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Towards the twin transition

Twin transition is gradually becoming a standard phrase. We all know it stands for simultaneous digital and green transitions. However, do we ever consider what that means for all of us?

Digital development has created fantastic tools for zero-delay number processing, fact finding and analyses; in general, learning from the past. At the same time, we know what is sustainable and have all the opportunities to choose a lifestyle in which we are on board with the twin transition, starting today.

First, we need to replace fossil materials and energy sources with renewables, look for opportunities to reuse materials and minimize consumption. It is essential to eliminate process fluctuations and leakages and avoid overdoing anything in overcapacity.

This is where the utilization of digital opportunities comes into the picture. As a simple first step, for example, industrial processes must aim for more optimized production schemes to meet the true product demands in terms of both quality and quantity. In other words, we should deliver products that "do the job" in sufficient quantities. Additionally, efficient utilization

of historical data and learning from it should be the key objective for digitalization opportunities in the industrial context. Our personal choices to prioritize renewable materials are crucial to support the green transition and have extensive impacts on industrial production.

In line with our mission, we at Elomatic are committed to creating solutions that support the green transition. We strive for excellence in expertise, aiming to be top professionals in our selected fields. This commitment is ingrained in our company's DNA, the very essence of where it all began. Yet, we aspire to achieve even more. Armed with the right people and the right mindset, we are poised to perform miracles!

As the new editor-in-chief, I'm pleased to announce that, moving forward, we will only publish a digital edition of this magazine. This way, we can reach even more of our customers, save the environment, and offer fresh reading experiences, including video content.

Tom Lind
CEO
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Artificial intelligence is here

Images: Silo AI

Can your company harness it?

Industry's interest in artificial intelligence (AI) has surged dramatically with the emergence of generative AI and the popularity of large language model based tools, such as ChatGPT. However, we are far from seeing AI's full potential. World-class AI experts from Silo AI advise companies to direct AI investments towards their core business to generate real and enduring value – as a technology, AI benefits significantly from economies of scale.

Niko Vuokko,
Chief Technology Officer, Silo AI

Silo AI is the largest private AI laboratory in Europe, employing about 300 people worldwide. The company's strength lies in deep AI expertise, exemplified by the fact that more than half of its staff members hold PhDs, and by an extensive track record of applying AI across multiple industries.

Silo AI was born when its founders recognized the ongoing AI talent drain in Europe, as the US and China were spearheading AI development. If Europe were to retain AI talent in the region and maintain its technological competitiveness globally, the need for a European counterpart to the AI companies in the west and east was imminent.

The idea was partly rooted in the distinctions in value systems between countries, highlighting the necessity to incorporate the European value system into AI development, but also to serve practical product development needs across industry by connecting top academic AI research with engineering talent. Since then, Silo AI has built AI solutions with hundreds of customers' for bespoke use cases across multiple industries, guided by their vision to build AI for people and focusing on where AI can create real value for their customers.

We had the opportunity to interview **Niko Vuokko** and **Jaakko Vainio**, Chief Technology Officer and Chief Operating Officer at Silo AI, both leading experts within AI with decades of experience between them. Vuokko leads the Smart Things business unit, developing solutions for tangible objects, such as mining machines, while Vainio is responsible for the Smart Applications unit focusing on digital business and cloud-based solutions.

How do you define artificial intelligence?

Vuokko: Artificial intelligence is a vast field and far from what one person could comprehend. One concrete implementation of it is large language models – a trend that has been in the headlines but is still only a small part of AI.

Vainio: There has been a significant increase in interest in generative AI. In the background, scientific development is progressing rapidly, and new models are constantly emerging. However, we mainly think of AI in terms of the value it produces for the customer. For example, we create neural networks, but we also use generative AI and large language

Jaakko Vainio,
Chief Operating Officer, Silo AI

> **For many valid reasons, the industry is slow to adopt new technology. AI is now at the same stage as aviation was over a hundred years ago.**

models, or even more traditional methods if a customer has very little data.

Vuokko: One could say that AI is largely what will provide a competitive advantage in the future: the core of how technology should be understood. If you look at history, the machine industry electrified in the past because electricity made it easier to add functionalities. Then came electronics, and next, devices could be connected to the internet, allowing software to be integrated into them. AI is the next major revolution, and soon it will be everywhere, as it simplifies and accelerates the achievement of better results.

At what stage is the industrial utilization of AI currently?

Vainio: It depends a lot on the industry, companies, and their sizes, but we are not very far along yet. There are exceptions, of course, and there is already quite advanced usage. Before AI can be utilized, a company needs to do its homework on digitalization: there must be data and IT infrastructure in place to build on top of. One significant factor is that there is still a shortage in AI talent. Companies should also learn to recognize AI's possibilities better.

