i>Track 1 - Interdisciplinary Innovations in Research & Track 2 - Research in Education, Social Sciences, and Policy</i>
16.30	Closure

**MCAST
RESEARCH & INNOVATION
EXPO 25**

***INTERDISCIPLINARY
INNOVATIONS IN RESEARCH***



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INTERDISCIPLINARY INNOVATIONS IN RESEARCH

SELBI: Supporting Early childhood education in Blue skills with generative AI

Shirley Ann Gauci¹; Francis Delicata¹; Alan Gatt²; Frankie Inguanez²; Heathcliff Schembri³; Kimberly Terribile⁴

¹ MCAST Applied Research and Innovation Centre

² MCAST Institute of Information and Communication Technology

³ MCAST Institute of Community Services

⁴ MCAST Institute of Applied Sciences, Centre of Agriculture, Aquatics and Animal Sciences

BACKGROUND

The concept of the “blue economy” has gained prominence in recent years, generating an annual value of \$1.5 trillion and projected to double by 2030 (European Commission et al., 2023). It aligns with the United Nations’ Sustainable Development Goal 14, which emphasises the conservation and responsible use of oceans and marine resources (United Nations, 2015). For Malta, where 15% of the Gross Domestic Product is derived from maritime industries (Environment & Resources Authority, 2019), the cultivation of “blue skills”, knowledge and competences associated with sustainable maritime activity, is of strategic importance. However, national reports highlight a growing skills gap in this sector, attributed in part to insufficient investment in education and training from the early years onwards (Malta Maritime Forum, 2022). Educational initiatives addressing blue skills have so far been fragmented, short-term, and predominantly directed at older children or industry professionals (European Schoolnet, n.d.). This leaves a critical lacuna in early childhood education and care (ECEC), which is widely recognised as the foundation for lifelong learning and for instilling sustainability-oriented values (Directorate for Quality and Standards in Education, 2021). SELBI (Supporting Early Childhood Education in Blue Skills with Generative Artificial Intelligence) addresses this gap by developing an innovative GenAI-powered retrieval-augmented generation (RAG) platform that equips ECEC



educators (KG1 to Year 2) with contextualised, age-appropriate resources. By embedding blue skills into ECEC pedagogy, the project aims to foster sustainability consciousness from an early age, while simultaneously supporting educators in their professional development and enriching Malta's human capital in alignment with national and European priorities.

OVERALL AIM

The overarching aim of SELBI is to integrate and enhance the acquisition of blue skills in ECEC by developing and evaluating a retrieval-augmented generation platform. Through tailored responses aligned with early years pedagogy, the platform supports educators in embedding sustainability competencies in their teaching practices. In doing so, the project addresses knowledge gaps among educators, contributes to Malta's maritime skills agenda, and demonstrates the transformative potential of generative AI in education (Lewis et al., 2020).

MAIN EXPECTED OUTCOME/S

The project is expected to deliver: (i) a national diagnostic survey identifying ECEC educators' current knowledge of blue skills; (ii) a curated repository of interdisciplinary resources; (iii) a GenAI-driven RAG platform capable of providing tailored pedagogical support; (iv) structured training for a purposive sample of educators; and (v) evidence of feasibility and scalability. These outcomes will inform policy and practice in ECEC, while also contributing to broader debates on digital innovation and sustainability in education (Mishra, 2019; Vygotsky, 1978).

RESULTS

SELBI adopts a five-phase mixed-methods design to ensure both technological feasibility and pedagogical alignment. The first phase comprised a large-scale diagnostic survey with ECEC educators (Kindergarten, Year 1 and Year 2), which identified knowledge gaps in blue skills. The second phase involved the development of a comprehensive repository of resources, including scientific publications and multimedia content, curated by experts in the blue economy and ECEC pedagogy. This repository formed the foundation of a retrieval-augmented generation system, developed by AI specialists who configured a large language model capable of generating context-sensitive responses to educators' queries. A web-based interface was designed in parallel to ensure accessibility and usability. At the time of writing, the project is in the final stage of the second phase, during which the interface is undergoing testing by the research team before progressing to the third phase, which will involve pilot implementation with educators. Data will subsequently be evaluated against five forms of validity: technical, criterion,

content, construct, and face validity (Cohen et al., 2007)—to ensure methodological rigour and reliability. Preliminary indications suggest the feasibility of aligning AI-powered platforms with ECEC pedagogy, revealing strong potential for embedding sustainability competencies within the early years curriculum. Beyond serving as proof-of-concept, the project establishes a methodological framework for integrating artificial intelligence with pedagogical innovation, thereby addressing critical gaps in maritime education while simultaneously empowering educators with new digital skills (Pelaneck, 2017; Pons, 2023).

IMPACT OF RESEARCH

The SELBI project has the potential to generate significant interdisciplinary impact across education, technology, and sustainability. At the pedagogical level, it pioneers the integration of blue skills into ECEC, an area where current programmes remain fragmented or absent (European Union, 2022). Through the application of the TPACK framework (Mishra, 2019), SELBI demonstrates how content knowledge (blue skills), pedagogical knowledge (ECE), and technological knowledge (GenAI) can intersect to create innovative teaching practices. By offering a certified pathway for professional development, the project strengthens the competence and confidence of educators in both sustainability and digital pedagogy.

At the institutional level, SELBI reinforces MCAST’s research capacity by fostering interdisciplinary collaboration across community services, marine sciences, and AI. This responds directly to the MCAST Strategic Plan 2022–2027, which prioritises cross-institute research and knowledge transfer (MCAST, 2021). Furthermore, the project positions MCAST as a contributor to Malta’s National Research and Innovation Strategic Plan 2023–2027, particularly in developing digital education ecosystems and promoting human capital in sustainability and emerging technologies (Ministry for Education et al., 2022).

At the societal level, the project addresses Malta’s maritime skills gap by embedding awareness of the blue economy in young children, thereby fostering future citizens capable of engaging with sustainability challenges. It aligns with global, European, and national policy frameworks, including the UN 2030 SDGs, the European Green Deal, and Malta’s Sustainable Development Vision 2050 (European Commission, 2019; MSDEC, 2018). SELBI also raises awareness among NGOs, policymakers, and industry stakeholders, encouraging collaboration across sectors.

Crucially, the project contributes to international debates on the ethical and effective use of AI in education. By adhering to the European Commission's Ethics Guidelines for Trustworthy AI (2019), SELBI ensures transparency, inclusivity, and responsibility in technological deployment. The long-term impact extends beyond Malta, offering a replicable model for embedding sustainability competences in ECE worldwide. In this sense, SELBI exemplifies a forward-looking research initiative that connects technological innovation with human-centric and ecological priorities, demonstrating how education can serve as a driver for sustainable societal transformation.

KEYWORDS

Blue skills, Early Childhood Education, Artificial Intelligence, Education Innovation
Project SELBI financed by Xjenza Malta, for and on behalf of the Foundation for Science and Technology, through the FUSION: R&I Research Excellence Programme under grant agreement number REP-2024-005.



The Ceramic Narrative Experiment

Claudia Anne Chircop¹

¹ Institute for the Creative Arts

BACKGROUND

This research builds on the foundations established during the previous academic year, where an exploratory investigation into the integration of ceramics, animation, and storytelling was undertaken. The earlier phase provided a space to test how digital and physical practices could converge in meaningful ways, particularly how the tactile qualities of ceramics could become vessels not only for form and function but also for narrative. By experimenting with animated sequences in conjunction with ceramic objects, last year's research uncovered the potential for these two disciplines to enrich one another, generating outcomes that felt both innovative and pedagogically valuable.

The documentation and reflection process during that first phase also demonstrated the importance of journaling and consolidating insights in a single space. This approach made it possible to identify connections between practice and teaching, while also leaving a record that could inform future iterations of the project. This year, the research shifts from being purely exploratory to being applied more directly within the classroom, particularly with Level 5 students enrolled in the Multi-Disciplinary Storytelling and Narratives unit. By embedding the findings of last year's work into teaching practice, the project seeks to test how these insights can enhance student learning, engagement, and confidence.

The decision to conduct surveys at two stages of the semester reflects a commitment to not only practical outcomes but also to measuring the impact of these interventions on students. This dual focus on developing the artistic work itself and on evaluating its pedagogical value, ensures that the research remains both practice-led and student-centred.

OVERALL AIM

The primary aim of this research is to create a cohesive body of work that integrates ceramics and animation in a way that feels intentional, narrative-driven, and visually unified. The intention for this year's research is to develop animated sequences that are not merely applied onto ceramic vessels but are

carefully aligned with the design of each piece, so that the object and the animation work together as part of a single storytelling experience.

Equally, the project aims to bring these practices into the classroom, using the reflections and learning curves to inspire and challenge students in their own creative development. By embedding the research into teaching, the goal is to foster greater student engagement, encourage experimentation across disciplines, and strengthen confidence in working outside of traditional comfort zones. This reflects a broader pedagogical ambition: to prepare students for contemporary creative industries where hybrid practices and interdisciplinary approaches are increasingly valued.

MAIN EXPECTED OUTCOME/S

The research is expected to produce a series of ceramic vessels that serve as narrative carriers, enhanced through carefully integrated animations. Alongside this, a sequence of animated scenes will be developed, designed to flow seamlessly and create a sense of continuity and progression. The project also aims to consolidate all documentation, research notes, reflections, and classroom insights into a dedicated journal. For students, the expected outcomes include higher levels of engagement, increased confidence in experimentation, and deeper understanding of how storytelling can extend across multiple disciplines.

RESULTS

The results to date demonstrate both practical achievements and valuable insights into student engagement. Two surveys were conducted to measure the impact of classroom activities. The first survey involved 16 participants and was designed to capture students' feelings at the beginning and end of a lesson. Results highlighted noticeable shifts in student engagement, emotional responses, and confidence levels across the session, suggesting that the planned lesson encouraged a more dynamic and immersive learning experience.

The second survey, though completed by a smaller group of 10 participants due to course withdrawals and illness, provided deeper reflections on the semester as a whole. Students reported growth in their personal confidence, recognition of their own creative progress, and a greater willingness to step beyond comfort zones. Importantly, many noted that the unit had encouraged them to experiment with unfamiliar media and approaches, and that their appreciation of interactive and multidisciplinary narratives had significantly increased.

On the practical side, a collection of ceramic vessels has been designed, constructed, and fired, each intended to support a narrative later extended through animation. The current stage involves glazing, with a focus on consistency and cohesion, ensuring the works feel like a unified collection and align visually with the animation that will accompany them.

IMPACT OF RESEARCH

The research impacts the curriculum, particularly in the ways it bridges disciplines and introduces students to new modes of creative thinking. In the field of animation, the project challenges students to think beyond conventional, screen-based outputs and instead consider how animated sequences can interact with physical forms. This shift encourages students to reimagine animation not just as moving images but as an adaptable medium that can engage with real-world objects and spaces. Such a perspective opens new creative possibilities and expands their understanding of animation as a tool for storytelling.

In ceramics, the impact lies in repositioning the medium as more than functional or decorative. The vessels produced through this research are designed as narrative carriers, objects that do not merely exist as crafted artefacts but actively participate in the telling of stories when paired with animation. This approach allows students to see ceramics through a new lens, one that values concept and narrative equally alongside craft and technique. It also highlights the potential of ceramics to operate within contemporary, interdisciplinary practices, making the field more relevant to students who may not initially identify as ceramicists.

Storytelling itself is enriched through this integration. By bringing together animation and ceramics, students are encouraged to develop narratives that operate across multiple platforms: tactile, visual, and temporal. This pushes them to think critically about how a story is constructed, how it can flow seamlessly from one scene or medium to another, and how the physical and digital can complement one another in creating meaning. Students also gain confidence in experimenting with interactive and participatory forms of narrative, reflecting a broader trend in contemporary storytelling practices.

Overall, the curriculum benefits from a more holistic and interdisciplinary approach, one that reflects the realities of contemporary creative practice. Students are challenged to embrace uncertainty, experiment with new tools, and combine different modes of making, all while reflecting on their personal growth. The project demonstrates that embedding research directly into teaching not only enriches the academic experience but also prepares students for a professional

landscape where adaptability and interdisciplinary collaboration are increasingly valued.

KEYWORDS

Multidisciplinary Storytelling, Ceramics, Animation, Student Engagement, Curriculum Integration, Interdisciplinary Practice.

AI and the Future of Media Education

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BACKGROUND

The rapid growth of Artificial Intelligence (AI) is reshaping creative industries in ways that present both opportunities and challenges for education. Media production is already being transformed by AI tools that automate editing, enhance visual effects, generate images and video, and assist with sound design. These tools are no longer experimental but are gradually becoming part of mainstream workflows. This reality raises pressing questions for vocational education providers such as MCAST, where our mission is to prepare students for professional practice in rapidly evolving fields.

The Media Department at MCAST Institute for the Creative Arts currently trains students in foundational skills such as camera work, lighting, and editing, which are then refined into advanced technical and creative competencies at higher levels. However, the rise of AI tools that can automate or bypass many of these traditional processes poses questions about the relevance of existing curricula. At the same time, AI is creating demand for new skills such as critical engagement with generative systems, adaptability to emerging workflows, and the ability to combine human storytelling with machine output.

This study was developed to better understand how AI is already shaping expectations within the media industry and how education must respond. It brings together the perspectives of industry professionals, lecturers, and students to identify the competencies that should remain central and the areas where change is required. In doing so, it provides a model for rethinking curriculum design across creative disciplines at MCAST.

OVERALL AIM

The aim of this project is to critically evaluate the impact of Artificial Intelligence on media education at MCAST and to explore how curricula can be restructured to remain relevant. By analysing perspectives from industry, educators, and students, the study seeks to identify which skills remain essential, which new competencies are required, and how assessment practices might be adapted to ensure graduates are both professionally competitive and creatively resilient.

MAIN EXPECTED OUTCOME/S

The main expected outcome is a set of informed recommendations for the redesign of Media courses at MCAST, with specific attention to the integration of AI. These will include suggestions for embedding AI literacy into the curriculum, preserving essential creative and critical thinking skills, and adapting assessment strategies to reflect genuine learning rather than rote use of tools. The project also expects to contribute to wider institutional discussions on how vocational education can stay agile in response to technological change.

RESULTS

Preliminary results from this qualitative study highlight significant contrasts between stakeholders. Industry respondents report that AI is already being integrated across the production pipeline, from pre-production concept development to post-production editing and effects. They emphasise the demand for hybrid skills that combine technical fluency in AI with creativity, adaptability, and human-centred storytelling.

Lecturers reveal a spectrum of perspectives. Some embrace AI as a professional necessity and are already experimenting with integrating it into teaching. Others express concern about over-reliance, the risk of students bypassing fundamental skills, and the potential erosion of critical and reflective learning. This diversity of opinion reflects the complexity of balancing pedagogical integrity with professional relevance.

Students demonstrate a mix of curiosity and anxiety. While some already use AI tools as brainstorming partners or for creative support, many fear that entry-level jobs will disappear, reducing pathways into the industry. Others believe AI will raise the bar, making originality and quality more valuable. Their responses highlight a generational tension: excitement about possibilities alongside deep concerns about employability and identity as creators.

Taken together, these preliminary results indicate that while AI is seen as an inevitable and increasingly indispensable tool, there is uncertainty about how it should be taught and assessed. The findings underscore the need for rethinking curricula and assessment methods to ensure they remain rigorous, relevant, and reflective of learning, while also equipping students with confidence and adaptability in a fast-changing environment.

IMPACT OF RESEARCH

This project has a significant potential impact across education, industry, and society. For education, it provides evidence-based insights that can guide the restructuring of curricula within the Institute for the Creative Arts and across other institutes at MCAST. By identifying the balance between transferable creative skills and emerging AI competencies, the study helps ensure that vocational training prepares graduates not only for the current market but also for the evolving professional landscape. It also opens a discussion on assessment design, encouraging practices that measure creativity, critical thinking, and adaptability rather than narrow technical outputs.

For the industry, the project addresses an immediate skills gap. Media companies are already adopting AI to optimise workflows, reduce costs, and expand creative possibilities. They need graduates who can operate within these new realities. By aligning training with industry expectations while retaining the distinct value of human creativity, MCAST can strengthen its role as a supplier of highly employable graduates. The findings will also be relevant beyond the media sector, as many industries face similar challenges in balancing automation with human contribution.

For students, the project offers reassurance and direction. It acknowledges their anxieties about employability and provides a roadmap for skills that will remain valuable, including originality, collaboration, ethical judgment, and narrative craft. By embedding AI literacy within an educational framework that values human creativity, MCAST can empower students to see AI not as a threat but as an opportunity for amplification.

At a societal level, the project contributes to Malta's positioning as a hub for creative and digital innovation. By adapting vocational education to the AI era, MCAST can ensure that graduates enter the workforce as agile, critical, and forward-thinking professionals who can raise the quality of local industries. This, in turn, can attract further investment and recognition for media and creative arts as a viable career path and research field.

KEYWORDS

Artificial Intelligence, Media Education, Hybrid Skills, Curriculum Design, Assessment.

T.I.M.E.talk - Teaching Inquiry through Malta's Eras by Co-Designing Historical Narratives with Children and Educators

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BACKGROUND

Malta's historical context presents rich opportunities for innovative pedagogical approaches that connect children with their heritage in engaging ways. The T.I.M.E.talk project, supported through the MCAST Research Fellowship Scheme, explores how artificial intelligence (AI) and participatory methods can support primary school children in engaging with local history. The project builds on the principle that history education should not only transmit knowledge but also cultivate inquiry, dialogue and reflective citizenship skills. Responding to both national educational priorities and global calls for re-imagining social studies curricula, T.I.M.E.talk positions children as co-creators of knowledge in the classroom.

Working in collaboration with schools, teachers, and policy representatives, the project investigates how children make sense of historical narratives and how digital learning platforms can facilitate more inclusive and inquiry-based approaches. The research draws on systems thinking and participatory action research to create a dynamic dialogue between researchers, educators and children. The project's methodological design ensures that children's voices are central, enabling them to express expectations of what an engaging AI-powered digital history learning tool should provide. Ultimately, T.I.M.E.talk aims to offer evidence-based insights into how heritage education in Malta can evolve to reflect contemporary needs, empowering children to situate themselves within a wider historical and social context.

OVERALL AIM

The project aims to create and evaluate an AI-powered learning platform that enables children to engage in inquiry-based conversations with historically inspired avatars. Its purpose is to support historical reasoning, empathy and digital literacy while providing educators with a flexible, curriculum-aligned tool that bridges technology, heritage, and pedagogy.

MAIN EXPECTED OUTCOME/S

Outcomes include:

- A prototype of AI-driven historical avatars tested in a Maltese primary school.
- Evidence on AI's potential to support inquiry and empathy in history education.
- Professional insights into teachers' needs for digital, inquiry-based pedagogy.
- Policy recommendations for integrating AI tools into the national curriculum.

IMPACT OF RESEARCH

T.I.M.E.talk will generate multi-layered impact across research, society, and education. In terms of scientific research, the project contributes to the emerging field of AI in humanities education, addressing a gap where most AI tools are concentrated in STEM. It provides an evidence base for how conversational AI can support inquiry, empathy and narrative reasoning at the primary level.

For society, the project strengthens children's sense of civic identity and historical awareness. By enabling learners to engage dialogically with diverse figures from Malta's past (including voices often marginalised in traditional narratives) the platform promotes inclusivity, empathy and critical citizenship. These skills resonate with democratic participation and intercultural understanding, extending beyond the classroom into family and community life.

From a curricular perspective, T.I.M.E.talk responds directly to Malta's Learning Outcomes Framework and Digital Education Strategy. It offers teachers a ready-to-use tool that shifts pedagogy from rote memorisation to inquiry-led exploration. The project also generates insights into how professional development can prepare educators to use AI ethically and effectively, ensuring technology enhances rather than replaces teacher expertise.

At the level of national and global priorities, the project aligns with SDG 4 (Quality Education) and UNESCO's agenda for AI in education. As a small-state initiative, it positions Malta as a contributor to international debates on ethical, child-centred uses of AI. By connecting digital innovation with cultural heritage, T.I.M.E.talk demonstrates how locally grounded projects can inform global discussions on the future of education.

KEYWORDS

AI in Education, Children's Voices, Curriculum Studies, Digital Heritage, Inquiry-Based Learning, History Teaching

Project TIME Talk is financed by the Ministry for Education, Sport, Youth, Research and Innovation



SeyAI



An Innovative Training Approach for ResEARCH ETHICS

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BACKGROUND

Research ethics establishes the norms for appropriate research conduct to safeguard the dignity, rights, and well-being of research participants. Yet, despite the research ethics subject has long been taught amongst researchers, studies reveal that awareness remains suboptimal. While the use of virtual reality (VR) has been employed in the education of various subjects, utilising Large Language Models (LLMs) in VR scenarios is relatively new and presents a promising avenue for enhancing various educational and training applications.



OVERALL AIM

This project's overall aim is to design and assess an innovative ethics training programme framework for healthcare and animal studies research, utilising a multimodal approach including an AI-driven VR prototype, with the long-term aim of enhancing the researchers' ethical skills and fostering a culture of research integrity.

MAIN EXPECTED OUTCOME/S

This project seeks to build on the state of play by: 1. proposing the development of a research ethics training programme framework, utilising a multimodal delivery approach moving away from traditional didactic methods; 2. utilise AI-driven VR as immersive technology to exploit its student-engaging benefits; 3. merge the AI-



driven VR prototype with a state-of-the art visualisation wall display to create a collaboration synergy between students using the VR and other classmates.

RESULTS

A research ethics training framework based on AI-driven VR, seminars, webinars, written material was designed by the research team. Preliminary content was incorporated to test the value of the research ethics training framework and train the custom LLM ‘ethics expert’. An AI ‘ethics brain’, and respective AI-driven Avatar, are being developed with emphasis on ethics procedures in two identified scenarios.

IMPACT OF RESEARCH

Emphasising research ethics awareness through an innovative approach, REACH-ETHICS can impact the healthcare, animal studies, and education disciplines. This is crucial for the project's success and aim towards impact by:



- 1. addressing some of the challenges faced in raising research ethics and integrity awareness amongst the healthcare and animal study disciplines, and*

2. *weaving good practices together in a unified, comprehensive framework to supplement the current alternative academic methods being used to teach research ethics and research integrity.*

KEYWORDS

Artificial Intelligence, Education Technology, Healthcare, Research Ethics, Virtual Reality

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BioMatter Innovations: Transforming Agricultural Waste into Sustainable Bio-Based Materials for Smart Manufacturing

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BACKGROUND

The BioMatter Innovations project addresses the urgent need to replace fossil-based raw materials by converting agricultural residues—olive waste, orange peel, and grape pomace—into advanced bio-based materials for smart and additive manufacturing (3D printing) applications.

This research focuses on developing fully compostable bio-resins and biopolymers designed to meet industrial requirements for durability, processability, and functional performance. The project integrates circular economy principles, ensuring that the resulting materials are both biodegradable and capable of supporting diverse applications such as moulding, coatings, automated manufacturing components, and 3D-printing feedstocks.

Under the scientific supervision of Dr Frederick Lia at the Malta College of Arts, Science and Technology (MCAST), and in collaboration with Invent 3D Ltd., the project combines expertise in chemical profiling, bioactive compound extraction, and sustainable material design. BioMatter Innovations is developing and validating a proof of concept for bio-based composites and resins that can compete with conventional petrochemical products.

By valorising agricultural waste streams and creating new high-value materials, BioMatter Innovations contributes directly to the circular economy and supports climate-positive manufacturing practices. The project highlights the potential of agri-food by-products to become a key resource for the next generation of sustainable materials, offering scalable solutions for the growing green manufacturing and 3D printing sectors. Bio Matter Innovations is financed by the Ministry for Education, Sport, Youth, Research and Innovation.

OVERALL AIM

The primary aim of BioMatter Innovations is to develop sustainable, bio-based materials derived from agricultural waste — specifically olive waste, orange peel,

and grape pomace — for applications in the smart manufacturing industry. The project seeks to create environmentally friendly, cost-effective bio-resins and composites that meet or exceed current market performance, offering viable alternatives for both the advanced materials sector and additive manufacturing (3D printing).

MAIN EXPECTED OUTCOME/S

- **Material Research and Development:**

Develop innovative, fully compostable bio-resins and composites by processing agricultural residues (olive waste, orange peel, and grape pomace). Optimise extraction methods to harness valuable natural polymers and bioactive compounds, and formulate blends suitable for industrial applications in both advanced manufacturing and additive manufacturing (3D printing).

- **Material Testing and Validation:**

Conduct comprehensive testing of the newly developed bio-based materials to evaluate their mechanical strength, thermal stability, processability, and environmental degradability. Ensure compliance with industry standards and performance benchmarks for sustainable manufacturing materials. Achieve proof of concept validation to demonstrate commercial feasibility.

- **Industrial Integration and Application:**

Collaborate with industrial partner Invent 3D Ltd. to test the bio-based materials in real manufacturing environments. Explore applications across moulding, coatings, functional components, and 3D printing feedstocks, supporting scalability and market readiness.

- **Capacity Building and Collaboration:**

Leverage the expertise of Dr Frederick Lia and the Malta College of Arts, Science and Technology (MCAST) to strengthen research capacity in sustainable material development. Foster knowledge exchange between academia and industry to accelerate innovation and build long-term collaborations within the bioeconomy sector.

RESULTS

BioMatter Innovations will deliver applied research outputs, including a validated proof of concept for bio-based materials, contributing to circular economy principles and supporting climate change mitigation efforts.

IMPACT OF RESEARCH

Impact of BioMatter Innovations

Scientific Research

BioMatter Innovations drives forward applied research at the interface of materials science, bio-based chemistry, and circular economy design. By valorising underused agricultural residues—olive waste, orange peel, and grape pomace—the project develops novel bio-resins and biopolymers that are fully compostable yet meet industrial demands for durability and processability. The project strengthens Malta’s research capacity through advanced chemical profiling, bioactive compound extraction, and material characterisation under the scientific supervision of MCAST. It provides an open platform for interdisciplinary collaboration, bridging academic research and industrial application, and serves as a model for how small island states can generate globally relevant innovation in sustainable materials.

Environment

The project directly addresses urgent environmental challenges by reducing agricultural waste disposal and associated greenhouse gas emissions while displacing fossil-based plastics. By creating biodegradable, renewable feedstocks, BioMatter Innovations supports circular resource flows and reduces reliance on finite petrochemical resources. It contributes to climate change mitigation by lowering carbon footprints across manufacturing and 3D printing supply chains and aligns with low-carbon and resource-efficient economy goals. Moreover, its focus on compostability and closed-loop lifecycles ensures that end-of-life impacts are minimized, helping to reduce landfilling and marine pollution.

Industry

For industry, BioMatter Innovations provides a new class of sustainable, high-performance materials tailored for smart manufacturing and additive manufacturing (3D printing). Industrial partner Invent 3D Ltd. gains early access to proprietary bio-resins and composites, enhancing competitiveness and opening new market opportunities in sectors such as automotive, packaging, consumer products, and education. End-users benefit from improved material availability

and compliance with evolving sustainability regulations and market expectations. The project supports new business models based on circular production and strengthens local supply chains by using locally sourced agricultural feedstocks, reducing dependency on imports.

National and Global Priorities

Nationally, the project advances Malta's Sustainable Development Strategy for 2050, particularly the goal of achieving a climate-neutral, green, and circular economy, and supports the National Research and Innovation Strategy 2020 by promoting eco-innovation and economic resilience.

At the European level, BioMatter Innovations aligns with the European Green Deal, the EU Bioeconomy Strategy, and the Circular Economy Action Plan, directly contributing to resource decoupling and the substitution of fossil-derived plastics with renewable alternatives.

