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# PEOPLE

## MARSEC FOUNDERS



**Krystyna Wojnarowicz** and **Geir Fagerhus** have been helping ambitious organizations to digitize their products, services and operations for decades.

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## THE MARSEC TEAM



Software wizard **Robert Jaremczak**



The sales crew: **Captain Bruce Angus** and **Captain Gisle Stava**



Silicon Valley CFO & strategist **Shauna Barker**



# Mixing software and water: Maritime meets Silicon Valley

**What's your passion? Most Valley people know theirs and want to know yours. So what's new on the Valley passion wagon? It's time to meet the "aquapreneurs" – a Norwegian and a Pole who are introducing their passion for everything maritime into innovation's very own backyard.**

To be more precise, Krystyna Wojnarowicz and Geir Fagerhus (no prizes for guessing their respective nationalities) share a life-long passion for the sea, software and social entrepreneurship.

"K&G", as they are becoming known, are a smart couple building a smart business based on smart devices. Their business, MARSEC Inc., is the result of a meeting of minds forged in the crucible of software process improvement.

Since the fateful first meeting between masters student (Krystyna) and her serial entrepreneur mentor (Geir), in Germany in 2001, they have been pulled together through shared passions and a set of values that sounds like a Top 10 Tips for succeeding in life and business: fairness, meritocracy, open collaboration, curiosity, integrity and determination.

Fuelled by this heady mix, K&G have spent more than a decade globe hopping, scrutinizing industries and technologies and striving to join the dots that help solve some of the world's "wicked problems".

The maritime industry, often described as 'conservative', though Geir prefers 'pragmatic', has certainly noticed their presence. After frequent speaker slots at e-Navigation seminars and an eye-opening appearance on a high level panel at the 2015 Nor-Shipping conference, K&G have quickly become a go-to source for what is next in maritime technology.

When you meet Geir and Krystyna, you notice how they exude a worldly savoir-faire developed by challenging old-school mindsets, resisting gender stereotypes and supporting smart digitization in sectors from automotives and telecom to banking and finance – and now maritime. This MARSEC DNA is also reflected in their team, which has a diversity and gender balance rare in both the shipping and ICT worlds.

## Digital nomads

You can often meet K&G in Palo Alto these days, where their company, MARSEC Inc., is part of Nordic Innovation House. However, digital nomads are not limited by borders and culture, and K&G currently shuttle between three carefully selected locations: Malta, Norway and the Valley.

To understand Malta we have to rewind... It's Sweden, 2007: K&G look down onto Malmö's wintry Öresund strait from their office in the iconic Turning Torso skyscraper. Having decided to bring their digital nous to the maritime world, they had just graduated as mariners after a grueling training in safety, security and high-speed navigation in icy Swedish waters.

"It was the ultimate test of our teamwork; we swapped roles while navigating at night through busy harbors and around dangerous skerries at speeds of up to 40 knots," says Geir. "We developed the intuitive communication skills and confidence needed to steer a fast-moving object, whether it's a sea rescue vessel or a startup company," adds Krystyna.

The birthplace of MARSEC, the Torso building was also great for blue-sky thinking. An elevated "Eureka moment" on that night in 2007 led K&G to sail their boat to Malta so that they could test technology at sea all year round. Living afloat in the harbor, they swiftly became part of Malta's development into the "island of open source".

"We did a lot of pioneering maritime market research to reveal the extent to which different ship types are software dependent and to discover the root cause of why the maritime industry is so behind other transport sectors," explains Krystyna. K&G then went on to found a non-profit foundation MARSEC-XL to develop the open architecture MARSSA.

In 2011, when an economic downturn and energy crisis was taking its toll on the maritime industry, MARSEC-XL cemented its position as an advocate of open source. On Valentines Day, it donated all of its MARSSA artifacts "from MARSEC with love" to the open-source community.

