

# Marine Tech Transformers

**Discover the impact of Marine-i**

*Accelerating marine technology innovation  
in Cornwall 2017-end 2019*



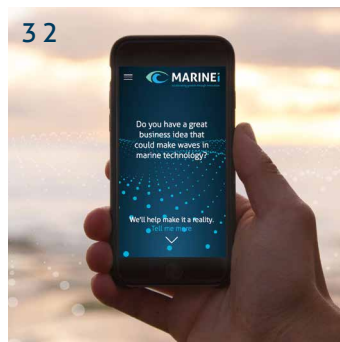
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# CONTENTS

- 4 INTRODUCTION**  
By Professor Lars Johanning, University of Exeter
- 6 STORY OF THE MARINE-I PROJECT**  
How Marine-i has pioneered a collaborative new approach in Cornwall's marine industry
- 9 CASE STUDIES**  
A selection of the innovative businesses that have received support from Marine-i
- 32 THE FUTURE**  
A bright future beckons for our marine technology sector...
- 34 PRAISE FOR THE MARINE-I PROJECT**  
What they have said about the Marine-i project



**European Union**  
European Regional  
Development Fund

[www.marine-i.co.uk](http://www.marine-i.co.uk)

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# INTRODUCTION

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## MARINE-I HAS TRANSFORMED MARINE TECHNOLOGY INNOVATION IN CORNWALL

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BY PROFESSOR LARS JOHANNING,  
UNIVERSITY OF EXETER

**P**art-funded by the European Regional Development Fund, Marine-i is a pioneering scheme designed to foster research, development and innovation in the marine technology sector in Cornwall and the Isles of Scilly. This sector has high growth potential and is therefore a key priority for the region.

Cornwall accounts for 8% of UK marine industry turnover and 1 in 7 of all UK marine jobs. We want to build on this powerful heritage to ensure that Cornwall plays a pivotal role in the sustainable marine industries of the future. These include marine energy, marine manufacturing, maritime operations and marine environmental technologies. We have a vision of Cornwall as a global leader for research, technology development and expertise and as the location of choice for businesses engaged in marine renewables technologies and the associated supply chain.

### COMPREHENSIVE RANGE OF SUPPORT FOR MARINE BUSINESSES

From day one, we have set out to help businesses embrace the emerging opportunities that will define the global marine sector to 2030 and beyond. Support has encompassed consultancy, leading-edge research expertise, grant funding, subsidised graduate staff and access to outstanding test facilities, including University of Plymouth's COAST Lab, DMaC, FaBTest and the Offshore Renewable Energy Catapult facilities.

The companies that engaged with Marine-i have had help from people who understand the unique challenges faced by marine technology businesses. Businesses have received the vital support they need to bring their innovations to market more quickly and with a greater chance of success.





University of Plymouth's COAST Lab

What links the many projects that we have supported is their high growth potential for the future, their ability to support new job creation in the Cornwall supply chain, and their potential to build important new global markets for Cornwall's unique marine technology expertise.

### STRATEGIC FUNDING CALLS

To support the broader strategic development of key new technologies in Cornwall, we launched two major funding calls. A fund of up to £1 million was made available to support research, development and innovation in marine robotics and autonomous vessels, while a fund of up to £500,000 was designated for innovative marine data technologies and applications.

### INDUSTRY-LEADING EVENTS

Marine-i ran regular Discovery Room sessions on a range of important marine technology topics. These gave businesses an opportunity to get up to speed on the latest thinking on an aspect of marine technology, to talk to experts in the field



and to meet related businesses who may wish to collaborate on bringing new technologies to market. The themes included robotics and AI, hybrid propulsion, composite materials, improving wave energy technology, surveying and marine data, drone technology, wave to grid systems, floating offshore wind strategy, high frequency radar and emissions reduction technology.

Our unique 2030 New Horizons Conference brought together 100 key industry leaders to explore the future landscape for Research, Development and Innovation in the South West and to help inspire new ways in which to foster a more effective innovation culture for high-tech businesses.

### MARINE-I HAS MADE WAVES AROUND THE WORLD

The initiatives that have been taken by the Marine-i project have been reported by industry titles all over the globe, including in Europe, the USA and Australia. This has raised the profile of Cornwall as a world leader in marine technology innovation.

Most importantly, the vital support that has been provided to pioneering companies in the industry has helped to ensure that marine innovation is being built on solid foundations, enabling Cornwall to grasp strategic growth opportunities for the future.

Marine-i has helped to create an environment where innovative marine businesses based in Cornwall and the Isles of Scilly now have a much greater chance of long-term success.

That is our legacy and we look forward to seeing these foundations being built upon.



# STORY OF THE MARINE-I PROJECT

**M**arine-i was a £9.3 million collaboration between University of Exeter, University of Plymouth, Cornwall College Group, Cornwall Marine Network, Cornwall Development Company and the Offshore Renewable Energy Catapult. It brought together key infrastructure and expertise to enable technology innovation in Cornwall and Isles of Scilly's marine sector, which has been identified as an area of high growth potential by the Cornwall and Isles of Scilly Local Enterprise Partnership.

Marine-i was designed to pioneer a new collaborative approach in Cornwall's marine industry and accelerate research, development and innovation within marine tech businesses.

## HOW WAS MARINE-I FUNDED?

Marine-i was awarded £6,851,462 of funding from the European Regional Development Fund as part of the European Structural and Investment Funds Growth Programme 2014-2020. The Department for Communities and Local Government is the Managing Authority for the European Regional Development Fund. Established by the European Union, the European Regional Development Fund helps local areas stimulate their economic development by investing in projects which will support innovation, businesses, create jobs and local community regenerations.

## WHY WAS MARINE-I SO VITAL?

Over the next decade and beyond, marine technology will be transformed as a new wave of innovation allows us to exploit the full potential of our oceans in ways that were previously not possible.

Getting the most from these new technologies will demand new ways of thinking and new levels of collaboration across different scientific and technical disciplines.

## HOW DID MARINE-I HELP MARINE BUSINESSES?

Marine-i is the most comprehensive marine research and innovation service ever designed for the marine tech sector in Cornwall – with the goal of helping marine businesses reach their full potential.



Businesses could benefit from:

- ▶ Marine innovation support through R&D feasibility studies, including from Research Business Fellows with cutting-edge marine technology expertise
- ▶ Reimbursable grants of up to £150,000 from the Marine Challenge Fund to provide vital technology funding and also 100% Rapid Innovation Grants of £2000 to accelerate projects
- ▶ Access to University of Plymouth's COAST Lab and University of Exeter FaBTest and DMaC facilities
- ▶ Access to risk/cost reducing test facilities for new technology development, via the Offshore Renewable Energy Catapult
- ▶ Graduate staff at a subsidised cost
- ▶ RD&I support for marine development projects
- ▶ 'Discovery Room' events programme
- ▶ Innovation Masterclass series
- ▶ Business assistance and knowledge exchange support.

## WHO WERE THE PROJECT PARTNERS?

Marine-i assembled a unique marine network of six key partners, all with outstanding expertise in the marine industry.



**University of Exeter** was the project lead partner. They provided Ocean Technology research support, including Research Fellows with electrical, mechanical, ocean science and technology expertise. In addition, the University of Exeter's research capabilities include a range of field testing, hydrodynamic analysis and deployment expertise including the Falmouth Bay test site (FaBTest), Dynamic Marine Component Test Facility (DMaC) and South West Mooring Test Facility (SWMTF). They also provided business assistance and knowledge exchange support.



**Cornwall Development Company** managed the Marine Challenge Fund which offered grants for marine innovation projects. In addition, they provided the core team to the Hayle project office and were available to support businesses throughout the grant process – from initial project shaping right through to claim.



**Offshore Renewable Energy Catapult** provided specialist sector knowledge around marine renewable energy technologies. They also gave access to national risk/cost reducing test facilities and specialist engineering services.



**Cornwall Marine Network** used their expertise to deliver bespoke business innovation guidance and facilitate collaboration to help marine businesses develop their innovation projects.



**University of Plymouth** provided marine and maritime research support, including Research Fellows with ocean science research experience. They also provided access to their COAST (Coastal, Ocean and Sediment Transport) Laboratory for physical model testing with combined waves, current and wind offered at scales appropriate for device testing, array testing, environmental modelling and coastal engineering. In addition, they provided business assistance and knowledge exchange support.



**The Cornwall College Group/Falmouth Marine School** used their industry links to develop relationships with marine SMEs and provided a marine technology focussed graduate placement scheme, with mentoring support, working with Unlocking Potential.

## MAKING WAVES

### MARINE-I OUTPUTS

Marine-i has accelerated innovation across the marine technology sector in Cornwall, achieving a great number of outputs that lay the foundations for future growth in the sector.

- ▶ **100** businesses have been supported in market led RD&I.
- ▶ **61** projects have been supported by grant funding (across **49** separate companies, **15** of which are start-ups).
- ▶ **9** businesses have been supported through the graduate subsidy scheme, creating new jobs for **11** graduates.
- ▶ **40** businesses took part in the Innovation Masterclass series.
- ▶ **14** Discovery Rooms with over **500** attendances.
- ▶ **£1.25 million** in private match funding has been leveraged.
- ▶ **30** collaborative RD&I projects with University of Exeter and University of Plymouth.
- ▶ **14** new products launched to market.
- ▶ Inward investment has been stimulated, with **7** businesses relocating to Cornwall or setting up a new office in Cornwall.
- ▶ Cornish company growth has been supported, with **3** expanding into new premises within the Marine Enterprise Zone.
- ▶ Over **200** pieces of media coverage in media around the globe, raising the profile of marine tech in Cornwall.



THE SUPPORT THAT WE HAVE RECEIVED FROM MARINE-I IS PROVING PIVOTAL IN ENABLING US TO REACH OUR FULL POTENTIAL.

**Ken Wittamore, Managing Director, Triskel Marine**



## THE WIDER IMPACT OF MARINE-I

As well as these direct outputs, Marine-i has pioneered and laid the foundations for a new kind of collaborative business support for the sector.

Marine-i has brought together an unprecedented partnership, combining existing infrastructure, research expertise, knowledge transfer and grant funding in a way that has been entirely business focused. It has worked collaboratively across project partners and also within the wider business support community.