Globally, the project supports key UN Sustainable Development Goals (SDGs):

- *SDG 12: Responsible Consumption and Production, through circular material flows.*
- *SDG 13: Climate Action, by reducing emissions and promoting renewable feedstocks.*
- *SDG 9: Industry, Innovation and Infrastructure, by strengthening sustainable manufacturing.*
- *SDG 8: Decent Work and Economic Growth, by creating green jobs and diversifying Malta's economy.*

Society

BioMatter Innovations fosters a circular, resource-conscious mindset by transforming low-value residues into valuable industrial inputs. It benefits rural communities and farmers by creating economic value from agricultural by-products, and it strengthens Malta's green innovation ecosystem through skills development, knowledge transfer, and new employment opportunities in bio-based industries. The availability of cost-effective, biodegradable consumer products also empowers citizens to make sustainable lifestyle choices. For small

island states with limited land and waste infrastructure, the project provides a scalable model for sustainable development.

KEYWORDS

Sustainable Innovation, Novel Bio-Based Materials, Renewable Resources for Smart Manufacturing, Agricultural Waste Valorisation, Circular Economy

Project BioMatter is financed by the Ministry for Education, Sport, Youth, Research and Innovation.



GOVERNMENT OF MALTA
MINISTRY FOR EDUCATION, SPORT, YOUTH
RESEARCH AND INNOVATION



MCAST

Digital water education through extended reality: the WATERLINE project

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BACKGROUND

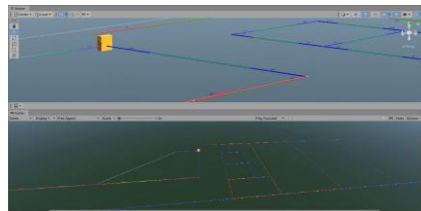
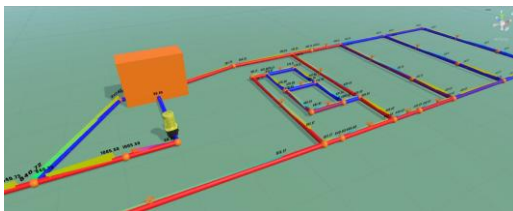
The WATERLINE project aims to establish a European Digital Water Higher Education Institution (HEI) Alliance, applying the quadruple helix model to drive innovation, research, and education in the water sector. A central element of this initiative is the development of advanced educational technologies, most notably MCAST's Virtual Reality (VR) water rig.



OVERALL AIM

The overall aim is to give a hands-on session demonstrating how VR can enhance technical understanding and training in digital water management.

MAIN EXPECTED OUTCOME/S



The VR rig replicates the water distribution test rig located at the Institute of Applied Sciences (IAS). As an immersive learning environment, it simulates real-world water management scenarios, enabling students to gain deeper insights and practical skills in water-engineering disciplines.

This innovation showcases interdisciplinary collaboration to deliver transformative learning tools.

RESULTS

The interactive, hands-on session will invite participants to experience the VR rig firsthand, explore its capabilities, and reflect on its practical applications.

IMPACT OF RESEARCH

The WATERLINE initiative, together with the development of MCAST's VR water rig, is expected to have a significant and multidimensional impact on higher education, research, and innovation in the water sector. At its core, the initiative addressed the urgent need for modernised learning environments that not only integrate digital tools but also foster stronger links between academia, industry, policymakers, and society.



One of the most tangible impacts lies in the enhancement of student learning. By replicating the physical water distribution test rig at the Institute of Applied Sciences in a virtual environment, the VR rig allows students to engage with complex water-management processes in a safe, cost-effective, and immersive way. This contributes to deeper conceptual understanding, skill acquisition, and the ability to transfer theoretical knowledge into practical problem-solving.

From a research and innovation perspective, the VR rig demonstrates how interdisciplinary collaboration can yield transformative educational technologies. The integration of engineering, water sciences, and ICT showcases how diverse expertise can converge to develop tools that not only support pedagogy but also open new avenues for applied research. This collaborative model can be scaled and adapted to other disciplines, reinforcing the role of digital technologies as catalysts



for innovation across higher education. At a broader level, WATERLINE strengthens European cooperation by building a sustainable knowledge network.

KEYWORDS

Immersive Learning, Interdisciplinary Collaboration, Digital Innovation, Education Technology



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Interdisciplinary Research Community of Practice (IRCoP)

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BACKGROUND

In alignment with MCAST's strategic objective to enhance its research culture, foster innovation, and promote cross-institutional collaboration, a dedicated Interdisciplinary Research Community of Practice (IRCoP) was established. The core aim of this group will be to identify emerging research opportunities and initiate inter- and multidisciplinary research projects, thereby advancing a more integrated and collaborative research ecosystem across MCAST's Institutes and Centres. By embedding this group within MCAST's broader strategy for research and innovation, the aim is to cultivate a sustainable, collaborative, and impact-driven research environment that reflects MCAST's position as a vocational and applied research higher education institution.

OVERALL AIM

To effectively realise its objectives, the group will serve as a catalyst for internal knowledge exchange and research networking, contributing to:

- The enhancement of MCAST's internal research infrastructure.*
- The growth of interdisciplinary teams that reflect the diversity of MCAST's academic domains.*
- The translation of innovative ideas into research proposals.*

MAIN EXPECTED OUTCOME/S

This initiative directly supports MCAST's commitment to:

- Strengthening a culture of applied research across the College.*
- Increasing participation in local, national, and European research funding programmes.*
- Building institutional research capacity and capabilities.*

KEYWORDS

Interdisciplinary, Community of Practice



MCAST

**MCAST
RESEARCH & INNOVATION
EXPO 25**

***RESEARCH IN EDUCATION,
SOCIAL SCIENCES, AND POLICY***



MCAST

RESEARCH IN EDUCATION, SOCIAL SCIENCES, AND POLICY

The COMPASS Project: Stakeholder Voices on Teacher Education in Malta

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BACKGROUND

Programmes for teacher training in primary education are designed to equip prospective teachers with the necessary skills and knowledge to meet the diverse needs of students and adhere to policy demands (Malik, 2018). Particularly in Europe, these programmes are robust, offering various courses that integrate theoretical knowledge with practical experience (study.eu, 2024). The current frameworks of teacher training programmes are commendable for several reasons. Literature in the field suggests that the comprehensive curriculum provided by these programmes ensures that teachers are well-rounded and prepared for classroom challenges (Darling-Hammond and Bransford, 2005). By blending theoretical knowledge with practical teaching experience, these programmes foster a deep understanding of educational principles and real-world application. Such programmes are designed to enable future primary teachers to meet international and national education standards and policies, ensuring that graduates are highly qualified and ready to join the teaching workforce (Darling-Hammond, 2017).



Despite their strengths, such programmes may not always be sufficient to meet the future demands of education, necessitating an innovative approach to teacher preparation (Darling-Hammond, 2017). This is especially pertinent in Malta, where the rapid pace of change in education, driven by technology, globalisation, and evolving student needs, means that current programmes may not fully prepare teachers for future challenges (Aubusson and Schuck, 2013). Traditional programmes often emphasise established practices over fostering innovation, critical thinking, and adaptability, which are crucial skills teachers need. Moreover, digital literacy, inclusive education, and social-emotional learning are becoming

increasingly essential but may not be adequately addressed in programmes for future primary teachers (Howard et al., 2021). These areas are also reflected in Malta's newly launched Education Strategy (MEYR, 2024). Thus, current programmes may fall short of preparing teachers for the complexities of future classrooms.

OVERALL AIM

In this context, the Comprehensive Overview of Malta's Primary School Stakeholders' Perspectives Project (COMPASS P) aimed to assess teacher training in Malta's primary education system by identifying existing gaps and future needs. This objective was achieved through five interconnected studies, which provided an opportunity for the respective stakeholders to share their opinions, perspectives, and experiences.

MAIN EXPECTED OUTCOME/S

The research project adopted a multi-stakeholder approach, gathering perspectives from students, families, newly qualified teachers, learning support educators (LSEs), and school leaders. Grounded in the conceptual framework of belonging, well-being, autonomy, and agency and employing a comprehensive mixed-methods approach, this study explored the voices, perceptions, challenges, and aspirations of these key stakeholders. The primary goal was to identify gaps and future requirements within Malta's teacher training framework, offering actionable recommendations to enhance its relevance, inclusivity, and sustainability.

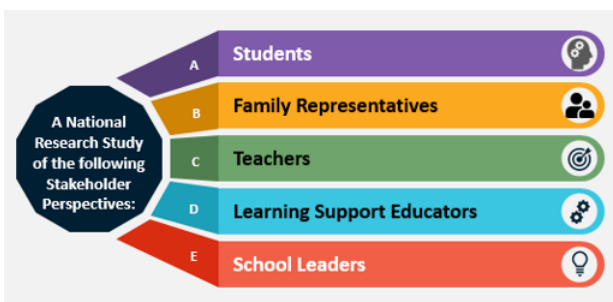
RESULTS

The findings revealed several systemic challenges within the context of Malta's teacher training programmes. Among the priorities identified by stakeholders are the need for more effective home-school communication, greater attention to the factors that determine teachers' well-being, and the creation of school environments that nurture autonomy and agency. While the data also highlighted several positive attributes within current practices, this conference presentation will primarily present areas that require improvement. Teacher belonging, though endorsed in policy, is shallowly enacted, highlighting the need for structured opportunities during school placements where student teachers can actively practise inclusive, community-building approaches. Teacher well-being remains an outlined weak point, underscoring the need for regular well-being check-ins during placements to support reflection and mentor-led strategies. While teacher autonomy exists on paper, it often depends on system permissions, suggesting a

need to offer student teachers flexibility in lesson planning grounded in learner needs. Finally, teacher agency is limited by top-down decision-making, highlighting the value of exploring how increased student-teacher involvement in decision-making can enhance their confidence and learner engagement.

IMPACT OF RESEARCH

By amplifying the voices and insights of key stakeholders, the COMPASS Project seeks to equip future educators with the skills and adaptability necessary to address the realities of future classrooms. The findings aimed to enrich the field of



teacher education by highlighting both the strengths and the areas worthy of attention. In doing so, the COMPASS Project sought to ensure that teacher education in Malta becomes more inclusive, responsive, and aligned with the lived realities of its educational communities. The impact of these findings, if addressed meaningfully, could be transformative for Malta's primary education system. By embedding teacher well-being support and real autonomy into teacher education, the system can nurture more empowered educators. Enhanced agency and focus on professional identity could lead to increased job satisfaction, reduced burnout, and greater teacher retention. Furthermore, promoting bottom-up decision-making and reflective practice can foster a more dynamic, learner-responsive education culture. Ultimately, these changes would not only support teachers but also positively impact all stakeholders within the education sector, potentially contributing to improved student outcomes.

KEYWORDS

Education Framework, Initial Teacher Education, Primary Education, Stakeholder Voices, Sustainable Teacher Education

EngageAll: Inclusive Student Civic Engagement as a Pathway for Enhanced Skills & Competences in Professional Higher Education

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BACKGROUND

EngageAll is an Erasmus+ collaborative project involving partner organisations from Germany, Belgium, the Basque, Malta, and Croatia.



EngageAll

Through the initiatives of this project, MCAST, as the Higher Educational Institution representing this project in Malta, along with the partner organisations, aims to promote inclusive student engagement in civic and extracurricular activities. By focusing on the diverse needs of students, this project seeks to raise awareness of the prominence of civic involvement for both personal development and societal benefit. It particularly targets enhancing inclusion for underrepresented and disadvantaged students, ensuring fair access to meaningful engagement opportunities.

The project's key deliverables include the development of a competence framework and toolkit to support student involvement, a student ambassador scheme to connect diverse role models with peers, including ones from underrepresented populations and peer learning initiatives to facilitate knowledge exchange. In addition, the project enables the establishment of a Student Advisory Group within each participating Higher Education Institution to incorporate student perspectives and validate deliverables.

This presentation will provide the initial results about one phase of the project, which has focused on the identification, analysis and bridging of the different skills related to student civic engagement. A core element of this work is to align the competence framework with the European Skills, Competences, and Occupations (ESCO) database, validate the final framework and then publish it. This will ensure its applicability and usability across European higher education contexts.

OVERALL AIM

This project aims to promote inclusive student engagement in civic and extracurricular activities within Higher Education. It seeks to raise awareness about civic involvement for personal and societal development, enhance inclusion of underrepresented and disadvantaged students, and develop practical tools and strategies for Higher Education Institutions to support and facilitate student participation in civic engagement.

MAIN EXPECTED OUTCOME/S

One primary expected outcome includes the development and validation of a competence framework and toolkit for student engagement and civic participation. This framework aligns with the ESCO database and provides Higher Education Institutions with practical tools to promote inclusive civic engagement. Further additional outcomes include the implementation of a student ambassador scheme and peer learning activities, which support students to continue developing their skills in terms of engagement and participation.

RESULTS

Preliminary results include the successful identification, analysis, and synthesis of competences related to student civic engagement through a mixed-methods research approach. A systematic literature review covering empirical articles published between 2000 and 2024 (n=47), a detailed analysis of competence frameworks (n=50), and feedback from qualitative studies involving expert interviews (n=8), focus groups with experts (n=3), student focus groups (n=5), and an interview with a student (n=1), have informed the development of the competence framework.

The competence framework maps a diverse set of skills such as learning literacy, reflective competence, decision-making, initiative, ambiguity competence, ethical practice, design and innovation thinking, digital literacy, future readiness, systems thinking, cooperation, communication, citizenship, leadership, and intercultural competence. These results establish a reliable platform for the development of an online toolkit for Higher Education Institutions to implement the competence framework and promote inclusive student engagement and civic participation.

IMPACT OF RESEARCH

EngageAll's research and project expected outcomes have a considerable positive impact on both society and education. By promoting inclusive student civic engagement within Higher Education, the project addresses critical societal challenges such as social exclusion, inequity, and democratic participation.

Enhancing the competences of students in leadership, ethical decision-making, communication, and inclusive dialogue would possibly equip young people to become active, responsible citizens capable of contributing positively to their communities and society.

The competence framework and toolkit developed through EngageAll provide Higher Education Institutions with practical, validated tools to support the participation of traditionally underrepresented and disadvantaged student groups. This inclusivity promotes diversity within civic activities and helps break down barriers to participation, thereby strengthening community cohesion and social capital.

In education, EngageAll raises awareness of the role that civic engagement plays in holistic student development, complementing academic learning with transferable skills that enhance employability and lifelong learning. The structured pathways created for recognising and validating civic and extracurricular competences encourage students to actively integrate these experiences into their personal and professional growth. Furthermore, the project's emphasis on aligning competences with European frameworks like ESCO facilitates consistency and compatibility across educational programmes and national systems, supporting mobility and recognition at an international level.

By positioning Higher Education Institutions as key players for democratic and societal impact, EngageAll promotes the vision of education as a means for social innovation and empowerment. The results of this project aim to prepare graduates who are flexible, empathic, ethical, and ready to work together to address societal challenges.

KEYWORDS

Civic Engagement, Competence Framework, Higher Education, Inclusion, Student Participation.



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Is there a linguistically “proper” way to speak Maltese? Educators' Linguistic Ideologies on Purism and Flexibility in Maltese

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BACKGROUND

Literature in the field of applied linguistics highlights the dynamic and fluid nature of languages, particularly in bilingual countries like Malta, where Maltese coexists with English. Within such contexts, linguistic terms such as 'code-switching', 'code-mixing' and 'loanwords' illustrate the blending of languages. Conversely, other strands of literature emphasise more rigid concepts, contrasting 'linguistic purism' (Daniel, 2024) with 'linguistic flexibility' (Kaplan and Berman, 2015), as well as 'fixity' with 'fluidity' (Oliveira do Espírito Santo, 2023). In bilingual educational contexts, questions arise as to whether languages should be used separately or interchangeably. In Malta, this issue has been addressed within national policies where a gradual shift from monolingual principles toward translanguing perspectives is becoming evident (Oliveira do Espírito Santo, 2023). Recent policy documents reflect this transition, introducing terms such as 'language mediation' and 'translanguaging', which not only acknowledge the coexistence of Maltese and English but also respond to the growing number of non-Maltese learners (National Statistics Office, 2024).

For early childhood education and care (ECEC), these issues are particularly significant. ECEC educators are among the first to support children's linguistic interactions, and their ideological views on purism and flexibility can significantly influence how young children experience and use languages. The underpinning study positions itself within this tension, exploring educators' perspectives on language practices in ECEC settings. More specifically, it investigates how educators' ideological views shape their perceptions of Maltese during the early years of education.

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OVERALL AIM

The presentation, which aligns with the outlined abstract, aims to elaborate on educators' views of linguistic purism and flexibility, with a particular focus on ECEC settings that cater for children aged 0 to 7 years. Unlike research at primary and secondary school levels, this stage remains underexplored, despite being a crucial context in which educators' language ideologies shape children's linguistic development. In this vein, the main research question guiding the underpinning study is: What are educators' views on the use of the Maltese language in ECEC settings, particularly in relation to linguistic purism and linguistic flexibility?

MAIN EXPECTED OUTCOME/S

The main expected outcome is to gain a deeper understanding of educators' linguistic ideologies and the dynamics that occur within ECEC settings. Building on this understanding, the study aims to examine the extent to which language ideologies are enacted in practice, as well as the barriers that may hinder the use of the Maltese language. The outcomes are expected to help address the current gap in research at the ECEC level, while also contributing to ongoing dialogues about the role of Maltese in education.

RESULTS

Educators' attitudes toward linguistic purism and flexibility reflected both shared views and underlying tensions. Almost all educators (94.4%) believed they should maintain 'pure' Maltese, using correct grammar and traditional vocabulary, particularly in formal contexts. Participants regarded this as the “proper” way to speak the language, as they deem themselves to be role models and should

therefore ensure that the Maltese language is used appropriately. Additionally, participants argued that this aligns with institutional expectations. At the same time, many regarded code-switching and translanguaging as useful for ensuring comprehension, while hybrid pseudo-loanwords were viewed negatively. This dual positioning highlighted a broader tension whereby educators strive to maintain purist ideals in accordance with personal and institutional demands, yet within the educational settings, more flexible practices are adopted to ensure comprehension. Data further showed that the context strongly influences the choice and practice of language. Educators reported modifying their use of Maltese depending on the demographics of the context, whether other members of staff or parents are present and whether particular linguistic norms are conditioned within the educational setting.

Additionally, educators described the growing presence of linguistically diverse children as a “daily struggle”, with many learners showing limited understanding of Maltese. Parents’ language practices were frequently cited as reinforcing these challenges, alongside a lack of digital resources. A concern raised by a few educators working in childcare settings related to the educators’ limited proficiency in Maltese, shifting attention to the preparedness of professionals. Overall, the findings highlight educators’ strong commitment to Maltese, yet reveal tensions between personal ideologies and the realities of linguistically diverse contexts.

IMPACT OF RESEARCH

For each of the outlined results, data points towards several implications that can be enacted at the policy and teacher training levels. These should recognise that both linguistic purism and flexibility have value, and that one should not replace or invalidate the other. While the use of Maltese in ECEC settings is considered essential, practices such as translanguaging can play a valuable role in supporting comprehension, particularly in linguistically diverse contexts. Importantly, such flexibility should not undermine the adoption of Maltese in ECEC contexts, but rather complement it. Additionally, in line with national requirements that educators are proficient in both Maltese and English, recruitment processes and professional development opportunities should ensure that educators meet these standards.

Parents should also be recognised as partners in children’s language development. Educators repeatedly emphasised the influence of home language practices on children’s use of Maltese. National and context-specific initiatives, such as workshops and information sessions, could be developed to encourage parents to

use Maltese more actively at home. By fostering collaboration between childcare centres, schools and families, children’s exposure to Maltese can be bridged across different contexts. Another significant implication concerns the availability of resources. Investment in digital resource development would not only support the work of early years educators and enhance children’s language development, but it would also strengthen Maltese as a language of teaching and learning. By focusing on these areas, it becomes possible to align the ideological goal of strengthening the Maltese language with the practical realities of linguistically diverse early years settings. This approach ensures that young children receive a strong foundation in Maltese; an essential measure outlined in the National Educational Strategy 2024–2030, under Strategic Objective 3: Growth and Empowerment (Government of Malta – Ministry for Education, Sport, Youth, Research and Innovation, 2023).

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KEYWORDS

Bilingualism, Language Ideologies, Linguistic Purism, Linguistic Flexibility, Maltese Language

Implementing international AI policies in TVET: From UNEVOC to the classroom

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BACKGROUND

*The integration of artificial intelligence (AI) into education is increasingly recognised as a transformative development, with the potential to enhance teaching, personalise learning, and strengthen institutional efficiency. Global policy bodies, including UNESCO's UNEVOC, have emphasised the importance of embedding AI within technical and vocational education and training (TVET) to prepare learners and educators for the rapidly evolving labour markets. Their recent recommendations, *European insights: Adoption of AI in TVET institutions – challenges, opportunities and recommendations (2025)*, for vocational educators within a European context highlight the need to go beyond technical skills and focus on a holistic approach to AI adoption. This includes fostering ethical awareness, critical digital literacy, and pedagogical strategies that enable educators and students to engage with AI not merely as a set of tools, but as a transformative influence on teaching, learning, and professional identity. Such an approach recognises that effective integration requires attention to cultural, social, and institutional dimensions, ensuring that AI adoption supports equity, inclusivity, and sustainability rather than reinforcing existing disparities.*

Within the Maltese context, MCAST serves as a UNEVOC centre, making it an ideal site to explore how UNESCO-UNEVOC's guidelines can be translated into practice. By taking the recommendations on board and delivering workshops to both educators and students, this investigation seeks to bridge the gap between policy and implementation. It will contribute evidence on how AI can be integrated into TVET in ways that are not only technologically viable but also pedagogically meaningful and socially equitable.

OVERALL AIM

The aim of this study is to examine UNESCO's UNEVOC recommendations and their impact on TVET within a European context. The research will operationalise these recommendations through custom-made workshops designed for educators and students at MCAST, addressing pedagogical and ethical recommendations. Using

practitioner inquiry, the researchers take into account their experience to critically evaluate the recommendations' feasibility, challenges, and opportunities for practice. The UNEVOC article suggests integrating human-centric skills, strengthening independent learning and teaching an ethical approach, hence, we the authors, from a practitioner inquiry perspective, seek to develop a locally grounded yet globally relevant framework that supports sustainable and inclusive AI integration in vocational education that is realistically attainable within our restraints and scope.

MAIN EXPECTED OUTCOME/S

The study is expected to produce actionable insights into how UNESCO's UNEVOC recommendations can be translated into practice in our vocational settings. Outcomes will include practical training models, identification of barriers and enablers of AI use, and a framework tailored to MCAST that informs both local practice and international discourse. The research will contribute to advancing equitable, ethical, and context-sensitive AI integration in TVET.

IMPACT OF RESEARCH

This study is expected to generate impact at the institutional, national, and international levels. At the institutional level, the testing of UNESCO's UNEVOC recommendations will inform the development of a structured framework to guide MCAST in advancing its adoption of AI in teaching and learning. This framework will not only provide a strategic pathway for sustainable and ethical integration but also serve as a transferable model for other vocational institutions in Malta, thereby strengthening the national capacity for AI in education. Internationally, the project will contribute to global debates on AI in education by presenting a locally grounded yet globally relevant framework. By critically engaging with UNESCO's UNEVOC recommendations and testing their feasibility in practice, the study will offer transferable lessons for other European and international vocational contexts. Ultimately, its impact lies in advancing a more nuanced, equitable, and contextually responsive understanding of AI's role in shaping the future of vocational education.

KEYWORDS

Artificial Intelligence, Vocational Education, Pedagogical Innovation, Ethical AI, Implementing AI, Human Centric Approach

Meaning Making Through Relational Ministry: A GT Approach to Student Development in Higher Education.

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BACKGROUND

This study explores how a Salesian youth ministry model contributes to developing students' potential within Malta College of Arts, Science and Technology (MCAST). Using constructivist grounded theory methodology, the research examines the role of a chaplaincy service in supporting the personal development of students through a holistic education approach.

OVERALL AIM

The study aims to examine how a Salesian youth ministry enhances student development at MCAST through chaplaincy services and through adult educator interventions, creating a practical framework (H.E.A.R.T.) for holistic vocational education.

MAIN EXPECTED OUTCOME/S

Through in-depth interviews with front-line practitioners across educational settings, the study creates a relational conceptual framework for use in practical settings. Its three core dimensions are: contextual conditions (structure and practitioners involved), actions and reactions (processes and proposals), and consequences (mentoring as the activity).

RESULTS

The findings highlight an educational approach that begins with young people in mind. The findings situate this approach in a caring culture fostering community and togetherness; listening-based approaches that meet young people where they are; and pastoral charity that integrates spiritual, moral, and personal development. Further, a framework for practice is introduced. The H.E.A.R.T. framework (Hospitality, Encounter, Action, Rethink, Transform) is presented as a practical model for adult educators and chaplains to engage in pastoral planning and student accompaniment at micro and macro levels of the educational institution. Results demonstrate that when these practitioners adopt family-style, relational approaches grounded in trust and authentic presence, they create transformative educational environments supporting students' full human

development. This research contributes to understanding how faith-informed care can enhance vocational education by addressing the holistic needs of contemporary learners.

IMPACT OF RESEARCH

Scientific Research Impact: The research advances educational approaches by providing empirical evidence for a holistic approach in vocational education and training. Using constructivist grounded theory, it creates a validated relational framework that bridges faith-based practices with educational outcomes and secular philosophical approaches. The H.E.A.R.T. framework offers researchers a replicable model for studying pastoral care effectiveness in educational settings. This contributes to the growing body of literature on holistic education, providing quantifiable measures for previously intangible concepts like "caring culture" and "pastoral charity."

Societal Impact: The study addresses gaps in contemporary education by demonstrating how spiritual and emotional support enhances academic and personal development. In an era where student mental health challenges are increasing, this research validates the importance of chaplaincy services and pastoral care given by adult educators in educational institutions. The framework provides practical tools for educators and administrators to create more supportive learning environments.

For Malta specifically, this research strengthens MCAST's educational approach and potentially influences national vocational education policy on holistic education. More broadly, it demonstrates how traditional religious approaches to youth ministry can be systematically integrated into modern educational frameworks, offering a model for other institutions seeking to address students' holistic development needs while maintaining academic rigor.

KEYWORDS

Youth Ministry, Salesian Education, Vocational Education, Holistic Development.

Vocational Education and Training Students' Subjective Well-being

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BACKGROUND

Across the globe, student populations are facing an unprecedented mental health crisis compared to their non-student peers (Arnett, 2014; Twenge, 2017). This alarming trend has been attributed to a complex set of interrelated factors (Hernandez et al., 2020). The Covid-19 pandemic has further compounded these difficulties, significantly worsening student well-being through increased anxiety, depression, and related disorders (Chang et al., 2021; Li et al., 2021) and an overall decrease in general well-being (Lemyre et al., 2023). During this period, students experienced a reduced predisposition to experience positive emotions while the predisposition to experience negative emotions was heightened (Wang et al., 2020). One of the few local studies on the topic reported that VET students experienced a lower Health Related Quality of Life (HRQOL) compared to European adolescents, with a high number of students (64%) also found to be struggling with issues in at least one area related to eating disorders, stress, depression, or anxiety (Abela et al., 2024). Contextual and demographic factors, including gender, socioeconomic background, history of mental health (Lemyre et al., 2023), social relationships (Wildschut & Fadji, 2024), and physical health (Hernandez et al., 2018), have been identified as significant correlates of well-being outcomes for higher education students. Studies examining higher education students' subjective well-being are limited, often focusing solely on academic achievement (Bücker et al., 2018). This reflects a need for further research in this area, especially because college student dropout rates and severe mental health issues in college students are often preceded by poor subjective well-being (Keyes et al., 2012). Among post-secondary students across diverse cultural contexts, life satisfaction, one of the three components of subjective well-being, is regarded as a key psychological indicator and is significantly associated with various psychological factors, including a sense of college belonging, loneliness, optimism, and anxiety (Civitci, 2015).