So what about Norway? Geir says his homeland should be at the high-tech forefront of ocean industries because its large, diverse maritime sector with high-value vessels and specialized ferries makes it a good test market. In addition, Norwegian values support innovation. In other words, it's the perfect European base for rolling out MARSEC solutions.

## **Marinate the Valley – digitize shipping!**

K&G's connection with the Valley, which they sincerely aim to "marinate" by creating bridges to the maritime world, is simple. Creative change agents by nature, they like to get things done. "The Valley is perfect for us because it moves much quicker and does innovation by passion, not committee," says Krystyna, who adds, "We want to promote vital changes and challenge old mindsets, so this is our spiritual home."

Geir describes the maritime industry as ripe for digital change. "It's one of the last industries to exploit Big Data – we aim to bring it out of the dark ages," he says. K&G's potential as maritime disruptors was duly noted when the McKinsey Global Institute cited their Internet-of-Things-at-Sea enabled solution, "Rex", in a 2015 report Internet of things: mapping the value beyond the hype.

The maritime industry's brightest minds have also understood that shipping is on the brink of a revolution – even old ships are full of sensors that generate massive volumes of data that is largely unexploited. However, old school thinking is slow to give way to the holistic, systems thinking needed to address maritime operational efficiency.

"With shipping facing criticism for falling outside the positive change wave created by COP21, the time is here for it to go fully digital and become truly efficient," says Krystyna. "We want to play a part in enabling a global system of sea traffic management and a smart intermodal transport structure," says Geir, concluding, "achieve this and we will help catalyze a huge positive impact on the world economy."

## K&G profiles



**Krystyna Wojnarowicz** has been working with ambitious organizations in the digitization of their products, services and operations for over a decade. She also co-founded and is Chair and Chief Strategy Officer of Silicon Valley-based MARSEC Inc., a multimodal transport optimization company. Krystyna holds a masters degree in Information Technologies Management and is also a commercial mariner.



**Geir Fagerhus** is President & CEO of Silicon Valley-based MARSEC Inc., a multimodal transport optimization company. He has nearly 30 years' experience from high-tech businesses and academia with focus on software intensive products and services. As an international entrepreneur, Geir has founded and managed businesses in many European countries and the US since the mid 1980s. He specializes in supporting industry sectors that become software dependent, such as telecom, automotive, bank and finance and maritime. Geir is also a commercial mariner.



# Krystyna Wojnarowicz

*Open source advocate Krystyna Wojnarowicz has spent decades helping industries transition towards digitalization and is now committed to bringing the maritime world up to speed. She is co-founder of Silicon Valley based Marsec, Inc., a software engineering center of excellence specializing in sea traffic management solutions.*

**W**hat lessons does Silicon Valley have for the maritime industry?

Silicon Valley software companies focus strongly on the customer. We are very good at developing new technologies and solutions that address customers' pain points thus providing real value. Another key element of our success is the widespread use of open source software as a component in our solutions. This enables us to shorten development time and radically lower the cost to the customer without compromising on system quality.

All Marsec's e-Navigation and sea traffic management solutions are based on open source. However, not everything has to be or should be open and free - it has to make business sense for all. Nevertheless, I do believe that encompassing open source components in products and services is a must and the way forward in maritime. It is one of the key enablers for the Internet itself and therefore for both the industrial Internet of Things and cloud computing.

*I believe you are also a proponent of open innovation and new forms of collaboration.*

The open source movement is all about collaboration and I think maritime can learn a lot from the open source movement about collaborative business models. In Silicon Valley, we collaborate with our competitors to create platforms upon which we then build innovative value-added services. Collaborative business models have to grow as an industry is transformed through the technology that is emerging.

Large software players have figured that they often use up to 80 percent of their time developing similar platforms. However, most of their income comes from the 20 percent of real innovative services run on the platforms. This is their competitive edge. So, instead of all wasting money maintaining individual platforms, they agree on the smallest common denominator and collaborate to distribute the maintenance costs.