This acceleration of RD&I activity has resulted in increased economic activity, with a number of key sub-contracts being placed with marine supply chain companies in Cornwall. This has enhanced the capabilities and track records of these companies, as it has introduced new products and started to create new high value jobs.

For example, Marine-i worked collaboratively with Cornwall Marine Network's Propel project and 29 businesses received complementary support which enhanced the benefits of Marine-i. Ongoing relationships between businesses and academic institutions have also led to applications to funds like InnovateUK Smart Grants. This is unlikely to have occurred without the RD&I work supported by the Marine-i project.

Marine-i has also demonstrated the immense long-term potential of the marine technology sector in Cornwall, in line with the economic growth ambitions of Cornwall and Isles of Scilly Local Enterprise Partnership.

## MARINE-I AS CATALYST

Marine-i has been a catalyst for powerful and lasting change in the sector on the ground. The networking

and collaborative elements of the project have led to the emergence of vibrant business clusters. These are now growing across a wide number of fields, including naval architecture and subsea engineering, geotechnical and sub-sea mining, autonomy for hydrographic surveying and more.

Marine-i has also helped accelerate the growth of businesses which have then gone on to win significant national industry awards, raising the profile for themselves and also for the marine tech sector in Cornwall. Triskel Marine won the DAME Overall Winner award in 2018, WorkFloat won the 'Spirit of Innovation' Award at the European Commercial Marine Awards 2019 and ARC Marine won the award for start-up of the year at the Maritime UK Awards 2019.

The project has led to the delivery of new products, services and high value jobs, creating new momentum and profile for businesses across a number of specialist fields.

- ▶ Autonomous vessels now being designed and manufactured in Hayle (Unmanned Survey Solutions, Ultrabeam Hydrographic).
- ▶ New marine tech software brought to market (Wave Venture, Navimeteo).
- ▶ Fresh impetus for Cornwall's world leading subsea geotechnics specialists (Armada Engineering, Subsea Minerals, Feritech, Ocean Hydraulics).
- ▶ Environmental goods and services for global markets (Triskel Marine, Kiote, Buoyant Works, WorkFloat, Reflex Marine).
- ▶ A new focus on hydrographic survey services; design, training and consultancy (Unmanned Survey Solutions, Ultrabeam Hydrographic).
- ▶ Marine renewables taken to the next level (Inyanga-Tech, AMOG, Global OTEC Resources, Wave Venture).
- ▶ New forms of low emission marine propulsion (Triskel Marine, RAD Propulsion, Bio Engine Technology, Whiskerstay).
- ▶ Imaginative new approaches to vessel and marine equipment design (Solis Marine, Toniq, Reflex Marine).





# DISCOVER THE AMBITIOUS BUSINESSES SUPPORTED BY MARINE-I

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HERE IS A SELECTION OF THE INNOVATIVE BUSINESSES THAT HAVE  
RECEIVED SUPPORT FROM MARINE-I

## DYNAMIC EDGE INNOVATION

**D**ynamic Edge Innovation Ltd was founded to provide a dedicated service to work with customers to take their product or design concept from initial idea through to a functioning prototype. Support from Marine-i is enabling the business to embrace new opportunities in Generative Design and 3D printing, creating new services for clients. Its new brand, Dynamic3dge, will focus on linking their software to the latest 3D printing machines. To get the new services ready for launch, the company was awarded a Rapid Innovation Grant to purchase the high specification PC it needed and the business has also benefitted from free training through the Innovation Masterclass run by University of Exeter.

[WWW.DYNAMIC3DGE.COM](http://WWW.DYNAMIC3DGE.COM)

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## JAXON SURFBOARDS AND WORKSHOPS

**J**axon Surfboards and Workshops is diversifying into a new type of eco-friendly surfboard, thanks to a Rapid Innovation Grant from Marine-i. It offers a range of workshops enabling customers to design, create and build their own custom surfboard. The team spotted an opportunity in the surfboard market to produce sustainable surfboards, using new materials combined with innovative methodologies and manufacturing techniques. This required research into new materials and testing of different foams, resins and fibre-glasses as well as 'live testing' of prototype boards. The company

was awarded a Rapid Innovation Grant, which has enabled them to progress with the design and production of prototypes.

[WWW.JAXONSURFBOARDWORKSHOPS.CO.UK](http://WWW.JAXONSURFBOARDWORKSHOPS.CO.UK)

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## OCEAN HYDRAULICS

**O**cean Hydraulics has identified an opportunity in the global offshore renewables market – a new way of anchoring seabed foundation piles. The SVB (Submersible Vertical Borer) is a revolutionary alternative to the current method of offshore and nearshore pile drilling – drilling down from the bottom of the pile rather than from the top. This alternative method could potentially bring significant cost savings as well as improve safety and stability. To move the project to the next level, the company needed 3D design visualisation to help prove the concept and to attract further investment. A Marine-i Rapid Innovation Grant helped fund this – leading to a new partnership and the design of a working prototype.

[WWW.OCEANHYDRAULICS.CO.UK](http://WWW.OCEANHYDRAULICS.CO.UK)

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## BUOYANT WORKS

**B**uoyant Works has created a new product for the offshore industry called Windshield, designed to enable safer crew transfer and extend the lifespan of landing piles by offering greater resilience against ►

# GLOBAL OTEC RESOURCES

**G**lobal OTEC Resources Ltd specialises in developing clean energy systems for off-grid communities. Their goal is to lower the entry barrier for island resorts generating energy using ocean thermals. They design bespoke systems with a consortium of engineering experts at kWh costs comparable with diesel generators and other renewables.

Attracted by the strong marine supply chain and the facilities available in Cornwall, the company decided to relocate its business to Newquay. Their expert team is now working to introduce Ocean Thermal Energy Conversion to international clients. The company plans to manufacture, sell and lease bespoke energy systems to luxury tropical hotels and resorts.

Global OTEC Resources has received two tranches of grant funding from Marine-i and has successfully completed the initial designs and feasibility studies as well as detailed design of the key components.

MD Dan Grech says: "We now have a preliminary design for our floating Ocean Thermal Energy

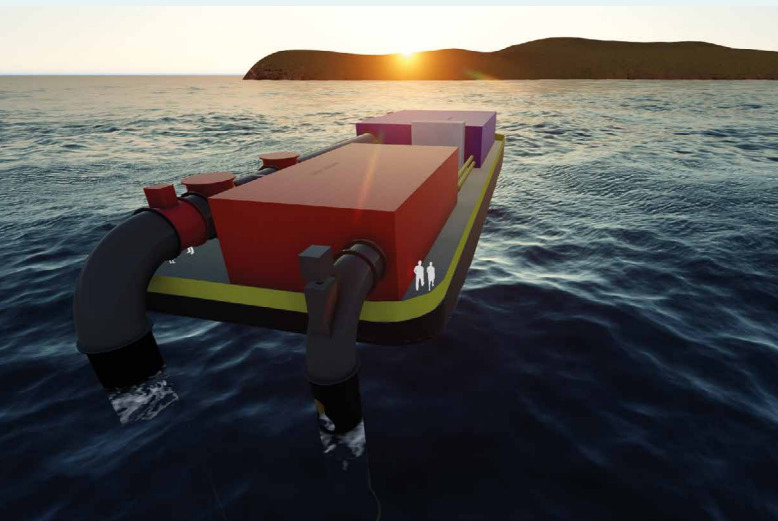
“  
WE ARE THRILLED TO HAVE  
SECURED SUPPORT FROM  
MARINE-I TO ENABLE US TO  
DE-RISK THE MOST  
CHALLENGING COMPONENTS  
OF AN OTEC SYSTEM.

**Dan Grech, Managing Director,  
Global OTEC Resources**

Conversion plant. This enables us to provide an accurate, on-budget cost model to meet the needs of our identified market. Our work has already attracted a letter of support from the Maldivian government, as well as a memorandum of understanding from a major, publicly-listed hotel chain which owns 50 resorts across the tropics. This demonstrates the outstanding commercial potential of our technology.”

Technical studies have also been completed which examined seabed conditions and soil types in the Maldives, as well as wind speeds, current speeds and wave heights. For part of this, Marine-i enlisted the help of a research fellow at the University of Exeter, who has carried out pioneering work to support the project.

Dan Grech adds: "We are thrilled to have secured support from Marine-i to enable us to de-risk the most challenging components of an OTEC system. We are certain that successful completion of this stage will unlock significant private investment, which in turn will mean that we can scale up and transition into the final design phase."



[WWW.OTECRESORTS.COM](http://WWW.OTECRESORTS.COM)



corrosion. Buoyant Works engaged with the Marine-i team to help with the build and testing required to bring the product to market. Support included utilising University of Plymouth facilities for material testing and working with Offshore Renewable Energy Catapult to conduct sea trials on a wind turbine with a full-size prototype. Offshore Renewable Energy Catapult also facilitated introductions to developers, vessel operators and the supply chain to support the company's market analysis.

[WWW.BUOYANTWORKS.COM](http://WWW.BUOYANTWORKS.COM)

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## 3DMSI

With a background in mining and architectural surveying, producing high quality 3D computer models for buildings, 3DMSI hit on an idea for a marine innovation with global potential. This is a service for ships and superyachts, documenting and modelling the exterior and interior layout, along with the engineering systems. It would use 3D scan data to model a complete ship, including its systems, and pair this with information from onboard sensors. This total scan package can then be used by design engineers and shipyards to offer superior service to vessels anywhere in the world. Marine-i funding has helped the business combine their internal laser scanning and 3D modelling with the intelligent onboard sensors to produce an active model.

[WWW.3DMSI.COM](http://WWW.3DMSI.COM)

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## PADDLE LOGGER

Paddle Logger Limited provides mobile apps which track paddlers using GNSS data, giving the user live feedback and data analytics. Now the company will take their technology a step further via a new system that signals when a paddler is in difficulty at sea, Paddler in Trouble. If the paddler needs urgent help, they can use the new system to immediately alert a third party with one flick of a button on their iPhone. Business assistance and a Rapid Innovation Grant has enabled Paddle Logger to press ahead with the rigorous testing required before release.

