Expanding connectivity has opened up new worlds of business opportunity in virtually all industries. But the northern shipping route is one place in the world where staying in touch could mean the difference between success and failure for an entire mission.

When staying connected becomes critical



Gregor Bogle

Teekay will be shipping gas from the Yamal LNG project, above the Arctic Circle in western Siberia, and over the northern route to Asian markets. "The importance of connectivity in this project is almost to the point of criticality," says Gregor Bogle, manager of electrical, instrumentation and automation for Teekay Gas, operating out of Glasgow. "If you lose power in the Pacific, you might drift around for a day or two before help arrives. Up there you can freeze solid before help comes, and then it's too late."

"That's why we have to have support 24/7," he states. Noting that ships will be navigating the roughly 2500 nautical mile Northern Sea Route with virtually no communications infrastructure along the passage, Bogle underscores the challenge of maintaining a robust connection to land support. Satellite coverage can be spotty in the high north, so Teekay is investigating technologies such as data connection using old-fashioned High Frequency radio that can send signals virtually around the globe, or to another ship with capacity to relay the signal. 'Snapshots' of 1 - 2 megabytes will be transmitted regularly, and vendors will collect all the data they can, whenever they can, so as to have it when the need arises.

If all this seems a bit like patchwork, it still gives the ships the connectivity they need to stay safe. "We plan for the worst and hope for the best, but we will always have at least some degree of connectivity," Bogle stresses.

Far, and yet so near

"These ships are designed to sail solo through the Northeast Passage. Not



only do they have to be prepared to meet all operational challenges, we have to help them avoid problems before they occur." In that context, Remote Diagnostic Systems (RDS) are essential tools for identifying potential systems issues.

"RDS allows us to provide advance support to our people on the vessels. On board, you know something is wrong when the alarm goes off. The crew don't have the time to methodically graph and predict everything. With advanced warning, they can do preventative, condition-based maintenance, and we can help them fix things at sea, too."

Teekay's Yamal LNG ships will employ power and propulsion systems from ABB. Gregor Bogle has visited ABB Marine's Integrated Operations Center at Billingstad, outside Oslo, where they monitor and diagnose systems in real time, and found it highly reassuring. "We like to know they have people on watch. It's that warm, fuzzy feeling, knowing they will be there."

ABB can connect to a ship, generate predictive reports, and identify trends that might go unobserved on board, while the crew tend to the day-to-day running of the vessel. And Teekay can monitor all its ABB DFDE (Dual-Fuel Diesel Electric) vessels using their myABB portal. The system allows them to see the location of ships and check alarm systems, and access all RDS data.

How much is too much?

For all its remarkable advantages, Gregor Bogle does believe that connectivity can be taken too far. Big Data enables the analysis of more data than "If you lose power in the Pacific, you might drift around for a day or two before help arrives. In the Arctic you can freeze solid before help comes, and then it's too late." most enterprises need, or are able to handle. Because Internet on ships is still slow, operators will collect large amounts whenever they are able, but Bogle maintains they should analyse performance based on need, not just data availability. In this he is simply acknowledging that there are limitations to what a company really needs to do, if not on what they can do.

"And you have to be clear on just what you want to expose," he warns. "Sharing data increases security concerns, and companies have to control their vulnerability."

Though most vendors are aware of the risk problem, owners have to take into account the potential threat of harmful action if they expose everything. The most common solution to this is to control the ship's connection to the suppliers, using one secure connection for the ship, another for crew, and a separate one for suppliers.

"If remote support is available," Bogle asks, "would you want your supplier to take control of the system and fix problem? It sounds tempting, but then you open a Pandora's box by relinquishing control. I trust my suppliers to do no harm, but if something goes wrong when they are in control of the system, how am I to know that they are not at fault? Of course I will want to know what happened while I was out."

He adds that class societies are also sceptical of relinquishing control of a ship, simply due to the ambiguous nature of responsibility when the system is open. "When you're dealing with perceived threat, suspicion is the threshold, not technology," Bogle concludes.

Never before in the north

"Teekay has shipped LNG all over the world, but we have never done it in ice,

so this is new to us," Bogle says. Another first is Teekay's use of ABB's Azipod propulsion system, instrumental in enabling the stern-going function that gives the tankers ice breaking capacity in more than six feet of ice.

"These tankers are probably the biggest ice going ships in the world," Bogle reflects. Teekay and partner China LNG will take delivery of six of the vessels for Yamal, operating on 25-year charter contracts. The vessels are ice classed to RMRS class Arc7, designed by Yamal consortium and built at DMSE in Korea. Yamal will employ four shipowners, and Gregor Bogle represents Teekay in the technical working group with the other owners. Teekay have their own Yamal operations group, and a team on site at the yard in Korea.

Yamal is the largest LNG project Teekay has served to date, and Bogle calls the facility itself "a logistical marvel". With no manufacturing on the site, every component is constructed at lower latitudes, transported and assembled in sub-zero conditions.

Yamal LNG owners Russian Novatec, French Total, the Chinese National Petroleum Company (CNPC) will invest USD 27 billion to extract the 900 billion cubic metres of gas reserves, with peak production scheduled to reach 16.5 million metric tonnes per year.

No substitute for experience

So with all the expense, complications, and risk to crew involved in sending ships through the Northern Sea Route, were autonomous vessels ever considered?

"It may sound like a good idea on paper, but there are just too many variables," Gregor maintains. "Not just in the north, but in general. With the complexity of systems and tasks,

"These tankers are probably the biggest ice going ships in the world."



The Yamal LNG carriers will be some of the most robust on the water

things are going to go wrong. What happens when a computer-operated ship is on a collision course with a human pilot? How can a computer know what the human will do? And who does a computer protect, itself or you?"

Having served many years at sea, Gregor can assure that no such dilemmas arise with a human crew. "Technology changes on ships, but not the mindset, and not the responsibilities. It's a condensed society on board, and you are all responsible for each other. You are the police, the fire department, the ambulance and the hospital. You are family and friends, and you can't just walk away. In the end it all comes back to the people."

And he is clear on the value of integrating shore support into the tight shipboard society. "When we share our on board experience with the support centre, it helps the specialists on land relate to the all-round nature of life on a ship."

Gregor Bogle sums up the significance of human experience in an increasingly digital world: "For example, a service centre is going to have a much easier time communicating to an engineer on board if they have people who have been on a ship," he observes. "At the end of the day, the success of all systems comes back to personal connections."