Vuokko: For many valid reasons, the industry is slow to adopt new technology. AI is now at the same stage as aviation was over a hundred years ago. The first commercial airplanes could carry two to three passengers, and air travel was still a bit exciting. But when people managed to reach their destination by air, it was a magical experience, which has nothing to do with how aviation is perceived today. It tells us that we are facing many decades during which the scale of AI will increase a thousandfold.

How does Finland fare in the competition?

Vainio: Finland is not at the forefront of AI development, but we are not lagging behind either. This is a small market, and there are few large companies here. As we know, significant product development projects require large investments. On the other hand, Finland is one of those countries that perform well relative to their size.

Like other countries, we face the challenge that companies are conducting proof-of-concept experiments that end up waiting for the right value creation mechanism. It is not enough to have the right AI model; the solution must also work in the right place at the right time. For

example, the service should not crash overnight if that is a requirement.

How can industry promote the green transition through AI?

Vainio: The green transition requires a lot of action across society. In some cases, AI and machine learning models work well, such as in improving resource efficiency or logistics. For example, production can be optimized to reduce waste or goods can be moved efficiently from one place to another, which reduces fuel costs. AI also brings tools to the energy markets that make pricing and transmission of renewable energy more efficient.

Vuokko: The green transition means doing things smarter and controlling things at a more detailed level than we are used to. AI allows industrial processes to be manipulated with more complex goals. After all, it is very challenging to balance all the numerous goals: quality, deliveries, process safety, sustainability, to name a few. AI enables decisions to be made at a microsecond level and to continuously fine-tune industrial processes.

Vainio: AI also works as a planning aid. One new area is energy-efficient machine learning models, as computing often consumes a lot of energy.

What are the biggest challenges to widespread AI utilization?

Vuokko: The core challenge is that big disruptions happen very rarely. When a revolution comes, the way of doing things changes, and that is when the actual benefit arises. The more agile a company is, the easier it is to embrace new technology. When the revolution is over, the goal is to optimize the current state and cement the processes, including procurement principles and everything else that keeps the machine running efficiently in that state of the world – the idea is to reject changes that make the company inefficient. But with a new revolution, operations need to change.

Vainio: Companies often haven't identified what the broader path to leveraging AI at the strategic level is. Typically, they want to reduce costs a bit and keep up with others. There are, however, various options for AI utilization, and what is best for your business is not self-evident unless you have the expertise or seek it. It is extremely easy to fall into a trap if you only look at the easiest and most obvious use cases that do not provide much help.

Vuokko: AI is one of those technologies that benefit significantly from economies of scale. Individual pilot projects can be disappointing because their scale is so small that they don't achieve economies of scale. On the other hand, companies must also understand that the benefits emerge when significant investments are made. It is not worth spreading the grains everywhere; choices must be made, and investments concentrated accordingly to reach a large scale.

Do companies have fears about AI?

Vainio: Fears are usually misplaced. For example, machine vision solutions often involve installing cameras in industrial facilities, which can raise concerns since they are wrongly associated with employee surveillance. Cybersecurity is also one thing that is discussed a lot, although AI does not pose a greater security risk than other technologies.

> **It is not worth spreading the grains everywhere; choices must be made, and investments concentrated accordingly to reach a large scale.**

However, there are few concerns that everything provided as input to ChatGPT is shared outside the organization. Nothing related to the core business should be put in an external service. The ethical questions regarding AI are also naturally important when discussing its applicability in society as a whole.

What tips do you give to companies that want to make progress in utilizing AI?

Vainio: As a rule of thumb, AI should be utilized primarily in your own core business. Support functions may yield small benefits, but for example, an energy company's biggest efforts should go into energy production or distribution. You also need to understand how to get started and learn to identify use cases. If you don't have the capabilities for this, you can start with the help of a consultant.

Vuokko: Two things need to happen simultaneously. One is how to build essential core capabilities needed to implement change in the company. In addition, there is a need for ideas on how to bring the technology to customers, going into another cycle that genuinely creates value. Many companies push forward for months without thinking about how to get the concept into the hands of the customer and, thus, fall into a pit. So, you must simultaneously consider the prerequisites and implement the concept in practice. This also leads to learning.

Vainio: For smaller companies, the good news is that it may even be easier to adopt AI when starting from a clean slate. For companies without data centers, solutions can be built using innovative technologies directly in the cloud. ◣

Striving towards Industry 5.0 — What does the future factory look like?

Text: Teemu Turunen
Images: Elomatic, iStock

Many associate industrial activities with smokestacks, water pollution, and reports of factories closing due to unprofitability. In reality, industrial operations are currently undergoing a significant transformation. Digitalization is playing an increasingly prominent role in manufacturing, and clean production technologies are becoming mainstream. Innovation, especially in the fields of bioeconomy and circular economy, is thriving as raw materials and materials are utilized across industry boundaries.