[WWW.PADDLELOGGER.COM](http://WWW.PADDLELOGGER.COM)



THE INNOVATION MASTERCLASS WAS A REAL EYE-OPENER FOR ME. AS WELL AS GIVING ME A THOROUGH GROUNDING IN THE TECHNIQUES AND PROCESSES FOR INNOVATION, IT HAS HELPED ME TO CLARIFY THE LONG-TERM VISION FOR OUR BUSINESS. I HAVE ALSO MADE SOME VALUABLE NEW INDUSTRY CONTACTS AS A RESULT OF THE SESSIONS. THERE IS NO DOUBT THAT MARINE-I HAS HELPED TO OPEN UP SOME REALLY IMPORTANT NEW DOORS FOR OUR BUSINESS. WE ARE DETERMINED TO MAKE THE MOST OF THESE OPPORTUNITIES AND ACCELERATE THE GROWTH OF OUR YOUNG COMPANY. IT HAS BEEN GREAT TO HAVE THE SUPPORT OF INDUSTRY EXPERTS WITH CUTTING-EDGE KNOWLEDGE, PEOPLE WHO REALLY UNDERSTAND THE CHALLENGES WE FACE AND CAN HELP US FIND THE RIGHT SOLUTIONS.

**Sam Baynham, Managing Director, Dynamic Edge**

## NATIONAL LOBSTER HATCHERY

The Marine-i programme has helped two University of Exeter science graduates to achieve their dream of working on a globally important research project for the National Lobster Hatchery in Padstow. This unique marine conservation charity works to improve the sustainability of the European Lobster. Graduates Elsa Domoney and Emma Theobald worked on nine-month research assignments with support from the Marine-i graduate subsidy scheme, during which time they were mentored to help them achieve their goals.

[WWW.NATIONALLOBSTERHATCHERY.CO.UK](http://WWW.NATIONALLOBSTERHATCHERY.CO.UK)

## SUBMARINE TECHNOLOGY LIMITED

Based on the Isle of Wight, Submarine Technology Limited (STL) has opened a new office in Cornwall to design and build ship-based multi-axis robotic arms that are fully motion-compensated. As an integral part of a new Autonomous Synchronised Stabilised Platform it will enable intervention tasks to be carried out from manned or autonomous surface vessels, playing an important role in the inspection, servicing and repair of offshore wind farms and other renewable energy technologies. The company has received grant funding and other support from Marine-i.

[WWW.STLRES.CO](http://WWW.STLRES.CO)

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## WHISKERSTAY

Whiskerstay has devised a new propulsion solution with wide applications for commercial and leisure marine vehicles, meeting demand in the marine sector for electric and hybrid propulsion systems that can deliver performance whilst also being environmentally friendly. A Rapid Innovation Grant helped fund the computer equipment needed to carry out vital system design and simulation work and specialist advice from Marine-i helped kickstart the project.

[WWW.WHISKERSTAY.COM](http://WWW.WHISKERSTAY.COM)

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## 3D KERNOW

3D Kernow is a Community Interest Company with a mission to spread awareness of the potential for 3D printing. In order to better support the marine sector with this work, Marine-i developed a research project to investigate the mechanical strength of 3D printed components, and how this can be improved. University of Exeter Research Fellow, Dr Tessa Gordelier worked with 3D Kernow to develop a suite of mechanical tests to optimise their printing practices. Working with Exeter Advanced Technologies Laboratory, opportunities were identified to optimise the tensile strength of printed components. These findings will help 3D Kernow advance their own printing practices and

also allow them to inform marine sector clients of the potential available through 3D printing.

[WWW.3DKERNOW.ORG](http://WWW.3DKERNOW.ORG)

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## FAL OYSTER

Fal Oyster is a limited company selling fresh shellfish, in particular native oysters. The company processes and purifies shellfish at its base on the Fal estuary. University of Exeter has carried out an oyster grower feasibility research study to demonstrate how marine technological innovation can enhance the sustainability and profitability of the Fal fishery, including a review of technologies for reproduction, growth and hatching of native oysters, and similar shellfish.

[WWW.FALOYSTER.CO.UK](http://WWW.FALOYSTER.CO.UK)

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## RAD PROPULSION

RAD Propulsion is a new company founded by engineers with proven experience in marine technology. The company aims to introduce an Internet of Things (IoT) connected approach to marine propulsion, offering levels of range and status assurance and confidence not currently available. A grant from Marine-i is allowing the company to work with marine technology expertise in Cornwall and benefit from the testing facilities available. The company is also working with University of Exeter to support their engineering testing and reliability development.

[WWW.RADPROPULSION.COM](http://WWW.RADPROPULSION.COM)

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## KIOTE

Kiote specialises in innovative marine designs and has devised a new concept in sail technology. This is a sail system that can propel an autonomous vessel very effectively while also providing excellent stability, even in rough seas. It can be automatically controlled and offer ►



# ARMADA ENGINEERING

**A**rmada Engineering, a global leader in marine hydraulics, is developing an innovative mobile powerpack for marine applications, with the help of a grant from Marine-i. The powerpack can be deployed for a wide range of marine maintenance tasks, including hydraulic flushing. It will offer many advantages over conventional equipment, as their MD, Joff Collins, explains:

"This new power pack is fitted with an intelligent HMI interface and Telematics. It will be diesel driven, enabling it to operate in virtually any location and it has built in gen-set with high pressure and flow capabilities. This will provide a 'one stop solution' for many different types of marine O&M tasks.

"This will appeal across many marine sectors, including the offshore, superyacht, shipping, and commercial fishing markets. It is loaded with added-value features for the customer, like Geofence for anti-theft measures and real-time reporting of key data such as fuel consumption. This product opens up new global markets for Armada Engineering.

"The grant from Marine-i is crucial for us. It means we can move quickly on to the next stage, which is the design and construction of a working prototype. We had previously sought investment from the private sector, but this is a very specialised area of marine technology which very few investors understand. That presented a real obstacle to getting the project off the ground.

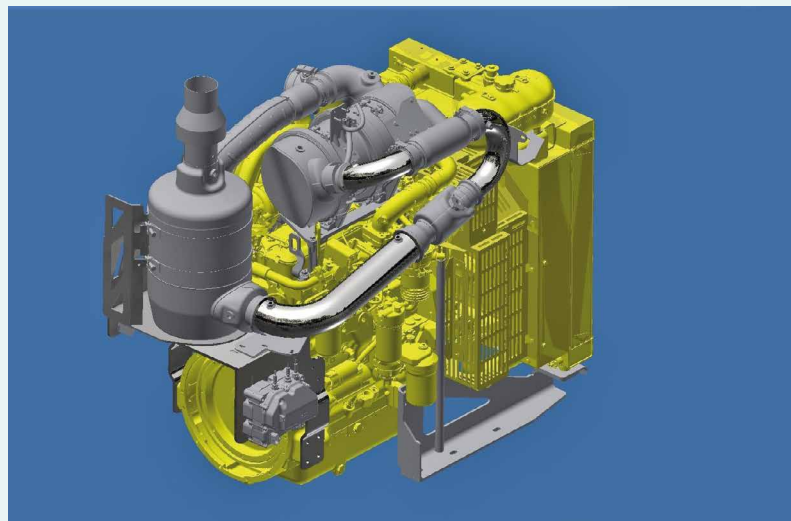
"Thankfully, the expert team at Marine-i could see the possibilities for our concept, and now we can power forward with its development."

In a further project which also received funding from Marine-i, Armada has developed an innovative subsea vertical drill rig. This is designed to offer an efficient alternative to existing offshore and nearshore pile drilling methods used in the renewable energy, oil and gas industries: for

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**Joff Collins, Managing Director,  
Armada Engineering**

example, for anchoring offshore wind farms. This project has directly led to the creation of two new, high-skilled jobs.



[WWW.ARMADAGLOBAL.CO.UK](http://WWW.ARMADAGLOBAL.CO.UK)

zero-fuel, long-range, high-speed propulsion for a wide range of vessels. With the support of a Rapid Innovation Grant from Marine-i, a Marine Challenge Fund grant, and research support from University of Exeter, Kiote were able to progress with computer modelling of the concept to prove its full potential, prior to moving on to develop a working prototype.

[WWW.KIOTE.COM](http://WWW.KIOTE.COM)

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## CWE UK

CWE UK Ltd develops technology for wave energy converters (WECs). Their parent company has successfully operated an array of three wave energy converters in Australia. CWE UK Ltd develops RD&I opportunities for WECs in the UK/EU and works with a number of local partners within the marine industry broadly in Cornwall towards those goals. Cornwall remains a potential market for WEC technology and marine energy projects into the future. Marine-i provided business assistance, introductions to local industry contacts and technical support from the team at Offshore Renewable Energy Catapult, University of Plymouth and University of Exeter.

## CORNISH CRABBERS

Cornish Crabbers is a builder and sales outlet for Cornish crabbers and Cornish shrimpers. With support from the Marine-i graduate subsidy scheme, they recruited a new Technical Officer and received funding support for nine months. The recruit was subsequently promoted to General Manager.

[WWW.CORNISHCRABBERS.CO.UK](http://WWW.CORNISHCRABBERS.CO.UK)

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## TIDE MILLS

Tide Mills Ltd has been developing technologies and processes for small scale tidal range generation in the UK and Africa, with the support

of InnovateUK, working from the technology development perspective whilst engaging in critical revenue support discussions and evolving spatial planning interactions. Tide Mills has worked with Marine-i to assess options for direct supply contracts into a significant new commercial development that could open the door to their first tidal range installation in Cornwall.

[WWW.TIDEMILLS.CO.UK](http://WWW.TIDEMILLS.CO.UK)

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## CLAXTON COMPOSITES

Claxton Composites trades as Padstow Boatyard, the location where it builds and refits commercial fishing vessels. The moulds and parts to make composite hulls need production volume in order to be commercially viable, while disposing of the used equipment is complex and costly. Claxton Composites want to develop a lower cost mould manufacturing technique with reusable components and lower disposal costs. It received business assistance from Marine-i.

[WWW.PADSTOW-BOATYARD.COM](http://WWW.PADSTOW-BOATYARD.COM)

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## OXI-TECH SOLUTIONS

Oxi-tech Solutions has developed an innovative system that produces ozone from water at low cost. Its patented electrode can fit within standard plumbing products and produce levels of ozone that destroy all known pathogens but are safe for humans. By incorporating its technology into ship systems, it aims to greatly mitigate pathogens – such as legionella – while ensuring food preparation carries a much-reduced risk of food poisoning. Marine-i grant funding supported the development of a specialised system for the shipping industry.