OVERALL AIM

This study seeks to address this gap by examining subjective well-being among Maltese VET students within this global context of growing mental health challenges. This study also examines demographic and contextual variables related to subjective well-being. Factors such as gender, area, level of study, learning difficulties, mental health conditions and student-lecturer relationship are considered following findings from international (Lemeyre et al., 2023) and local research on mental health (Abela et al., 2024). Examining these associations is vital in developing a deeper understanding of subjective well-being, which can act as a preventative marker for future student mental health risk.

MAIN EXPECTED OUTCOME/S

We envisaged measuring current subjective well-being of VET post-secondary students through two validated instruments: the Brief Multidimensional Students' Life Satisfaction Scale and the Positive and Negative Affect Schedule. We expected to find a relationship between the three components of subjective well-being: Positive Affect, Negative Affect and Life Satisfaction. We predicted factors such as gender, area and level of study, learning disabilities, mental health conditions, student-lecturer relationships, perceived responsibilities, and perceived health to be related to subjective well-being.

RESULTS

Data were collected from 391 students aged 16–46 ($M = 19$) through the administration of an online questionnaire. It is noteworthy that 49% of respondents held part-time jobs, 28% had a diagnosed medical condition, and 20% were experiencing financial difficulties. Students reported an overall moderate subjective well-being. However, lower mean scores were reported in both positive and negative affect when compared to a study carried out during the pandemic with MCAST students aged 18 and over (Atkins, 2022). While results indicate significant interrelations between well-being components (Positive Affect, Negative Affect and Life Satisfaction), these varied from what was expected from the literature. Demographic and contextual variables such as age, gender, socio-economic status, level and area of study, perceived responsibilities, perceived health, and student-lecturer relationships showed significant associations with subjective well-being outcomes. Notably, students with diagnosed mental health conditions or learning disabilities reported lower subjective well-being.

IMPACT OF RESEARCH

The findings of this study highlight the need for differentiated and targeted approaches to supporting student well-being in vocational education and training as part of broader efforts to address the societal mental health crisis. Given that risk and protective factors vary across levels of study, institutions should avoid a one-size-fits-all model and instead develop tiered support systems that address the unique challenges faced by different student groups. For example, lower-level students may require greater academic and financial assistance, while higher-level students may benefit from interventions that reduce workload stress and address the impact of extenuating circumstances for instance union directives. Crucially, the consistent role of student–lecturer relationships as a protective factor underscores the importance of equipping lecturers with the skills to foster supportive, inclusive, and empathetic learning environments. Professional development programmes on relational pedagogy, well-being literacy, and early identification of vulnerable students could be key in this regard. Moreover, embedding well-being within curriculum design, assessment practices, and institutional policy can help create a culture that values and promotes student well-being as integral to educational success. In turn, such practices can enhance not only individual outcomes, such as resilience and retention, but also the broader reputation and effectiveness of educational institutions.

At the same time, these findings signal important directions for future research. Further work is needed to examine which support strategies are most effective in practice, how interventions can be adapted to different student demographics and contexts, and the long-term outcomes of well-being initiatives on academic achievement, retention, and resilience. Future studies should also investigate the mechanisms through which lecturer–student relationships promote well-being and explore innovative, evidence-based approaches to strengthening this protective factor.

KEYWORDS

Subjective Well-Being, Vocational Education, Student Mental Health, Life Satisfaction, Positive And Negative Affect

From Java to Python: Evaluating Student Outcomes and Teacher Experiences in the Computing Secondary Education Syllabus Transition

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BACKGROUND

Selecting the first programming language remains a live question in computing education, with schools weighing factors such as syntax accessibility, conceptual scaffolding, and assessment practicality. Against this backdrop, this study examines learning outcomes associated with a syllabus shift from Java to Python. The research spanned across two academic years (2023–24 and 2024–25) and involved secondary computing students who already had knowledge of Java or Python, as part of the Maltese computing ordinary level syllabus. These students were assigned a standardized exercise and the code produced was independently graded.

A pool of candidate tasks was co-designed with participating teachers to align with curricular objectives and typical classroom practice. These tasks were piloted with a small group of students to assess feasibility and timing, after which one 30-minute task was selected. The grading rubric allocated marks to distinct properties of the student code such as naming and comments, correctness, structure, proper use of language constructs, and clarity to capture both functional and qualitative dimensions of performance. Approximately 85 students took part over the two year period.

The exercise was hosted at MCAST IICT as part of a workshop that also included a tour of the facilities, demonstrations in the robotics lab and a guidance session on future academic and employment pathways, providing additional engagement while keeping the assessment component standardized. Following the visits, focus groups were held with the teachers to give context to the findings. These focus groups explored implementation approaches, perceived challenges, and professional support needs during the transition. The study will include results from official national statistics once these are released.

OVERALL AIM

This study evaluates the implications of the syllabus transition from Java to Python by (i) comparing student performance on a standardized, rubric-graded

programming task; (ii) eliciting students' perceptions of approachability, confidence, and ease-of-use with the language they studied; and (iii) documenting teachers' strategies, challenges, and support needs during the transition. It examines whether programming language choice is associated with differences in code quality, problem-solving outcomes, and perceived accessibility, and triangulates these findings with forthcoming official statistics.

MAIN EXPECTED OUTCOME/S

The study provides empirical evidence on whether Python, compared to Java, leads to higher-quality code and improved problem-solving performance in a standardised programming task. It also aims to capture students' perceptions of Python's approachability and ease of use relative to Java, offering insights into how language choice influences learner confidence and engagement. Additionally, the research identifies key challenges faced by teachers during the transition, including resource gaps and professional support needs, thereby informing future curriculum design and teacher training initiatives.

RESULTS

The standardised programming task revealed a slight overall performance advantage for students who had studied Python compared to those who had studied Java. While students from both cohorts produced functional solutions, Python submissions tended to achieve marginally higher overall scores. The difference, however, was modest and does not indicate a decisive advantage in problem-solving capability at this stage.

Approximately 55 students participated in the first year (Java cohort) and 30 students in the second year (Python cohort), drawn from public, church, and private schools. The task was graded using a common rubric assessing multiple dimensions of code quality and solution completeness, without privileging any language-specific features.

In addition, 10 teachers participated in focus groups that provided a qualitative context. Educators reported a mix of opportunities and challenges during the transition: some observed that Python felt more approachable for beginners, both due to simpler syntax and the ability to avoid object-oriented concepts in the beginning. They noted limited communication between teachers at different schools, declining numbers, disruptions related to COVID and ongoing changes in assessment procedures. Further analysis will incorporate official SEC examination statistics once they are published, enabling a more comprehensive comparison between this standardised exercise and national assessment outcomes.

IMPACT OF RESEARCH

This analysis provides initial, practice-grounded evidence about the Computing Secondary Education syllabus transition from Java to Python. The preliminary results show a modest overall advantage for students who studied Python and indicate that learners perceive it as more approachable. It suggests that adopting Python can lower barriers to entry and strengthen early engagement. An alignment with broader educational continuity is noted: Python has been adopted within the A-Level Computing syllabus and is widely used at MQF Level 6, creating a coherent progression from secondary through advanced and tertiary studies.

For students, the improved approachability can translate into higher confidence, better persistence on tasks, and potentially increased enrolment and retention in Computing pathways. At the same time, concerns were voiced by teachers about adapting to the new syllabus and coverage of different techniques at appropriate points in the pathway, along with the introduction of electronic boards and GUIs.

For teachers, the findings highlight the importance of structured professional development and shared resources during the transition. Priorities include sample tasks and solutions in Python, rubrics aligned to syllabus objectives, cross-school moderation opportunities, and communities of practice that reduce isolation. This is especially salient given declining enrolments in computing and changes in assessment logistics at the ordinary level.

At a system level, the study underscores the value of evidence-based reform. Comparing these findings with forthcoming official SEC statistics will enable more robust judgments. Monitoring indicators such as enrolment trends, transition rates, gender balance, and attainment gaps can guide targeted interventions. Investments in accessible teaching materials, student-friendly tooling, and teacher time for collaboration can help convert the transition's promise into sustained improvements in outcomes.

Overall, the move to Python, coupled with deliberate support for conceptual depth and teacher capacity, can strengthen Malta's digital skills pipeline from secondary to advanced and tertiary education.

KEYWORDS

Programming, Computing, Secondary Education, Curriculum.



**MCAST
RESEARCH & INNOVATION
EXPO 25**

***BUSINESS, MEDIA, ARTS, AND
CULTURAL PERSPECTIVES IN
RESEARCH***



MCAST

BUSINESS, MEDIA, ARTS, AND CULTURAL PERSPECTIVES IN RESEARCH

Borma Tbaqbaq: Colonialism and the oppression of women

Tyrone Grima¹

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BACKGROUND

Borma Tbaqbaq is a research project based on the theatrical work created by Valeria Buhagiar (Maltese-Canadian director of the film Carmen), Angele Galea and Pauline Fenech. The plotline of the play centres on a man, accused of having killed a young girl in Malta. A Canadian lawyer of Maltese origins is flown into Malta to defend the case, revisiting issues of deep intergenerational trauma in the process. My role in this project, apart from researching, will be in supporting the production team and directing this theatrical piece.

The concept behind this practice-as-research project on feminist theatre is to further uncover the parallels between colonialism and the oppression of women, using theatre as an effective and safe tool. The patterns of oppression to 'control' women are a mirror of how colonialism works, and we are still under its influence. The stripping away of identity, self-pride and confidence of oppressed women happens through a gnawing narrative that is both toxic and inhumane, leaving a husk of what once was a beautiful, well-adjusted woman.

This feminist theatre piece highlights a number of pertinent and pressing issues. Theatre is the perfect vehicle to portray and explore abuse of power and put a spotlight on the contributions and the value that women enrich our societies with. The above-mentioned intergenerational wounds, compounded and drilled into our communities by colonialism and patriarchy, need to be exposed and faced before they can ever be overcome and healed. The communal experience that is offered to an audience watching this explained to them on stage is very powerful and can help in bringing change.

OVERALL AIM

Research through theatre gives the opportunity for in-depth questioning that arises from analysing different audience interactions. The project aims to produce

a work that transcends our experience as Maltese but touches the heart of an international problem we still see around us – the taking of land from others, the audacity to strip others of their rights and seeing others as less, and the outright killing of others.

MAIN EXPECTED OUTCOME/S

Such investigative theatre sheds further light on the lack of equal representation, the lack of work/life balance, the level of self-sacrifice expected from women, lower access to resources and lack of proper and adequate support. It is imperative to face it head-on to eradicate these inequalities from the root of the problem, not glaze over them and tick boxes. Treating women as lesser beings is dangerous and affects their quality of life. Femicide is a worldwide issue that this project intends to address in an artistic framework, a thought-provoking and relevant theatrical experience. Theatre is a tool to promote empathy, solidarity and social justice.

RESULTS

A methodology/modus operandi of how theatre can be used to exhibit and explore issues related to feminism.

IMPACT OF RESEARCH

'Borma Tbaqbaq: Colonialism and the oppression of women' builds on previous and on-going research in showing how theatre can be a powerful tool to address issues and dynamics related with feminism.

KEYWORDS

Feminism, Colonialism, Performance, History.

Dynamic Integrated Virtual Event System: Unveiling initial results of a modular methodological framework to enhance audience engagement in live event production

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BACKGROUND

The integration of virtual elements into live events has transformed audience engagement by merging physical and digital realms into immersive, interactive experiences. This research project, in collaboration with industry partner Studioseven, proposes a modular methodological framework to enhance audience engagement in live event production. Aligned with MCAST's Future Digital Technologies pillar, the project addresses industry demands for scalable, dynamic solutions to elevate audience participation through innovative narratives. The framework leverages visual programming tools to integrate diverse media sources, real-time data, sound, music, and emerging technologies into cohesive narratives.

In the presentation, initial results of the structured methodological framework will be presented based on key themes from the literature review, international case study examples, and needs analysis with Studioseven. These sources are central to the development stages of this project.

OVERALL AIM

The research presentation "Dynamic Integrated Virtual Event System: Unveiling Initial Results of a Modular Methodological Framework to Enhance Audience Engagement in Live Event Production" aims to share preliminary findings from a comprehensive data triangulation analysis. By synthesising insights from three key sources:

- 1. thematic trends in literature,*
- 2. international case study benchmarks,*
- 3. a needs analysis with industry partner Studioseven*

The aim is to validate the framework's design through the research presentation by demonstrating how the modular methodology could address a number of gaps identified in existing research. Through this presentation, the aim is also to

highlight industry relevance of DIVES by revealing key methodological objectives based on Studioseven's operational challenges and opportunities. Finally, the presentation aims to propose actionable methodological innovations to showcase early evidence of how a dynamic virtual-physical integration can elevate audience participation in a live event. This presentation bridges theory and practice, positioning the framework as a transformative tool for the events sector while inviting collaborative refinement from academia and industry stakeholders.

MAIN EXPECTED OUTCOME/S

This research addresses the industry's need for scalable digital solutions in immersive live events by proposing a modular framework that seamlessly blends virtual and physical elements through advanced technology. The outcomes of the research presentation will demonstrate how enhanced audience engagement in live events could be attributed to the skilful application of innovative digital technologies and narratives. These findings position the framework as a transformative tool for live event production, setting the foundation for a practical pilot project example that could offer actionable insights for entertainment, corporate, and cultural sectors.

IMPACT OF RESEARCH

The integration of digital technology, artificial intelligence (AI), immersive media, and interactive storytelling in live event production has the potential to revolutionise the industry by introducing innovative, data-driven methodologies. This research study aims to develop practical solutions that enhance audience engagement while streamlining production workflow tailored for the dynamic needs of diverse live event production.

The key areas of impact are:

1. Scalable AI-Driven Content Generation

One of the most transformative contributions of this research is the development of AI-driven automation for live events. Through the combination of machine learning and real-time data processing, the study explores how AI can dynamically adjust lighting, visuals, and audio in response to audience interactions and performer cues. This approach eliminates the need for pre-programmed sequences, allowing for truly adaptive performances that evolve organically. The potential applications extend beyond entertainment as it could also be applied to corporate events, educational seminars, and cultural performances that could all benefit from AI-enhanced personalisation and responsiveness.

2. Forward-Looking Hybrid Event Strategies

The shift toward hybrid (virtual + physical) events has accelerated, yet many productions still struggle with seamless integration. This research seeks to establish a replicable framework that bridges digital and physical spaces, ensuring cohesive experiences for both in-person and remote audiences. By standardising best practices in virtual stage design, real-time streaming optimisation, and interactive participation tools, the study could help event producers overcome logistical challenges while expanding global reach and accessibility.

3. Measuring & Optimising Audience Engagement

Traditional audience analytics often rely on post-event surveys or passive metrics. This research introduces real-time data models that track engagement through biometric feedback, interaction patterns, and sentiment analysis. By capturing live audience responses, event organisers can make on-the-fly adjustments to maximise impact. These insights also provide long-term value, helping creators refine future events based on empirical behavioural trends rather than intuition alone.

By challenging conventional production methods, this research encourages a shift toward adaptive, intelligent event design. The findings could influence not only entertainment but also sectors like education, marketing, and cultural heritage, where immersive storytelling is gaining traction. Additionally, this research collaboration with industry (Studioseven) ensures that theoretical findings translate into real-world applications, strengthening this research's potentials as an example for digital event innovation.

KEYWORDS

Immersive Digital Events, AI-Driven Event Production, Real-Time Audience Interaction, Scalable Live Event Technologies

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Exploring Play As A Coping Strategy And Its Non-Immediate Effects On Level 2 Performing Arts Students

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BACKGROUND

This study frames co-facilitated, sociodramatically informed, play-based practice as a vehicle for learning, co-regulation, and social transformation, implemented within a Practice as Research (PaR) framework. Three cohorts of Level 2 students who chose performing arts for the second semester participated: one control group and two experimental groups. The study initially considered final-year students but shifted to Level 2 due to barriers such as part-time employment, academic pressures, and social hesitancy. This decision also aligned with the higher dropout rates typically observed among lower-year students (Torou, Borg & Chircop, 2022). Embedding the EXIT framework (Meyers, 2016) within a play-rich, spatially dynamic environment enabled the actualisation of transitional phenomena and objects (Winnicott, 1971), as well as embodied play in contexts of transition and potential trauma, supporting adaptive, socially attuned, and imaginative capacities while fostering agency, shared authorship, and co-responsibility.

For the first time, the EXIT framework was implemented in a room with diverse balls, providing a constant playful setting that invited curiosity, experimentation, and a sense of belonging. Play supported social interaction in multiple ways. Free play gave participants space to experiment, take risks, and act spontaneously, helping them explore personal boundaries and try out new behaviours. Rule-based play introduced structure, requiring negotiation, cooperation, and shared responsibility, thereby strengthening group dynamics and collective accountability. Artistic play combined imagination and decentering—a crucial component of Expressive Arts—encouraging participants to step outside their habitual perspectives, engage with situations differently, and explore new modes of self-expression. Together, these forms of play created a dynamic environment that supported cognitive, emotional, and social growth.

Over the four-month program, participants demonstrated increased co-responsibility, creativity, and social cohesion, enabling them to reimagine interactions and internalise principles of agency, action, and inclusivity. By

prioritising process over product, the project modelled an approach that encouraged experimentation and emergent meaning-making rather than adherence to predetermined outcomes. Sociodrama (Moreno, 1946) and his concept of breaking the cultural conserve provided a practical framework for exploring social realities, habitual roles, shared ideologies, and relational tensions through role-playing, brainstorming, and play.

The observed outcomes indicate that this approach can cultivate empowerment, belonging, and agency. At the end of the study, 60% of participants (average age 16) expressed a desire to continue their studies at MCAST. The findings also suggest that this process may be particularly beneficial for young people navigating transitions toward independent or semi-independent life beyond family or institutional settings. Moreover, extending EXIT and play-based sociodrama to other educational levels—particularly Level 3 students, who historically exhibit the highest dropout rates (Torou, Borg & Chircop, 2022)—could provide timely relational and embodied support during critical transitions, highlighting its potential for broader future implementation and impact.

OVERALL AIM

The project aimed to implement the EXIT framework within a play-rich, spatially dynamic environment to support participants' adaptive, imaginative, and socially attuned capacities. By combining free, rule-based, and artistic play, the project sought to cultivate agency, shared authorship, and co-responsibility, while enabling exploration of personal boundaries, experimentation with new behaviours. Through this approach, the project intended to create a setting that nurtures cognitive, emotional, and social negotiation, encourages curiosity and risk-taking, and promotes collective accountability within a playful, supportive, and expressive context.

MAIN EXPECTED OUTCOME/S

The main expected outcome of implementing the EXIT framework in a playful classroom is the emergence of a strengthened sense of community and belonging within MCAST, alongside enhanced individual self-awareness and agency. While specific developments are inherently unpredictable due to the framework's responsiveness to the group's unique dynamics, prior evidence demonstrates that EXIT effectively encourages social cohesion, collaborative engagement, and adaptive capacities. By embedding play as a core element, participants are anticipated to experience increased curiosity, experimentation, and shared responsibility, creating an environment in which both collective and individual

growth are supported, and the relational and imaginative potential of the group can be actively realised.

RESULTS

The observed outcomes indicate that this approach can cultivate empowerment, belonging, and agency. At the end of the study, 60% of participants (average age 16) expressed a desire to continue their studies at MCAST. The findings also suggest that this process may be particularly beneficial for young people navigating transitions toward independent or semi-independent life beyond family or institutional settings. Moreover, extending EXIT and play-based sociodrama to other educational levels—particularly Level 3 students, who historically exhibit the highest dropout rates (Torou, Borg & Chircop, 2022)—could provide timely relational and embodied support during critical transitions, highlighting its potential for broader future implementation and impact.

IMPACT OF RESEARCH

This project demonstrates how embedding the EXIT framework within a playful classroom can inform curriculum design by prioritising experiential, body-based, and socially attuned learning. With the amalgamation of playful, emergent activities, participants develop co-regulation skills and the ability to be fully present in the here and now and an awareness of emotional stability—foundational capacities often overlooked in traditional curricula. These processes, in turn, support agency, collaboration, and creativity. Beyond education, structured play strengthens social cohesion, inclusivity, and a sense of belonging, illustrating how responsive, evidence-based frameworks can bridge individual development with collective well-being, ultimately contributing to a healthier, more adaptive society.

KEYWORDS

Expressive Arts in Transition, Play, Social Negotiation, Transitional Objects, Co-regulation

Traditional Maltese Textile Crafts: A Study on Their Contribution to Health and Wellbeing

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BACKGROUND

Traditional textile crafts have long been an integral part of Maltese cultural heritage, yet there seem to be fewer people who practice these skills on a regular basis. This study aims to investigate the positive effects on well-being when engaging in traditional Maltese textile crafts, such as lace-making (bizzilla), weaving (insig), and embroidery (rakkmu), across different age groups.

The researcher will employ a three-research methodology approach throughout the study. The first phase involves conducting observational studies of Maltese and Gozitan artisans who frequently practice these traditional techniques and may have also taught them to others. The second phase focuses on developing three games inspired by these heritage skills. Designed as hands-on, physical games, they will encourage participants to actively engage with the crafts. Additionally, an online application will be designed to support continued skill development beyond the games. Branded as ‘Hilietna,’ both the games and the application aim to unite people while promoting well-being, togetherness, and cultural appreciation through craft.

In the third phase, a public event will be organised to attract participants of all ages, encouraging them to engage with the games and application use. Phase four includes pre- and post-participation surveys that will measure changes in mood, stress levels, and cognitive engagement, providing valuable insights into the therapeutic potential of these crafts.

The researcher will collaborate with Camilleri Paris Mode, a brand committed to supporting local artisans and promoting Maltese craftsmanship in fashion and interior design. Their involvement will help ensure cultural authenticity and relevance.

The project’s recommendations and the developed games and applications can guide policymakers, educators, and healthcare professionals on integrating textile-based therapies into community programs, schools, elderly homes and mental health initiatives. Ultimately, this research aims to bridge tradition with

modern wellbeing practices, preserving Maltese textile heritage while promoting holistic health benefits across generations.

OVERALL AIM

The overall aim of this study is to explore the contribution of traditional Maltese textile crafts, specifically lace-making (bizzilla), weaving (insig), and embroidery (rakkmu), to individual and community health and wellbeing. By combining observations, game-based engagement workshops, and a digital tool, the research seeks to evaluate the therapeutic, cognitive, and social benefits of these practices. It further aims to preserve and promote Maltese textile heritage while offering practical recommendations for integrating craft-based interventions into education, healthcare, and community programs, ultimately fostering cultural continuity, stress reduction, and intergenerational connection.

MAIN EXPECTED OUTCOME/S

The study is expected to generate evidence on how Maltese and Gozitan artisans preserve, teach, and promote traditional textile crafts while highlighting their role in wellbeing. It will deliver three heritage-inspired educational games and an interactive online application, both designed to encourage learning, creativity, and stress relief across all ages. By merging tradition with modern pedagogy, the project will foster intergenerational engagement, cultural preservation, and therapeutic benefits.

RESULTS

Although the project is still in progress, several expected results can be presented during the EXPO. The initial Literature Review has provided valuable insights into the history and evolution of local textile techniques, documenting their role in Maltese cultural identity. It also highlights their implementation in both informal and formal education, as well as their cultural and therapeutic significance, particularly their potential to foster wellbeing, strengthen social cohesion, and support cultural continuity. This review serves as a critical foundation for integrating traditional Maltese crafts into innovative game-based learning and educational practices.

Data gathered through preliminary observations with artisans in lace-making (bizzilla), weaving (insig), and embroidery (rakkmu) has shed light on their current practices, teaching methods, and approaches to sustaining heritage crafts. These findings not only document the techniques and traditions but also capture the artisans' perspectives on the emotional, cognitive, and social benefits of engaging

with their craft. Such data will serve as an essential reference for designing meaningful resources to further enhance the benefits of wellbeing when engaging in textile-art practices.

In addition, prototype models of the three physical games inspired by these traditional skills will be available for display. While still in the testing phase, the games represent an innovative way of engaging different age groups in fun, yet culturally rich activities. Their design integrates elements of creativity, teamwork, and skill-building, ensuring that they are both educational and enjoyable.

Collectively, these expected outcomes demonstrate the project's potential to bridge cultural preservation with wellbeing promotion, offering new ways to sustain Maltese textile heritage while engaging diverse communities.

IMPACT OF RESEARCH

Impact on Society

This research has the potential to generate significant social impact by reintroducing traditional Maltese textile crafts into the lives of diverse communities. Crafts such as lace-making, weaving, and embroidery are more than artistic expressions; they are carriers of identity, history, and intergenerational knowledge. By highlighting their therapeutic value, the research demonstrates how heritage practices can support wellbeing, reduce stress, and encourage mindfulness.

The research also contributes to strengthening community cohesion. Through the development of physical games and the #ilietna application, the crafts are transformed into accessible and interactive experiences that appeal to children, youth, adults, and the elderly alike. This encourages intergenerational dialogue, where younger generations learn from older artisans, while older participants experience a renewed sense of purpose in passing on their knowledge. Such interactions foster stronger social bonds, inclusivity, and mutual respect.

Additionally, the project raises awareness of Malta's intangible cultural heritage at a time when globalisation and industrialisation have threatened traditional practices. By presenting these crafts as contemporary tools for creativity, education, and health promotion, the research supports cultural sustainability. Collaborations with local brands such as Camilleri Paris Mode ensure that artisans are recognised and valued, strengthening local economies and reinforcing Malta's position as a country that cherishes and revitalises its cultural roots.

Impact on Curriculum

In terms of education, this research offers a fresh framework for integrating traditional skills into modern curricula. The games and digital applications developed during the project can serve as innovative teaching resources, demonstrating how cultural heritage can be combined with experiential and game-based learning methodologies. By embedding these activities within schools, vocational programs, and lifelong learning initiatives, students gain not only practical skills but also insights into history, creativity, and wellbeing.

Curriculum designers can use the research findings to develop cross-disciplinary modules that merge arts, culture, and health education. For example, lessons on embroidery could combine elements of design, mathematics, and fine motor skills, while weaving could be connected to sustainability and material sciences. Furthermore, the therapeutic aspects of crafts highlighted in this research could inform the development of programs aimed at supporting mental health in educational settings, offering students creative outlets to manage stress and improve concentration.

For adult and community education, the integration of crafts into curricula provides opportunities for upskilling, personal growth, and social interaction. Elderly participants can benefit from cognitive stimulation and social engagement, while younger learners are exposed to traditions that enhance cultural literacy and identity.

Ultimately, the research bridges tradition and innovation, positioning Maltese textile crafts as valuable educational tools that enrich curricula while simultaneously promoting wellbeing, creativity, and cultural continuity.

KEYWORDS

Textile crafts, Traditional, Maltese, Wellbeing, Educational

Project financed by the Ministry for Education, Sport, Youth, Research and Innovation



From flash fiction to the theatre stage. Dramaturgical insights from the production of Mitt Ruħ.

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BACKGROUND

The presentation draws upon outcomes of a research project entitled ‘Mitt Ruħ: From microstory to the stage. A practice-as-research study into character development and staging’. The project was inspired by Ġorġ Mallia’s flash fiction collection, Mitt Ruħ, which included one hundred character-centred micro stories, and their respective illustrations. The process began with a study into character development and character-led devising, followed by a number of characterisation workshops, in collaboration with Theatre Lab Malta, which tested the micro-story as a tool for training in characterisation techniques. Subsequently, the study looked at the same micro stories as a tool for devising techniques, during which theatrical scenes were explored in preparation for the drafting of a theatre script. The playwrighting process was informed by all of the aforementioned phases of the study. Finally, a play script was produced, taken through all the stages of a production process, in collaboration with Theatre Lab Malta. The theatrical performance, Mitt Ruħ, which was staged at Spazju Kreattiv in collaboration with the support of Arts Council Malta in December of 2023, emerged out of the complex intra-actions – to use Barad’s posthumanist term – of a number of



creative agents including the script, Mallia's original micro stories and respective illustrations, the direction, the performers, set, light and sound design, and the engagement of the audience, among others. Impressions from the audience were also collected via an online questionnaire and personal observations obtained after each performance. The presentation will focus primarily on the dramaturgical developments that emerged from the complex process outlined above, with insights that may be relevant to both characterisation and playwrighting approaches.