Industrial activities play a vital role in the fight against climate change both now and in the future: 45% of greenhouse gas emissions in the EU-27 area[1] and 20% of all emissions come from industrial activities. Furthermore, only 12% of the raw materials used by industry are recycled[2]. The Green Deal recognizes the role of industry, and the EU has formulated a vision of Industry 5.0 to achieve a technological leap toward more sustainable production operations. This new vision builds upon the previously discussed Industry 4.0 concept, adding depth and comprehensiveness[3].

What could Industry 5.0 mean in practice? What might the future factory look like? Let's explore the possibilities in the 2030s from different perspectives.

Starting with customer and stakeholder needs

Sara is about to go hiking in Norway and needs a new hiking jacket. She found a suitable one online and is now picking it up from a self-service kiosk. The jacket's features have been customized for her from dozens of product variations, a common practice in production.

The jacket's digital product passport has recorded production conditions, allowing Sara to trace the origins of the raw materials all the way back to their source. This ensures that the stated sustainability criteria have been met throughout the jacket's life cycle. In fact, the product passport contains a vast amount of information that different stakeholders can access according to their needs.

Unlike before when Sara's jacket might have been manufactured in China, this product didn't travel far. The clothing brand decided to invest in a new production facility in Finland, where ESG (Environmental, Social, Governance) matters are taken seriously. Factors influencing the location decision included Finland's stable industrial policy, long traditions in refining, easy availability of skilled labor, and nearby logistics chains for raw materials.

- Products are becoming increasingly customized.
- Logistics chains are transparent.
- Factory location depends on multiple factors, not just production costs.

Innovative production ecosystems

Several players are involved in making Sara's hiking jacket. The first has produced the raw material for hemp yarn, which Sara selected as the fabric base. The next player has started producing the yarn, utilizing not only hemp but also various other ecological raw materials such as wood, straw, recycled plastic, and glass wool. The clothing brand's production unit further refines the yarn, manufacturing the jacket and adding the specified features.

Sara chose a coating for her jacket that naturally repels mosquitoes. The active substance is derived from basil and patented by a biotech company, which supplies it for various applications. Additionally, the jacket features printable sensor technology

Industry 4.0	Industry 5.0
• Centred around enhanced efficiency through digital connectivity and artificial intelligence	• Ensures a framework for industry that combines competitiveness and sustainability, allowing industry to realise its potential as one of the pillars of transformation
• Technology - centred around the emergence of cyber-physical objectives	• Emphasises impact of alternative modes of (technology) governance for sustainability and resilience
• Aligned with optimisation of business models within existing capital market dynamics and economic models - i.e. ultimately directed at minimisation of costs and maximisation of profit for shareholders	• Empowers workers through the use of digital devices, endorsing a human-centric approach to technology
• No focus on design and performance dimensions essential for systemic transformation and decoupling of resource and material use from negative environmental, climate and social impacts	• Builds transition pathways towards environmentally sustainable uses of technology
	• Expands the remit of corporation's responsibility to their whole value chains
	• Introduces indicators that show, for each industrial ecosystem, the progress achieved on the path to well-being, resilience and overall sustainability.

" **Instead of a single entity handling all production stages, production now occurs in industrial production ecosystems where each player specializes in their area.**

to measure moisture and temperature on the inner surface, automatically opening small ventilation channels created during the manufacturing process.

Instead of a single entity handling all production stages, production now occurs in industrial production ecosystems where each player specializes in their area. This allows for better customization of products and faster market entry for innovations. These players are located on the same industrial campus, forming innovative development environments. Their required data is collected in a shared cloud, managing the supply chain and distributing data to each player as needed. Individual players no longer need to worry about factory assets; they are purchased as services from specialized providers.

• Specialized players collaborate within new production ecosystems.
• Traceability and digital product passports ensure transparency in production.
• Shared infrastructure enhances efficiency.

Sustainability as an integral part of production

A service provider manages the factory's energy and utility production, owning the infrastructure and selling the utilities to each player as a service. This particular factory primarily uses electricity generated from clean wind power. Due to fluctuating electricity prices, a synthetic methane gas boiler is used when necessary.

Resilience is built into energy production, with key components duplicated, and storage capacity available for both electricity and heat. Energy recycling is maximized within the factory, and heat pumps produce temperatures exceeding 180°C for curing the coating.

Water usage has been minimized, although the factory is not yet completely closed-loop. However, wastewater from the process is utilized, serving as dilution water in another company's processes. The factory only releases sanitary water, which is captured and used for city district heating through a

low-temperature district heating network.

