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HOW TO BECOME A SMART PORT CITY OF CALL

Benjamin Vernooij, Business Development Manager IoT & Embedded;
Mary Etienne, Business Development Director, Dell EMC

As sensors have become more affordable and robust, they are being broadly adopted literally everywhere on the cranes; at the port, on the ship, in the hull, the main engine, and the auxiliary machinery and on even small equipment items, each gathering and collecting data for analysis. We are also already seeing some leading ports implement IoT solutions, focusing on traffic management systems, automation and digital invoicing (customs).

For example, one of our customer's IoT-based solution connects to heavy equipment like cranes with a view to monitoring all end-points while a visualization tool monitors the location of the machinery in the port and whether it is fully operational or not. Another customer's solution analyses voyage data, equipment data, and network structures to optimize overall operational performance for ship owners, partners and customers.

Increasingly, we are seeing condition-based maintenance systems – equipment monitoring in real time to remotely service products via the Internet so parts can

be swapped out at the next port of call, thereby reducing the ship's operational down-time and costly delays.

Other examples include 3D printing and using Augmented Reality to intuitively guide ship repairs by technicians without expert knowledge of the individual ship's system.

CONNECTIVITY

Innovative cloud technology on board has been found to increase productivity, lower ship to shore communication costs and increase data speeds by up to 50% [1]. Along with reduced workload in the engine room due to cleaner fuels, we believe that all these advances will allow further reductions in minimum crew sizes. As a result, ports can expect to see smart ships that can be managed and maintained from a central base of operations to identify potential issues ahead of time to ensure maximum safety for the crew and minimal downtime for the vessel.

What will this mean? Think automatic collision avoidance, automatic berthing, a

self-monitoring hull, engine and cargo; the ability to sail autonomously for a limited time in certain conditions and even no-crew drones for specific applications, such as short-distance ferries, tugs and fireboats. We also envisage intelligent planning based on AI assisted data analytics, accounting for complex variables such as optimal sailing routes, vessel speed and fuel consumption, upcoming weather fronts and on-board weight distribution. From a staffing perspective, all of these developments will require new skills and training.

In any case, whether ships are operated locally or by remote control, operational decisions at the port will be data driven. For example, AIS (Automatic Identification System), a satellite-based data exchange allows the tracking of virtually all cargo ships for vessel routing, taking into account the weather, traffic situation and port capacities along the route.

BECOMING A SMART PORT

It is important to say at the outset that piecemeal IoT projects – while positive – will

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not make your port smart. Rather, systemic transformation demands a major mind-set change. Ports need to look outside, focus on global, rather than local, interests, and think about the efficiency of the entire shipping logistics value chain rather than the port alone. A full IoT implementation has to benefit both the port users as well as the port authority itself.

A supermarket cold chain case study [2] is a great example of how end-to end business collaboration for a smart port city might inter-connect and work. This starts with the shipper of the goods in the country of origin (say, a banana producer) to smart reefers and container tracking (delivered by a shipping company) to the arrival of the goods in the port of destination (customs clearance) to the hoisting of the container using smart cranes to the transfer of the container to an IoT-tracked truck to end delivery to the stock room in the supermarket.

It is no longer enough to just deliver your piece in the value chain. All stakeholders have to collaborate to promote the efficiency of the overall ecosystem and develop integrated solutions that address shared port challenges like limited space, safety and security risks and sustainability.

NEW EXPERTISE

In addition to the port value chain, which includes stakeholders like the port authority, shipping agencies, terminal operators, importers, exporters, custom brokers, truck companies, and warehousing providers, you also need to enlist the expertise of new partners that are leaders in digital transformation, including hardware and software vendors plus system integrators.

It is wonderful to see that some great, joined-up initiatives are already taking place. At Hamburg, for example, connected-port initiatives are helping to double capacity—but not space — by 2025, simultaneously reducing operating costs for operators and logistics costs for cargo owners.