OVERALL AIM

The aim of the presentation is to draw dramaturgical insights, within a post-humanist framework, from observations on the intra-active relations between the main agencies involved in the process. A post-humanist framework in this sense is fitting because both human (direction, performers, designers, audience, etc.) and non-human (printed stories and illustrations, script, design elements, etc.) agencies contributed to the development of the dramaturgy in a complex, intra-active way. Ultimately, the aim is to share and disseminate the process among theatre educators, students, and makers, and other artists, especially those active within the MCAST Institute of the Creative Arts.

MAIN EXPECTED OUTCOME/S

As already indicated above, the main outcomes include observations on the organic approach applied in the research project, which allowed for different stages and agencies to inform the creative process. Apart from the writing of the script and the process that led to its full theatre production, outcomes also include insights into rehearsal processes, and observations taken from the audience.

RESULTS

As noted above, the presentation will focus mainly on the creative process and the reception of the performance from the audience's point of view. Although the creative process involved an opening to various agencies, ultimately it was steered by the researcher as writer and director. I shall therefore be sharing my own observations of the process from such a point-of-view. However, the presentation will also juxtapose the makers' dramaturgy with some observations coming from a mixed audience, made up of theatre-educated perspectives and the perspectives of a mixed audience. The emphasis of the presentation, however, will be more on sharing the creative process.



IMPACT OF RESEARCH

Research shows that the adaptation of flash fiction to the theatre stage is not very common. Mitt Ruñ also took a particular approach, which cannot be described simply as an adaptation of content from one medium (flash fiction) into another medium's expression (the theatre). Sharing both how Mallia's microstories were used during the characterisation workshops, as well as how they were used during the playwriting and rehearsal process, can inform both the formation of apprentice actors and playwrights, as well as possibly inform the practices of more experienced theatre makers.

KEYWORDS

Flash Fiction, Playwriting, Dramaturgy, Rehearsals, Audience Reception

Eco-Somatic Scores: Choreographic Navigations with Maltese Ecologies

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BACKGROUND

Malta, as a small island state, faces pressing ecological challenges such as water scarcity, coastal vulnerability, and biodiversity loss. While these issues are often discussed in scientific and policy contexts, the arts offer complementary, embodied ways to sense and respond to ecological transformation. Eco-Somatic

Scores: Choreographing with Maltese Ecologies is a workshop series developed within the broader MSCA-ERA Fellowship project Environmental Turn of Dance (ETD). It explores how somatic practice, choreographic methods, and simple AI-assisted tools can cultivate ecological awareness in participants. The workshop invites communities to engage directly with their surroundings, using bodily exercises, environmental listening, and score-based improvisations to rehearse new relationships with local ecologies. Participants co-create “scores” (sets of open instructions) that frame the environment not as a passive backdrop but as an active co-choreographer. This approach draws from ecological philosophy and dance studies, emphasising resilience, attentiveness, and intra-connectedness. At MCAST, the Applied Research and Innovation Centre (ARIC) provides the interdisciplinary setting for developing and testing these practices in collaboration with artists, students, and community stakeholders.



Through accessible formats, open-science documentation, and public sharing, the workshops aim to foster ecological literacy, community dialogue, and sustainable habits. By integrating environmental data, embodied practice, and creative expression, Eco-Somatic Scores offers a replicable model for combining research, education, and public engagement.

OVERALL AIM

The aim of Eco-Somatic Scores is to design and deliver participatory workshops in Malta that combine somatic movement, choreographic scores, and ecological awareness. By situating bodies in relation to local environments and multispecies dynamics, the workshops cultivate attentiveness, resilience, and sustainable behaviours. They demonstrate how dance-based methods can complement scientific and policy approaches, fostering ecological dialogue across educational, cultural, and community settings.

MAIN EXPECTED OUTCOME/S

The workshop is expected to generate: (1) reproducible eco-somatic score formats adaptable for schools, arts organisations, and community groups; (2) heightened participant awareness of ecological interdependence, measured through reflective feedback; (3) an interdisciplinary template linking dance, environmental philosophy, and applied sciences; and (4) publicly accessible documentation (images, notes, open datasets) to support replication.

RESULTS

Ongoing research

IMPACT OF RESEARCH

Eco-Somatic Scores contributes to impact in three interlinked domains: research, education, and community engagement.

Research impact: Within dance studies and environmental humanities, the workshop advances the concept of “environment as co-choreographer.” It expands methodological repertoires by formalising eco-somatic scores that bridge embodied awareness with ecological indicators. Documentation through open-science practices ensures that insights are accessible for future study, while interdisciplinary collaboration with AI and applied sciences introduces novel tools for dance-based environmental inquiry.

Educational impact: The workshop provides a transferable format that can be adopted by schools, higher education, and cultural institutions. Its participatory

structure allows students to engage with ecological themes experientially, complementing formal curricula in science and sustainability. By nurturing embodied literacy alongside scientific knowledge, the workshops contribute to holistic education and align with the EU's Green Deal and Sustainable Development Goals.

Community impact: For Maltese residents, artists, and community groups, the workshop serves as a forum for dialogue and collective experimentation. By situating movement in local environments—from gardens to coastal areas—it fosters shared responsibility for ecological stewardship. Accessible facilitation (multilingual, inclusive, trauma-informed) ensures participation across diverse groups, including youth and underrepresented communities. The outcomes—such as greener event practices and community-generated scores—can inform local NGOs, policy actors, and cultural organisations seeking to embed sustainability in their practices.

Overall, Eco-Somatic Scores models how participatory art practice can support resilience and ecological consciousness in small-island contexts. Its integration into the MCAST Research & Innovation Expo demonstrates the college's leadership in connecting creativity, sustainability, and applied research for tangible societal benefit.

KEYWORDS

Eco-Somatics, Choreographic Scores, Environmental Awareness, Community Practice, Malta



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EXPO 25**

***TECHNOLOGY, HEALTHCARE,
AND THE HUMAN EXPERIENCE
IN RESEARCH***



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TECHNOLOGY, HEALTHCARE AND THE HUMAN EXPERIENCE IN RESEARCH

Symmetries in Random Permutations and the P vs NP problem

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BACKGROUND

An analysis of randomly selected permutations is presented. The random permutations are joined together with Feistel rounds to build encryption and hashing algorithms. Using this method, the unconditional existence of one-way functions is proven. The existence of one-way functions has important implications in computer science and cryptography.

OVERALL AIM

To present the work leading to the paper "Symmetries in Random Permutations and the P vs NP Problem" as well as the follow-up papers, currently in peer-review, which are due to be published later this year.

To increase the audience and interest in the results, as well as showcase the methods used to achieve the results.

To present solutions to important open questions in computer science.

MAIN EXPECTED OUTCOME/S

Increased audience and understanding.

Presentation of solution to P vs NP problem, as well as other related problems.

RESULTS

Algorithm $\#$ is a one-way function. The existence of a one-way function implies that $P \neq NP$.

It is possible to show that $P=NP$ for unary languages.

IMPACT OF RESEARCH

The P vs NP problem is one of the Millennium Problems. These are a set of well-known open problems presented by Clay Mathematics institute. The P vs NP

problem is the most famous open problem in computer science with strong implications in all scientific fields.

The existence of one-way functions is a stronger result. It is equivalent to the existence of non-trivial symmetric encryption.

KEYWORDS

P vs NP, Symmetric Encryption, Computational Theory, One-way Functions

SmartShield

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BACKGROUND

Space debris, defined as man-made objects in orbit that no longer serve a useful purpose, represents a growing hazard to operational satellites and spacecraft. These objects vary widely in size and are typically classified into three categories: smaller than 1 mm, between 1 mm and 10 mm, and



larger than 10 mm. While existing shielding systems can effectively withstand impacts from sub-millimetre particles, and Earth-based observation systems are capable of tracking debris larger than 50 mm, a critical detection gap remains for objects in the 1–10 mm range. At low Earth orbit (LEO) altitudes, such debris can travel at velocities exceeding 5 km/s, carrying enough kinetic energy to cause severe structural damage.

Currently, traditional material testing for satellite shields often relies on a pass/fail assessment, providing limited information on the extent or nature of the damage. This lack of detailed impact characterisation limits a satellite operator's ability to determine whether the spacecraft remains safe for continued operation, requires repair, or should be decommissioned. Furthermore, undetected damage can compromise mission objectives and reduce satellite lifespan.

There is therefore a clear need for in-situ sensing technologies capable of detecting, locating, and quantifying impacts in real time. Such systems would enable better-informed decisions on satellite maintenance and contribute to a more comprehensive understanding of the debris environment in LEO. By closing the detection gap for small yet hazardous debris, these technologies could play a crucial role in enhancing satellite resilience, improving space situational awareness, and supporting long-term sustainability of orbital operations.

OVERALL AIM

The aim of this project was to develop and validate a smart surface sensor integrated into a satellite shield, capable of detecting, locating, and quantifying damage caused by space debris impacts. By employing a multilayer resistive track network and timing circuitry, the system sought to estimate the size, shape, and speed of impacting debris. This technology aimed to close the existing detection gap, improve satellite health monitoring, and support informed maintenance and operational decision-making in orbit.

RESULTS

The smart surface sensor's performance was validated through simulation in Proteus, with an Arduino Mega handling control and data processing. Eleven tests were conducted to assess size and shape estimation. The system consistently detected single impacts at edges, corners, and the grid centre, confirming uniform sensitivity across the surface. It successfully identified the minimum detectable area of 1×1 mm and accurately mapped larger damaged regions. The sensor distinguished separate impacts, merged overlapping zones into contiguous areas when appropriate, and avoided false detections when only partial layer disruptions occurred.

Eight additional tests evaluated the velocity measurement subsystem. The system reliably converted timing delays between front and rear layer penetrations into accurate velocity estimates for different layer spacings. Timing resolution scaled proportionally with clock frequency, and accuracy was confirmed using known delays. The maximum measurable delay was limited by the monostable circuit to approximately 1.1 ms; however, bypassing this allowed the full 12-bit counter range of 4095 counts to be utilised. Reverse signal sequencing caused inconsistent results, revealing a firmware limitation when handling non-standard event orders.

Overall, the sensor achieved high-resolution damage detection, precise impact shape reconstruction, and robust speed estimation for space debris. These results validate its potential as a low-cost, scalable, and integrable solution for in-situ monitoring of satellite shield impacts, supporting improved satellite health assessment and debris environment analysis.

IMPACT OF RESEARCH

From an operational perspective, integrating this technology into satellite shields could transform post-impact decision-making. Instead of relying on indirect assessments or waiting for mission degradation to become apparent, operators

would receive immediate and detailed impact reports. This would support proactive maintenance scheduling, targeted repairs, and, in some cases, the ability to modify mission parameters to mitigate further damage. The resulting improvements in satellite health monitoring could extend mission lifetimes, reduce unplanned downtime, and optimise resource allocation.

Beyond individual spacecraft, widespread adoption of this technology could significantly enhance the overall understanding of the LEO debris environment. By aggregating in-situ measurements from multiple satellites, it would be possible to build more accurate debris distribution models, identify high-risk orbital regions, and refine mitigation strategies. Such data would also complement existing ground-based and space-based observation systems, providing a more complete picture of the debris population across size ranges.

Economically, the technology offers a low-cost, scalable, and easily integrable solution compared to alternative sensing methods, making it suitable for both new satellite designs and retrofitting on existing platforms. This affordability increases its potential adoption across a wide range of missions, from commercial communications to Earth observation and scientific research satellites.

KEYWORDS

Smart Shield, Satellite Space Debris



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Bridging Complexity and Practice: A Sequential GIS-Based Framework (SHIL) for Ecosystem Prioritisation in the Mediterranean

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BACKGROUND

Biodiversity loss is accelerating worldwide, largely due to habitat degradation, land-use change, and climate pressures. These threats are particularly critical in the Mediterranean Basin, one of the world's biodiversity hotspots, where ecological richness coincides with high anthropogenic pressures. Conservation and restoration strategies in such regions require robust tools that can integrate multiple datasets, identify ecological priorities, and support decision-making across scales. While advanced tools like Zonation, Marxan, or Prioritizr are powerful, they are often technically demanding, requiring specialised software, coding skills, and advanced statistical knowledge. This limits their practical use by regional planners, managers, and practitioners.

In contrast, Geographic Information Systems (GIS) are widely adopted in conservation planning for their accessibility and capacity to manage diverse datasets. However, most GIS-based approaches lack standardised frameworks for systematically prioritising ecological values in a transparent, reproducible manner. To fill this gap, the Sequential Hierarchical Intersection Layers (SHIL) method was developed as a GIS-based framework that integrates habitat quality, biodiversity values, and ecological connectivity through sequential intersections of ecological datasets. SHIL emphasises accessibility, transparency, and replicability, making it a valuable tool in contexts where data availability and technical expertise may be limited.

Sicily, with its diverse habitats, high endemism, and strategic biogeographic position in the Mediterranean, provides an ideal case study to test the SHIL method. Despite being a biodiversity hotspot, the island faces significant fragmentation, land-use pressures, and lagging integration of ecological priorities into spatial planning, underscoring the urgency of applying systematic conservation approaches.

OVERALL AIM

This research aims to develop and test the Sequential Hierarchical Intersection Layers (SHIL) framework as an accessible, replicable, and scalable GIS-based tool for ecosystem prioritisation. By applying SHIL to Sicily, the study evaluates its ability to integrate habitat quality, species richness, and ecological connectivity into a composite prioritisation index. The ultimate goal is to provide researchers, planners and conservation practitioners with a transparent, user-friendly method to identify ecological hotspots and inform biodiversity management in Mediterranean and comparable regions.

MAIN EXPECTED OUTCOME/S

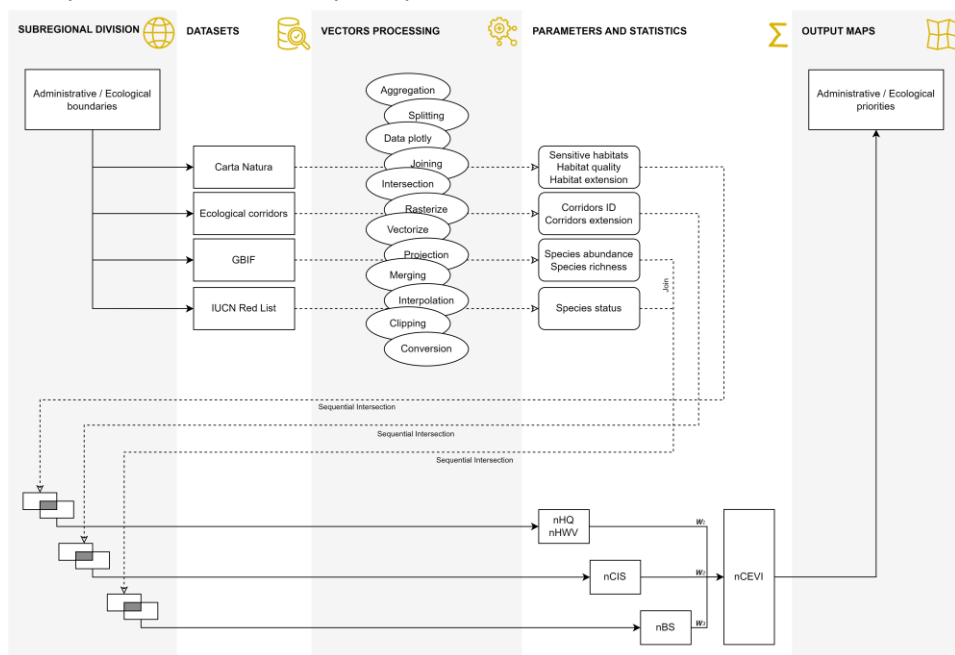
The main expected outcome is the validation of SHIL as a practical and transferable conservation planning tool. By producing spatially explicit prioritisation maps, the framework is expected to highlight ecological strongholds, critical corridors, and areas requiring urgent intervention in Sicily. The method should demonstrate that complex ecological data can be integrated into a transparent, stepwise workflow within a standard GIS environment. This outcome will confirm SHIL's utility as a decision-support system that bridges scientific research and policy, guiding conservation and restoration actions in biodiversity-sensitive regions.

RESULTS

Application of the SHIL framework in Sicily generated multi-scale prioritisation outputs at both administrative (municipal) and ecological (habitat-polygon) levels. Habitat quality assessments revealed a fragmented ecological mosaic, with high-quality areas concentrated in the mountainous and inland provinces of Palermo, Messina, Enna, and Caltanissetta, corresponding to the Madonie, Nebrodi, and Etna systems. In contrast, low values were prevalent in coastal and urbanised zones, particularly in Trapani, southern Agrigento, and eastern Catania, reflecting significant anthropogenic pressure. The Biota Score, derived from species occurrence data, identified localised hotspots such as Favignana, Pantelleria, and Lipari, while most municipalities exhibited low species-based values due to uneven sampling and limited data coverage. Ecological connectivity analyses further highlighted the scarcity of intact functional corridors, with central and south-eastern provinces (Enna, Caltanissetta, Ragusa, Siracusa) emerging as critical nodes requiring conservation attention. Integration of indices into the Composite Ecological Value Index (CEVI) provided a holistic prioritisation. High CEVI scores clustered in the island's central and north-eastern regions, confirming their importance as ecological strongholds. Notably, smaller islands also ranked highly,

underscoring SHIL’s capacity to detect ecologically valuable isolated systems. At the habitat scale, the framework provided finer granularity, capturing fragmented yet high-value habitat patches that were not fully represented at the municipal scale, reinforcing the benefit of applying SHIL across multiple subdivision layers.

Overall, SHIL proved effective in synthesising diverse datasets into clear, reproducible prioritisation outputs. Its application demonstrated that the method can highlight both broad ecological patterns and fine-scale conservation opportunities, making it a practical and adaptable tool for conservation planning in Sicily and other biodiversity hotspots.



IMPACT OF RESEARCH

The accelerating global biodiversity crisis requires tools that can bridge the gap between scientific research and practical conservation planning. The Sequential Hierarchical Intersection Layers (SHIL) framework responds directly to this challenge by providing an accessible, replicable, and transparent approach for ecosystem prioritisation. Its impact is twofold: advancing methodological innovation in conservation planning and offering immediate practical value to decision-makers operating in biodiversity-sensitive regions such as the Mediterranean.

From a methodological perspective, SHIL demonstrates that conservation prioritisation does not necessarily require specialised or technically complex tools such as Zonation, Marxan, or Prioritizr, which, while powerful, remain inaccessible to many practitioners due to steep learning curves and reliance on programming environments. Instead, SHIL leverages standard GIS functionalities, available through open-source platforms such as QGIS, to deliver systematic, stepwise prioritisation. This makes the approach inherently more inclusive, lowering barriers for environmental agencies, local authorities, and NGOs that may lack advanced technical expertise but still require robust spatial decision-support tools.

The case study in Sicily illustrates the potential policy and management relevance of SHIL outputs. By producing spatially explicit maps of ecological values, the framework identifies priority areas for protection, restoration, and connectivity enhancement. These outputs can directly support the implementation of global and regional biodiversity targets, such as the Kunming-Montreal Global Biodiversity Framework and the EU Biodiversity Strategy for 2030. For Sicily, where ecological values are high but pressures from land-use, urbanisation, and climate change are intense, SHIL provides evidence-based guidance to integrate biodiversity priorities into local and regional planning. Importantly, its modular design enables integration of additional layers—such as ecosystem services, socio-economic factors, or climate projections—thereby broadening its application beyond ecological criteria alone.

In practice, SHIL contributes to conservation impact at multiple scales. At the local level, municipal-scale outputs can guide authorities in identifying priority habitats, restoring degraded ecosystems, or establishing ecological corridors. At regional and national levels, aggregated outputs can inform strategic biodiversity planning, strengthen ecological networks, and support compliance with conservation directives. The transparent structure of the framework also facilitates communication with stakeholders, providing visual and easily interpretable outputs that can foster consensus-building and community engagement.

Beyond Sicily, the SHIL framework has high transferability to other Mediterranean and global biodiversity hotspots. Because it relies on widely available datasets and does not require advanced computational infrastructures, it can be adapted to diverse contexts, including regions where data and resources are limited. This scalability positions SHIL as a valuable addition to the global suite of conservation planning tools, complementing advanced modelling approaches by offering a practical alternative where simplicity, transparency, and adaptability are paramount.

In summary, the impact of SHIL lies in democratizing access to robust conservation planning methods, strengthening science-policy interfaces, and contributing to biodiversity protection in regions under urgent ecological stress.

KEYWORDS

Spatial Prioritisation, Multi-Criteria Analysis, Biodiversity Hotspots, GIS-Based Framework, Geospatial Analysis.

Mapping Market Mood: A Data-Driven Analysis of Sentiment and Cryptocurrency Price Dynamics

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BACKGROUND

Abstract. The growing integration of Artificial Intelligence (AI) and Natural Language Processing (NLP) in financial markets is reshaping how asset price prediction is approached. In the context of cryptocurrency—where price movements are heavily influenced by investor sentiment—sentiment analysis has emerged as a critical tool for interpreting market dynamics. This study examines the correlation between sentiment polarity extracted using two domain-specific NLP models, FinBERT and FinancialBERT, and the price fluctuations of three major cryptocurrencies: Bitcoin (BTC), Ethereum (ETH), and Ripple (XRP).

OVERALL AIM

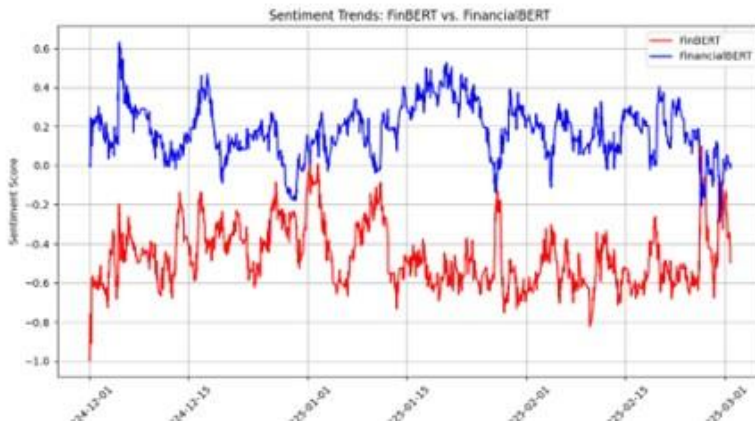
The research investigates the extent to which sentiment indicators can act as leading signals for price trends by analysing correlations across multiple time lags: immediate, 12-hour, and 24-hour intervals. A hybrid sentiment framework was employed, leveraging FinBERT and FinancialBERT to extract sentiment scores from financial news articles aggregated through the MediaStack API. Concurrently, historical cryptocurrency price data was retrieved from the CoinGecko API. Over a 90-day period, a dataset of 1,300 financial news articles was analysed.

MAIN EXPECTED OUTCOME/S

This research underscores the potential of AI-powered sentiment analysis as a complementary indicator to traditional technical and fundamental analysis in the cryptocurrency space. It opens the door for further exploration into real-time predictive systems, multilingual sentiment frameworks, and the integration of hybrid AI models to improve forecasting precision in decentralised finance (DeFi) environments.

RESULTS

The results indicate a measurable delayed correlation between sentiment and price movements. Ethereum demonstrated the strongest sentiment-price correlation, increasing from 0.3819 to 0.3900 after 24 hours. Bitcoin followed, with



a correlation rising from 0.2899 to 0.2919, while XRP showed the weakest but still positive correlation (from 0.1005 to 0.1205). These findings suggest that sentiment signals do not immediately influence market prices but may serve as short-term predictors within a 24-hour window—particularly for Ethereum.

IMPACT OF RESEARCH

This study confirms that sentiment analysis plays a crucial role in cryptocurrency market behaviour, particularly for assets heavily influenced by retail sentiment. The FinBERT + FinancialBERT hybrid model demonstrated moderate to strong correlation with BTC and ETH price movements, highlighting the potential of AI-driven sentiment tracking as an additional tool in DeFi market analysis.

While sentiment analysis alone cannot fully predict cryptocurrency price movements, its integration with technical indicators, macroeconomic factors, and real-time trading strategies can enhance market forecasting models. Future research should focus on refining AI-based sentiment models, expanding real-time trading applications, and integrating alternative financial indicators to develop a comprehensive predictive framework for cryptocurrency markets.



KEYWORDS

Cryptocurrency, Sentiment Analysis, FinBERT, FinancialBERT, NLP, AI, Bitcoin, Ethereum, Ripple, Machine Learning, Market Prediction

Project DEFI is financed by the Ministry for Education, Sport, Youth, Research and Innovation



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Using Google Earth to Assess Recreational Spaces in Malta: Implications for Child Physical Activity

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BACKGROUND

Malta is the most densely populated country in the EU, with rapid urbanisation placing growing pressure on its limited open spaces. Children's opportunities for outdoor play and physical activity are increasingly shaped by the availability, quality, and accessibility of public recreational sites such as playgrounds, parks, and playing fields. International evidence highlights how these environments support autonomy, competence, and social connection, key needs for healthy child development and habit formation. However, Malta lacks a centralised register of playgrounds or open spaces, making it difficult to evaluate provision or identify inequalities in access. Against this backdrop, this study applied a novel, cost-effective spatial audit using Google Earth satellite imagery to map, measure, and classify recreational spaces in three contrasting Maltese regions (Northern Harbour, South Eastern, Northern). These regions vary in demographic composition, population density, and socio-economic context, providing a critical testbed for assessing spatial equity. By quantifying provision both in absolute terms and relative to population size, this research contributes to a deeper understanding of how urban form and socio-economic disparities influence children's opportunities for play and physical activity. Findings aim to inform policy discussions on minimum standards for open space provision and the urgent need for retrofitting strategies in Malta's dense built environment.

OVERALL AIM

This study aimed to systematically audit recreational spaces across three Maltese regions, assessing their total and functional area and analysing per-capita provision relative to child population and socio-economic indicators. The central objective was to evaluate spatial equity in access to play and recreation, thereby addressing the research question: "What is the availability of publicly accessible recreational sites in selected Maltese regions, and how does this align with child population density and socio-economic context?"

MAIN EXPECTED OUTCOME/S

The study delivered a reproducible, geo-referenced dataset of playgrounds and recreational sites across half of Malta's regions. Outcomes include: (i) quantification of per-capita provision at regional and locality levels; (ii) development of a percentile-based size typology to characterise functional capacity; and (iii) evidence on spatial inequalities and their alignment with population needs. Collectively, the outcomes will provide policymakers and planners with an empirical basis for setting national standards, retrofitting underserved areas, and ensuring that recreational provision supports children's physical activity and well-being.

RESULTS

A total of 105 recreational sites were identified across 30 localities, covering a combined area of 343,995 m², equivalent to 0.11% of Malta's land mass. While the three regions exhibited similar overall totals (≈113,000–117,000 m² each), per-capita provision diverged sharply: South Eastern offered 1.36 m²/person, Northern 1.09 m²/person, and Northern Harbour only 0.62 m²/person. At the locality level, provision ranged from 0 m²/person (Ta' Xbiex) to 3.23 m²/person (Marsaskala), with 72% of localities offering less than 1 m²/person of recreational space. When restricted to designated play areas, 55% of localities provided under 0.1 m²/person. Gini coefficients confirmed meaningful intra-regional inequality, with Northern Harbour displaying the highest dispersion (weighted Gini = 0.401). Statistical analyses revealed strong associations between total population and recreational/play area ($\rho = 0.698$ and $\rho = 0.653$, respectively, $p < 0.001$), but no relationship with population density. Functional analysis showed that although larger sites contained more absolute play space, they devoted proportionally less of their footprint to play (2–12% in mega/very large parks vs 27–43% in small sites). A small number of exceptional parks inflated regional totals, masking deficits in everyday accessibility. These findings suggest a material misalignment between provision and child population needs, highlighting the inadequacy of current provision against international benchmarks (e.g., UK Fields in Trust, HKPSG). The results underscore the urgency of introducing national standards, creating a public register of recreational sites, and prioritising retrofitting strategies to ensure equitable, child-focused access to play opportunities across Malta.