Efficiency is still emphasized, but the term used is no longer "energy efficiency" but rather "efficiency indicator," calculated by artificial intelligence. It considers various efficiency aspects, including energy, raw materials, energy prices, and order volume. It is noteworthy that recycled raw material fractions are increasingly used, making raw materials more heterogeneous. However, automation, advanced sensor technology, and artificial intelligence enable stable and adaptable production processes. Improved control algorithms also mean that overproduction is no longer necessary.

• Energy and utilities are procured as services.
• The main energy source is electricity, but alternatives are available.
• Systems are designed for resilience and flexibility.
• Water use efficiency is increasingly important.
• Production capabilities enable using lower-quality and more heterogeneous raw materials.

Changing roles for employees

Working in manufacturing has changed significantly since the 2020s. In the control room for the fabric production process sits Pekka, who spent his earlier career in a plywood factory. He can apply his previous manufacturing expertise in this role but has also had to learn many new skills.

In Pekka's current position, the most important tasks involve validating control changes proposed by artificial intelligence and monitoring quality – not all aspects of quality assurance can be done mechanically. AI doesn't autonomously control processes but suggests changes, with final decisions made by humans. Fortunately, these systems are user-friendly, and Pekka has learned to use them easily by utilizing the factory's digital twin. It also assists in other training sessions, and the project department uses it for planning and simulation of new investments.

The most significant change in Pekka's work has come from robots, which handle physical tasks. His previous duties were physically demanding, leading to musculoskeletal problems. In fact, it is not even possible to walk near the operating machines anymore; they are enclosed for safety. This change is reflected in safety statistics: the last significant accident occurred 1,789 days ago. Overall, working conditions have improved significantly, with robotic cleaners maintaining the cleanliness of production facilities. Real-time IoT sensors monitor and adjust air quality throughout the production hall.

Meaningful work for Pekka comes from mentoring. The mentor-apprentice model has returned, with both sides learning from each other. The new generation has a lot to offer in terms of improving factory operations. Pekka's mentee handles both production tasks and maintenance duties since versatility is now favored.
- Manual labor is decreasing, with robots used in new applications.
- AI and digital twin applications are widely used in production.
- Versatility and continuous learning are valued.
- Workplace environments are maintained as healthy and safe.
- Usability is a key aspect of system design.

Digitalization as the backbone of production

As mentioned earlier, production operators receive support from various intelligent applications in their daily work. However, utilizing these applications requires a vast amount of data. Data is collected traditionally into a centralized automation system but is increasingly refined and analyzed in the cloud. In addition, Internet of Things (IoT) devices collect extensive data outside the core process, which is integrated into the same database as process data.

Data is also obtained from supply chains, allowing for seamless traceability back to the origins of raw materials. It is noteworthy that the same measurement data is used extensively for different purposes, flowing seamlessly between different systems and interfaces.

For example, a sophisticated particle analyzer has been incorporated into the hemp pulp manufacturing process. It analyzes both the composition of the pulp and impurities within it. Composition data primarily helps in process control, but when processed, it is also made available on various data-driven dashboards, enabling the factory's engineering team to leverage AI-processed information. Similarly, impurity particle data is crucial for maintenance, allowing for the prediction of potential equipment breakdowns and the maintenance of spare parts inventory.

Analyzer data is also updated into digital twin models. Realistic data is continuously available for training, real-time optimization, and project management needs.

> **❚❚ Analyzer data is also updated into digital twin models. Realistic data is continuously available for training, real-time optimization, and project management needs.**

- Data is increasingly used throughout the entire value chain and life cycle.
- IoT application utilization is expanding, but not all data goes to the cloud.
- Predictive maintenance models become more precise, and their applications expand.
- The digital twin is actively used for various needs.

Emphasis on anticipation and flexibility

Today, maintenance operations look like this: Sini, who works in the maintenance department, retrieves the 3D model of a coating spray nozzle from the library and sends it to a 3D printer for production. While waiting for the nozzle to be completed, Sini assists the project department. They are currently reconfiguring the layout of one factory section to introduce fire-resistant coating for construction industry applications. The layout change is straightforward because the utility connections and foundations were designed to be flexible and adaptable from the beginning.

At the end of the day, Sini reviews the predictive maintenance application. She notices that an automatic order has been placed for a pump impeller, which has a 92% likelihood of being needed within the next month.
- 3D printing is an integral part of maintenance.
- The layout can be easily modified.
- Inventory management and maintenance are based on continuous anticipation.