[WWW.OXITECHSOLUTIONS.COM](http://WWW.OXITECHSOLUTIONS.COM)



# TRISKEL MARINE

**T**riskel Marine is a small, hi-tech company that specialises in marine data management and power control systems. It has been a key player in a number of pioneering collaborative projects in the hybrid marine energy and propulsion sector.

Triskel Marine has been working on a project with a major commercial client to develop a unique new product in hybrid marine energy which has potential for major growth across international markets. Managing Director, Ken Wittamore, says:

“This is a real breakthrough for the sector. We had reached the stage in our development where we needed to exhaustively trial the new system to get ready for the commercial product launch.

“Our grant from Marine-i enabled us to establish the facility we needed and fit out the test rigs and engine systems. The grant funded specialised test equipment and prototyping tools, and computer modelling software.”

These trials were vital to ensure a successful launch and meet the world-class standards expected by Triskel Marine’s US partner and by other potential customers. In November 2018, Triskel Marine was named Overall Winner in the DAME global awards



“  
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**Ken Wittamore, Managing Director,  
Triskel Marine**

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for marine design at the METSTRade show in Amsterdam – the world’s biggest marine equipment competition. Ken Wittamore adds:

“Since the launch of the Integrel system we have established worldwide distribution and have also won the prestigious IBEX award in the US for Most Innovative Product. Triskel Marine is the only company ever to have won these two awards in the same year. This has really helped drive the business forward and we are now getting worldwide attention for our groundbreaking technology.”



[WWW.TRISKELMARINE.CO.UK](http://WWW.TRISKELMARINE.CO.UK)

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## INYANGA-TECH

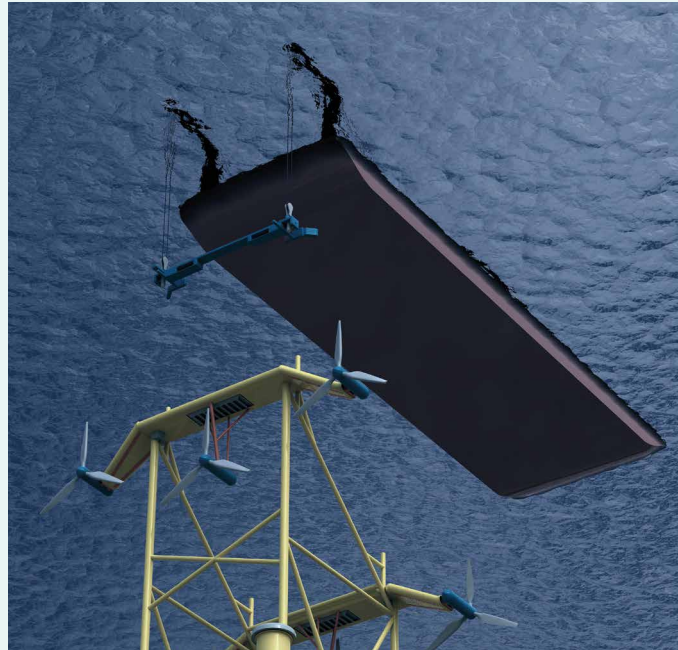
Inyanga-Tech has launched an innovative tidal energy project called HydroWing, which is based on a full-systems approach targeted at subsea tidal energy arrays. Richard Parkinson, Managing Director of Inyanga-Tech explains:

"The HydroWing technology greatly reduces the dependency on offshore construction vessels during the construction phases and eliminates the need for these vessels during the O&M phase.

"This is achieved through focus on weight reduction and modularisation, using tried and tested subsea construction methods. This also makes the technology more viable for remote areas where specialised vessels are not available."

The project has received grant support from Marine-i which has enabled the recruitment of two specialised research project engineers. Inyanga-Tech has also gained additional support from University of Exeter, who undertook research looking at operations, maintenance, reliability and yield analysis. Richard Parkinson says:

"This exciting project is right at the cutting edge of innovation in tidal energy technology. This research work will help build the business case and accelerate commercialisation of the technology.



"The HydroWing project is the realisation of years of experience within our team to develop a collaborative solution to commercial exploitation of tidal energy. We aim to rapidly develop the technology towards a first demonstrator deployment in 2020."

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THIS EXCITING PROJECT IS RIGHT AT THE CUTTING EDGE OF INNOVATION IN TIDAL ENERGY TECHNOLOGY. THIS RESEARCH WORK WILL HELP BUILD THE BUSINESS CASE AND ACCELERATE COMMERCIALISATION OF THE TECHNOLOGY.

**Richard Parkinson, Managing Director, Inyanga-Tech**

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[WWW.INYANGAMARINE.COM](http://WWW.INYANGAMARINE.COM)

## TONIQ

**T**oniq Ltd designs and manufactures a wide range of products using advanced materials, specialising in composites. Now it is set to revolutionise marine craft racing seats. The company's advanced construction techniques can produce a seat that better withstands extreme conditions as well as introducing environmental benefits using bio-composite materials. A Rapid Innovation Grant has enabled the company to purchase the advanced CAD and IT hardware needed to carry out rendering of the designs and to complete their Finite Element Analysis. University of Plymouth is on hand to help with the research expertise to develop this new product.

[WWW.TONIQLTD.CO.UK](http://WWW.TONIQLTD.CO.UK)

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## MOR ENGINEERING

**M**or Engineering is a specialist commercial consultancy founded in 2018. It identified a gap in the market for high quality, custom-made instrumentation in the maritime sector and is developing a working prototype of a robust, modular datalogging system that exceeds the performance of most commercial systems currently available. For a young business, it was difficult to raise the funding needed for prototype development and testing, so a Rapid Innovation Grant from Marine-i provided a crucial boost for the project. Marine-i has also helped with business mentoring and with networking opportunities.

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## BISEN TECHNOLOGY INVESTMENT

**B**ISEN Technology Investment Ltd provides solutions for UK companies, helping them to develop new technologies and capabilities aimed primarily at winning business in the export market. BISEN has developed a global transport and delivery system for hovercraft used in search and rescue and humanitarian aid markets. It is a space efficient system which is compatible with existing air transport methods, while also allowing scope to accommodate a 26-foot hovercraft. BISEN was awarded a Rapid

“IT HAS BEEN GREAT TO HAVE THE INPUT OF THE MARINE-I TEAM, WHO HAVE BEEN VERY HELPFUL WITH PROJECT PLANNING AND HAVE ACTED AS A USEFUL SOUNDING BOARD TO DEVELOP THE BUSINESS STRATEGY AND DISCUSS THE FUTURE POTENTIAL OF THE PRODUCT. THE TEAM ARE ALWAYS AVAILABLE, VERY FLEXIBLE AND, OF COURSE, THEY HAVE EXCELLENT KNOWLEDGE OF THE MARINE TECHNOLOGY INDUSTRY – SO THEY UNDERSTAND THE CHALLENGES THAT WE FACE.

**Andrew Wickham, Managing Director,  
Buoyant Works**

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Innovation Grant to fund the purchase of a laptop for CAD software to carry out design engineering and structural analysis of the system and the University of Plymouth assisted with testing and development.

[WWW.BISEN-GROUP.COM/BISEN-TECHNOLOGY-INVESTMENT-LTD/](http://WWW.BISEN-GROUP.COM/BISEN-TECHNOLOGY-INVESTMENT-LTD/)

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## HARBOURSIDE PHYSIOTHERAPY

**H**arbourside Physiotherapy provides specialist physiotherapy services to fishermen and seafarers. The company's latest initiative is a research project to gain a better understanding of the present health of seafarers, which will lead to new training programmes and working practices that will help organisations to look after the physical health of their crews. The company was awarded a Rapid Innovation Grant to purchase fitness tracker watches for the study to gather data from people working across a range of fishing activities, such as beaming, netting, and potting.

[WWW.HARBOURSIDEPHYSIOTHERAPY.CO.UK](http://WWW.HARBOURSIDEPHYSIOTHERAPY.CO.UK)



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## ARC MARINE

**A**RC Marine is the first eco-engineering company in the UK specialising in artificial reefs. Their patented invention, Reef Cubes, is a robust and simple interlocking modular system that is ideal for restoring complex marine environments. Director Tom Birbeck says:

“Much of our world’s fisheries are now over exploited. There is a real danger that stocks of all the species that we rely on for food could collapse within 30 years. Our reefs can protect the aquaculture which many of these precious species rely on.

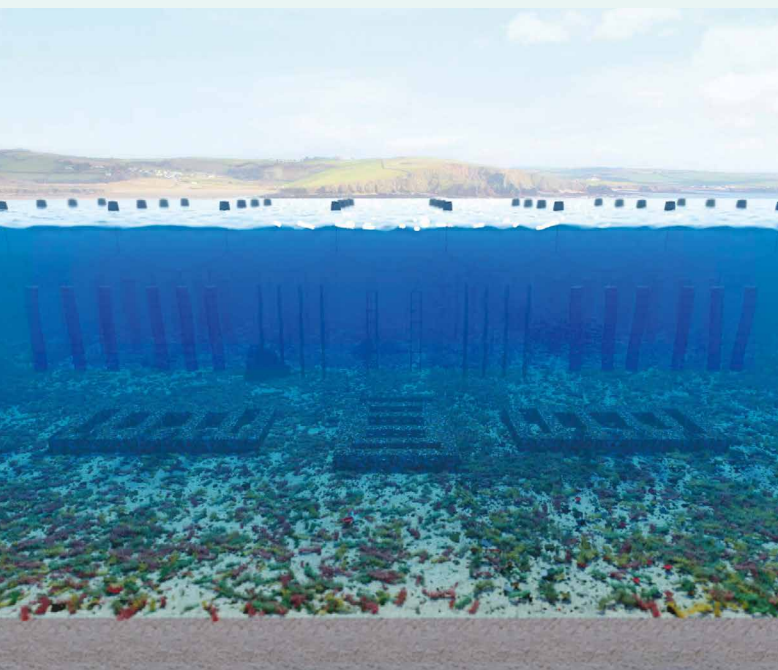
“Our patented design for each cube features an integral chamber and six passages through which marine creatures can access the structure. Sediment collects naturally inside the cube and this chamber also provides an excellent habitat for many diverse species.”