IMPACT OF RESEARCH

This project directly supports several national priorities in Malta, particularly in the areas of public health, education, and sustainable urban development. Children's physical activity levels are a growing concern, with sedentary lifestyles

contributing to rising risks of obesity and non-communicable diseases. By mapping recreational provision and identifying inequalities in access, this research provides policymakers with robust, reproducible evidence to guide the development of national standards for open space and playgrounds. Such standards have long been absent from Maltese planning frameworks, despite being referenced in the Strategic Plan for the Environment and Development (SPED). Establishing minimum provision benchmarks aligned with population needs would represent a major step towards a healthier, more equitable built environment. Moreover, the project aligns with Malta's commitments to the EU Green Deal and Sustainable Development Goals by prioritising inclusive, accessible, and safe public spaces. At the societal level, the findings highlight both opportunities and deficiencies in how recreational spaces are distributed and designed. Localities with very limited or no provision risk depriving children of spaces that support autonomy, competence, and social interaction, key drivers of physical, cognitive, and emotional development. By making inequities visible, the research empowers local councils, parent groups, and NGOs to advocate for targeted investment, retrofitting, and repurposing of urban land. For example, the conversion of surplus road space into micro-play pockets or the rehabilitation of brownfield sites into family parks illustrates how evidence-based interventions can deliver immediate social benefits. Beyond child health, the creation of safe and attractive open spaces fosters stronger community cohesion, intergenerational interaction, and civic pride. From an environmental perspective, the study contributes to rethinking how limited urban land can be used more sustainably. While Malta's high-density development poses constraints, the identification of soil- and planter-rich areas within existing playgrounds points to opportunities for nature-based play. Such interventions not only expand playable surfaces but also enhance biodiversity, shade, and climate resilience, improving thermal comfort in outdoor environments. In this sense, recreational spaces become multifunctional assets simultaneously supporting children's play, environmental sustainability, and urban liveability. By linking spatial equity to environmental stewardship, the project underlines how small-scale, locally tailored interventions can cumulatively advance Malta's transition towards healthier, greener, and more resilient communities.

KEYWORDS

Recreational Spaces, Physical Activity, Children, Spatial Equity

Data Exploration, Computation, and Optimization for Discovery and Experimentation (DECODE)

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BACKGROUND

The Data Exploration, Computation, and Optimisation for Discovery and Experimentation (DECODE) research group is an academic team whose research focuses on data-related research using machine learning and data mining techniques. The team applies this knowledge in various domains such as news, marketing, and other data-focused topics.

Data Exploration: The team is skilled in retrieving, cleaning, and exploring data to identify hidden patterns for more efficient interpretation and use.

Computation: The creation of models that identify hidden patterns and replicate human behaviour is one of the core skills that the team constantly researches and focuses on.

Optimisation for Discovery and Experimentation: The team focuses their research on hyperparameter optimisation, model selection, and experimental design to help researchers and practitioners make the most of their work.

One of the goals of this team is to create content that supports young learners in their understanding of machine learning through practical applications, workshops, and interactive educational content.

The team strives to collaborate with members of the industry to assist in research endeavours, whilst also bringing real-world case studies to the academic community. Such collaboration leads to larger, possibly funded, projects as well as academic and industry skills alignment.

The team is committed to making its research more accessible, and thus the work by various members of the team has been published in academic journals and conferences, with software released under open-source licenses.

OVERALL AIM

DECODE research group's main goal is to use machine learning and data analysis in applied areas, including business operations and environmental monitoring, among others. The aim of applied machine learning is to find hidden patterns in

data and create computer models that can simulate human behaviour and even enhance it. Another intention of DECODE is to guide learners into machine learning applications and offer opportunities to work closely with industry partners on real-world projects. DECODE's findings will also be published in academic journals, and the resulting software will be available for free to make research accessible to everyone.

MAIN EXPECTED OUTCOME/S

- *Better Data Understanding: Developing techniques for retrieving, cleaning, and interpreting data, leading to better insights.*
- *Application of ML Models: Development of various machine learning models applied to various areas.*
- *Additional Education: Creation of educational content and workshops for learners to apply machine learning.*
- *Industry Collaboration: Collaboration with industry members, to access and work on real-world cases and potential funding opportunities.*
- *Knowledge Dissemination: Publication of research in academic journals and conferences, alongside open-source software, promoting accessibility and skill alignment.*

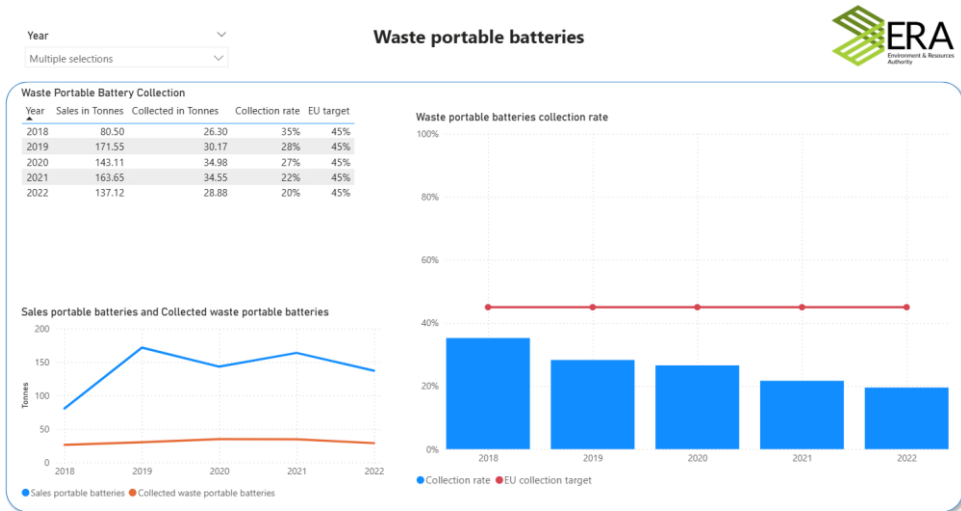
RESULTS

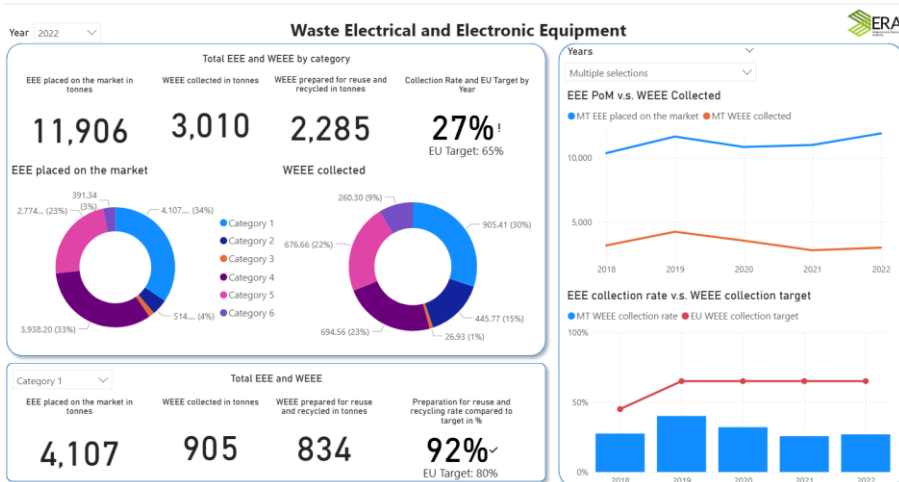
After successfully completing the DataVisuals project, we have had a successful MCST FUSION REP 2025 project titled "Supporting Early Childhood Education in Blue Skills with Generative Artificial Intelligence (SELBI)" which is due to end in April 2026. The project focuses on researching the use of generative artificial intelligence in support of early years educators for the creation of educational content on Blue Skills.

A number of industry collaborations are advancing, and research has started. Firstly, with the Environment & Resource Authority (ERA) Air Quality department, where the team has jointly designed an interactive dashboard to showcase the air quality reporting that the authority curates. This makes their reporting more accessible and understandable to the public. We have also designed three interactive dashboards with the Waste Management team at ERA, which is serving as a test case for the National Statistics Office in transitioning of reporting from static PDF to interactive dashboards.

IMPACT OF RESEARCH

The team is researching various machine-learning techniques which can lead to academic publications. The outcome of said studies also benefits the undergraduate research undertaking in various manners. Additionally, programming and machine learning-related modules also benefit since the





researchers can enhance the course content with research-related material and relevant content. Through industry collaboration, the team is lending their expertise in assisting the decision-making processes and recruitment of specific companies. Several research projects have been initiated which were directly shaped by industry needs, and which results were communicated and supported by the companies in question. The team is contributing on a national level by supporting local government entities in transitioning to emerging technologies, namely interactive dashboards, to meet their annual reporting obligations. With the recent two projects completed in collaboration with ERA, this team is also aiding the National Statistics Office of Malta to consider a wider migration to this technology. As per RIS3 Malta's National Strategy 2021-2027, Emerging Technologies is one of the national priorities, whereby Artificial Intelligence is one of the niche areas. Through this team, the individuals can advance their research skills and grow their portfolio, which aids in positioning them to undertake national or European-funded projects that address said priority.

KEYWORDS

Machine Learning, Artificial Intelligence, Data Mining, Data, Optimisation

TRACE

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² Discover the Blu

BACKGROUND

The early life stage of sea turtles remains one of the least understood phases of their life cycle, largely because of the absence of suitable methods to tag hatchlings at emergence. Conventional techniques such as flipper tagging or the use of satellite transmitters are not applicable to this life stage, as hatchlings are too small and fragile to be marked reliably without compromising their survival. This knowledge gap has long constrained our capacity to evaluate fundamental parameters such as survival rates, dispersal pathways during the “lost years,” and eventual recruitment into adult nesting populations. Without robust information from this critical early stage, long-term demographic and conservation models remain incomplete. To address this limitation, we hypothesised that environmental DNA (eDNA) collected from sand within hatchling emergence tracks can be used to assign haplotypes, thereby providing a non-invasive method of genetic tagging for individuals at the very start of their lives. Such an approach would create the possibility of genetic mark–recapture across life stages without direct handling of hatchlings. Previous research in Northeast Florida has demonstrated that eDNA recovered from sand samples can be assigned reliably to sea turtle haplogroups and haplotypes, supporting the feasibility of this novel approach and highlighting its potential for advancing population-level studies.

OVERALL AIM

The TRACE project aims to pioneer a non-invasive genetic tagging method for sea turtles in Europe by harnessing (eDNA) from sand within hatchling emergence tracks. This innovative approach addresses one of the most critical knowledge gaps in sea turtle research: the early life stage, where survival, dispersal, and recruitment into adult nesting populations remain poorly understood due to the lack of suitable tagging methods. TRACE seeks to determine whether haplotypes can be reliably extracted from emergence-track samples, enabling individual-level identification without handling hatchlings or relying on invasive material. By generating haplotype data from hatchlings, the project will explore the potential for long-term capture-recapture genetic monitoring of loggerhead populations in the Mediterranean. If validated, this approach could complement existing

*conservation tools, establish a foundation for population-level genetic baselines, and contribute to improved regional strategies for the management and protection of *Caretta caretta*.*

MAIN EXPECTED OUTCOME/S

*We expect to investigate whether an emergence-track substrate can reliably yield haplotypes from individual hatchlings. If this is the case, then results will provide the foundation for future longitudinal monitoring and genetic mark–recapture studies. The results will inform the development of a scalable, innovative tagging approach that could be applied across Mediterranean rookeries and used in case a nesting female could not be identified, improving our understanding of population connectivity and nesting-site fidelity in a critical region for *C. caretta*'s nesting and population dynamics.*

RESULTS

*During the 2025 nesting season in Malta, TRACE successfully completed its first field sampling phase. Sand samples were collected from emergence tracks of hatchling loggerheads (*Caretta caretta*), alongside water samples from nearshore areas. These samples were carefully processed and stored under strict contamination-prevention protocols, providing a strong baseline for subsequent laboratory analysis. Results are still to be determined following ongoing laboratory experiments, which will assess the feasibility of extracting haplotype information from these environmental DNA samples.*

IMPACT OF RESEARCH

If validated, this non-invasive approach, which is novel in Europe and conducted through environmental DNA (eDNA), could represent a significant step forward for both individual-level and population-level sea turtle research. At present, genetic information is primarily obtained through invasive sampling methods, such as biopsies, or indirectly through the collection of non-viable eggshells. While these techniques have contributed greatly to our understanding of population structure and connectivity, they remain limited in scope, particularly when it comes to hatchlings. Hatchlings are rarely included in long-term studies because they cannot be tagged or genetically identified without compromising their survival. This leaves a critical knowledge gap during the earliest and most vulnerable life stage. By demonstrating that emergence-track sand samples can yield haplotype information, TRACE offers a methodology that could enable both genetic tagging and genetic mark–recapture studies from the very beginning of a turtle's life cycle. This would allow researchers to generate longitudinal datasets that connect

hatchlings with adult nesting females across decades, without ever having to physically handle the animals. Such datasets could revolutionise how population dynamics are studied, by providing access to genetic information from individuals that would otherwise remain untraceable.

Beyond methodological innovation, the project carries important conservation implications. The ability to non-invasively build genetic baselines across rookeries could provide managers with a cost-effective and scalable tool to assess population diversity, connectivity, and nesting-site fidelity in the Mediterranean and beyond. In regions where access to hatchlings is restricted or where invasive sampling is politically or socially sensitive, eDNA could serve as a practical alternative, ensuring that valuable data is still collected without disrupting local conservation practices.

Ultimately, TRACE has the potential to establish a new standard for marine turtle research in Europe, bridging molecular ecology, conservation management, and non-invasive monitoring. Its legacy could extend far beyond Malta, shaping international conservation strategies and contributing to the global effort to safeguard endangered sea turtle populations.

KEYWORDS

Marine Turtles, eDNA, Population Genetics

Project TRACE is financed by the Ministry for Education, Sport, Youth, Research and Innovation



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Science in Semiconductor Manufacturing

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BACKGROUND

Semiconductor package manufacturing is a high-tech manufacturing field. The Manufacturing of semiconductors normally takes place in two distinct plants. The processes producing the processed wafer are known as the “Front End” processes and are conducted in a wafer FAB. The wafer is then shipped to a “Back End” semiconductor manufacturing plant.

Finite Element Modelling (FEM) is a powerful tool for researching various aspects of flip-chip technology in semiconductor packaging. As an example, FEM can be applied in areas such as thermal analysis, where FEM can simulate heat distribution and thermal stresses in flip-chip assemblies. This helps in understanding how different materials and designs affect heat dissipation and thermal performance. FEM techniques, such as Mechanical Stress Analysis, can evaluate mechanical stresses and strains in wire bonds, solder bumps and underfill materials. This is crucial for predicting failure modes and improving the reliability of flip-chip connections.

OVERALL AIM

The proposed project aims to explore and improve key stages of semiconductor production by combining advanced computational modelling with experimental techniques rooted in physics and chemistry. The stages outlining the semiconductor production process, such as dicing, bonding, encapsulation, and cleaning, are essential for ensuring the durability, performance, and reliability of semiconductor devices. However, these processes involve complex interactions between mechanical forces, thermal effects, and chemical reactions, many of which are not yet fully understood. By integrating computational simulations with hands-on experimentation, the project seeks to uncover some of the fundamental principles driving these processes, paving the way for more efficient, reliable, and scalable manufacturing methods.

The primary focus is on developing detailed models that can accurately simulate the physical and chemical behaviours occurring during some of the stages of production. At this point, the project is looking at the following areas:

- *Wire bonding - how bonding materials interact under pressure, as well as damage .*
- *Plasma- Work is ongoing to set up how encapsulation techniques influence the final product's stability.*

These are just examples as the decisions of which processes will be studied will be taken during the execution of the actual project.

The broader goal of the project is to enhance the efficiency, reliability, and scalability of semiconductor manufacturing by building on the body of knowledge that bridges the gap between fundamental science and practical application. By uncovering the underlying physical and chemical principles governing key production processes, this work will provide process engineers with deeper insights into how mechanical, thermal, and chemical factors interact during manufacturing. This understanding will empower engineers to make more informed decisions, optimise production parameters, and address challenges such as stress-induced failures, material defects, and thermal management more effectively.

As a result, the project aims to directly improve critical production metrics, including yield, product quality, and consistency, while reducing waste and inefficiencies. By equipping engineers with a stronger scientific foundation, this initiative will not only enhance current manufacturing practices but also pave the way for the development of next-generation technologies, ensuring the semiconductor industry can continue to meet the evolving demands of advanced electronics.

MAIN EXPECTED OUTCOME/S

The innovative nature of this research lies in its interdisciplinary approach, combining finite element modelling (FEM), advanced physics, and chemical techniques to study and optimise semiconductor production processes. While these processes—such as wafer sawing, die attach, wire bonding, flip chip, underfill, moulding, and plasma cleaning—are well-established in the industry, they are often optimised empirically rather than through a deep understanding of the underlying science. This project challenges the status quo by shifting the focus to a science-driven framework, enabling a more systematic exploration of the physical and chemical principles at play. By integrating computational modelling with experimental validation, this research project offers a novel way to uncover hidden mechanisms and interactions that have previously been overlooked or poorly understood.

One of the key innovations is the development of high-fidelity predictive models that can simulate complex behaviours such as stress distribution, thermal effects, and chemical reactions during manufacturing. These models have the potential to challenge existing norms by providing engineers with tools to predict outcomes and optimise processes before physical prototyping, reducing costs and time-to-market.

The research is highly likely to lead to process improvements in selected areas. For instance, it could reveal previously unknown relationships between material properties, process parameters, and device performance, leading to the development of new materials or process modifications that enhance reliability and efficiency.

RESULTS

At this stage, models are still being set up, and so no results are available. However, an overview of the proposed models and processes will be provided.

IMPACT OF RESEARCH

The innovative nature of the research lies in its ability to push the boundaries of current knowledge and technology, offering fresh perspectives and solutions to existing challenges. This research is characterised by its novel approach, which integrates advanced methodologies, interdisciplinary collaboration, and cutting-edge technologies. By leveraging tools such as Finite Element Modelling (FEM), Computational Fluid Dynamics (CFD), and imaging techniques, the research aims to provide deeper insights into complex phenomena that were previously difficult to analyse.

One of the key aspects of this research is its potential to challenge existing norms. Traditional methods in semiconductor packaging, such as plasma cleaning or underfill process engineering, have relied heavily on empirical data and observing secondary effects, such as contact angle measurements. This research introduces a more systematic and predictive framework, utilising sophisticated simulations and modelling to optimise processes and materials. By doing so, it questions the conventional wisdom and practices, encouraging a shift towards more efficient and reliable methodologies.



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KEYWORDS

Process Engineering, Semiconductors, Packaging, Yield

Project ScienceSemiCon is financed by the Ministry for Education, Sport, Youth, Research and Innovation.



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Detecting Marine Debris using an AI Autoencoder model and Computer Vision Pipeline

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BACKGROUND

Marine and coastal environments face a multitude of threats, primarily from pollution such as plastic waste, which can harm marine life and disrupt the ecosystem. Traditional monitoring of marine areas is typically time-consuming and laborious, with results often delayed. In this study, the main challenge for automated visual systems is the high variability of "normal" sea conditions, where features like sun glare, rocks, and varying water depths can be mistaken for anomalies. A semi-supervised approach is employed, whereby a model is trained solely on normal data, since data containing abnormal behaviour is often scarce.



OVERALL AIM

This study focuses on the development of an automated, UAV-based system to detect anomalous objects, such as plastic waste and buoys, in aerial sea images. The main aim is to develop a model that learns a general representation of normal sea patterns from drone footage. Afterwards, the model would be capable of detecting objects and patterns that deviate from the behaviour it was trained on by analysing the reconstruction error.

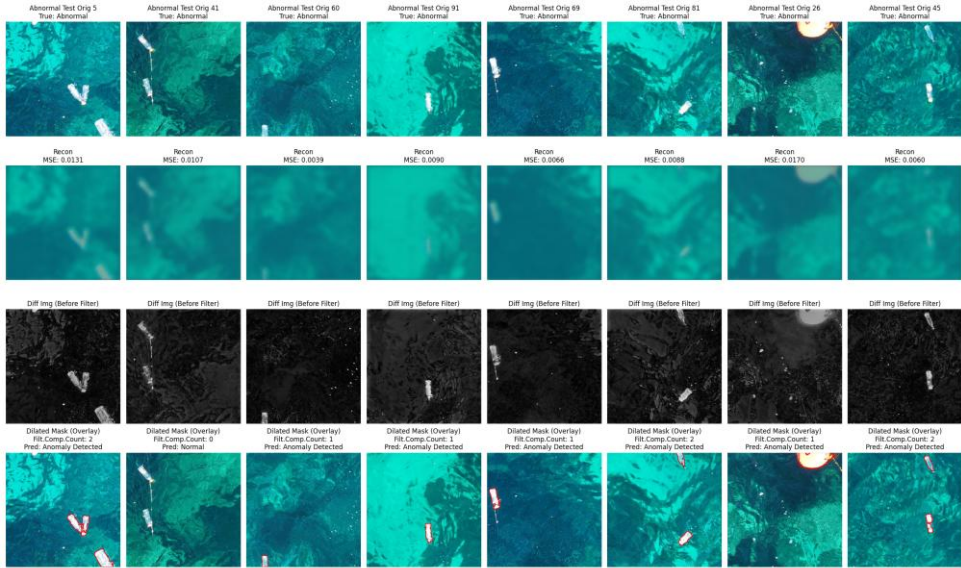
MAIN EXPECTED OUTCOME/S

A trained autoencoder model capable of accurately reconstructing varied "normal" sea images. A robust, multi-stage computer vision methodology that analyses reconstruction error to distinguish between true anomalies (marine debris) and false positives caused by natural variations like sun glare. An end-to-end process that not only flags anomalies but also retrieves their GPS coordinates from original image metadata, enabling rapid response.

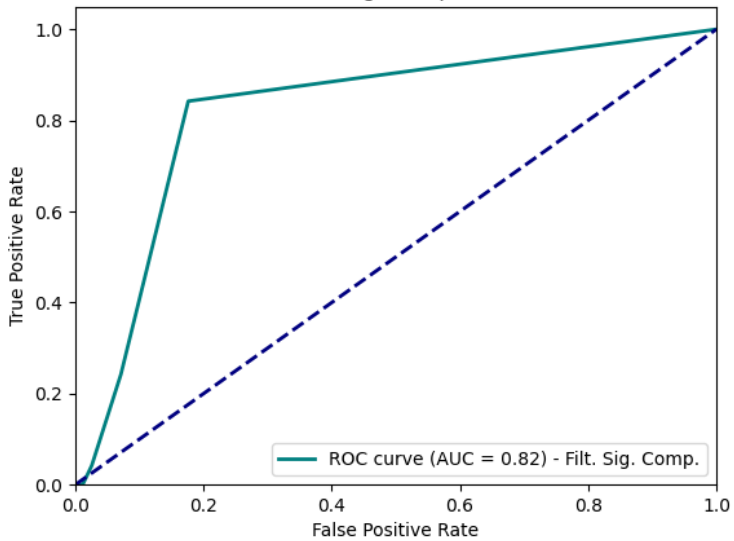
RESULTS

The final model uses a pipeline that filters reconstruction error regions based on their area, solidity (compactness), and colour properties to isolate anomalies. The

system achieved a promising Area Under the Curve (AUC) of 0.82, indicating good discriminative power between normal and abnormal classes.



ROC - Filtered Sig. Comp. Count Based



Histograms of the final anomaly scores (a count of filtered error regions) demonstrate a clear separation between the normal and abnormal test sets. The

method proved effective at significantly reducing false positives previously caused by sun glare, as confirmed by visual inspection of test images.

IMPACT OF RESEARCH

The system provides real-time information, which is essential to decrease first intervention time and avoid possible environmental losses. The methodology can be applied to monitor critical areas such as bathing waters and Marine Protected Areas (MPAs) in accordance with environmental directives.

The model's ability to localise errors can be used to pre-label anomalies in new datasets, significantly reducing manual annotation effort for future research. This contributes to a practical, fast, and accurate method for identifying and locating marine plastic pollution.

KEYWORDS

Smartpol, Marine Pollution, Anomaly Detection, Artificial Intelligence, Autoencoder, Computer Vision, Semi-Supervised Learning, Unmanned Aerial Vehicle (UAV), Reconstruction Error

Project SMARTPOL is funded by the MarTERA partners – Xjenza Malta, and supported by the European Commission under grant agreement MRT-2021-057A.



Conducting farm trials and field station trials on the scope for microalgae to support crop production, including substituting for conventional inputs and coping with abiotic stresses

Jules Siedenburg¹; Malcolm Borg,¹; John Galea¹

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BACKGROUND

A small but growing academic literature suggests that applying microalgae to agricultural crops offers a potent means to support crop production. This literature is based mostly on laboratory and greenhouse-based experiments and was recently summarised in an academic paper by University of Malta researchers spearheaded by the applicant for this fellowship. These same researchers have also been assessing the efficacy of microalgae on tomatoes and aubergines via farm trials conducted in partnership with a leading Maltese farmer, the findings of which will soon be published in a second academic paper. All this evidence suggests that microalgal inputs can support cropping in several distinct ways, namely boosting baseline production, enhancing resilience to biotic and abiotic stresses, and improving product quality. This remarkable technological profile suggests that using microalgae as crop inputs could help farmers cope with looming threats like climate change and land degradation. Microalgal inputs may also create scope to reduce reliance on conventional inputs like agrochemicals, which might reduce farm costs while boosting consumer health and well-being.

OVERALL AIM

Key data gaps vis-a-vis this use of microalgae nonetheless remain that constrain uptake by farmers, namely (i) the degree to which microalgae can substitute for different conventional inputs like fertilisers, fungicides and nematicides, and (ii) the capacity of microalgae to enhance the resilience of crops to different abiotic stresses when these become accentuated or when more than one occurs at a time. The research will address these questions by conducting field station trials that simulate different farming scenarios, then testing microalgal inputs in these cases. It will also continue established farm trials to further examine key questions while cross-pollinating with the field station trials.

MAIN EXPECTED OUTCOME/S

Deliverables will include publishing an academic paper and a media piece, delivering at least one conference presentation, and producing guidelines on using microalgae as crop inputs in Malta.

KEYWORDS

Crop Production, Agricultural Innovations, Microalgae, Food Security, Food Systems Transformation

Project ALGAECROPSUPPORT is financed by the Ministry for Education, Sport, Youth, Research and Innovation.



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SUSTAINABLE RESEARCH ACROSS EDUCATION, ENERGY AND ENVIRONMENT

An Investigation in the Efficiency of the Primary Testing Methods of Testing Asphalt

Nicholas Kast¹

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BACKGROUND

Asphalt testing plays a vital role in ensuring the structural integrity, safety, and longevity of road infrastructure. In Malta, two primary methods for bitumen extraction, centrifuge and automatic, are widely used across laboratories. Both are recognised by international ISO standards but are treated as methodologically equivalent, despite potential differences in performance. This study was initiated to critically evaluate that assumption.

This research investigates whether these methods yield statistically comparable results when assessing two critical parameters: bitumen content and fine particle distribution, particularly the percentage passing the 63 μ m sieve.

The project draws on a comparative, inter-laboratory approach, testing twenty asphalt batches (across base, binder, wearing, and stone mastic layers) using both methods in four separate accredited laboratories in Malta. Each sample was processed under controlled ISO procedures to ensure validity. The study then analysed reproducibility, repeatability, and alignment with specification limits.