Necessary conditions for success are already in place

Elements like those described above are already in use in various industries, and similar applications will become more widespread in the future – a comprehensive industrial transformation is just beginning. Particularly intriguing pioneers are new technology startups building their production operations "from scratch" and reshaping the prevailing production landscape. This should be a lesson for all of us: it is crucial to develop new opportunities from the early stages of facility planning. ◣

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Teemu has extensive experience in energy and process consulting in several industries. He currently works as Business Development Director in the energy and process business area. His focus is to lead the development of sustainable solutions for future needs.

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Watch the video on Elomatic's approach to the digitalization of factories

Elomatic's new CEO Tom Lind:

"We want to be known for our deep expertise in selected areas of the green transition"

According to Tom, one of his main ambitions
is to internationalize all sectors of Elomatic.
The company's sharpened focus will encompass
various aspects of the green transition,
aligning with the company's commitment
to designing solutions that increase the
wellbeing of people and the environment.

Images: Elomatic

How has your work at Elomatic begun?

My work has begun really well, and I have quickly gotten into Elomatic's operations. I have also had plenty of time to meet our people in Finland and abroad too, though there are still plenty of meetings ahead. The atmosphere here is very open, and people are happy to engage in conversations.

What attracted you to Elomatic?

Elomatic is a reputable, privately owned company, and here you can make a difference quickly. The company is also familiar to me in many ways: I have had both competitive and customer relations with Elomatic over the years. In that sense, this was not a leap into the unknown at all, rather a leap into the already known and proven.

What kinds of goals do you have?

Basically, I am an engineer and I like clear structures. Since the world around us has changed in such an unprecedented way, we have to find ways to respond to this quickly, that's clear. Just as important as choosing new focus points, however, is daring to give up something. It is also important to create a healthy and open atmosphere so that we can achieve

what we set out to do. And of course, changes must be reflected in Elomatic's growth and profitability.

My personal goal is to create close relationships with the entire organization. I want to hear what people at different levels and places think. I believe it is completely possible in a company of this size.

A major transformation is underway as we move towards a carbon-neutral circular economy. What do you believe are Finland's strengths given this situation?

Finland's strengths are certainly related to the versatility of our educational base. We have an education system that has kept us at the forefront of the green transition for decades. On the other hand, it has to be remembered that even though Elomatic is a Finnish company, we are strongly internationalizing. International growth supports us in our goals, but also the other way around: our Finnish base gives us a good starting point for success.

Here in Finland, we have a very reputable startup ecosystem in fields such as material efficiency and the circular economy. We have several examples of various companies successfully scaling up their innovations through collaboration with Elomatic.

How do you see the role of digitization in the future?

The importance of digitization will naturally continue to grow, but it is important to remember that it is a bit like fire: a good servant but a bad master. It improves routines and boosts design efficiency, but it does not replace people. I believe that artificial intelligence must be harnessed to support business structures, and not the other way around. It should strengthen engineering work.

In what ways can Elomatic and other engineering and consulting companies help their customers in the green transition?

Elomatic's business purpose is to design solutions that increase the well-being of people and the environment. In this way, everything we do aims to promote the green transition. I believe the best way we can help is to concretize good ideas. We have a unique ability to turn concepts into reality, as proven by our track record. Elomatic is especially good at refining different types of project ideas and scaling them up into profitable businesses.

In this context, I would also like to mention the potential of acting as a project engine, even though it is not yet very common among offices. Elomatic's project development company, Green North Energy, has a great mission to accelerate the green transition by enabling the production of green fuels and chemicals. Having a financially solid company with expertise in the various phases of the project in the background provides a completely different starting point for these kinds of operations. It is impressive how Elomatic has boldly set out to create this kind of new approach.

Elomatic operates in several industries, and your task is to bring expertise especially to on-land business operations. What kinds of challenges and opportunities do you see ahead?

A clear challenge is that our traditional on-land business is facing a major change. I do not believe that we should compete for project volume in this situation; instead, we need to identify those areas within the green transition in which we can offer excellence. In the future, we will focus especially on the circular economy, resource efficiency and new forms of energy, targeting our competence development accordingly.

As an opportunity, I see expanding our expertise and providing comprehensive consulting right from the start of the project development path. We have already taken the bull by the horns and acquired the energy business consultancy Elron. The acquisition supports our vision well, as Elron has specialized in renewable energy projects in recent years. Together with Elron, we will be able to pursue our goal even better, for example in connection with the launch of wind power projects.

As far as I understand, Elomatic is one of the few companies that can manage the entire chain from clean energy production to ship design, covering everything from "propeller to propeller". With on-land operations, we can complement our excellent expertise in the marine industry.

You have a versatile background in industry, consulting and academia. How will you be able to utilize this experience with Elomatic?

