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# Why the sea is an underappreciated test bed for innovation

Water covers some 71% of the surface of our planet, and more than 80% of it remains unexplored. We know so little about what lies on the sea bed and what our oceans actually contain. We've sent rovers to neighbouring planets and probes deep into space, and those missions have yielded not only fascinating scientific discoveries, but innovation and technology that has since been applied to more every day, commercial use cases. Our seas will spawn similar benefits.

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Exploring the marine environment should be a much higher priority than it is at present, and I've no doubt that the technology developments needed to learn more about the ocean floor will generate significant commercial and societal value in adjacent applications.

I've been around the sea almost all of my life, whether in a wetsuit as a child SCUBA diving from the age of 8, as an ROV pilot and marine treasure hunter on the hunt for the Merchant Royal, or as the founder of a marine robotics company. It fascinates me because it always has a new story to tell and secrets

to reveal.

I've built two businesses focused on addressing some of the most difficult issues facing the marine industries, having seen them first hand earlier in my career. In doing so, those businesses have had to develop new ways of working, and crucially new technology to help execute the tasks at hand. But while that technology was developed to solve the problems we were seeing in the marine environment – and particularly around the energy transition – the innovations developed for subsea scenarios could be used in a vast array of other applications – on land, in the air, and perhaps even in space.

## Exploration breeds innovation

Some of the technologies we use every day have origins in other exploratory fields – from the GPS in our phones and cars that was originally developed by the US Department of Defence, or artificial heart pumps based on designs NASA used to pump fuel around space shuttles. Why did these industries develop such ground-breaking innovations? Because there were big challenges to overcome and some of the brightest minds, with investment behind them, focusing their attention on them.

The marine environment not only remains largely unexplored, but presents significant challenges that make robotisation a perfect solution – we refer to these as the five Ds; dirty, dull, dangerous, difficult and dear. These five factors make truly understanding what's happening in our oceans incredibly complex – for humans and for technology, but for the latter that may be advantageous.

Due to the inherent difficulty of overcoming these issues, a technology that can carry out a task in subsea conditions may also be able to carry out a similar task elsewhere in other extreme environments, including on land – indeed it may be better suited than a technology developed in the reverse order.

> *There has been much talk about computer vision and autonomy technology related to autonomous passenger vehicles, and yet some of the most interesting work in these fields is found under the sea.*

# Technology: Under the sea

At Vaarst we're equipping Remotely Operated underwater Vehicles (ROVs) with Simultaneous Localisation and Mapping (SLAM) technology that gives them the ability to understand the environment around them, where they are, as well as systems which give them the ability to execute a given strategy with minimal human supervision. This could be to follow the route of an underwater cable connecting an offshore windfarm to the mainland and capture high-definition video, or to hover in-situ and monitor a gas pipeline node in strong currents.

Our business is currently focused on the marine environment because that's where our heritage lies, and where there's a clear business case to implement this technology – saving businesses working in this space millions of pounds by reducing the size of crews, and the ships needed to carry them, and reducing the emissions these fossil fuel burning vessels pump out.

However, there's no reason the systems we've developed for ROVs couldn't in future be fitted to other types of vehicles – including robots used to inspect mines and other environments that are dangerous for human personnel, or even autonomous vehicles.

As the commercial case for investing in marine exploration grows and more and more investment flows into the sector, we could yet see a Cambrian Explosion of marine-developed innovation. To date, less than 20% of the ocean floor has been mapped — 13% in just the past four years – but there have been *calls from leading industry figures for enhanced global cooperation* that will see the entire sea bed mapped by 2030. When that happens, the opportunities for knowledge transfer and cross-pollination of technology will be huge.

This is a future I'm incredibly excited about being a part of – one where we not only understand more about the nature of our seas and oceans, but one where we all reap the benefits of the work that revealed the secrets of our planets' unexplored spaces.

Brian Allen is CEO at *Vaarst*

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