This research fills a local knowledge gap and contributes to the global discussion on asphalt quality assurance. It is highly relevant as Malta continues to invest in durable and sustainable infrastructure.

OVERALL AIM

The aim of this research is to investigate whether centrifuge and automatic bitumen extraction methods yield statistically equivalent results in asphalt testing. By comparing their performance across particle size distribution and bitumen content, the study seeks to assess whether current standards treating both methods as interchangeable are valid or whether the choice of method significantly affects test outcomes.

MAIN EXPECTED OUTCOME/S

The main expected outcome is the identification of systematic differences between the two extraction methods, particularly in the percentage of fines passing the 63 μ m sieve. The research anticipates confirming that the automatic method yields consistently higher fines content due to greater mechanical action. This would challenge the assumption of interchangeability and inform revisions to ISO/EN testing standards, improve lab procedures, and guide the industry toward more accurate quality control practices in asphalt production.

RESULTS

The study revealed measurable and consistent differences between the two methods. The automatic extractor (M2) produced higher percentages of fines passing the 63 μ m sieve across all asphalt layers, base, binder, wearing, and stone mastic asphalt (SMA).

Statistical comparison showed that M2 had stronger internal repeatability and yielded values that were closer to or slightly above standard specification thresholds. In contrast, centrifuge-extracted samples (M1) often reported values at or below acceptable limits. Notably, SMA and wearing courses exhibited the highest sensitivity to method selection.

The findings also showed a lack of inter-method reproducibility, with variations across laboratories using the same method. While M2 methods were more consistent, human factors, machine maintenance, and procedural deviations still contributed to result variability.

Overall, the results suggest that current ISO standards may need to differentiate between methods rather than assume equivalency. This could lead to revised calibration benchmarks or preferential method adoption for specific asphalt types.

IMPACT OF RESEARCH

This research offers a significant impact for both the asphalt testing industry and broader infrastructure quality control. In Malta, where a mix of extraction methods is currently accepted under identical standards, this research highlights a pressing need for differentiation in practice.

The confirmation that the automatic extraction method consistently yields higher fines values has practical consequences. Fine content, especially particles passing the 63 μ m sieve, is a key parameter in determining asphalt durability, workability, and resistance to deformation. By demonstrating that M1 (centrifuge) underreports fines relative to M2, the study calls into question the reliability of

results from manual methods, especially in borderline compliance cases. This has implications for engineers and contractors whose projects may pass or fail based on these test outcomes.

Standardising around a more repeatable and robust method like the automatic extractor could reduce disputes, rework costs, and project delays. Furthermore, the research underscores the importance of improving lab practices, promoting routine inter-laboratory comparisons, and incorporating modernised equipment that minimises operator-dependent variation.

Beyond Malta, the findings could contribute to international standards bodies such as ISO or CEN, especially as nations look to harmonise quality controls for sustainable infrastructure. In countries with developing infrastructure testing frameworks, this study can serve as a model for refining testing procedures and adopting evidence-backed methods.

In academia, the study lays the groundwork for further investigation into other asphalt quality parameters influenced by extraction method, such as bitumen recovery efficiency or chemical composition shifts due to solvent type. The dual lens of engineering practice and academic rigour amplifies the study's impact.

As infrastructure demands grow, particularly with smart roads, climate resilience, and sustainable construction, the accuracy and reliability of foundational testing methods like those evaluated here are critical. This research contributes directly to that foundation.

KEYWORDS

Asphalt Testing, Bitumen Extraction, Sieve, ISO Standards, Laboratory Methods

ELEVATE - Empowering Island Students through Innovation and Entrepreneurship

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BACKGROUND

Our proposal aligns with EIT Urban Mobility's strategic objectives by promoting innovation and entrepreneurship in urban mobility, targeting students from RIS regions, and addressing challenges in island and coastal areas. By closing the knowledge gap, we aim to foster a new generation of innovators and entrepreneurs equipped to tackle the unique challenges and opportunities in urban mobility, particularly in island and coastal areas.



We will organise three 3-day training events in Madeira, Azores, and Reunion for students from diverse backgrounds. Sessions will cover design thinking, entrepreneurial mindset, ideation, business pitching, and market readiness, incorporating real-world challenges from municipalities and local industries for hands-on learning.

The training targets students from EIT RIS countries, leveraging Malta's experience to enhance the design of relevant challenges.

Five online outreach events, including a major networking event and four webinars, will engage a broad audience. The project aims for 40,000 annual impressions for EIT Urban Mobility-branded content.

The project addresses specific urban mobility challenges in island and coastal regions, particularly related to tourism, ensuring long-term impact and increased innovation levels.

Efforts will be made to attract and support young women in the training events, promoting gender diversity in the urban mobility sector.

The training includes theoretical and practical formats, such as geocaching and treasure hunts, structured into modules with self-study components before live sessions.

By focusing on urban mobility in coastal regions and scaling up existing solutions, the project aligns with EIT Urban Mobility's strategic priorities. Collaboration with municipalities and local industries ensures practical solutions.

This project supports EIT Urban Mobility's objectives by delivering targeted training, addressing regional needs, promoting long-term impact, and encouraging gender diversity with innovative teaching methods.

OVERALL AIM

This project aims to inspire diverse students with innovation and entrepreneurship skills through intensive training events in Madeira, Azores, and Reunion. Each location hosts a 3-day session on design thinking, entrepreneurial mindset, ideation, business pitching, and market introduction. Participants will tackle real-world challenges and compete in pitch events. The program starts with an online kickoff and includes five outreach events. The final competition, held online, will see winners from each location compete, with the ultimate winner receiving tickets to the Barcelona Mobility conference. Engaging at least 120 students, the project seeks to foster innovation and entrepreneurial spirit, achieving broad visibility for EIT Urban Mobility and driving meaningful urban mobility innovation in island communities.

MAIN EXPECTED OUTCOME/S

This project will organise three 3-day on-site intensive innovation and entrepreneurship training events for students in three island locations: Madeira, Azores, and Reunion. These students will come from multidisciplinary backgrounds and varying academic years. The training sessions will cover design thinking, entrepreneurial mindset, ideation, business pitching, and bringing ideas to market. Malta, with its similar challenges and greater experience, will assist in designing the challenges.

Objectives

Train 120 students from EIT RIS countries in innovation and entrepreneurship through on-site events in Madeira, Azores, and Reunion.

Engage 50 participants per location and achieve at least 40,000 annual impressions for EIT Urban Mobility-branded online content.

Conduct three 3-day on-site events, an online kickoff meeting, and five online outreach activities.

Leverage Malta's expertise, existing networks, and resources to effectively engage students and stakeholders.

Complete all activities within one year, from the online kickoff to the final online competition.

Expected Outcomes

Skill Development: Students will gain essential skills in innovation and entrepreneurship, focusing on real-world urban mobility challenges.

Engagement: Active participation from 120 students, with at least 40 participants per location.

Visibility: Achieve 40,000 annual impressions for EIT Urban Mobility-branded online content.

Impact: Enhanced innovation and entrepreneurial capabilities within island communities, with feasible solutions proposed for local urban mobility challenges.

Recognition: Winning teams will gain exposure and opportunities at a major urban mobility conference.

The project integrates the topic of urban mobility in coastal cities throughout its teaching activities, focusing on the unique mobility needs and environmental considerations specific to island and coastal communities. The approach includes targeted workshops, practical challenges, and focused discussions to address both general urban mobility principles and their coastal applications.



Each in-person training session will include dedicated modules on coastal urban mobility, covering challenges such as seasonal congestion from tourism, environmental preservation, limited land for transportation infrastructure, and the reliance on intermodal transit systems. Participants will explore these issues

through case studies, data from Madeira, Azores, and Réunion, and examples from other coastal cities facing similar challenges.

During design thinking sessions, participants will focus on creating solutions specifically adapted to the realities of coastal environments, such as:

Managing fluctuating population demands due to tourism.

Developing eco-friendly transportation options that protect marine and coastal ecosystems.

Addressing resilience in the face of climate change impacts like rising sea levels and extreme weather events.

By incorporating these regional mobility scenarios, participants can better understand and design for the unique challenges faced by coastal cities.

The ideation and pitch sessions will challenge participants to develop real-world solutions relevant to coastal urban settings. For example, they may work on concepts for reducing vehicle emissions near tourist hotspots, improving the efficiency of ferry or waterway transit, or optimising mobility for both residents and tourists in environmentally sustainable ways.

Workshops will focus on the practicalities of implementing sustainable mobility systems that account for the environmental and logistical challenges of coastal cities. These activities will enable participants to brainstorm solutions that address limited land space, maritime traffic integration, and community needs.

RESULTS

The ELEVATE project is currently in its implementation phase, following the official kick-off meeting in January 2025. Coordination and management mechanisms are fully operational across the five partner institutions: Kimitisik, MCAST, University of Madeira, University of the Azores, and the Reunion Island Agency for Innovation. To date, the consortium has conducted one successful online outreach webinar in May 2025, and preparatory activities for the three on-site training events are well advanced. These events, scheduled to take place in October - November 2025, will be held across the three island states of Madeira, Azores, and Réunion, with logistical arrangements, recruitment strategies, agendas, and participant engagement plans already established.

IMPACT OF RESEARCH

Enhancing Innovation and Entrepreneurship Skills: The project offers intensive 3-day training events in Madeira, Azores, and Reunion, equipping participants with

essential skills in design thinking, entrepreneurial mindset, ideation, business pitching, and market readiness. This hands-on, practical approach ensures that students can effectively address real-world urban mobility challenges.

Addressing Regional Needs and Promoting Inclusivity: Targeting students from EIT RIS countries, the project focuses on regions with high innovation potential but lower current activity. With Malta's expertise, the training is tailored to local needs. Efforts to attract young women help promote gender diversity, aligning with the call's emphasis on inclusivity.

Fostering Real-World Impact and Sustainability: By tackling challenges provided by municipalities and local industries, participants develop solutions that are immediately applicable and beneficial to their communities. This practical focus ensures the training exceeds minimum requirements by contributing to meaningful, sustainable changes.

Broadening Reach and Visibility: The project aims to achieve at least 40,000 annual impressions for EIT Urban Mobility-branded content through online events, social media campaigns, and local media engagement. This extensive outreach ensures the wide dissemination of outcomes and objectives, enhancing the visibility and impact of EIT Urban Mobility initiatives.

Knowledge Triangle Integration: Integrating education, research, and innovation, the project collaborates with academic partners, industry experts, and municipalities. This approach ensures the training is based on a thorough needs analysis, fostering a long-term increase in regional innovation levels and continuous improvement.

KEYWORDS

Entrepreneurial Skills, Entrepreneurship Education, Design Thinking, Innovation, Outermost Regions

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Re-establishing the MCAST Microgrid as a Living Lab for Renewable Energy and Smart Grids

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BACKGROUND

The integration of renewable energy sources, energy storage, and smart digital technologies is rapidly reshaping the global energy landscape. Malta, as a small island state with ambitious decarbonisation targets, requires innovative solutions that can address challenges such as grid stability, high solar penetration, and electrification of transport. In this context, the MCAST microgrid offers an invaluable opportunity to act as both a research facility and a demonstration platform.

Originally designed as a teaching and research tool, the microgrid is now being revitalised to address today's pressing needs in renewable integration and energy digitalisation. By combining photovoltaics, battery storage, and advanced energy management systems, the microgrid will enable experimentation with demand-response strategies, Volt-Var control, and intelligent monitoring. Moreover, it will create an applied learning environment where students can gain practical skills in system design, data analytics, and operations of modern energy systems — skills highly sought after by industry.

Beyond its educational mission, the microgrid is envisioned as a hub for collaboration. It will allow local and international companies, start-ups, and research organisations to test innovative solutions in a real-world setting. Applications such as vehicle-to-grid, grid-interactive buildings, and micro-mobility can be piloted directly on campus, providing immediate societal and industrial relevance.

The re-establishment of the MCAST microgrid, therefore, contributes not only to academic excellence, but also to Malta's green transition, innovation ecosystem, and workforce readiness in the renewable energy and smart grid domains.

OVERALL AIM

The overall aim of re-establishing the MCAST microgrid is to create a sustainable Living Lab that bridges education, research, and industry collaboration in renewable energy and smart grids. The initiative will provide students with

practical, hands-on training, enable applied research on advanced energy technologies, and offer industry partners a platform to test innovative solutions. By doing so, the microgrid will contribute to Malta's renewable energy transition, support the digitalisation of energy systems, and foster green skills development for the future workforce.

MAIN EXPECTED OUTCOME/S

The revitalised MCAST microgrid will deliver a functional Living Lab that enables real-world testing of renewable energy integration, storage solutions, and smart grid technologies. It will enhance student learning through practical, industry-relevant training, while supporting applied research in areas such as demand response, digitalisation, and vehicle-to-grid. The initiative is expected to foster collaboration with industry, generate innovation opportunities, and contribute directly to Malta's renewable energy and sustainability goals.

RESULTS

While the MCAST microgrid is currently in the process of being re-established, preliminary results from preparatory work and past deployments already demonstrate its potential impact. The original installation showcased how a campus-based microgrid can effectively combine photovoltaic generation, energy storage, and load management to provide a stable and controllable environment for both teaching and research. These experiences have informed the current design process, ensuring that the new iteration integrates advanced digital monitoring and energy management features.

Early engagement with stakeholders indicates strong interest from both industry and academia to use the microgrid as a testing ground for emerging technologies. Preliminary assessments have identified key areas of application, including demand response algorithms, battery optimisation strategies, and grid-interactive building controls. Moreover, initial feasibility studies suggest that integrating vehicle-to-grid functionality and micro-mobility charging infrastructure is both technically achievable and educationally valuable, offering students hands-on experience with cutting-edge applications.

On the educational side, preliminary classroom and lab exercises linked to the microgrid concept have already been piloted, allowing students to work with datasets and simulations. These activities have proven highly effective in bridging theoretical knowledge with real-world applications, laying the foundation for the experiential learning environment that the microgrid will provide once fully operational.

In summary, while full-scale implementation is ongoing, the preparatory phase has already generated meaningful insights. These preliminary results highlight the microgrid's role as a catalyst for applied research, practical training, and industry collaboration, setting the stage for impactful outcomes in Malta's renewable energy and smart grid landscape.

IMPACT OF RESEARCH

The re-establishment of the MCAST microgrid is expected to generate a significant impact across multiple domains, acting as a driver for innovation, skills development, and sustainable energy transition in Malta.

Scientific Research

The microgrid will serve as a unique experimental platform for applied research in renewable energy, storage technologies, and smart grid solutions. It provides an environment where novel energy management strategies, demand-response systems, and vehicle-to-grid applications can be tested under real conditions. This will contribute to new research outputs, publications, and collaborations with both local and international academic partners.

Economy & Finance

By offering industry partners—including SMEs and start-ups—a testing ground for innovative products and services, the microgrid will stimulate economic activity and reduce barriers to innovation. It has the potential to attract research investment, support technology transfer, and build pathways for commercialisation. The training of skilled graduates in energy and digitalisation will also enhance employability, directly strengthening Malta's human capital.

Society

The project will help raise awareness of renewable energy and energy efficiency among students, staff, and the wider community. Demonstrating cutting-edge technologies in a real-world setting increases societal engagement with the energy transition and inspires young people to pursue careers in STEM and sustainability-related fields. The microgrid will also act as a showcase for sustainable practices on campus, creating a visible impact beyond academia.

Environment

The microgrid supports Malta's shift towards decarbonisation by integrating photovoltaics, energy storage, and smart management to optimise energy use and reduce carbon emissions. It provides a model for efficient renewable integration

and demonstrates how sustainable energy solutions can be scaled across campuses, communities, and industry.

Industry

The revitalised system offers industry a Living Lab where new hardware, software, and services can be tested before deployment in larger-scale projects. This accelerates innovation cycles and strengthens collaboration between academia and business, particularly in fields such as renewable integration, digitalisation, and micro-mobility.

Curriculum

Embedding the microgrid within MCAST's educational framework ensures that students gain practical, hands-on training with real systems. It bridges the gap between theory and practice, aligning learning outcomes with industry needs. The integration of data analytics, system monitoring, and optimisation tasks will also modernise the engineering and energy curricula.

National and Global Priorities

The initiative aligns with Malta's National Energy and Climate Plan, the EU Green Deal, and the UN Sustainable Development Goals. By addressing renewable integration, digitalisation, and skills development, the microgrid contributes directly to national resilience while positioning MCAST as a regional leader in applied sustainability education and research.

In summary, the MCAST microgrid is more than a technical project: it is a platform that delivers multi-dimensional impact—scientific, economic, societal, environmental, industrial, and educational—while reinforcing Malta's contribution to global sustainability priorities.

KEYWORDS

Microgrid, Renewable Energy, Smart Grids, Energy Digitalisation, Living Lab

A methodology for incorporating Sustainability Skills into Higher Education Curricula – Building on GreenComp

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BACKGROUND

Higher education (HE) institutions play a pivotal role in equipping learners with the competences required to address urgent global challenges such as climate change, biodiversity loss, and social inequality. In response to this need, the GREENDALE Erasmus+ Project has developed a structured



methodology to support educators in embedding sustainability competences within higher education curricula, building directly on the European GreenComp Framework (Bianchi et al., 2022).

OVERALL AIM

The overall aim of this project is to provide educators with a structured yet adaptable methodology for revising unit-level learning outcomes, pedagogical approaches, and assessment strategies without compromising disciplinary integrity. By fostering competences such as systems thinking, futures literacy, and responsible action, the project strengthens graduate employability while supporting the transformative role of higher education in advancing the United Nations Sustainable Development Goals (SDGs) (European Commission, 2020; UNESCO, 2021).

MAIN EXPECTED OUTCOME/S

The key outcomes of the overall GREENDALE Erasmus + project include:

- A structured methodology for embedding sustainability competences into higher education curricula, aligned with the GreenComp framework (Bianchi et al., 2022).

- A practical handbook for educators, a repository of case studies and teaching resources, and training programmes that strengthen pedagogical innovation.

-Enhanced institutional capacity to integrate sustainability across disciplines, stronger collaboration among European HEIs, and the empowerment of students as sustainability change agents in alignment with the SDGs (European Commission, 2020; UNESCO, 2021).

RESULTS

Following an in depth secondary research and content analysis, the approach for the Methodology was based on four sequential steps: (1) analyzing existing curricula to identify entry points for sustainability integration; (2) mapping opportunities for embedding sustainability competences through interdisciplinary and stakeholder collaboration; (3) developing innovative teaching, learning, and assessment strategies that foster critical thinking, systems thinking, futures literacy, and responsible action; and (4) aligning revised curricula with institutional and accreditation standards to ensure long-term impact and compliance (UNESCO, 2021). These steps are supported by practical tools, templates, and case studies that enable educators to re-frame learning outcomes, design sustainability-focused activities, and implement assessment strategies that capture transversal competences.

Furthermore, the developed methodology is characterised by its co-creative and flexible design, enabling adaptation across disciplines, institutions, and national contexts. It emphasises experiential, reflective, and problem-based learning approaches, drawing on international best practices such as the Green Office model and sustainability-focused internships. By embedding sustainability as a transversal competence rather than a specific standalone subject, the methodology aims at advancing both student employability and responsible citizenship, aligning higher education practice with the European Green Deal and the United Nations Sustainable Development Goals (SDGs)

IMPACT OF RESEARCH

By equipping students with sustainability competences such as systems thinking, critical reflection, and future literacy (Bianchi, Pisiotis, & Cabrera Giraldez, 2022), the GREENDALE project fosters learners who are able to engage as active change agents in their communities and workplaces. This contributes to building social resilience, promoting inclusive participation in sustainability transitions, and strengthening employability by aligning skills with emerging green labour markets (UNESCO, 2022). Through collaborative partnerships among European higher

education institutions (HEIs), Greendale also strengthens transnational networks that can promote sustainable practices beyond academia. Furthermore, by embedding education for sustainable development (ESD) principles into teaching and assessment, Greendale aligns higher education with global commitments to climate action and the protection of ecosystems (UNESCO, 2021).



Additionally, this project provides a practical methodology and handbook for revising and enriching higher education curricula without altering the unit content itself. By offering tools for integrating transversal competences into unit-level outcomes, teaching strategies, and assessments, the project strengthens pedagogical innovation while ensuring academic integrity. This curricular reform promotes experiential, interdisciplinary, and problem-based learning, enabling learners to tackle complex sustainability challenges. The resulting teaching resources, case studies, and educator training initiatives also serve as scalable models for HEIs across Europe.

At the policy level, GREENDALE contributes to achieving the United Nations Sustainable Development Goals (SDGs), particularly SDG 4 (Quality Education), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action) (European Commission, 2020; United Nations, 2015). By aligning higher education practice with both European and global sustainability agendas, the project ensures that institutional transformation in partner countries contributes to international priorities for just and sustainable transitions. In this way, GREENDALE positions higher education as a central actor in addressing shared global challenges.

KEYWORDS

Higher Education, Greencomp, Sustainability Competences, Curriculum Development, Pedagogy



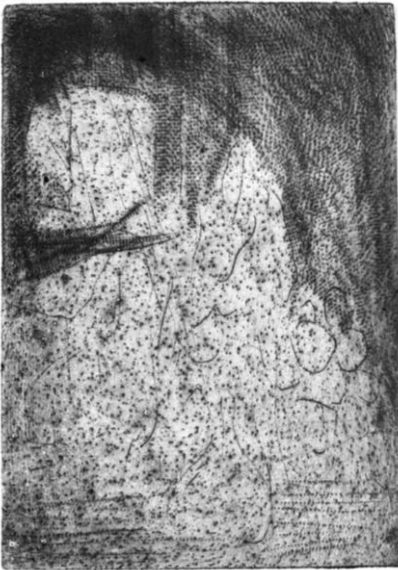
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A/r/tographic Exploration of Sustainable Printmaking Practices

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BACKGROUND



This research stems from the new printmaking studio at the Institute for the Creative Arts (ICA), offering a crossover between research and studio practice. Grounded in an a/r/tographic methodology (with participants adopting the roles of artist, researcher, and teacher), this project is a critical exploration of the commitment to materials that are sustainable and non-toxic in contemporary printmaking, and how their acceptance as legitimised materials in contemporary printmaking radically shifts artistic practice and pedagogical engagement.

The early stages of the research focused on material experimentation, placing students as co-inquirers, critically reflecting on how the 'live' qualities of printmaking (repetition, transformation, juxtaposition) become a metaphor for learning as recursive and reflective. Outcomes were documented through a digital repository, reflective journal, and pedagogical portfolio to illustrate the starting point for both artistic exploration and educational decision-making.

This project will progress into a more theoretical and analytic phase, acknowledging a transition toward academic research, while prioritising printmaking as the primary method of inquiry. This second phase will focus on finding a place among the wider



debates about art education, sustainability and artistic research. It also marks a significant moment in the researcher's artistic process; the synthesis of experimentation with materials, conceptual development, and considered analysis. In framing the studio as a site of the creation of knowledge, the project positions printmaking as a teaching practice, a learning practice, and an art-making practice developed through the simultaneous considerations of artist and educator.

OVERALL AIM

The main aim of this research is to critically investigate and enhance sustainable, non-toxic printmaking practices within an a/r/tography framework that knits together art-making practice, pedagogy, and academic research. It aims to analyse the scrupulous, cyclical, and reflective processes of making printmaking works and how they impact and deepen learning for students and the researcher within the creative process, and the cyclical nature of the process of making. Beyond the studio, this project aims to promote collaborative engagement with the larger community and contribute to academic conversation through publication and distribution.

MAIN EXPECTED OUTCOME/S

The research is expected to achieve several outcomes that reflect both artistic and pedagogical growth:

- 1. A portfolio of prints and artist statements that portray conceptual and technical development in sustainable printmaking.*
- 2. A pedagogical portfolio documenting lesson plans, teaching methods, and evidence of student learning.*
- 3. An expanded digital repository of processes and reflections, designed as a long-term teaching and learning resource.*
- 4. A peer-reviewed academic paper connecting artistic inquiry with reflective pedagogy.*
- 5. Broader outreach activities that extend practice beyond the studio, offering students and the researcher opportunities for engagement with wider audiences.*

RESULTS

The first phase of this research study produced a good amount of material, demonstrating the fruitful intersections of practice, pedagogy, and research. A



weekly reflective journal documented the artist-teacher role, as well as student assessments, while also highlighting the difficulties encountered in balancing technical instruction of drypoint, linocut and monoprints with workshop and studio management and the researcher's own need to develop in artistic practice. Sustainability emerged as a key factor in practice and pedagogy. A portfolio of educator and student work was developed that will continue to grow as the students' inquiry deepens. It has been organised by technical process and demonstrates how conceptual development grows out of practical skill and gains

strength through artist statements and documented intentions. The pedagogical portfolio included lesson plans, schemes of work and resource plans to document the thoughtful integration of sustainable printmaking into the curriculum. In conjunction with this, a digital archive documenting the processes involved in making and concepts was established as an ethics-based resource for students to access the flexibility of choice associated with printmaking while bringing their practice together with their theoretical preparation. Although working within constrained time and plans that were open-ended could produce uncertainty and interrupt the general workflow of teaching, there was time for reflection and opportunity for adjustment. These interruptions confirmed the recursive nature of a/r/tographic research and established possibilities for the next research stage.

IMPACT OF RESEARCH

The study impacts three areas: society, environment and curriculum. From the social perspective, the research facilitates opportunities to engage in meaningful artistic practices by students and researchers in a community of practice, underpinned by printmaking as an inherently accommodating the reflective and participatory education contexts. The same community of practice provides students with a voice to co-construct their creative ideas and developments, as well as with the opportunity for different practitioners to engage with more sustainable forms of art production than the current standard of disposable commodities. Through the co-inquiry and peer exchanges between students, the collaborative nature of the research allows shared ownership of knowledge and skills. The inclusion in a community of practice not only guides student experience but also demonstrates and extends the social significance of art as a way to speak, create cultures, and build community. When it comes to the environment, the focus is on the non-toxic and sustainable printmaking approaches. Traditional printmaking relies on toxic materials and chemicals that can be detrimental to the printer maker, but also the ecosystem at large. This research experiments with and incorporates non-toxic alternatives, as a practice that models sustainable and responsible practice within the wider creative arts ecosystem. This exemplifies the responsible reduction of health risks with the printmaking workshop, whether it's a private studio or an educational one. It also promotes ecological awareness through practice and experiential learning. The routine use of sustainability as part of everyday studio practice promotes an evolving culture towards a greener creative industry, and allows students to position themselves as future practitioners with an environmental and social consciousness. The broader environmental agenda implies that this project develops a broader alignment of art education and practice with sustainable development goals. For the

curriculum, the link is clear. The research is taking place primarily in an educational printmaking studio. It has also produced a teaching portfolio, lesson plans, and a digital repository that have embedded sustainability and reflective inquiry into the



curriculum structure of art education. These outputs demonstrate how conceptual inquiry, reflective thinking in documentation, and ethical values can augment studio-based, practical ways of learning. In this context, the project addresses long-lasting pedagogical development through modelling how one can embed artistic practice, research, and sustainability within pedagogy. Altogether, these three levels of impact establish the research as a model for how art can be a socially engaged, environmentally responsible, and pedagogically innovative practice.

KEYWORDS

Sustainable Printmaking, A/r/tography, Pedagogy, Reflection, Community

OurOBS: Our joint ocean OBServations for the Malta-Sicily shelf

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BACKGROUND

The waters surrounding Malta, despite being among the most heavily used stretches of the Mediterranean, remain largely understudied. During Malta's EU accession phase, the country committed to safeguarding fish stocks within its 25-mile management zone. This obligation requires an ecosystem-based fisheries management approach, which goes beyond simple monitoring of fishing activities, demanding repeated, detailed studies to understand ecosystem dynamics and assess fish stock health. However, until now, knowledge of Malta's marine environment has largely relied on short-term, project-based monitoring, leaving significant gaps in understanding the factors that shape local biodiversity and fisheries.