Meanwhile, Rotterdam's interconnected information hub, the Portbase Port Community System, offers a one-stop shop for logistics and information exchange that addresses the needs of all stakeholders, from port customers through terminal operators and service providers. Rotterdam even uses 3D printing technologies to support the maintenance and repair of parts and accessories.

Connected ports are also playing an active role in smart cities – for example, Hamburg has developed a tidal energy use plan and taken a number of innovative measures to reduce carbon emissions. All of these developments are making us rethink how ports can be managed and operated.

FIVE CRITICAL SMART PORT STEPS

1. Outline your vision: Ask yourself what you want to achieve by becoming smart – in other words what is the strategic imperative? This strategic goal should go beyond mere efficiency improvements and focus on the long-term.
2. Collect and store your data: Of course, sensors are not a new technology – they have long been used in ships and ports. The difference now is that they have become smaller, better and cheaper. Additionally, new technologies like edge computing are making it possible to collect valuable business data in an affordable way. By digitizing your assets and transferring all your data to a central IoT hub, you can start sifting through the telemetry you have collected. The good news is that there are new and improved ways of gathering data from existing and new systems. Current technology can work within a new generic “Data Orchestration” layer to establish interoperability between systems that historically has worked in a siloed environment. New equipment can be added, leading to a powerful combination where existing and future data can be combined in a secure manner or separated in a safe environment, depending on the specific needs.
3. Analyze your data for business insights: Remember that your new digitized and existing assets are gathering tons of data. You are now ready to turn that raw data into structured sets and easy-to-digest visuals, all with the purpose of generating valuable business insights that will drive business optimization and cost savings. This is where the Internet of Things comes into play. A data lake is a centralized platform where different streams of raw data come together, where both structured and unstructured data can be analyzed and cross referenced.
4. Automate and optimize processes: This next step is to act on those insights. Think about integrating operational processes and proactively managing maintenance programs. Adjusting and

REFERENCES

- [1] Navarino Telecom case study: <http://i.dell.com/sites/doccontent/corporate/case-studies/en/Documents/2016-navarino-10022985-oem-cloud-maritime-communications-infinity-cube.pdf>
- [2] Supermarket cold chain case study: <https://www.emc.com/collateral/customer-profiles/h16184-using-data-to-help-avoid-food-waste.pdf>

automating business processes may require some fresh investment but over the long-term, it cuts down the need for manual decision making and a lot of number-crunching. This is a process of continual improvement – you should continue to incorporate new insights on an ongoing basis. Be agile – do not attempt to boil the ocean, and question whether manual, disparate processes be automated or eliminated and which risks and issues are made more complicated?

5. Transform your business model: These first four phases will help you deliver operational excellence and efficiency, which is an important foundational step. However, the next and most exciting part – reinventing your business model can only happen above through partnership, collaboration and joined-up thinking.

ABOUT THE AUTHOR

With over 20 years' experience in IT, ranging from developing and supporting end-to-end IT solutions and professional services, Benjamin Vernooy, Business Development Manager IoT & Embedded for Dell EMC, is passionate about bridging the gap between engineering and IT with the goal of achieving a true digital transformation.

As the Business Development Director at Dell EMC OEM in the EMEA region, Mary Etienne leads its marine industries vertical. She is a business and technology leader with over 30-years' IT industry experience in senior sales and management roles with Fortune 500 companies.

ABOUT THE ORGANIZATION

Enabling the industry with transformational technology and compute platforms continues to be one of Dell EMC OEM's most exciting journeys as big data, sensors and communication, artificial intelligence, M2M, deep learning, the industrial Internet of Things and cloud technologies propel the industry into its 'Marine 4.0' digital future. Its heritage, scale and marine-ready IT infrastructure have made Dell EMC OEM the marine industry's most complete technology provider across the entire value chain for enabling tomorrow's smart ships, offshore oil and gas installations, renewable energy structures, and the operational and services infrastructures supporting the entire ecosystem.

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