Through Marine-i it received grant funding, technical advice, and access to University of Plymouth’s COAST Lab facilities, where it could carry out an exhaustive range of tests that closely mirror real-life ocean conditions. Proving the performance of Reef Cubes was a vital step in gaining the confidence of customers and helping the product to fulfil its global potential.

A Rapid Innovation Grant was used to purchase diving equipment for conducting vital sea trials, while Marine-i events have provided valuable new learning for their team. Tom says:

“This grant has enabled us to carry out extended surveys and eco-mooring installation trials in preparation for a full commercial launch.”

In the 2019 Maritime UK Awards, ARC Marine was named Best Start-up of the Year.



“MUCH OF OUR WORLD’S FISHERIES ARE NOW OVER EXPLOITED. THERE IS A REAL DANGER THAT STOCKS OF ALL THE SPECIES THAT WE RELY ON FOR FOOD COULD COLLAPSE WITHIN 30 YEARS.

**Tom Birbeck, Director, ARC Marine**

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[WWW.ARCMARINE.CO.UK](http://WWW.ARCMARINE.CO.UK)

## PANGEOTEK

Pangeotek offers project management, marine construction and vessel inspection services. They are developing new drilling software solutions, including Autocore, intelligent software with associated hardware that will provide the backbone to PLC controlled drills within the marine geotechnical industry. By maximising drilling efficiency, this new product is expected to reduce costs and also the carbon footprint. Marine-i gave Pangeotek business assistance and provided introductions to new industry contacts.

[WWW.PANGEOTEK.COM](http://WWW.PANGEOTEK.COM)

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## ST AUBYN ESTATES

St Aubyn Estates is a family-owned enterprise spanning 5,000 acres. The estate includes the famous St Michael's Mount, which is run in partnership with the National Trust. It is developing and upgrading a challenging Environmental Management System and needed advice from marine specialists in areas such as power for their ferries, addressing coastal erosion and dealing with plastics pollution. Marine-i helped with business assistance, technical information and signposting to funding support.

[WWW.STAUBYNESTATES.COM](http://WWW.STAUBYNESTATES.COM)

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## RATSEY MARINE SERVICES

Ratsey Marine Services is building on its experience in marine manufacturing and design to develop a series of innovative marine products. To bring these to market, the company needed the capability to produce precisely designed 3D-printed parts. A Rapid innovation Grant from Marine-i enabled it to buy a license for Rhino/CAD modelling software, together with a dedicated CAD computer screen and the skills training to operate the system effectively. This has helped the company to bring vital product development capabilities in house.

## WAVEBLADES

Waveblades specialises in racing sailboards and is planning to launch an innovative new product to outperform all other boards on the market. To make a step change in the quality of manufactured boards, they plan to go into production using a moulded vacuum infusion system, based on the very latest technology, as well as a new, patented centreboard system, using a production process originally developed for the aerospace industry. A Rapid Innovation Grant from Marine-i enabled Waveblades to proceed with the CAD drawings and 3D rendering needed to create a working prototype for testing.

## FERITECH GLOBAL

Feritech Global designs, manufactures and supplies marine geotechnical equipment and services to a global client base. Operators lease or buy Feritech's equipment to ascertain details about the seabed. This data is crucial to the planning, costing and operations of seabed structures such as ports, offshore wind turbines and oil rigs. Marine-i funding is supporting Feritech to develop a high bandwidth sub-sea wireless data system to add to its product suite.

[WWW.FERITECH.COM](http://WWW.FERITECH.COM)

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## CLEANER SEAS GROUP

Inventor James Sirmon has formulated several inventions to help tackle marine plastic pollution. Through Marine-i, the University of Plymouth has been able to apply recent pioneering research into the fibres shed from clothes during washing to help the company understand the shed rate and how long it will take to clog standard filter media. This work is a crucial part of the development of a new in-line filter which will collect microplastic fibres, to prevent them entering the sea via waste water treatment plants.

[WWW.CLEANERSEASGROUP.COM](http://WWW.CLEANERSEASGROUP.COM)



TAKING ON A NEW EMPLOYEE ALWAYS PUTS AN INITIAL STRAIN ON CASH FLOW. THE GRADUATE SALARY SUBSIDY SUPPORT WE RECEIVED FROM MARINE-I WAS A GREAT HELP, GIVING US BREATHING SPACE TO GET OUR NEW EMPLOYEE UP TO SPEED. THE MARINE-I TEAM SUPPORTED US FROM START TO FINISH AND MADE THE PROCESS VERY EASY.

**Jack Gifford, Director,  
Jack Gifford Marine Design**



## IMETRUM

Imetrum manufactures precision video position displacement sensing equipment. It is developing a new, non-invasive sensing technology for wind turbine and marine diesel engine application. This will use Machine Learning algorithms to analyse the motions of moving components and detect deviations and trends in the performance of the equipment, with a view to improving operating efficiency and maintenance life. Its Marine-i grant is helping to fund the hardware and software needed to develop the system, as well as the recruitment of a software engineer and a research engineer. In addition, University of Exeter is providing machine learning research support for offshore wind turbine applications.

[WWW.IMETRUM.COM](http://WWW.IMETRUM.COM)

## FISHY FILAMENTS

Fishy Filaments is a pioneer in recycling nylon monofilament fishing nets, developing and delivering a high value raw material for 3D printing. It aims to further develop their technology, recycling a broad range of fishing net wastes and producing high quality recycled

plastics. Marine-i has provided business assistance to their team.

[WWW.FISHYFILAMENTS.COM](http://WWW.FISHYFILAMENTS.COM)

## FALMOUTH HARBOUR COMMISSIONERS

This statutory trust port authority manages the inner harbour and bay at Falmouth with a responsibility to facilitate sustainable prosperity and benefit the wider community. Stakeholder benefits could be substantially increased if the port was able to attract more cruise ship operators. To do this cost effectively, it wants to develop a modular mooring system to be manufactured locally and deployed using existing local vessels. Marine-i has provided access to testing at University of Plymouth's COAST Lab and academic support from University of Exeter to progress toward full scale field tests.

[WWW.FALMOUTHHARBOUR.CO.UK](http://WWW.FALMOUTHHARBOUR.CO.UK)

## SKRATCH

Skratch is an experienced marine design company, working on a range of projects. Through Marine-i the University of Plymouth is investigating offering research support of CFD analysis and aerodynamic advice for a groundbreaking project. This innovative project is the design of a canard wing sail for merchant ship wind propulsion. Primary analysis shows a possible 40% increase in drive compared to existing wing sails of similar dimensions. Wing sail drive can reduce fuel consumption and environmentally critical emissions.

## FRONTIER TECHNICAL

Frontier Technical is developing the patent protected MARLIN 'Modular Floating Platform' system for underwater construction of Floating Offshore Wind (FLOW) platforms. The system will ►



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# UNMANNED SURVEY SOLUTIONS

Unmanned Survey Solutions (USS) is a key player in smarter hydrographic survey technology. Its next generation of Unmanned Surface Vessels (USVs), the Accession Class, is a much-larger vessel than their previous models and is designed for use in the open sea.

Aimed at the offshore industries and with the ability to operate long endurance applications, the Accession Class will work as a force multiplier with a mother vessel and will integrate increased payloads to provide the launch and recovery of Unmanned Aerial Vehicles (UAVs). This innovative 4.5m vessel is being designed from the ground up by a Naval Architect.

The applications of the Accession Class will include seabed mapping, offshore wind farm turbine inspections, enforcement activities by inshore fisheries and conservation authorities, environmental mapping on intertidal areas, and the monitoring of marine mammals.

This innovative vessel has the opportunity to reach global markets and create important new opportunities for Cornwall's marine supply chain. Business assistance and a Marine-i grant have



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THIS IS A FANTASTIC OPPORTUNITY AND WE ARE DELIGHTED TO RECEIVE SUPPORT FROM THE MARINE-I MARINE CHALLENGE FUND.

**James Williams, Director,  
Unmanned Survey Solutions**

”

supported the design and construction of a full-scale working prototype.

The Marine-i Graduate Support Scheme meant that USS was able to employ a full-time Technical Support Manager to work on the installation and calibration of this innovative technology.

James Williams, Director at USS said: “This is a fantastic opportunity and we are delighted to receive support from the Marine-i Marine Challenge Fund to be able to develop our own offshore renewables class vessel.”



[WWW.UNMANNEDSURVEYSOLUTIONS.COM](http://WWW.UNMANNEDSURVEYSOLUTIONS.COM)

use a remotely operated 'Subsea Tug' in conjunction with a surface vessel and obviate the need for large oil and gas construction yards and large floating crane vessels as well as an option for energy to be transferred by autonomous underwater 'Energy Transfer Shuttle' to shore without an undersea cable connection. The overall aim is to improve energy access for coastal communities. Marine-i has supported Frontier Technical to participate in regional FLOW strategy development and provided experienced advice on relocation to Cornwall. Frontier Technical aims to swiftly commercialise its technology and contribute to regional GVA and employment through manufacture of high value product and provision of services to export and domestic markets.

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## SOLIS MARINE ENGINEERING

Solis Marine Engineering is a specialist in naval architecture and marine engineering design. The company wants to grow its business by applying high-end engineering analysis techniques to the marine industry, including marine renewables, salvage and general marine consultancy. Its support from Marine-i included a grant towards the cost of a high power computer to run the computational fluid dynamics specialist software they use, to help increase throughput and develop solutions for potential new customers. In addition, the Marine-i Graduate Support Scheme helped fund the recruitment of a Naval Architect.

[WWW.SOLISMARINEENGINEERING.CO.UK](http://WWW.SOLISMARINEENGINEERING.CO.UK)

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## KEYNVOR MORLIFT LTD

Keynvor MorLift Ltd (KML) is a marine and offshore contractor and a specialist vessel owner and operator. KML's innovation project seeks to research, develop and test heave compensation

on a workboat knuckleboom crane, to allow the crane to operate in harsher sea conditions than a non-compensated crane. The heave compensation will also act on the crane's winch to allow subsea and surface operations of the crane winch in harsh sea states. Marine-i awarded a Marine Challenge Fund grant to support the cost of system design, installation and testing, platform engineering works, and the services of a naval architect and project manager. The commercialisation of this product will greatly enhance the capabilities of Cornwall's marine industry.