In response to this knowledge gap, the Malta College of Arts, Science and Technology (MCAST) launched OurOBS (Our OBServations), a landmark marine research initiative. Spearheaded by the Oceanography section of MCAST's Institute of Engineering & Transport, the project conducted a 10-day oceanographic survey on board the Italian research vessel R/V GAIA BLU, the largest vessel of its kind in Italy. The study aimed to provide a first comprehensive baseline portrait of the Maltese marine environment, linking physical and biochemical data of the water column with ecosystem and fish stock dynamics.

The survey was conducted in collaboration with Italy's Consiglio Nazionale delle Ricerche (CNR) and supported by Xjenza Malta and Aquatic Resources Malta, highlighting the importance of both national and international partnerships. Alongside the MCAST research staff, the team included five MCAST students, whose participation provided hands-on training in applied research. The initiative represents a crucial step toward consistent marine monitoring to guide sustainable management of Malta's coastal waters.

OVERALL AIM

The overall aim of OurOBS is to establish a baseline understanding of the physical, chemical, and biological characteristics of the waters surrounding Malta. By conducting a comprehensive oceanographic survey, the project seeks to generate

data that will inform ecosystem-based fisheries management, enhance knowledge of local marine dynamics, and provide the foundation for regular, long-term monitoring of fish stocks and environmental conditions in Malta's 25-mile management zone.

MAIN EXPECTED OUTCOME/S

The main expected outcomes of the OurOBS project include a first 360-degree snapshot of Malta's marine environment, detailed data on water column structure, and an improved understanding of how ocean dynamics affect the trophic chain, from plankton to small pelagic fish. Additionally, the project will strengthen national and international research collaboration, provide practical experience to MCAST students, and establish a framework for ongoing, sustainable marine monitoring and evidence-based management.

RESULTS

The 10-day oceanographic cruise on R/V Gaia Blu successfully collected comprehensive physical and biochemical data across the Maltese waters, covering multiple locations within the 25-mile management zone. Researchers documented water temperature, salinity, chlorophyll, and plankton distributions, providing critical insights into the factors shaping local marine ecosystems.

Preliminary understanding suggests significant variability in both temperature and nutrient levels, which are likely to influence the abundance and distribution of small pelagic fish. Observations of plankton communities indicate spatial heterogeneity, which may have implications for the resilience and productivity of the local trophic web. These initial findings underscore the need for repeated, long-term surveys to capture seasonal and interannual variability.

The participation of MCAST students also proved highly valuable, offering practical exposure to field research techniques, sample collection, and data analysis. The collaboration with CNR, Xjenza Malta, and Aquatic Resources Malta demonstrates the benefits of combined national and international expertise in addressing complex marine research questions.

While final results are pending detailed laboratory analyses, the expedition has already established a robust baseline dataset that will support ecosystem-based fisheries management, inform sustainable resource use, and guide future monitoring campaigns. This first large-scale survey sets a precedent for regular, systematic oceanographic observation in Maltese waters, enabling more informed

decision-making for conservation and fisheries policies in a region under increasing pressure from climate change and resource exploitation.

IMPACT OF RESEARCH

The OurOBS project will generate a step change in how marine ecosystems in the Malta–Sicily shelf are observed, understood, and managed. Despite the ecological, cultural, and economic importance of this region, it remains critically understudied and subject to major data gaps that constrain effective ecosystem-based management. By establishing a joint long-term observational framework across national boundaries, OurOBS will create the baseline knowledge and operational capacity needed to address these challenges.

The project’s scientific impact lies in its ability to produce the first coordinated, high-resolution oceanographic dataset for the Malta–Sicily shelf. By integrating CTD profiles, ADCP current measurements, biogeochemical sensors, and biological sampling, the project will uncover ecosystem dynamics that were previously undocumented. This integrated dataset will enable a more accurate assessment of physical–biological interactions, biodiversity patterns, and ecosystem functioning, forming a solid foundation for marine ecological research in the Central Mediterranean.

The policy and management impact will be equally significant. OurOBS will directly inform the implementation of the EU Marine Strategy Framework Directive, the Common Fisheries Policy, and the Convention on Biological Diversity targets, while supporting the designation and management of Marine Protected Areas. By providing evidence-based tools to assess fish stock dynamics, habitat vulnerability, and climate change impacts, the project will strengthen both Maltese and Italian capacity to meet national and EU-level obligations.

Beyond science and policy, the project will have a strong capacity-building and societal impact. Through joint training, exchange of expertise, and the development of open-access data products, OurOBS will foster a new generation of researchers and practitioners equipped with cutting-edge observational and analytical skills. The project’s outputs will also be accessible to stakeholders, including fishers, NGOs, and coastal managers, ensuring that knowledge is co-produced and applied.

Finally, the transboundary cooperation fostered by OurOBS is a major innovation. By integrating resources and expertise from Malta and Sicily, the project creates a scalable model for regional marine observation systems that can be replicated in other areas of the Mediterranean and beyond. In this way, OurOBS not only

addresses pressing local knowledge gaps but also contributes to global efforts for ocean observation, monitoring, and conservation.

KEYWORDS

Oceanographic Survey, Ecosystem-Based Fisheries Management, Marine Monitoring, Malta-Sicily Shelf, Pelagic Ecosystems, Baseline Data

The research activities were supported by Xjenza Malta to participate in the research expedition aboard the R/V Gaia Blu, in collaboration with the Italian National Research Council (CNR)



Bridging Science and Conservation: Dolphins as Bioindicators in a Changing Ocean

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BACKGROUND

*The common bottlenose dolphin (*Tursiops truncatus*) is a key sentinel species for the health of marine ecosystems, particularly in coastal areas increasingly affected by human activities and climate change. While research across the Mediterranean has provided valuable insights into dolphin ecology, behaviour, and threats, Malta still lacks an integrated, long-term monitoring programme for its resident bottlenose dolphin population.*

The DOLPHIN-CLIMATESENT aims to fill this critical gap by establishing the first national photo-identification (photo-ID) catalogue of bottlenose dolphins in Maltese waters. Building on eight years of pre-existing photographic data collected by EcoMarine Malta, this catalogue will be expanded with new data acquired through systematic sea-based surveys. Individual dolphins will be identified based on dorsal fin characteristics, enabling the monitoring of population size, site fidelity, social structure, and long-term presence in areas of interest, such as aquaculture sites.

A key component of the project is the application of non-invasive skin mark analysis protocols to assess dolphin health indicators. Lesions, scars, and physical injuries will be recorded and categorised to detect signs of environmental stress or human-related impacts, such as interactions with fishing gear, pollution, or habitat degradation. The project will also explore emerging methodologies, such as using skin mark patterns to estimate sex, providing an ethical and low-cost alternative to invasive sampling methods.

Furthermore, this project will integrate existing acoustic data from the DELFISHPAM project with new visual observations, creating a multi-dimensional dataset that provides a comprehensive understanding of dolphin behaviour,

habitat use, and potential responses to climate-driven changes in the marine environment.

The outcomes of this project will contribute to marine spatial planning, conservation strategies, and sustainable tourism practices in Malta, while fostering collaborations with international research networks and enhancing local capacity for marine mammal monitoring and conservation.

Through academic and public dissemination, the project will raise awareness of human impacts and potential climate-related stressors on dolphins, while equipping policymakers, eco-tourism operators, and the public with actionable insights to support marine conservation and responsible wildlife interaction.

OVERALL AIM

The overall aim of this project is to apply the principles of skin mark analysis to (1) characterise the type, extension and evolution of marks in the Maltese common bottlenose dolphin population, and (2) identify possible sex differences to build a sex-discrimination model based on high-quality photographic data. Simultaneously, it will evaluate anthropogenic activities such as interactions with fishing gears and farms, and link dolphin health indicators to climate-related environmental changes.

The study will improve monitoring of individual dolphins, population structure, and stressor exposure by combining photographic data with pre-existing acoustic data from the DELFISHPAM project. This will enable informed marine conservation and spatial planning.

Detecting and mitigating the threats of climate change to marine mammals will require some realignment of research and monitoring priorities, coupled with rapid and flexible management that includes both conventional and novel conservation interventions.

MAIN EXPECTED OUTCOME/S

The DOLPHIN-CLIMASENT project is expected to deliver Malta's first national photo-identification catalogue of bottlenose dolphins, enabling long-term monitoring of population size, site fidelity, and social dynamics. By applying non-invasive skin mark analysis, the project will provide new insights into dolphin health and the impacts of human activities and climate-related stressors. An exploratory sex-estimation model based on skin patterns introduces an innovative, ethical research tool. Integrating photo-ID with acoustic monitoring, the project will generate a multi-dimensional dataset that supports marine spatial planning,

conservation strategies, and eco-tourism guidelines, while enhancing research capacity, fostering collaborations, and raising public awareness on marine conservation.

IMPACT OF RESEARCH

The DOLPHIN-CLIMASENT project addresses critical national, European, and global priorities for biodiversity conservation, climate action, and sustainable development. At the national level, it directly supports Malta's Sustainable Development Vision for 2050 and contributes to the National Biodiversity Strategy and Action Plan (NBSAP), which provides the framework for implementing the Convention on Biological Diversity. By creating Malta's first long-term dataset on bottlenose dolphins, the project offers a valuable evidence base for improving marine spatial planning, mapping of future Marine Protected Areas (MPAs), and enhancing the national Code of Conduct for dolphin-watching, thereby promoting sustainable eco-tourism while safeguarding marine biodiversity.

In relation to climate change, the project contributes to the Malta Climate Action Plan by applying non-invasive methods to monitor stress indicators in marine mammals, which act as early-warning bioindicators of environmental change. By linking dolphin health to shifts in prey availability, water quality, or sea temperature, the project enhances national resilience and adaptive management strategies in the face of growing climatic pressures.

At the European level, the outcomes of this study align with the EU Biodiversity Strategy for 2030, which calls for improved monitoring frameworks and the restoration of damaged ecosystems. Bottlenose dolphins are recognised indicators of Good Environmental Status (GES) under the Marine Strategy Framework Directive (MSFD) and are protected under the EU Habitats Directive (Annex II and IV). The project therefore strengthens Malta's ability to meet EU obligations by generating high-quality, non-invasive scientific data that informs policy and ecosystem-based marine management. Furthermore, its emphasis on ethical research supports the EU Animal Welfare Directive, advancing best-practice approaches in marine science.

Globally, the project contributes to the UN Sustainable Development Goals (SDGs), particularly SDG 14 (Life Below Water), by safeguarding marine biodiversity, and SDG 13 (Climate Action), through the development of bioindicators to monitor climate-related impacts on marine ecosystems. It also supports the objectives of the UN Decade of Ocean Science for Sustainable Development (2021–2030) by generating knowledge that bridges science, policy, and society.

Beyond its scientific and policy relevance, the project has wider societal and economic impacts. It strengthens Malta's eco-tourism sector by promoting responsible dolphin-watching and offering operators guidelines grounded in science. It also enhances ocean literacy through targeted dissemination activities, raising awareness of how human activities and climate change affect marine life. By building local capacity for dolphin monitoring and fostering international collaborations, the project ensures long-term benefits for research, education, and conservation.

KEYWORDS

Climate Change, Bottle-Nose Dolphins, Photo-ID, Human Pressures

Project DOLPHIN-CLIMASENT is financed by the Ministry for Education, Sport, Youth, Research and Innovation.



GOVERNMENT OF MALTA
MINISTRY FOR EDUCATION, SPORT, YOUTH
RESEARCH AND INNOVATION



EcoMarine Malta



MCAST

MEDSEAPLAN: Malta's Data and Scenarios for a Sustainable Mediterranean Blue Economy

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BACKGROUND

Maritime Spatial Planning (MSP) is crucial for a sustainable blue economy (SBE) in the Mediterranean. With the increasing competition for maritime space for different purposes (including renewable energy, transport, and conservation), spatial plans support the sustainable management of such uses, for a balance between blue growth objectives and environmental targets. An ecosystem-based approach (EBA) is, in fact, central to the processes of the MSP Directive, which establishes a framework for MSP implementation in EU waters. The MEDSEAPLAN project (2024-2027) aims to develop a comprehensive scientific knowledge-based tool for the application of the EBA in MSP processes, in several sub-sea basins in the Mediterranean. The project method will involve (i) putting to test data collection and processing methods including the deployment of data collection instruments on industry vessels, the design and testing of a floating data buoy, data collection through nature-based solutions and the development of a digital twin; and (ii) running a participatory process involving MSP competent authorities, national data agencies and industry representatives. MEDSEAPLAN will then use the collected input from the new data sources and stakeholders to assess a series of future MSP scenarios, as products for MSP planners and stakeholders to consider for their future planning.



OVERALL AIM

The project aims to critically assess Malta's MSP framework within the wider Mediterranean context, examining how national legislation, governance arrangements, and planning practices integrate the EBA and SBE objectives. Through a comparative analysis with five other Mediterranean countries, the study seeks to evaluate Malta's capacity to provide ecologically sound, participatory, and integrated marine governance, while identifying gaps, opportunities, and

ways to improve MSP implementation in line with EU directives and international commitments. The project will also assess ocean literacy gaps within the context of industry-oriented training and education, and develop an ocean literacy educational programme tailored for MSP-related sectors and professions.

MAIN EXPECTED OUTCOME/S

The study will deliver a systematic appraisal of Malta's MSP framework, highlighting strengths, limitations, and alignment with EU and regional instruments. Expected outcomes include: (i) an evidence-based evaluation of Malta's data and knowledge systems, stakeholder engagement, and legal integration of SBE principles; (ii) identification of institutional and policy gaps impeding effective MSP; and (iii) targeted recommendations to enhance Malta's capacity for integrated ocean governance. Comparative insights will help policymakers and stakeholders understand Malta's MSP experience in the broader Mediterranean context, and guide future sustainable marine and coastal planning.

RESULTS

Preliminary Results: Comparative insights from other Mediterranean countries highlight shared challenges, including varying levels of data integration, stakeholder participation, and ecosystem-based management. Malta's experience provides a useful example of how a small island state can progressively advance MSP implementation, offering lessons for both national policy and regional cooperation in the Mediterranean context. Malta has transposed the MSP Directive into national law and designated a competent authority, but implementation remains at an early stage. The forthcoming National Spatial Strategy (NSS) is expected to embed MSP more clearly, yet current frameworks remain to be improved. Overall, Malta demonstrates progress in formal compliance with EU requirements but improvements are still ongoing.

IMPACT OF RESEARCH

Malta occupies a unique position in the Mediterranean Sea: a small island state with a significantly large Exclusive Economic Zone (EEZ). The comparative analysis of MSP frameworks provides an important opportunity to assess how Malta's national system can evolve to meet both domestic needs and regional sustainability objectives.

The impact of this research is threefold. First, at the policy and governance level, the study highlights the structural gaps in Malta's MSP framework, such as those related to sectoral policies, stakeholder participation mechanisms, and data

infrastructures. By systematically identifying any shortcomings, the study provides an evidence base for strengthening national legislation and institutional arrangements. This has immediate value for Maltese authorities as they prepare the forthcoming NSS, ensuring that MSP is embedded as a core governance tool.

Second, at the capacity-building level, the project supports Malta in bridging the gap between EU legal obligations and domestic implementation. By aligning national practice more closely with the EU MSP Directive, the Marine Strategy Framework Directive, and the Barcelona Convention, the research contributes to building a more coherent and future-proof planning system. This has the potential to improve inter-agency coordination, enhance compliance with international obligations, and strengthen Malta's role in regional cooperation initiatives.

Third, at the economic and societal level, the research advances Malta's ability to harness the opportunities of the SBE. Malta's heavy dependence on maritime activities, including shipping, fisheries, tourism, and offshore energy, makes MSP a strategic tool for balancing economic growth with ecological protection. The study provides actionable recommendations for integrating EBAs, ecosystem services, and embedding ocean literacy into national planning and education programmes. This not only supports environmental resilience but also creates the conditions for more inclusive and participatory governance.

In the longer term, the impact of this research extends beyond Malta. By situating Malta's experience within a Mediterranean-wide comparative analysis, the project generates insights into how small island states can adapt and operationalise MSP within complex regional governance frameworks. This contributes to ongoing debates on integrated ocean governance, offering a replicable model for aligning national priorities with international commitments.

KEYWORDS

Blue Economy, Marine Spatial Planning, Ocean literacy, Mediterranean

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Sustainable Blue
Economy Partnership



modernAKIS: Modernising Agriculture Knowledge and Innovation Systems

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BACKGROUND

In times of increasing pressure on the use and management of natural resources and high political and societal ambitions with respect to



sustainable ways of food production, the European Union (EU) has defined visionary goals (e.g. European Green Deal) to tackle climate change and sustain a healthy way of life. Within this context, the timely access and integration of rapidly evolving scientific knowledge, innovation and technological developments across actors who participate in agricultural value chains is key to a successful transition towards the European vision. This is also reflected in the 2021-2027 Common Agricultural Policy (CAP) that stipulates the importance of practical Agricultural Knowledge and Innovation Systems (AKISs). AKIS refers to the networks, organisations, and processes that facilitate the generation, exchange, and application of agricultural knowledge and innovations within a given agricultural system. Such a framework is supported by AKIS actors (i.e. actors from R&D institutions, advisory services, farmers/producers, policymakers, agribusiness, private sector and NGOs) as well as physical and digital platforms that allow effective knowledge sharing and support innovation. However, the AKIS concept is not yet widely known, and the capacity of decision makers to implement this approach remains underdeveloped. The diversity of AKIS systems often challenges adequate knowledge flows at national/regional/local levels, and the decentralisation and privatisation of agriculture services (e.g. advisory services, education and training activities) contribute to an increasing pluralism of actors. Such challenges set the scene for the work undertaken by this project. With the involvement of a diverse range of partners from all 27 EU member states (including ministries, universities, chambers, etc.) and spanning over 7 years (2022-2029), the project aims to make the AKIS approach an effective tool for all actors of agrifood

systems. This abstract provides an overview of the project's objectives and its achievements to date.

OVERALL AIM

The project's main objective is to enhance AKIS actors' capacity to leverage individual, organisational, and systemic resources necessary for transforming AKIS systems into more coherent and efficient ones, thereby contributing to the transition towards sustainable management and use of natural resources in farming and forestry.

MAIN EXPECTED OUTCOME/S

The main outcomes expected include: (i) the provision of a new know-how to be used by policy makers and other AKIS actors, to improve knowledge flows and develop a well-functioning AKIS in their country (ii) supporting Member States' benchmarking in order to choose the most effective AKIS interventions adapted to local/regional/national situations (iii) the provision of approaches to better connect actors, policies, projects and instruments to speed up innovation and the uptake of knowledge.

RESULTS

The following are some of the recent project developments:

Significant progress was made in relation to the Communication, Dissemination and Exploitation Plan of the modernAKIS project. While the overall CD&E strategic framework remained unchanged, there were significant achievements in visibility, engagement, and exploitation of project outcomes.

1. Internal communication was strengthened through the creation of an updated SharePoint, while the AKISConnect Toolkit was launched to supply partners with ready-to-use outreach materials. Monthly coordination meetings and regular reminders supported more consistent partner participation. The website, launched in 2022, became a central hub with over 34,500 visits, supported by tailored content and analytics to track visitor roles. Social media activity generated strong engagement, with 81,552 impressions and over 11,500 interactions. Six joint newsletters and a dedicated email marketing strategy further expanded outreach.
2. Events served as a major dissemination tool: 100 networking events, 30 international presentations, and extensive use of printed and multimedia materials, including 47 videos on YouTube, significantly boosted project visibility.

3. *Regarding exploitation, progress advanced ahead of schedule. Individual exploitation plans with AKIS Coordination Bodies were launched earlier than planned, supported by templates and roadmaps. A co-creation process, complemented by Horizon Booster expertise, ensured that results were embedded in national AKIS structures and informed policymaking. Annual AKIS seminars monitored progress and sustained momentum.*
4. *KPI evaluation showed strong outcomes: website visits, newsletter subscriptions, and engagement exceeded expectations, while social media followers fell slightly below target but were balanced by high interaction rates. Editorial outputs such as practice abstracts and policy briefs remained a priority for the next phase.*

Overall, this evidence demonstrates that modernAKIS has built a solid foundation for visibility, stakeholder interaction, and long-term impact, while refining internal processes to improve efficiency and support exploitation in later phases of the project.

IMPACT OF RESEARCH

The project will achieve impact through an iterative cycle of collection, organisation, and delivery of new topical knowledge ready for practice. Key AKIS actors can access this knowledge through the knowledge exchange platform and apply it in their context to achieve better knowledge flows and thus a better functioning AKIS. Knowledge will pertain to AKIS models, strategies, governance solutions, and types of AKIS interventions beneficial to achieving CAP objectives. Network interactions will enable actors to draw on practice-oriented knowledge for integrating advisors and innovation

support into the AKIS and incentivising researchers to deliver practice-ready knowledge. Key AKIS actors in modernAKIS can draw from the comparative analyses of the 27 MS to understand where they can improve their AKIS. Subsequently, they can extract and take advantage of new know-how and practices being experimented with in AKIS models and strategies applied across the EU from the knowledge exchange platform. The project will enable the capacities of relevant coordinating bodies to monitor, measure and improve the organisation/functioning of their AKIS. These activities will help them to identify, share and learn strategies and mechanisms for a well-functioning AKIS. The project provides a forum for such bodies to discuss and exchange knowledge on all aspects of systemic change management.

- *Scientific impacts include benefits to scientists and practitioners who aim to develop tools/enhance the management practices of complex socio-political ecosystems, especially with a focus on knowledge of management and actor networks.*
- *Economic impacts are also expected through reduced systematic access costs for participants of AKIS. Further, the lessening of informational asymmetry is expected to incentivise the adoption of innovative and cooperative practices with individual pay-offs. Also, the benchmarking against better practices may trigger interventions which provide additional incentives and revenues for advisors, researchers, and innovators.*
- *Social impacts are also foreseen as the AKIS network will increase awareness, understanding, knowledge and capacities for system change of key AKIS actors. Long-term improvements in trustful relationships are also expected. Meanwhile, by setting up an EU-wide network of key AKIS actors - building on existing networks, projects and policies- modernAKIS will accelerate the uptake of innovative AKIS governance models and interventions as well as of practice-oriented knowledge.*

KEYWORDS

Agriculture Knowledge and Innovation, CAP Strategy, AKIS Coordinating Body, Advisory Services, Communities of Practice

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EIT Food - Collecting, verifying, reporting and reducing GHG emission (COVERE²)

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BACKGROUND

In the last 150 years, the average global temperature has increased by more than 1 °C. This is due to greater concentrations of greenhouse gases (GHG) and has dramatic consequences for both planet and people. The greatest potential for emissions reduction in the European Union is to be found in the agricultural sector. Agricultural companies, however, face several challenges in reaching their net-zero goals. These include fast, simple, and comprehensive traceability of the environmental footprint; the quality and verification of available data; compliance pressure; and pressure from customers and the partners in the value chain.

We will therefore develop a solution that helps agricultural companies, especially in the dairy industry, to collect and verify the GHG emissions data (especially the sources of electricity generation), to streamline their sustainability reporting, in order to reduce carbon emissions and improve compliance with regulations.

The activity has four phases and twelve work packages. In the first phase will streamline the project's approach, develop the necessary components to verify projects, and conduct market research. In the second phase, we will conduct relevant tests, complete the life cycle assessment study, and pilot our solution on the farm at the University of Helsinki. In the third phase, the partners will prepare their solution for the launch to market. The key focus is on service preparation for the market and training. In the last phase, the solution to the market will be introduced. Here, the focus will be on sales, marketing, and business development. After the project, there will be three key exploitable results. First is the COVERE2 approach to GHG emissions reporting. Second is the Life Cycle Assessment study. Third is the COVERE2 GHG emissions reporting advisory.

OVERALL AIM (MIN 50 - MAX 100 WORDS)

The 'COVERE2' project is created by the consortium of the University of Helsinki (Finland), ELEKS (Estonia), Vitagora (France), and Malta College of Arts, Science and Technology (Malta). In this project, we will jointly develop a solution that helps agricultural companies, especially in the dairy industry, to collect and verify the

GHG emissions data (especially the sources of electricity generation), to streamline their sustainability reporting, in order to reduce carbon emissions and to improve compliance with regulations.

MAIN EXPECTED OUTCOME/S (MIN 50 - MAX 100 WORDS)

The expected outcomes will give tools to companies to perform digital traceability. There are several problems that companies are facing in regard to reaching their sustainability or net-zero goals. First, it's the automated, optimised accounting for GHG emissions. Second, it's the quality of data. Third, its an urgency to comply with relevant regulations. Fourth, it lacks expertise around sustainability. Fifth, it's either a lack of required digital infrastructure or its fragmentation. Six, the security concerns about the company's data. Seven, as the net zero topic is new to some companies and their priority is directed towards dealing with recession and inflation, they do not know how or do not have time to approach the net zero predicament. Our solution will help companies to understand their GHG footprint, we will support them in reducing their emission while they grow their business. In addition, companies can improve their image via demonstrating that they contribute to tackling climate change. Our solution also impacts society. We facilitate access to knowledge on GHG emissions for all actors in society (customers, companies, regulators, etc). Therefore, we empower citizens, including consumers, to make an informed decision while buying an agri-food product. Overall, our solution contributes to reaching net-zero goals and, by that, a reduction of global warming, as it decreases the negative impact of the milk and dairy industry on the environment.

RESULTS

After the project completion, we will have three key exploitable results. First is our COVERE2 approach to GHG emissions reporting. This will allow businesses to accurately calculate their total GHG emissions on an organisational and product level as required by regulations. Emissions will be calculated for the whole value chain of interconnected business entities, thus providing a holistic view and avoiding double accounting. Second is the Life Cycle Assessment study. In this study, the environmental impact of milk production is assessed utilising ISO14040 (ISO, 2006). The system boundary is set from the cradle to the farm. The selected functional unit is 1 kg energy-corrected milk. The assessment will use data from KER 1 and KER 3 and will focus on global warming potential. However, other impact categories are also included (cumulative energy demand, land use). Third is our COVERE2 GHG emissions reporting advisory. This service will establish the status quo on the current state of GHG emissions reporting in a company, conduct

an initial gap analysis, create a recommendation report on the improvement of GHG emissions reporting and on compliance reporting (e.g., CSRD, ISO, SECD). Our primary markets are France, Germany, and Denmark. In the next step, we will enter the UK market. We expect to have our first customer in 2025.

WP4 – Market research

MCAST leads WP4 “market research”, an in-depth market research on the market potential for GHG emissions accounting, verification, and reduction in the dairy industry in the European Union. The research aims to identify the actors, including potential customers and competitors, summarise the current challenges and trends, map out the approaches to digital traceability and identify the best practices. The findings will be synthesised in the form of a recommendations report, which will inform the consortium’s go-to-market approach (g2m) and feed the commercialisation plan (DEL01_WP1).

The market research was concluded and reported in December 2024. The report has been accepted by the Lead partner.

WP10 – Introduction to Market

The last project phase, “introduction to market”, takes place in 2025 until the end of the project (August 2025). The last project phase contains only one WP “Introduction to market”. This WP is focused on selling the project solution, expanding the network of possible customers and partners, and marketing activities to promote the solution and consortium. At this moment, there are three predicted ways of generating leads: through inbound and outbound campaigns, and account-based marketing.

In terms of generating leads through inbound channels, first, ELEKS will create a landing page with the offering, while their main page is currently under construction. Usability tests have been completed, in which MCAST participated, and the product identity has been presented. Then the preparation of a social media campaign on LinkedIn and publish blog posts about the consortium and its results on the project webpage. MCAST has drafted two articles, of which one is published and one is under review (20/03/2025). The main outbound activities in this project phase are presentations at industry-specific conferences and tradeshows and participation in events related to the dairy and food industry in general.