Probably very well, because I'm familiar with the industry and I know what it is like to be a customer. I have also cooperated with educational institutions and students for years. Above all, I hope that the overall benefit of my background will be more than the sum of its parts. Combining it with Elomatic's profile as a non-listed company allows us to build an attractive employer image. We definitely want to be the most reputable employer in the field.

What makes the CEO happy?

I am happy when things are discussed with a smile and when our teams dare to experiment and concretize new things together. Perhaps I am happiest when I get to welcome talented young people who are coming to work for us.

In three words, describe what Elomatic will be like in five years?

The first word that comes to my mind is international: in the next few years, we will become strongly international in all our sectors. The next term is deep expertise: we aim to be known in the future for our deep expertise in our chosen areas. Last but not least, I want to emphasize our role as an enabler of the green transition: I want us to be known five years from now as a bold actor with new thinking who moves projects forward, finds financiers, brings people together and creates a framework for our customers' success.
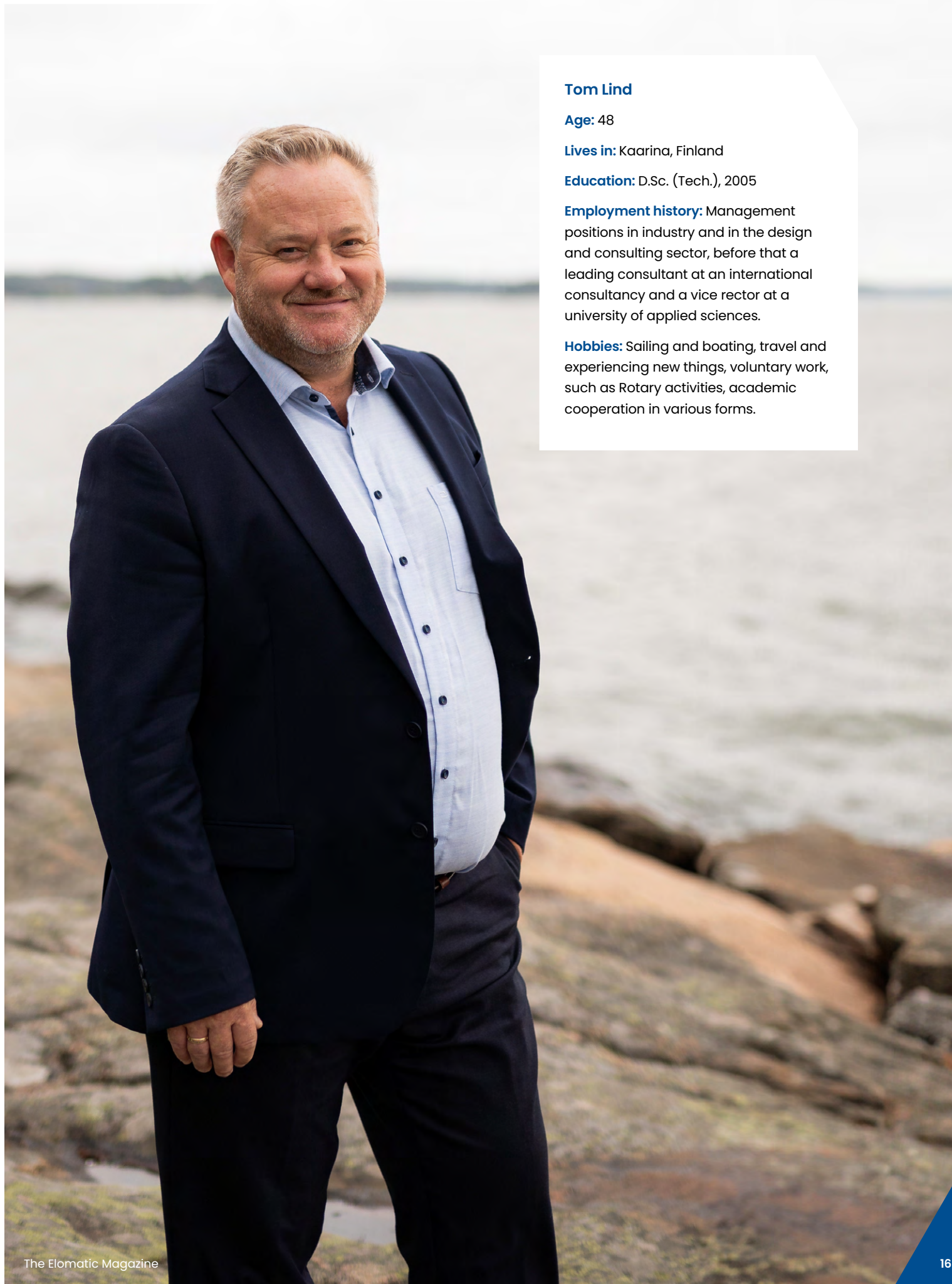
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Employment history: Management positions in industry and in the design and consulting sector, before that a leading consultant at an international consultancy and a vice rector at a university of applied sciences.