[WWW.KEYNVORMORLIFT.CO.UK](http://WWW.KEYNVORMORLIFT.CO.UK)

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## WOLFRAM MARINE

This is a specialist consultancy founded by Prof Julian Wolfram to focus on innovative designs for the marine industry, of which he has many years of academic and commercial experience. Wolfram Marine has come up with a totally new concept for the design of floating breakwaters. This design would enable these breakwaters to be lighter and therefore much more cost effective to manufacture. Wolfram Marine received a package of support from Marine-i, including knowledge exchange manager time, business research fellow assistance and testing in the flume at University of Plymouth's COAST Lab.

## WAVE-TRICITY

Wave-Tricity is a technology company focused on solving the challenges faced by island nations and coastal communities globally, many of which have wastewater provisions that do not meet modern environmental standards and have high, fluctuating costs. A trials platform, at sea for over two years in Wales, is testing combining 100% renewable power from three sources (solar, wave and wind) and storing it via batteries to provide ►

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# WAVE VENTURE

**W**ave Venture is a specialist wave energy consultancy and software provider. The company merges engineering and economic analysis methods and uses these to deliver wave energy technology related services. Its MD, Ronan Costello, explains:

"The customers who can benefit from our services include businesses investing in wave energy technology, organisations conducting research and development on wave energy conversion systems, and companies planning the deployment of wave energy farms."

Wave Venture is now developing an innovative Techno Economic analysis product called "Wave Venture TE". This software is a hybrid desktop-cloud integrated engineering and financial analysis package. The software will allow for Wave Energy Converter (WEC) developers to rapidly and accurately analyse their devices. This software brings the additional benefit of optimisation that includes all stages of a commercial wave farm development. Ronan Costello says:



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RECEIVING A MARINE  
CHALLENGE FUND GRANT  
FROM MARINE-I HAS GIVEN  
A HUGE BOOST TO THE  
PROJECT. IT WILL HELP US  
MOVE QUICKLY TO THE NEXT  
STAGE, WHICH IS TO DEVELOP  
A WORKING PROTOTYPE OF  
WAVE VENTURE TE.

**Ronan Costello, Managing Director,  
Wave Venture**

”

"There are a number of key milestones that we need to reach before we are ready to take the product to full commercial launch, such as running Wave Venture TE on multiple example applications to verifying the accuracy of the software.

"Receiving a Marine Challenge Fund grant from Marine-i has given a huge boost to the project. It will help us move quickly to the next stage, which is to develop a working prototype of Wave Venture TE."

This pioneering product would put Cornwall at the forefront of a new field of commercial analytics. It could also help stimulate growth in the wider wave energy industry, by giving investors and WEC developers the information they need to formulate successful commercial strategies.

[WWW.WAVE-VENTURE.COM](http://WWW.WAVE-VENTURE.COM)





THE GRANT FROM MARINE-I HAS BEEN A SIGNIFICANT CONTRIBUTION TOWARDS THE COST AND ALLOWED ME TO KICKSTART THE PROJECT. WE NOW EXPECT TO HAVE A WORKING PROTOTYPE READY TO GO TO SEA WITHIN A YEAR AND FULL COMMERCIALISATION WITHIN TWO YEARS. THE SUPPORT HAS BEEN INVALUABLE IN HELPING US ACCELERATE OUR INNOVATION.

**Mike Curnow, Founder, Ocean Hydraulics**



power to the end user – Hybrid Generation and Smart Storage. The aim is to utilise a sea borne platform based on this technology that can provide wastewater treatment facilities, green power and, if required, fresh water to island and coastal communities. Marine-i has provided business assistance to help them develop and prove their concept.

[WWW.WAVE-TRICITY.COM](http://WWW.WAVE-TRICITY.COM)

## BLUEFRUIT SOFTWARE

**B**luefruit Software Ltd specialises in providing embedded software for innovative companies. Bluefruit has worked on a number of Marine-i support projects, including a student-led training and prototype app project for Cornwall-based social enterprise, The Rock Pool Project. Bluefruit is also currently working on an innovative prototype with a new Cornwall-based marine start up. The University of Exeter has also introduced the company to a number of marine tech businesses for collaborative RD&I projects requiring embedded software.

[WWW.BLUEFRUIT.CO.UK](http://WWW.BLUEFRUIT.CO.UK)

## BLUE FIN YACHTS

**B**lue Fin Yachts is a surface finishing company, specialising in the superyacht and high performance vessel market, and working globally for high profile and high net worth clients. Through Marine-i, the University of Plymouth has been working with the team at Blue Fin to assess the adherence of new coatings to existing substrates, to help optimise the application process in boat yards where vessels cannot be housed in specialist paint sheds for reasons of size and capacity.

[WWW.BLUEFINYACHT.COM](http://WWW.BLUEFINYACHT.COM)

## EVIDENCE PLASTIC CIC

**E**vidence Plastic CIC was formed to further develop the Tidal Revival mobile app, which supports groups and individuals who clean beaches to evidence the waste they collect. This database is made available for academic researchers and policy makers to help bring about positive change. Through Marine-i, the University of Plymouth have provided support to look at how the app should record the waste collected by beach cleaners so that it can be categorised into existing academic databases and hence add value to over 25 years of data collected in this field.

[WWW.TIDALREVIVAL.CO.UK](http://WWW.TIDALREVIVAL.CO.UK)

## COCKWELLS MODERN AND CLASSIC BOAT BUILDING

**C**ockwells has built a world class reputation for bespoke boat building and has also diversified into composite motorboats and high-carbon superyacht tenders. Through the Marine-i Graduate Support Scheme, Cockwells was able to recruit a Project Officer and a Design Draughtsperson.

[WWW.COCKWELLS.CO.UK](http://WWW.COCKWELLS.CO.UK)

# ULTRABEAM HYDROGRAPHIC

Ultrabeam Hydrographic provides ultra-high resolution hydrographic survey solutions for clients around the world with marine-based assets. These include bridge structures, harbours, subsea cables, and renewable energy installations, as well as shipwrecks.

The company has developed a new type of unmanned surface vessel, the Ultra-2, a 3-metre catamaran designed to gather fast, accurate and highly detailed survey data in challenging environments. The craft is able to carry a full suite of survey tools and is believed to be the only unmanned surface vessel of its kind. Gabriel Walton, Technical Director for Ultrabeam, says:

"The Ultra-2 is powered by four electric thrusters in a vectored thrust layout. This thruster configuration means the craft can make precisely controlled movements in any direction. Its movements are very similar to that of an aerial drone.

"This dynamic positioning offers huge advantages in marine surveying. The Ultra-2 can hold its position accurately even in river currents and can also achieve much closer inspection of features than would be possible with any conventional craft. This technology is a real game-changer for the industry."

A second Marine-i funded project is now underway to give Ultrabeam another industry first – the capability for its unmanned surface vessel to deploy underwater robots at surface level, which will then perform detailed visual inspections below the surface. Gabriel Walton says:

"Through the grant funding support we have obtained from Marine-i, we continue to push the boundaries of Cornish marine innovation with our highly versatile unmanned surface vessels and, delivering our services from the Middle East to the Scandinavian Arctic, we are genuinely showing what Cornwall has to offer."

The support of the Marine-i Graduate Scheme meant that Ultrabeam was able to recruit a

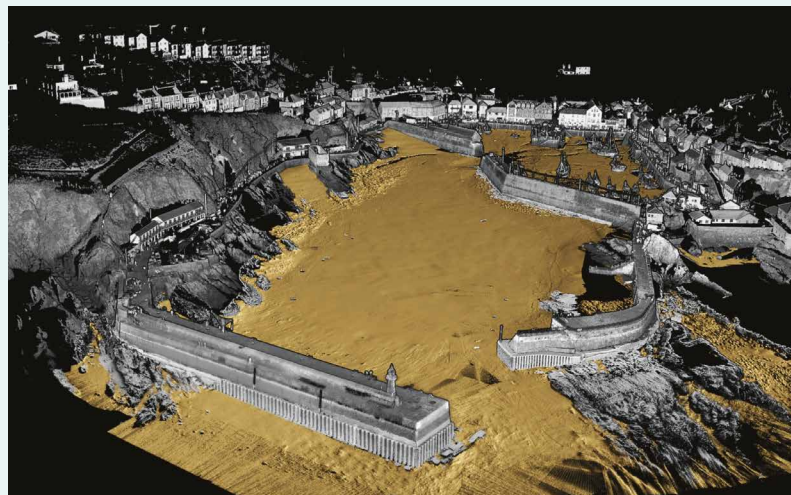
“  
WE CONTINUE TO PUSH THE  
BOUNDARIES OF CORNISH  
MARINE INNOVATION WITH  
OUR HIGHLY VERSATILE  
UNMANNED SURFACE VESSELS.

**Gabriel Walton, Technical Director,  
Ultrabeam**

specialist Robotics Engineer to help accelerate the development of these innovative projects.

At the 2018 Cornwall Live EDGE Awards, Ultrabeam Hydrographic was named 'Best Digital Innovation in Marine.'

*The image below shows an Ultrabeam high-resolution 3D view of Mevagissey Harbour.*



[WWW.ULTRAHYDROGRAPHIC.COM](http://WWW.ULTRAHYDROGRAPHIC.COM)

# WORKFLOAT

**W**orkFloat has been designed to bridge a gap in the market between small workboats and larger, more expensive workboats and multcats that can only be moved on the road using costly low loaders and that then need a crane or hoist for launching and recovery.

Toby Budd, Managing Director of WorkFloat says:

"WorkFloat 'folds' up to tow behind a 4x4 on the road or to slide into a standard shipping container. Once afloat, the 8m x 5m 'mini multicat' can lift, pull and carry an impressive deadweight. This innovative product has a wide range of applications, including commercial diving, light dredging, flood relief, ferry, survey work, drilling and superyacht support.

"A bit like a worker ant, WorkFloat may be small and light but she's incredibly strong."

The company received grant support from Marine-i for the initial design work as well as for building a prototype and carrying out full-scale physical testing. Marine-i partner University of Plymouth assisted with prototype trials for buoyancy and stability. Cornwall Marine Network's Propel project



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THIS INNOVATIVE PRODUCT HAS A WIDE RANGE OF APPLICATIONS, INCLUDING COMMERCIAL DIVING, LIGHT DREDGING, FLOOD RELIEF, FERRY, SURVEY WORK, DRILLING AND SUPERYACHT SUPPORT.