In terms of account-based marketing, the focus will be on several corporate accounts and customise our offering accordingly to their long-term needs in GHG

emissions accounting. The g2m approach, market research, consortium partners, and established collaborations in the project will play a significant role in making a decision on which accounts to concentrate, as we need to consider the revenue history, account history (if it's an existing customer of ELEKS), margins and profitability, as well as the viability that the client in question. The key milestone is signing the first customer(s), regenerating a minimum of 10.000€ at the latest 6 months after the project has ended (M4_WP10).

IMPACT

Increase new digital solutions in use to improve supply chain efficiency, integrity and transparency:

Our digital solution aims at evaluating and ultimately reducing GHG emissions in agri-food production. By utilising the GHG emissions accounting platforms available on the market, we automate the data collection. Then, we improve the quality of data. Finally, we generate a GHG emissions report. Through this, we increase the efficiency, integrity, and transparency of operations. Our clients are empowered and well-armed to decrease their GHG emissions, ensuring the sustainability of their business.

We plan to launch to the market our solution in the year 2025, after completing the piloting phase and conducting a strong preparation for commercialisation. At that stage of the innovation development, we do not intend to create other digital solutions in the years 2026, 2027, or 2028, but we will be open to listening to market needs and adapting to our customers' wishes. Improvement in the impact on ecosystems due to factors identified as EU Green Deal and/or CAP targets

KEYWORDS

GHG emissions, CSRD, Energy tracing, Scope 1, Scope 2, Scope 3 emissions, Verification, Sustainability

COVERE² (Project ID: 23109) is funded by the European Institute of Innovation and Technology (EIT), under Horizon Europe, the EU Framework Programme for Research and Innovation.



SMARTPOL: development of an Unmanned Surface Vehicle based on the GNSS-Enabled Navigation technology.

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BACKGROUND

Coastal and inland waters are increasingly stressed by anthropogenic pressures—ranging from plastics and hydrocarbons to diffuse chemical runoff—undermining ecosystem health and the services these environments provide. Continuous monitoring is therefore essential, yet conventional survey workflows are labour-intensive and slow, with results often reaching decision-makers only after days of manual sampling and analysis. SMARTPOL responds to this gap with an integrated, real-time approach that combines an unmanned surface vehicle (USV) and a Shore Control Centre (SCC) to detect, map, and assess pollutants as events unfold. Within this framework, the USV serves as the primary mobile sensing asset: a twin-motor, differential-thrust platform guided by centimetre-level GNSS corrections and mission waypoints planned and supervised through an online GIS interface. This architecture delivers agile manoeuvrability in confined waters, robust localisation for repeatable transects, and live data relay for rapid interpretation and action.



A specific research thrust within SMARTPOL targets microplastics. These particulates are pervasive throughout the water column, shorelines, and seabed, and their small size, heterogeneous sources, and evolving physicochemical properties make detection and attribution challenging. By augmenting in-situ sensing on the USV with ground-truth sampling and post-analysis, SMARTPOL seeks to characterise microplastic presence while exploring correlations with co-measured environmental parameters obtained in real time.

OVERALL AIM

SMARTPOL aims to deliver a practical, end-to-end pollution detection, monitoring, and analysis system that operates in real time across inland and coastal waters—centred on a fully operational USV that will be built, commissioned, and deployed during the project. The core elements are: (i) a GNSS-enabled USV equipped with modular, pollutant-relevant sensors (e.g., turbidity, fluorescence, hydrocarbon

detection, conductivity/temperature) and (ii) an SCC that ingests, validates, visualises, and archives data while orchestrating missions via an online GIS planner. High-precision navigation—achieved through a GNSS base station supplying corrections—enables the USV to fly precise line plans, revisit transects, and execute adaptive sampling patterns as new plumes are detected. Multi-site validation campaigns in Turkey, Malta, and South Africa will be used to assess performance across varied hydrological and operational contexts.

MAIN EXPECTED OUTCOME/S

- A fully operational USV, sea-trialled and accepted, capable of autonomous waypoint tracking and adaptive sampling with live data streaming to the SCC.
- A reliable, real-time USV-centric workflow for detecting and mapping pollutants, substantially reducing the latency between observation and intervention compared with manual surveys.
- A high-quality dataset linking in-situ environmental parameters to microplastic occurrence, supported by systematic ground truthing to verify USV-borne measurements.
- Demonstrated repeatable, waypoint-based transects with centimetre-level positioning, enabling temporal comparisons and precise return-to-scene assessments after mitigation measures.
- Operational playbooks for authorities and stakeholders to transition from periodic manual monitoring to persistent, risk-based surveillance using autonomous surface assets.

While real-time autonomy accelerates insight and response, traditional manual sampling remains integral as a validation layer to confirm detection sensitivity and quantify measurement uncertainty.

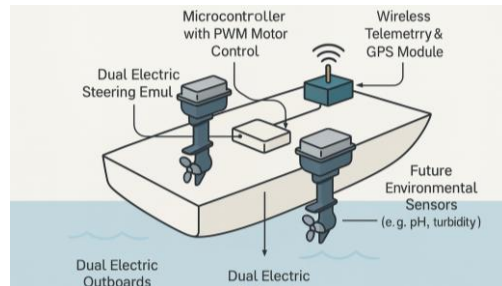
RESULTS

USV Performance and Mission Execution (Expected)

- *Line-keeping and repeatability. The USV will maintain planned transects with high positional fidelity using RTK-enabled navigation, supporting precise revisits for temporal comparisons and change detection across campaigns.*
- *Manoeuvrability in confined waters. Twin electric motors with differential thrust will enable tight turning radii and stable low-speed control for operations near shorelines, harbours, and river mouths.*

- *Adaptive sampling. When in-situ parameters exceed configured thresholds (e.g., turbidity/fluorescence), the mission planner will retask the USV to densify coverage over emerging plumes, improving spatial resolution without materially extending mission time.*

- *Low latency to insight. Live telemetry to the Shore Control Centre (SCC) will reduce time from observation to interpretation compared with manual surveys; results will be visualised on the GIS interface for immediate review and archiving.*

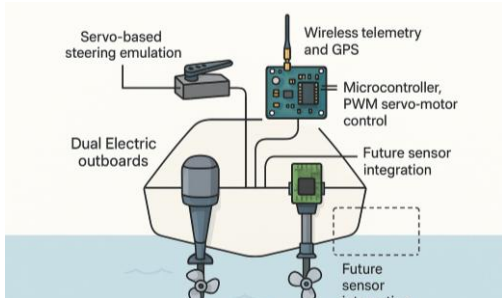


- *Operational availability. The system will demonstrate reliable launch–recover–relaunch cycles during multi-hour sorties, with remote health checks (power, comms, GNSS fix quality) and contingency behaviours (return-to-home on fault).*

GNSS Navigation Results — RTK (Obtained)

- *Centimetre-level positioning. Using a local base station and RTK corrections, we achieved stable, centimetre-level horizontal positioning suitable for narrow capture radii around waypoints and repeatable track overlays on revisits.*

- *Consistent line-keeping. Logged trajectories show tight adherence to planned transects, with minimal cross-track drift during clear-sky segments and rapid recovery after transient obstructions.*



- *High fix availability. The GNSS engine maintained a high proportion of fixed solutions, with swift re-acquisition following brief drops to float under challenging multipath conditions.*

- *Time alignment and logging. All GNSS positions are time-synchronised with sensor streams and exported as georeferenced layers and figure-ready plots, enabling direct comparison between missions and sites.*
- *Operational implications. The obtained RTK performance underpins precise plume delineation, reliable adaptive sampling, and accurate return-to-scene assessments after mitigation actions.*

IMPACT OF RESEARCH

By coupling autonomous surface operations with live analytics, SMARTPOL strengthens environmental protection, public-health safeguarding, and maritime safety. The same USV-SCC system can be applied to routine bathing-water surveillance during the swimming season; to proactive stewardship of Marine Protected Areas within the Natura 2000 network; and to rapid assessment of acute incidents such as oil or chemical spills, where immediate, spatially resolved intelligence reduces ecological and economic harm. Moreover, investigating microplastics alongside co-measured parameters addresses an urgent scientific and policy need as plastic pollution pressures mount. The approach aligns with established European directives governing bathing waters and habitat conservation, while modernising how evidence is gathered: from slow, episodic sampling to responsive, data-driven operations on the water.

KEYWORDS

Smartpol; Marine Pollution; Unmanned Surface Vehicle; Real-Time Monitoring; GNSS-Enabled Navigation; Multi-Sensor Payloads; Autonomous Mission Planning; Microplastics; Shore Control Centre.



Project SMARTPOL is funded by the MarTERA partners – Xjenza Malta, and supported by the European Commission under grant agreement MRT-2021-057A.

Optimisation of a structural design and build solution for a multi-storey commercial building.

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BACKGROUND

The optimisation of structural design and build solutions is critical for mid-rise commercial buildings, where cost, time, performance, and sustainability must be carefully balanced. A four-storey commercial building presents opportunities to compare reinforced concrete, structural steel, and precast or hybrid systems to achieve efficiency in material usage, construction speed, and lifecycle performance. Effective optimisation requires aligning architectural layouts with structural grids, rationalising spans, and integrating prefabrication or modular methods to reduce waste and improve quality. Consideration of embodied carbon, fire safety, and seismic performance further guides system selection. By applying a holistic optimisation framework, designers and contractors can deliver structural solutions that are cost-effective, durable, and environmentally responsible while supporting rapid project delivery.

OVERALL AIM

This study aims to evaluate and optimise structural solutions for a four-storey commercial building by comparing reinforced concrete, steel, and precast systems. The objective is to identify a cost-efficient, sustainable, and constructible approach that balances structural performance, construction time, and lifecycle environmental impact. The research is guided by key questions: Which structural system delivers the most cost-effective solution? How does system choice influence construction time, buildability, and carbon footprint? Can an optimisation framework successfully reconcile economic, performance, and sustainability priorities? The study advances three hypotheses: (H1) Precast or hybrid systems reduce construction time compared with cast-in-situ concrete without compromising performance; (H2) Steel–concrete composite frames provide optimal balance between cost and efficiency for medium spans; and (H3) Sustainability criteria shift preference toward lighter or modular systems with reduced embodied carbon.

MAIN EXPECTED OUTCOME/S:

The research is expected to deliver a comparative evaluation of reinforced concrete, steel, and precast systems for a four-storey commercial building, highlighting their relative performance in terms of cost, construction speed, structural efficiency, and embodied carbon. A key outcome will be the development of a replicable optimisation framework that integrates economic, environmental, and buildability criteria, enabling both academics and practitioners to apply it to similar mid-rise structures. The study will generate evidence on how precast and hybrid systems can accelerate project delivery, how steel–concrete composites can optimise spans and reduce foundation demands, and how sustainability priorities can shift design preferences toward lower-carbon materials. Outcomes will also include design guidelines and practical decision-support tools for contractors and developers. Collectively, these findings will contribute to advancing academic knowledge while providing the industry with actionable strategies for delivering faster, greener, and more cost-effective commercial buildings.

IMPACT OF THE RESEARCH

This research will significantly contribute to the academic community by advancing knowledge in structural optimisation, sustainability, and integrated design methodologies. Through a comparative evaluation of reinforced concrete, steel, and precast systems for a four-storey commercial building, the study develops a replicable optimisation framework that synthesises cost, constructability, and embodied carbon analysis. Such a holistic approach strengthens the interdisciplinary links between structural engineering, architecture, and environmental design, while also enriching teaching and research resources with practical case studies of mid-rise commercial structures. The findings are expected to stimulate scholarly dialogue on how optimisation can reconcile economic, environmental, and performance criteria, thereby broadening the scope of research in sustainable construction.

Within the sustainable building industry, the research will have a practical impact by providing evidence-based guidance for selecting structural systems that optimise project outcomes across time, cost, and environmental dimensions. The framework can be adopted by designers, contractors, and developers to support the delivery of faster, greener, and more cost-efficient projects. By demonstrating the advantages of offsite fabrication, modular construction, and recyclable materials, the study contributes to industry-wide efforts to reduce embodied carbon and align with evolving sustainability regulations. Furthermore, the

outcomes highlight practical pathways for improving supply chain efficiency, mitigating construction risk, and enhancing the long-term adaptability of commercial buildings. In a sector facing increasing demands for decarbonisation, this research offers robust, actionable insights that can support both immediate project performance and long-term sustainability objectives.

KEYWORDS

Structural Optimisation; Commercial Building; Reinforced Concrete; Steel Frame; Precast Systems; Sustainable Construction; Embodied Carbon; Design And Build

PAGES - A JPI-OCEANS project for the Good Environmental Status of the sea

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BACKGROUND

To ensure the sustainability of marine resources and achieve the Good Environmental Status (GES) of European seas, the European Union introduced the Marine Strategy Framework Directive (MSFD), which provides a coordinated approach for EU Member States, promoting a precautionary framework to prevent irreversible changes. The Directive employs 11 descriptors that outline key ecosystem features and help define monitoring strategies for assessing marine health. However, ecosystem evolution cannot be fully understood through purely linear approaches and threshold-based assessments, which have been proven to be often ineffective and unreliable. Innovative observation strategies for assessing the marine ecosystem need to adopt process-based approaches that allow identifying significant changes in biodiversity within the frame of ocean dynamics at different scales.

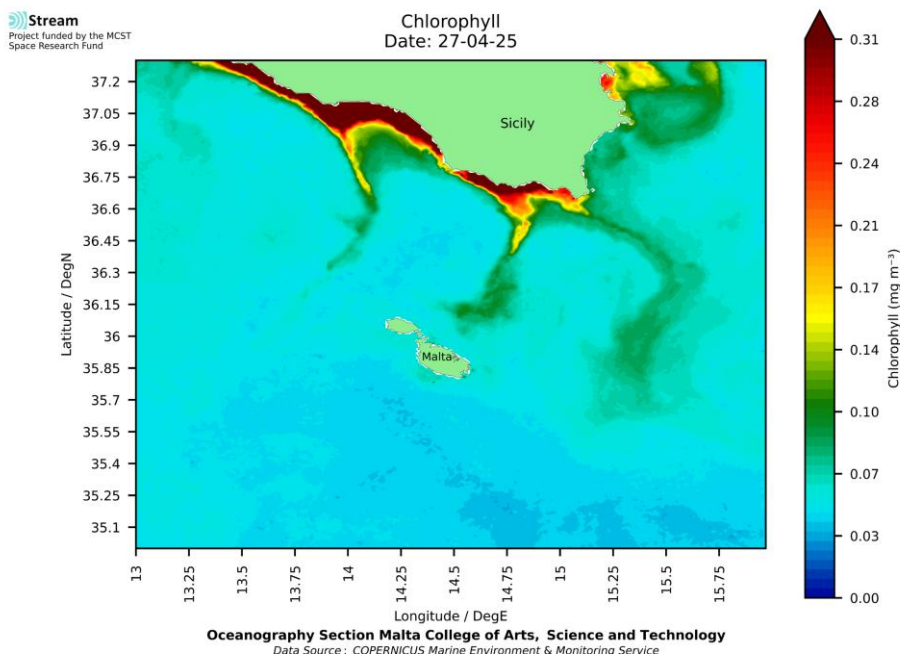
Scientific efforts have aimed to refine GES definitions and to establish robust metrics for assessing environmental health. A complementary approach was explored within the JPI-Oceans initiative “Science for GES” (S4GES), which implemented a Joint Research Cruise aboard the R/V Belgica in 2022. The S4GES cruise tested an innovative monitoring strategy integrating physical, chemical, and biological data. The methodology focused on a process-based sampling strategy, ensuring efficient and effective observational activities aligned with MSFD objectives. By pursuing a similar approach, the oceanographic cruise BIOTREC-Tara aboard the CNR R/V Gaia Blu aimed to explore coastal ecosystems and their connectivity with offshore waters. This initiative employed a trans-disciplinary, multi-platform, and multi-sensor sampling approach, investigating coastal biodiversity and biogeochemical processes within the frame of coastal plume and filament dynamics.

OVERALL AIM

PAGES aims to promote and develop innovative approaches to assess the marine Good Environmental Status (GES) for the national implementation of monitoring plans in the context of the Marine Strategy Framework Directive (MSFD), by means of process-based approaches. PAGES will contribute to a more comprehensive and reliable assessment of marine ecosystem health. PAGES introduces an integrated, process-based approach to enhance MSFD monitoring strategies by diagnosing biodiversity within specific dynamic, oceanographic processes.

MAIN EXPECTED OUTCOME/S

- further exploit samples and data collected in previous oceanographic cruises;
- plan new cruises to assess the GES over regions characterised by specific physical and biogeochemical dynamics, linking the dots between hydrodynamic, biogeochemical, and biological data, pursuing an adaptive sampling strategy;



Example of sampling area (Sicily Channel) for the Mediterranean 2026 PAGES cruise on board of RV Gaia Blu. The area is strongly characterized by wind-induced Chlorophyll-rich filaments

- *reinforce the outcomes of the JPI-O Action S4GES by providing a solid and generalised science-based proof-of-concept for an efficient and effective assessment of the marine GES.*
- *achieve an observational strategy aimed at simplifying the assessment of the marine environmental status, and addressing the different aspects of the MSFD and its associated investments.*
- *transfer PAGES approach to different marine systems.*

RESULTS

PAGES is a 3-year project (Sept 2025 – 2028) involving four partners: the National Research Council of Italy through the Institute for Marine Science (CNR-ISMAR) acting as Lead Partner, the Royal Belgian Institute of Natural Sciences (RBINS), the Atlantic Technological University (ATU) in Ireland, and the Malta College of Arts, Science & Technology (MCAST). The project is articulated over 6 Work Packages: WP1: Technical And Scientific Requirements Consolidation; WP2: Scientific Analysis; WP3: Cruise Preparation; WP4: GES Assessment; WP5: Promotion And Dissemination; and WP6 Management.

MCAST is actively participating in the planning and execution of an oceanographic cruise in the Central Mediterranean, including the area around the Maltese Islands, to be conducted in a domain with strong upwelling phenomena and hence complementing the research already done in the North Sea during the first phase of the S4GES Action, conducted in areas with different physical and biogeochemical regimes. MCAST will provide expertise in the oceanography of the area, support in data analysis, and provide inputs to AI-based analysis tools.

Furthermore, MCAST leads WP5 on project promotion and outreach, which has a demanding target of linking science to policy and to engage with environmental agencies in European Regional Seas to improve their practices and to adopt the S4GES marine monitoring process-based approach in their MSFD endeavours.

Our participation will definitely build on the experience of the oceanographic cruise that was carried out in the OurOBS project this summer.

IMPACT

The PAGES project will be delivering on several aspects, including:

- (i) *Consolidation of the Science Base for the implementation of MSFD;*

(ii) Supporting an improved definition and measurement of Good Environmental Status; and

(iii) Promoting the implementation of a process-based approach to GES

The project will be fully exploiting data collected during both S4GES and BIOTREC-Tara cruises and will further contribute to a more comprehensive and reliable assessment of marine ecosystem health. PAGES introduces an integrated, process-based approach to enhance MSFD monitoring strategies by diagnosing biodiversity within specific dynamic, oceanographic processes. Building on the concept that biological responses cannot be separated from physical dynamics, given that marine microorganisms and their surrounding fluid share the same density. PAGES will apply integrated techniques, to refine ecosystem assessments, leveraging past and future data. The project challenges traditional, linear threshold-based methods, and will be consolidating an adaptive observational strategy that allows for a better and comprehensive detection of anomalies affecting ecosystem stability. Providing proof-of-concept studies, PAGES aims to influence national MSFD observation frameworks, shifting from conventional sampling to process-driven monitoring. PAGES will demonstrate how understanding environmental dynamics can simplify complexity by revealing emergent ecosystem patterns, and thus contributing to a more effective, data-driven approach for assessing marine environmental status.

In particular, WP5 will disseminate results for further use by policy and practice, especially to decision-makers and non-scientific target audiences, creating user-oriented knowledge products. Dedicated workshops will share new knowledge on the practical understanding of the directive and its conceptual approaches. They also aim at identifying needs and clues, as a structured learning process that will support an “official task group”, the Marine Strategy Competence Center, and, in general, the entire community working and addressing the MSFD. These workshops intend to induce a bottom-up energetic flow in the scientific community, where researchers from different disciplines will be involved, thus paving the way to a realised holistic approach. This will be further boosted by training schools for the younger scientists. The proposed approach will also contribute to structuring a dialogue between different experts and facilitate a transformation from a silos approach to a true ecosystem approach, aiming at building rules of correspondence between different communities



KEYWORDS

Good Environmental Status; Process-based monitoring; Adaptive sampling strategy; Integrated Physical Oceanography-Biodiversity; Ocean Health

This project was supported by Xjenza Malta through the JPI Oceans initiative under the project PAGES



Towards a coordinated Marine Data Ecosystem for the Maltese Islands

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BACKGROUND

Marine data and information are essential ingredients not only for sea-based research, climate studies, the monitoring of the state of health of the sea and the management of its resources. Indeed, the marine data value chain in the evolving information age targets new avenues, reaching out to industry and fuelling smart, innovative applications that can raise economic levels to new heights that perhaps we cannot yet fully grasp.

Marine data and information are generated to serve different targets. Marine observations (including space-based earth observations) and data from numerical models provide essential systematic information on the state variables of the sea and marine ecosystems, aiding a number of users and applications.

Despite the importance of marine data Malta still lacks a national coordinated and sustained system for marine observations. No more data collected by best effort in singular project-funded endeavours, no more data silos restricting the access to multiple users. The CONNECT project pledges for a plan to enhance the marine data production as a coordinated national effort, targeting the needs of local stakeholders, adding value and boosting the blue economy, and serving an evolving knowledge-based society. Marine data and information are not simply meant for research, but are an essential ingredient to exploit the marine data value chain in the evolving information age, with new avenues reaching out to industry and fuelling innovative applications that can raise economic levels to new heights that we need to target.

OVERALL AIM

Under the patronage of the Parliamentary Secretariat for Youth, Research & Innovation, the Malta College of Arts, Science & Technology is leading the project 'Connecting marine data to serve society' (CONNECT) that aims to catalyse the design of a coordinated national system for the collection of essential data about the sea around the Maltese Islands. The CONNECT project brings stakeholders together by creating a cluster for marine observations, and is precisely conceived

to support the harvesting, management, access and sharing of the same marine data for multiple purposes and to diverse categories of users.

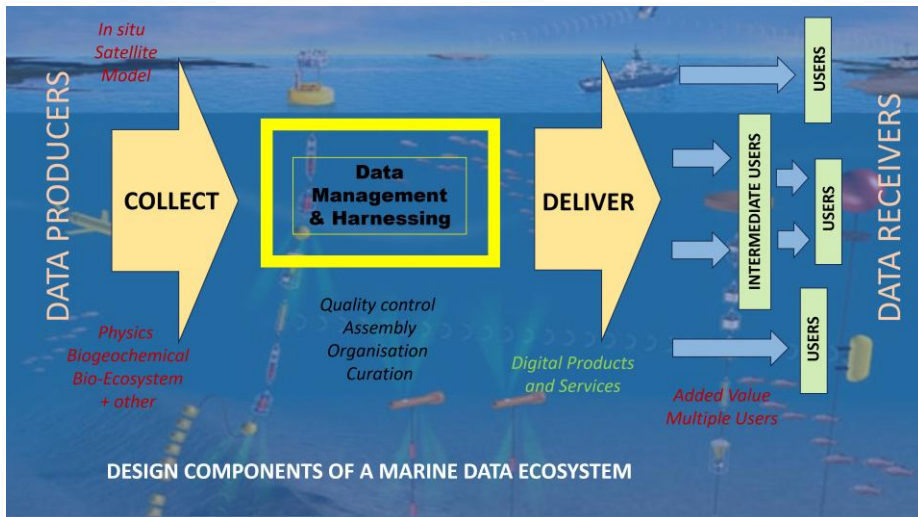
MAIN EXPECTED OUTCOME/S

The project focus is to CONNECT key actors to share assets and resources through clustering initiatives related to marine data acquisition and applications, including data from space platforms. The ultimate aim is in CONNECTing data to support and service society. Data available from different sources, including data collected for research, management and monitoring activities, as well as data generated by third parties, can be shared and accessed as a public good, and hence supporting the use and re-use of data to generate a multiplier effect through value addition by a wide range of users, leading to the generation of knowledge and supporting blue growth and economic activity.

RESULTS

A CONNECT stakeholders core group has been created to network key national players that need, use or plan to use marine data for their responsible activities and remits. The group is intended to synergise existing efforts, and to develop joint actions serving the needs of a wide spectrum of users engaged in public assignments, private enterprise, economic activities and human endeavours related to the sea. The core group has been essential to build consensus, thrust and ownership of the project targets, sharing ideas and discussing the various contexts to favour a national marine observing system that fits the needs of our nation, serving society and committing to the sustainable development of our territorial waters. The CONNECT Conference held on 29th September was an important milestone. The conference brought national stakeholders, responsible entities, members from the research community, operators and private enterprise to meet and discuss the delivery of essential marine data to the nation, with brainstorming on a nationally coordinated system and framework to streamline marine observations in Malta for a multi-dimensional approach comprising monitoring, ecosystem services, research, industry and security. This includes satellite-derived data that is increasingly serving so many of our daily endeavours and services. The Conference also served to highlight scenarios in the EU and globally, and to highlight the building blocks for the national backbone for marine

core data management and related services for open access and free exploitation in applications to serve society.



Schematic diagram describing the flow and elaboration of data from acquisition to delivery

IMPACT

The proportion of the stretch of sea around us that falls under Maltese jurisdiction compared to the land territory of the Maltese islands, is an amount that far exceeds that of other countries in the EU. This brings with it duties and challenges, such as for the protection of the marine ecosystem and the conservation of biodiversity, but it also bears a resource that we probably still do not know and have not yet recognised enough. The challenges are there and we must overcome them, but these same challenges should be an incentive to turn them into advantages by creating added value with R&I that strengthens and boosts the economy, especially in those sectors linked to the sea. In the marine sector at both global and regional scales, we are expecting big changes in the way we design products and deliver services. The demand on sea resources will continue to grow on a world level, but especially in the Mediterranean and in our country this development linked to the sea, or as we know it better under the Blue Economy, must at the same time safeguard sustainability by ensuring the effective protection of the sea. For those who will be able to prepare well for this near future, and plan and complete the framework to ensure success, these challenges will open up new

horizons of great advantages in the economic field. The CONNECT project addresses the need for the country to be supported by the core marine data collected in an organised and sustained manner. High-quality marine data is key to the monitoring of the state of health of the sea, and the conservation and management of its resources. Marine data is required by users to meet their operational (eg. port activities, shipping and navigation, oil exploration, aquaculture & fisheries, oil pollution response, search & rescue), and strategic planning and management needs (eg. marine spatial planning, and the evaluation of conflicts for space and common resources, securing marine food resources and ecosystem services, climate change, mitigation and adaptation), on top of the broader ambitious targets of the European Green Deal, and international agreements, such as the UN 2030 Agenda, and the Paris agreement on climate change. In a knowledge-based society, data provides the essential ingredients for our informed and calculated decisions, choices and actions. Indeed, the marine data value chain in the evolving information age targets new avenues, building on the capacity to integrate a wide range of data sources to transform data into knowledge and to connect, engage, and empower citizens, governments, and industries by providing them with the capacity to inform their decisions, fuelling innovative applications that can raise economic levels to new heights. Generating data consistently will give us the cutting edge to impact on the digital trend with innovative services, and this is the big cost-benefit of a national marine data system.

KEYWORDS

Marine Core Data; Marine Observations; National System; Research & Innovation; Oceanography

CONNECT, a Project on Marine R&I financed by the Ministry for Education, Sport, Youth, Project and Innovation, and the Office of the Parliamentary Secretary for Youth, Research and Innovation



GOVERNMENT OF MALTA
MINISTRY FOR EDUCATION, SPORT, YOUTH
RESEARCH AND INNOVATION
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