## MARSEC INC

Sea Traffic Management solutions provider  
Headquarters in Silicon Valley

### Main products:

- Open Bridge Platform (OBP)
- Route Exchange App (REX)
- Open Shore Platform (OSP)

[www.marsecinc.com](http://www.marsecinc.com)

Marsec XL Norway undertook the IoT @ Sea testbed in collaboration with Bastø Fosen ferry company to test the app called Rex. Bastø Fosen now uses Rex, which stands for Route Exchange, on all of its five ferries in the Oslo Fjord, the most heavily trafficked fjord in Norway.



This is how open source works. For instance, why do all these huge companies work “for free” to develop Linux? Because it’s just the platform upon which real innovation occurs. The Valley has understood this, but Europe is still lagging behind. The maritime industry, especially marine electronics players, should grab this opportunity to make things cheaper, faster and better for everyone. Open source will reduce development costs for software companies and allow them to focus on the real differentiating value, while lowering prices for the customer. So, it’s a win-win situation.

*Some maritime players are concerned about data security and ownership.* Indeed, with Big Data being produced and collected from shipboard sensors, the question is, “who owns what?” Data is a competitive asset and has to be managed as such at the enterprise level. For it to drive strategic insights that lead to competitive advantage like improved performance, predictability, and profitability, data must be analyzed

and presented as useful information for end users and decision makers.

Aggregating and analyzing Big Data in-house may be challenging, so I see the emergence of “data brokers”, companies specializing in turning data into useful information to support informed decisions.

Beyond this, shipowners could consider releasing the commercial potential of their data by selling it whenever it makes business sense. There are some relevant and well-proven data management models for this in the financial services sector.

Data and system security is of paramount importance. Security should be incorporated from the early design stages of a robust system architecture, and the highest security mechanisms should guard the data itself. Here the maritime industry can learn a lot from such industries as financial or medical services or the defense sector.

At industry level, the latest digital developments suggest some profound changes. The maritime sector, as part of intermodal transportation networks, will become one of the new hybrid industries,

driven by the advent of the industrial Internet of Things which will blur boundaries between traditional industries.

*An “Internet of Things at Sea” would involve interconnecting ships and shore in real time. With deep sea connectivity still expensive, isn’t this science fiction?* Not at all: the industrial Internet of Things revolution could see the transport industry being one of the early adopters. We’re very close to being able to build an Internet of Things at Sea that allows us to connect and exchange data all the time and anywhere via Internet enabled technologies. For once, maritime seems well positioned to have a head start, as we already have sensors producing all kinds of data onboard ships. However, as yet it isn’t really being collected and analyzed properly in real time.

Ashore, the Internet of Things can enable this by pushing data continuously to and from the cloud. At sea however, continuously pushing data from ships into the cloud and to shore is difficult and expensive and even undesirable due to



## KRISTYNA WOJNAROWICZ

Co-founder of Silicon Valley-based Marsec Inc., Krystyna has a masters degree in Information Technologies Management and is also a commercial mariner. She specializes in helping industries transition to state-of-the-art digital technologies. Prior to founding Marsec, Krystyna worked for the Carnegie Mellon's European Software Engineering Institute. Krystyna is a frequent speaker and presenter at Maritime and ICT conferences and author of articles for various publications. Follow Krystyna on Twitter at @MARSEC\_XL.



security concerns with the current marine communications solutions. However, two new developments promise to change this.

Deep-sea connectivity via high throughput satellite networks could massively increase data capacity and help unlock the potential for ship-wide data gathering. However, nano-satellites will likely be the real enabling technology, providing cheap, global connectivity for the entire maritime industry. As small as a shoebox, cheap to build (from off the shelf components) and launch, they can fill in the present coverage black spots. More importantly though, unlike traditional satellites with 10-15 year lifetimes, nano-satellites can be replaced with software- and hardware-updated versions every two years. This will provide the almost continuous technology refresh rate required for the success of the industrial Internet of Things at Sea.

