Building a Resilient Business: Lessons From an Autonomous Ship

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The events of 2020 have revealed a new truism in business. No matter what the sector or geography, success increasingly depends on the resilience to survive and thrive in the face of external disruption.

But as the COVID-19 crisis has demonstrated, building a business model impervious to unpredicted events is easier said than done. Interestingly, and perhaps somewhat counter-intuitively, a revolutionary new autonomous vehicle may help chart the course.

The Mayflower Autonomous Ship (MAS) is an AI- and solar-powered marine research vessel based in Plymouth, UK, capable of independently traversing oceans while gathering crucial environmental data. The vessel is designed and constructed by the marine research non-profit organization ProMare, and controlled by an AI Captain built on advanced IBM technologies.

At its core, there are essential elements to MAS’s ability to detect and avoid ocean hazards. And as MAS undergoes sea trials now underway, ahead of its first trans-Atlantic voyage in early 2021, these core capabilities offer three guiding principles for navigating business risks:

1. Intelligence

Helping MAS to navigate at sea, a rich array of onboard devices and sensors constantly scan the horizon for changes that may indicate a hazard ahead.

IBM’s computer vision technology deciphers images streaming in from the ship’s six on-board video cameras. Trained on millions of maritime images gathered by the ship maker since 2017, this vigilant AI-powered system is now able to recognise a wide range of threats in the vicinity of the ship—whether physical outcroppings of land, floating debris, marine life, other vessels or various other potential perils.
MAS’s AI Captain has been trained to detect and avoid ocean hazards.

One of the biggest threats to MAS is the ocean weather. To mitigate it, MAS leverages meteorological data from IBM’s The Weather Company to plan its route and avoid adverse conditions. When network connectivity isn’t available, MAS’s on-board weather station keeps the data flowing.

MAS’s AI Captain is able to fuse these different datasets in order to make rapid and informed decisions—something business leaders increasingly need help with. As shock events throughout history have demonstrated, the seeming certainties on which we build our business models are anything but certain—whether you’re managing a building, a factory, a retail business, a piece of civil infrastructure or any other type of organization or enterprise.

2. Autonomy

With no humans onboard, MAS must be able to operate independently—even in the middle of the ocean with limited or no network connectivity. To do so, MAS is equipped with Level-5 automation, so it can act safely with no human intervention.

Key to this is IBM’s decision automation system. Called Operational Decision Manager (ODM), the system assesses all available data against a pre-determined set of rules, enabling the AI Captain to make the best decision in response to real-time events.

ODM accesses a broad range of data sources, including the ship’s computer vision system, weather data, radar, sonar and other marine navigation systems to better understand the surrounding environment. And because it is trained on two key sets of rules—International Regulations for Preventing Collisions at Sea, as well as International Convention for the Safety of Life at Sea—ODM ensures that MAS follows maritime regulations, while taking into account real-time data to optimise its decision making.

In the world of finance and commerce, automated decision management systems are used by successful businesses to analyze customer activity and automate the process of recommending relevant offers and services. Such automation also enhances privacy and security, identifying possible cases of fraud, as well as reducing the amount of personal and sensitive information that staff members are required to process.

If, like MAS, a business has a decentralized computing architecture, edge computing is key for enabling the autonomy required for continuous operations. Small, powerful and lightweight edge devices provide just enough compute power for a ship, car, oil rig, or piece of equipment to operate independently, even without network connectivity. When a connection with the network cloud is made, performance data is uploaded, system updates are downloaded, and the autonomous system continues.

3. Agility
MAS has agility built into its core. Its three-hulled, trimaran form ensures high levels of hydro- and aero-dynamics. And without the need for humans to live on board, it is lightweight and fuel efficient. Waterproof photovoltaic panels fitted to its upper surface enable it to draw on energy from the sun when available, with a modern, high-efficiency generator acting as backup in case solar power is low in supply.

The ship has high levels of redundancy built into it, meaning that its systems are both isolated and duplicated in order to reduce to chance of a single-point failure. And rather than mindlessly following a pre-charted course, MAS’s AI Captain evaluates all available data and constantly updates the ship’s route and speed, second by second.

The AI Captain itself was built using agile methodologies. Even before the ship was constructed, the AI Captain machine learning models were built and tested on an IBM AC922 Power server—the same technology behind some of the world’s most powerful supercomputers. This reduced the time and expense of physical testing, and it means that MAS’s algorithms can be constantly tweaked and updated by the MAS support team on shore. It also means that the AI Captain can easily installed onto other vessels.

**Lessons for Business**

Events of this year have shown us that companies need to be resiliently responsive to rapidly changing environments. As with ships at sea, things can and do go wrong in business. Course-correcting strategies are needed to ensure organizations can push on, regardless.

MAS is just one small ship in a large ocean, but it serves as a case study for business resilience and continuity. Fortunately, the business intelligence technologies used on MAS are tried and tested enterprise solutions that are already available to organizations of all shapes and sizes. The key is to build a fusion of intelligence, autonomy and agility into the heart of your operations—to ensure that even when a hazard or storm appears on the horizon, you are equipped to navigate around it and carry on.

You can follow MAS’s adventures via an exciting new mission portal at [MAS400.com](http://MAS400.com).
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