**Toby Budd, Managing Director, WorkFloat**

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also helped WorkFloat with marketing advice and a grant towards exhibition costs.

In June 2019, WorkFloat was awarded the overall 'Spirit of Innovation' Award at the European Commercial Marine Awards, held at Seawork, Europe's largest commercial marine exhibition. The award sponsors commented:

"WorkFloat is exactly the kind of forward-thinking product that people who attend shows like Seawork are interested in, and it ingeniously fills a gap in the market".



[WWW.WORKFLOAT.CO.UK](http://WWW.WORKFLOAT.CO.UK)



## WAVE HUB

Wave Hub is a research institution set up to provide testing services for ocean energy technology. The Wave Hub site is the largest, most technologically advanced site in the world for testing ocean energy. Wave Hub requested support to define technical specifications for an important equipment tender and expert advice on assessing the tenders submitted. Marine-i provided business advice and technical information, together with access to industry expertise and contacts via Discovery Room events.

[WWW.WAVEHUB.CO.UK](http://WWW.WAVEHUB.CO.UK)

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## GAISFORD SURF EQUIPMENT

Gaisford Surf Equipment make fibre reinforced plastic competition surf skis and paddle boards. Marine-i has provided specialist support from University of Plymouth and connected them to specialist suppliers which will help the company adopt updated processes to replace single use plastic film in vacuum bags with reusable moulded silicone bags. This enhanced process enables accelerated production times and a reduction in waste.

[WWW.GAISFORDSURF.COM](http://WWW.GAISFORDSURF.COM)

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## BG RENEWABLES

BG Renewables Ltd supports major project developers, investors and European utilities with the capabilities needed to develop and deliver viable renewable energy projects, with a particular focus on offshore wind. The University of Exeter is providing the company with research support to investigate the market potential and RD&I requirements for large scale production of seaweed in UK waters – the cultivation of seaweed at an industrial scale offers the potential for significant environmental benefits and global business opportunity.

[WWW.BGRENEWABLES.COM](http://WWW.BGRENEWABLES.COM)

## LM HANDLING

LM Handling provides lifting and handling equipment services globally, primarily in the oil and gas industry. In order to sustain future growth, the company wants to break into the renewables market. This will require it to develop new tools and adapt existing ones in order to develop the capability to handle very large diameter piles. Marine-i and Offshore Renewable Energy Catapult have provided a range of technical information and market insights to help them plan their strategy.

[WWW.LMHANDLING.COM](http://WWW.LMHANDLING.COM)

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## HOOPERBERG CREATIVE COLLECTIVE

Hooperberg Creative Collective is an award-winning interior design consultancy. Marine-i helped the company explore how to take their floating restaurant design concept to market. This included making introductions to specialist companies and exploring options to overcome planning issues, as well as costings and other RD&I aspects.

[WWW.HOOPERBERG.COM](http://WWW.HOOPERBERG.COM)

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## WHOLESHIP CONSULTING

Wholeship Consulting is a management consultancy that specialises in marine technology companies. It focuses on businesses that are looking for marginal gains and the development of high performance teams. Marine-i provided help for the business in the form of advice, market information, industry contacts and signposting to relevant support programmes. The company also attended Marine-i's series of Innovation Masterclasses.

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## FAL RIVER CORNWALL

This company operates ferries and river cruises in and around the Falmouth area and is a key part of the transport network and local tourism industry. Fal River Cornwall wanted to explore the potential for moving their fleet to electric propulsion, giving ►

the business a smaller environmental footprint while reducing operating costs and improving vessel longevity. To help de-risk this investment decision, Marine-i provided technical information and research support for a feasibility study on the proposed new vessels. In addition, the Marine-i Graduate Support Scheme enabled the hiring of a Deputy Manager for the project.

[WWW.FALRIVER.CO.UK](http://WWW.FALRIVER.CO.UK)

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## MARINE POWER SYSTEMS

**M**arine Power Systems has developed the novel WaveSub, a wave energy converter with a power capacity that can match the larger offshore wind turbines. WaveSub could create a step-change in the commercial viability of wave power. Marine-i provided help with sourcing an office location to support WaveSub's 1:4 scale sea-trials at FaBTest, introductions to the Cornish marine energy supply chain, and access to the testing facilities at University of Plymouth's COAST Lab.

[WWW.MARINEPOWERSYSTEMS.CO.UK](http://WWW.MARINEPOWERSYSTEMS.CO.UK)

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## JACK GIFFORD MARINE DESIGN

**J**ack Gifford Marine Design has boosted its team with the recruitment of designer Charlotte Monks, thanks to support from the Marine-i graduate subsidy scheme. Jack Gifford Marine Design provides integrated yacht design and naval architecture services, with a focus on designing cleaner, smarter yachts using eco-friendly materials and eco-friendly propulsion. Charlotte joined the team after completing her degree at Falmouth University.

[WWW.JACKGIFFORD.CO.UK](http://WWW.JACKGIFFORD.CO.UK)

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## WATER POWERED TECHNOLOGIES

**W**ater Powered Technologies provides environmentally friendly, low cost energy

solutions for water delivery to farms, smallholdings and off grid communities. Marine-i supported the company through specialist research by the Offshore Renewable Energy Catapult, investigating the potential for a tidal flow driven pump innovation.

[WWW.WATERPOWEREDTECHNOLOGIES.COM](http://WWW.WATERPOWEREDTECHNOLOGIES.COM)

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## BIO ENGINE TECHNOLOGY

**B**io Engine Technology Ltd has received grant funding and academic research support through Marine-i as they work to develop and commercialise an external combustion engine, powered by bioethanol. Bioethanol can be distilled from natural sugars in non-food crops, food waste and food by-products. Although CO<sub>2</sub> is emitted by combustion of bioethanol, it is considered carbon neutral due to its short carbon cycle – ie it does not release carbon captured millions of years ago. As a liquid fuel, bioethanol can be transported, distributed and used in a similar way to conventional fossil fuels and could find applications in marine craft and commercial ships, which cannot adopt electric propulsion due to the low energy density of current and emerging battery technology.

[WWW.CLEANCLIMATE.CO.UK](http://WWW.CLEANCLIMATE.CO.UK)

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## TRIVANE

**T**rivane Ltd is developing an innovative floating offshore wind platform concept. Marine-i support has included Offshore Renewable Energy Catapult providing the company with market analysis, design support and energy cost analysis and they will continue to provide support to Trivane beyond the project span of Marine-i to help grow regional capability to support the Great South West Floating Wind strategy. This aims to establish a regional supply chain to support floating offshore wind, particularly in the Celtic Sea and for export.

# AMOG

**A**MOG is based in Australia with offices in the UK, USA and Colombia. The company delivers industry-leading scientific and engineering expertise to projects of any scale. A technology arm has grown over the last five years, where technology has been developed, licensed to large manufacturers and successfully sold in the marketplace. Wave energy is an area where AMOG has developed significant expertise and the team have worked together to invent the concept for a revolutionary new kind of wave energy device.

When looking at options for testing their innovative device, Cornwall stood out as a world beating location for the team, having access to excellent wave resources, outstanding test facilities and a comprehensive marine supply chain, as well as expert support from the Marine-i project. This included access to the University of Plymouth's COAST Lab.



“THIS IS A UNIQUE AND  
HIGHLY INNOVATIVE WAVE  
ENERGY DEVICE THAT WILL  
MAKE A REAL IMPACT IN THE  
WAVE ENERGY MARKETPLACE  
WORLDWIDE.

**Dr Hayden Marcollo, Director, AMOG**

Director David Rowley explains:

“Marine-i have provided grant funding for the AMOG team to put in place sea-trials of our wave energy device, with a 1:3 scale model of the device tested at the University of Exeter FabTest site in Falmouth, an ideal 'nursery' test site for wave energy convertors.

“This enabled us to test various aspects of the product design and its integration, providing confidence in the design and operation before scaling up to a full size version connected to the grid in the next test phase.”

Through the Marine-i Graduate Support Scheme, AMOG was able to recruit a Renewables Project Engineer to oversee sea trials of the full-size device.

Director Dr Hayden Marcollo adds: “This is a unique and highly innovative wave energy device that will make a real impact in the wave energy marketplace worldwide. Being able to test AMOG's product in Cornwall, with support from Marine-i, is helping us drive our project forward.”

[WWW.AMOGCONSULTING.COM](http://WWW.AMOGCONSULTING.COM)



WE ARE HUGEY GRATEFUL TO THE MARINE-I TEAM FOR THEIR SUPPORT. IT HAS ADDED MASSIVE MOMENTUM TO THIS EXCITING PROJECT AND GIVEN US THE OPPORTUNITY TO ACHIEVE FIRST MOVER ADVANTAGE IN A HIGHLY COMPETITIVE MARKET.

**Jackson Fearn, Managing Director, Jaxon Surfboards and Workshops**



## RESILIENT COASTS

**R**esilient Coasts Ltd is run by Dr Emma Rendle; an international consultant with expertise in marine science and coastal engineering. It offers technical, business development and project management services. Its innovation focuses on the collation of citizen science coastal morphology data using web, mobile apps and machine learning. This system will enable the consultancy to work with significant science and research organisations, such as the British Geological Survey. Its Rapid Innovation Grant from Marine-i was used to purchase the powerful IT hardware it needed to run numerical models and analyse data at enterprise grades.

[WWW.RESILIENTCOASTS.COM](http://WWW.RESILIENTCOASTS.COM)

## SUBSEA MINERALS

**S**ubsea Minerals is a marine mining company with unique experience of the seabed. Funding from Marine-i has accelerated the development of a platform and drilling unit delivering faster landing on the seabed and much quicker mineral collection. Combined, the productivity gains of this could be up to twenty-fold compared to existing technologies. The unique self-levelling base of the unit allows it to be lowered onto an uneven seabed and adjust the platform automatically for vertical drilling, whilst

the legs can operate in a wide variety of sea-bed conditions. The drill uses a water powered reverse circulation down the hole hammer for very fast mineral collection. Marine-i funding has helped the company design, fabricate and test both key elements of the innovation. In addition, the University of Exeter provided hydrodynamic analysis research support.