"Edge or fog computing" is the other enabling technology. It brings processing power closer to the sensors aboard ships. The collected data is analyzed in real time onboard, then some is

used directly to support crew decisions and only what is needed ashore is batched up and shot into the cloud.

This also means much less satellite bandwidth and associated costs, but also requires some extra computing capacity on board. Luckily, sensors and processing are very cheap. You can use small, powerful and inexpensive Linux computers, which need little power and space. Locating them onboard will also help to solve data security and ownership issues for ship owners. Edge computing using open architecture delivers seamless interoperability at low cost.

*The Danish Maritime Authority has been exploring the Maritime Cloud idea, and I believe you recently collaborated with them on an e-Navigation test bed. Yes, we are actively involved in developing and supporting the Maritime Cloud, an open source framework for maritime communication. We utilized an edge computing approach in this test bed, which uses an iPad app connected to a Linux server located onboard vessels to demonstrate auto-*

mated Sea Traffic Management.

We deployed the test bed onboard five vessels owned by Bastø Fosen ferry company in the Horten-Moss Strait, the most heavily trafficked seaway in Norway. To test the app, we also created land-based installations at Bastø Fosen's traffic center and at the Norwegian Coastal Administration where they also oversee traffic.

The app, called REX, short for Route EXchange, allows captains to share routes in real time to optimize navigation. It connects bridge crew to a system that takes into account each ship's characteristics, including how long it takes to accelerate and decelerate. Besides aiding quick decision-making, the app can also be used as a planning station to plan routes and adjust them well ahead of departure.

The test bed indicated fuel savings of up to 15% per annum. Based on this, I believe that industrial Internet-of-Things-enabled solutions such as REX can lead to the building of a global system of sea traffic management and a smart intermodal transport system. ●



# ABOUT US

## **MARSEC, Inc.**

### ***Shaping the digital future of maritime.***

Headquartered in Palo Alto, MARSEC is a multimodal transport optimization company. We utilize the Industrial Internet of Things and Big Data analytics technologies to improve maritime operations through revenue optimization and cost savings.

Our sea traffic management solutions are based on open, innovative applications easily modified for the customer's specific needs. The MARSEC Open Bridge Platform (OBP) and Open Shore Platform (OSP) compile data from ship sensors to enable automated and secure interoperability between sensors and other instruments both onboard ships and ashore.

MARSEC directly addresses the pain-points of mariners and ship operators by automating daily operations and providing unique and simple-to-use tools.

One example is REX, our route exchange and optimization solution, which allows real-time sharing and exchange of intended routes between ships and shore-based vessel management and traffic coordination centers.

See more on REX [here](#).

#### **RELATED FILES**

- MARSEC logo

# OPEN ARCHITECTURE

The Marsec founders, [Krystyna Wojnarowicz](#) and [Geir Fagerhus](#) also founded the non-profit foundation MARSEC-XL to develop the open architecture MARSSA.

[MARSEC-XL](#) (Marine Software Engineering Center of Excellence) aims to support the digitization of the maritime industry. It undertakes a range of activities from applied research, education and training to business operations and technology transfer.

[MARSSA](#) is the first Open Reference System Architecture (ORSA) in the maritime industry. MARSSA aims to provide both a basis for the development of standards and an architecture that supports the integration and interoperability of software-dependent devices and systems onboard ship and onshore.

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## VIDEOS



Bringing software to maritime



Nano satellites & Big Data



Krystyna Wojnarowicz about  
the e-Navigation community

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- [Profile of Krystyna Wojnarowicz](#)
- [Krystyna Wojnarowicz's blog](#)
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- [Krystyna Wojnarowicz on "Silicon Valley comes to maritime"](#)
- [Krystyna Wojnarowicz' insights on "e-Navigation"](#)

## PHOTOS



Krystyna Wojnarowicz at Nor-Shipping 2015



Krystyna Wojnarowicz at Nor-Shipping 2015