Hobbies: Sailing and boating, travel and experiencing new things, voluntary work, such as Rotary activities, academic cooperation in various forms.

Significant savings with mobile scanning:

Infinited Fiber Company virtualized its factory spaces quickly and cost-effectively

Images: Elomatic, iStock

Infinited Fiber Company is constructing a large recycled fiber plant in Kemi within the premises of an old paper mill. The company required precise information about the space for equipment placement and commissioned both indoor and outdoor mobile scanning from Elomatic. This approach resulted in substantial savings in both time and money.

Infinited Fiber Company has globally unique technology to turn textile waste that would otherwise be landfilled or incinerated into high-quality fibers for the textile industry. In pursuit of their mission, the company is currently preparing to establish a flagship factory in Kemi within the premises of the old paper mill.

Point cloud as the foundation for design

Before commencing construction, Infinited Fiber Company needed access to point cloud data of the existing environment. A point cloud is a three-dimensional dataset composed of millions of individual points within a given area. This data enables precise positioning of equipment.

"Our design team is spread across Europe, and the distances to the factory are significant. Travel is costly and inefficient. Moreover, human memory fades after a few minutes, whereas a virtual model is always accessible," explains **Matti Reivonen**, the Design Manager at Infinited Fiber Company.

Mobile scanning emerged as the optimal choice

The decision was made to conduct the measurements through mobile scanning, a cost-effective and speedy method as it is performed on the move. An alternative would have been traditional stationary scanning, where a device scans its surroundings from a fixed position. While this method

can capture small details and provide highly accurate point cloud data, it is time-consuming, requiring the scanner to be moved over a thousand times for comprehensive data.

Heidi Laitinen, Project Manager at Elomatic, mentions that mobile scanning achieves sub-10 mm accuracy, which was adequate for this purpose.

"The factory has a vast amount of open space, making the mobile scanner an ideal choice. The project could have been executed with a stationary scanner, but it would have taken significantly more time, with no added value in terms of accuracy. Stationary scanners excel in scenarios like scanning paper machines where space is tight, and there are many details."

> **❚❚ The project could have been executed with a stationary scanner, but it would have taken significantly more time, with no added value in terms of accuracy.**

Scanning conducted in two phases

Elomatic experts conducted indoor scans in February 2023 and outdoor scans later in the spring after the snow had melted. Before scanning, Elomatic performed risk assessments to address factors such as navigating dark and tight corners.

The project also involved total station measurements, which enabled the creation of coordinates and the alignment of the factory with its intended location. Thus, the new point cloud data aligned correctly with the previously established design model.

"Total station measurements can be thought of as the backbone, and the point cloud forms around it during scanning. Total station work is demanding because it involves a delicate device influenced by various factors such as temperature fluctuations and vibrations. There's no room for errors as we need millimeter-level accuracy across a large area to generate precise point cloud data," emphasizes Laitinen.

Designers empowered with a browser-based service

Elomatic provides customers with the point cloud data generated through scanning. For mobile scanning customers, Elomatic also offers a browser-based cloud service application, iReality3D. In this way, the persons selected by the customer can view the generated data, make their own notes, and download point clouds.

"Point cloud files are exceptionally large and occupy a considerable amount of space on network drives. With our cloud service, designers can access data even on their mobile devices. Navigation within the service is possible within the 3D point cloud or through 360-degree photo views captured by the device," adds Laitinen.

How does a point cloud form during scanning?

A point cloud is created during scanning when the scanner's SLAM (Simultaneous Localization and Mapping) sensors rapidly measure millions of data points within the environment while simultaneously tracking the scanner's position. Each point receives its own set of coordinates in a three-dimensional coordinate system, providing x, y, and z values. As hundreds of millions of points accumulate, a highly accurate representation of the environment emerges, allowing for the identification of features such as the location and dimensions of load-bearing structures.

> **❚❚ Elomatic was the only one in Finland offering mobile scanning to us. We saved significant sums.**

Successful outcome

Laitinen expressed satisfaction with her team's results in Kemi, stating that each team member excelled in their respective areas. She also praised Infinited Fiber Company for their excellent cooperation and said that it is by no means a given that the customer is easily reachable.

Reivonen was also pleased with the outcome.

"It was evident that Elomatic's scanning team consists of highly skilled professionals. Additionally, having access to a more detailed point cloud dataset and the iReality3D service, which provides a more realistic view, proved beneficial. Both are essential at different stages of the design process."

Mobile scanning still uncommon in Finland

Elomatic has been using mobile scanning technology since 2021.