[WWW.SUBSEAMINERALS.COM](http://WWW.SUBSEAMINERALS.COM)

## FAL ENERGY PARTNERSHIP

**T**he Fal Energy Partnership was one of Cornwall's first community energy co-operatives, set up in 2012, as a response to local concerns about rising energy prices and the risky future of energy supply. With the aim of developing an integrated sustainable energy action plan for its community, Marine-i is supporting the business to identify and evolve potential marine energy solutions.

[WWW.FALENERGY.CO.UK](http://WWW.FALENERGY.CO.UK)

## FAL FISHERIES CIC

**M**arine-i has provided business assistance to support the creation of RD&I Micro Floating Oyster Hatchery concept that is primarily intended to repopulate the Fal Oyster Fishery stocks. Once proven, this can be rolled out to other fisheries requiring regeneration. Marine-i has also provided support to Fal Fisheries CIC to make funding applications to the SBRI Seafood Innovation Fund and the European Maritime and Fisheries Fund as well as provided introductions to fund application collaborating partners.

## NAVIMETEO

**N**avimeteo has designed a system for improving weather forecasting at ports and anchorage sites, with support from MSC, one of the world's largest



cruise ship operators. This will be the first system that will capture real-time marine weather data from vessels and share a network of real-time data with other vessels. As a result, ship captains will be able to make better informed operational decisions, all of which have a high impact on their operating performance and costs. A Marine-i grant has allowed Navimeteo to fund the staff, equipment and software needed to thoroughly test the system and prove its effectiveness. University of Exeter is also providing a machine learning research project that will compare real-time weather information with forecasts in order to improve future forecasting accuracy at ports.

[WWW.NAVIMETEO.COM](http://WWW.NAVIMETEO.COM)

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## REFLEX MARINE

Reflex Marine is an international company that develops new technologies for the marine industry. Storm-Pro is an innovative cargo container designed to address the main challenges of handling cargo in open water, particularly in the offshore wind energy industry. Storm-Pro is a very lightweight container that uses modern high strength composite materials and elastomeric elements that can safely disperse impact energy without damage to adjacent assets. It also offers a high-ratio payload that improves vessel transit speeds and fuel/power efficiency. Its Marine-i grant was used to fund the design and construction of a working prototype for vital field testing.

[WWW.REFLEXMARINE.COM](http://WWW.REFLEXMARINE.COM)

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## WILLS RIDLEY

Wills Ridley manufactures hydraulic steering and electrical controls for yachts and commercial boats, worldwide. It is designing a new steering system to give improved manoeuvrability to twin rudder vessels (largely superyachts and naval warships). The system will use innovative software architecture to control on-board systems. The two rudders will be synchronised electronically and controlled by a touch screen system. This will save weight by eliminating the need for a tie bar and increase both the level and the ease of control. This project is vital to the future

growth prospects of the company. They received a grant from Marine-i for software development and for the building of a pre-production prototype.

[WWW.WILLSRIDLEY.COM](http://WWW.WILLSRIDLEY.COM)

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## LUTRA MARINE

Lutra Marine specialises in environmentally friendly dredging techniques, with the goal of avoiding damage to sensitive marine habitats. To keep pace with this growing market it needed to test new, improved dredging equipment. It engaged with Marine-i which has provided business assistance for their team.

[WWW.LUTRAMARINE.CO.UK](http://WWW.LUTRAMARINE.CO.UK)

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## WAVES4POWER

Waves4Power is a Scandinavian company with an office in Cornwall. They specialise in community wave energy projects and have successfully developed a wave energy device for a fish farm in Norway. Marine-i helped the company investigate using the wave energy technology for the Isles of Scilly.

[WWW.WAVES4POWER.COM](http://WWW.WAVES4POWER.COM)

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## MARINE DESIGN AND CONSTRUCTION

Founded by Shane Carr, MDC designs, builds and installs pontoons and access bridges, as well as licensing their own patented pontoons. It recently created Tugdock, a unique modular floating dock aimed at the tug and workboat market. This innovative design would have worldwide applications and could lead to the establishment of a new production facility in Cornwall. Marine-i provided grant funding and business support to help MDC progress its new product to the demonstration stage.

[WWW.MARINEDESIGNCONSTRUCTION.COM](http://WWW.MARINEDESIGNCONSTRUCTION.COM)

# THE FUTURE

## A BRIGHT FUTURE BECKONS FOR OUR MARINE TECHNOLOGY SECTOR...

**M**arine-i has shone a spotlight on the huge potential for marine technology in Cornwall and the Isles of Scilly. It has demonstrated the rich vein of talent, capability and inventiveness in the region and has laid strong foundations for future growth.

Although the marine technology sector is diverse, this project has highlighted that there are particular strengths in certain emerging areas, including offshore renewables, autonomous vessels, seabed mapping and marine propulsion. These are set to capitalise on evolving global trends.

Marine-i has been a powerful catalyst for innovation and has proven that there is massive ambition amongst small and medium sized businesses (SMEs) in Cornwall to develop pioneering solutions to worldwide market challenges. Marine-i has helped them de-risk the R&D process to unlock the huge potential that exists within the region.

Here are just some of the impressive advances that have been made in the four strategic areas we identified at the outset of the Marine-i project.

### 1. MARINE ENERGY

Companies like AMOG, Buoyant Works and Inyanga-Tech have introduced brilliant new concepts that have advanced our thinking in wind, tidal and

wave energy, a fast-growing sector with enormous global potential.

### 2. MARITIME OPERATIONS

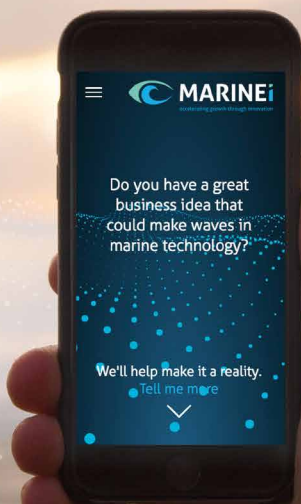
Unmanned Survey Solutions, Ultrabeam Hydrographic, and Imetrum have taken the use of autonomous vehicles and drones to new levels for operations such as surveying and seabed mapping. In the field of drilling and subsea mining, Feritech, Subsea Minerals, Armada Engineering and Ocean Hydraulics are all putting Cornwall on the map with their world leading solutions. WorkFloat is a breakthrough concept that has almost endless applications in marine operations and maintenance.

### 3. MARINE MANUFACTURING

Through the imaginative application of cutting-edge technology, Cornish companies such as Solis Marine, Kiote, Tonic and Reflex Marine are rewriting the rules for the design, engineering and manufacture of marine equipment.

### 4. MARINE ENVIRONMENTAL TECHNOLOGY

Triskel Marine, RAD Propulsion and Bio Engine Technology are all breaking new ground in the development of low carbon and hybrid marine propulsion and putting Cornwall at the forefront of this dynamic sector of marine technology. To protect our precious aquaculture, ARC Marine has invented an award-winning product that has already attracted global attention.



“ IF WE CAN CONTINUE TO PROVIDE AN ENVIRONMENT IN WHICH BUSINESSES LIKE THESE HAVE THE SUPPORT THEY NEED TO BRING THEIR INNOVATIONS TO MARKET, THEN MARINE TECHNOLOGY IN CORNWALL AND THE ISLES OF SCILLY WILL HAVE A VERY BRIGHT FUTURE INDEED. ”

#### HOW CAN WE BUILD ON THE SUCCESS OF MARINE-I?

By working alongside these ambitious businesses, the Marine-i team has been able to understand the challenges they face that can act as barriers for future development. This is a crucial learning from the project. It is only through addressing these that more of our marine technology businesses will be able to reach their full potential in future. These identified barriers include:

- ▶ Resource capacity within SMEs to develop and execute projects



- ▶ The availability of working capital to ensure that sufficient cash flow is available for pre-revenue RD&I projects, particularly those which need to scale up to meet nationally or internationally significant market challenges
- ▶ The need to build the critical mass within the business and research community in order to deliver large-scale projects to address wider market challenges. This will require greater collaboration across the business, research and investment community

It is vital that the next generation of capable SMEs continue to be assisted in their RD&I journeys. This should be through a combination of early stage support and also collaborative working to overcome the barriers highlighted above.

If we can continue to provide an environment in which businesses like these have the support they need to bring their innovations to market, then marine technology in Cornwall and the Isles of Scilly will have a very bright future indeed.

FIND OUT MORE AT [WWW.MARINE-I.CO.UK](http://WWW.MARINE-I.CO.UK)

## PRAISE FOR THE MARINE-I PROJECT

“

Marine-i has really made waves in the UK maritime sector, helping ambitious businesses accelerate innovation.

**Harry Theochari, Chair, Maritime UK**



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“

Not only has Marine-i helped boost local marine tech businesses, it has also attracted inward investment to Cornwall. The county is now recognised as a world player in marine technology.

**Kate Kennally, CEO, Cornwall Council**



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“

Marine-i has been a champion of marine tech in Cornwall and Scilly, spanning autonomous vessels to environmental protection and clean growth. We are particularly indebted for their support in developing the potential for floating offshore wind technology in our region, which we believe could be transformative for coastal communities in our area and make a huge contribution to achieving our goal of a net zero carbon economy by 2030.

**Mark Duddridge, Chair, Cornwall and Isles of Scilly LEP**



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“

Small businesses can sometimes need additional support to help unlock their full potential. The Marine-i project shows the amazing results that can be achieved when the right kind of support is in place.

**Ann Vandermeulen, Development Manager, Federation of Small Businesses**



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“

Marine tech is a huge export market for Cornish businesses with many great success stories. Marine-i has taken this to the next level.

**Kim Conchie, CEO, Cornwall Chamber of Commerce**



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“

Marine-i has provided a crucial and time-critical boost to the innovation capabilities of existing and emerging marine technology businesses across Cornwall, helping them develop and test new products and processes and justifying this innovative private-public-academic project collaboration which Cornwall Marine Network is delighted to have supported.

**Paul Wickes MBE, CEO, Cornwall Marine Network**



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GEORGE DADD OF KIOTE, SHOWN ON THE RIGHT, AT WORK ON THEIR PROJECT







[WWW.MARINE-I.CO.UK](http://WWW.MARINE-I.CO.UK)