"There aren't many players like us in Finland yet. We can produce data much faster, resulting in cost savings," explains Laitinen.

"Elomatic was the only one in Finland offering mobile scanning to us. Fortunately, based on our trust in their expertise, we knew the service would be of high quality. We saved significant sums," Reivonen adds.

Elomatic's experts also contributed to the project by providing device design. According to Reivonen, this was highly valuable.

"It's beneficial when the measurement team understands what designers need from the data." ◣

What happens when gray and green merge?

In the new era, sustainability and technological development go hand in hand

Throughout history, technological innovations have marked significant milestones, but today, we face perhaps the greatest challenge and opportunity of all: combining sustainable development with technological progress. These two realms – the green and the gray – are often treated and managed as separate domains, although combining them can set us on a path towards growth.

Text: Jani Moisala
Images: Elomatic, iStock

Industry stands at the crossroads of its era, and significant decisions must be made to move towards innovation and growth. Alternatively, competitiveness may decline, leading to stagnation. Companies that can unite the forces of sustainability and technology stand to gain substantial competitive advantages. New technologies can help businesses reduce resource consumption, improve energy efficiency, and create entirely new business models.

Key drivers of industrial transformation are exceptional

In retrospect, one can observe a pattern where technological breakthroughs have led to significant societal changes. The invention of the steam engine ushered in the Industrial Revolution, the proliferation of electricity revolutionized production systems, and the rise of information technology digitized processes and methods. Each of these transformative forces has not only affected how products are manufactured but also how societies and economies function.

Today's transformative forces extend beyond technology. Sustainability has emerged at the forefront of industry, profoundly impacting companies' reputations and end products. Environmental protection, social responsibility, and economic sustainability are becoming integrated into the values and strategies of industrial firms.

It is crucial to understand that industry is not isolated but interacts with the global economy, politics, and societal movements. Recognizing and comprehending these key transformative forces is paramount to building a sustainable and prosperous future.

The role of industry in sustainable development

Sustainability is now key to success in global markets. The three pillars of sustainability – ecological, social, and economic – significantly influence how industrial companies define their success and where they invest. Balancing and integrating these pillars is challenging but necessary.

Ecological sustainability directly relates to preserving our planet's resources. Industry bears a significant responsibility for global carbon emissions, and therefore, it must lead the search for solutions. Energy efficiency, the adoption of renewable energy sources, and the application of circular economy principles are examples of how industry can reduce its environmental footprint.

Companies are also investing in social and economic sustainability

Social sustainability focuses on people: employees, consumers, and the communities in which industry operates. This entails safe working conditions, fair wages, and opportunities for personal development within and outside the company. Today, social responsibility for businesses is emphasized more than ever, driven by the expectations of consumers, investors, and regulators.

Economic sustainability is a complex matter, but at its core, it is about creating long-term value for the company and its stakeholders. This involves investments in new technology, expertise, and innovation, as well as risk management and readiness for future challenges.

> **❚❚ It is crucial to understand that industry is not isolated but interacts with the global economy, politics, and societal movements.**

> **Sustainability should no longer be viewed solely as an environmentally friendly endeavor; it is usually economically profitable as well.**

Technology continues its rapid evolution

As sustainability requirements grow, technological development shows no signs of slowing down but continues at a brisk pace. Digitalization has already deeply affected industrial structures and practices, and it is clear that its rapid development will continue to reshape the industrial landscape. Digitalization also offers opportunities to simultaneously achieve ecological and economic benefits.

Artificial intelligence and machine learning enable the rapid analysis of increasingly complex datasets, helping companies predict future trends, demand, and risks. This, in turn, leads to better decision-making, cost-efficiency, and innovation. To remain competitive and sustainable, companies must embrace these new technologies and integrate them into their operations.

Towards automation

Many industrial processes that once required immediate human involvement can now be automated and optimized through digital technologies. Automatic quality control systems, increased sensors, and data analysis have revolutionized production lines, making them more flexible, efficient, and reliable.

Autonomous operations extend beyond factories and production lines. For instance, in logistics, autonomy is becoming increasingly prevalent, resulting in more efficient transportation of materials and products while reducing environmental impacts. In the future, artificial intelligence, automation, and blockchain will enable more efficient and flexible processes.

The synergy between sustainable development and technologies

Sustainability should no longer be viewed solely as an environmentally friendly endeavor; it is usually economically profitable as well. Energy-efficient processes, waste-minimizing production lines, and circular economy practices can yield significant savings for companies. New technologies, in turn, facilitate the adoption and optimization of these sustainable solutions.

Real-time monitoring of emissions and waste by facilities enables companies to react quickly and efficiently. Artificial intelligence can analyze vast amounts of data, identifying ways to streamline processes while reducing resource consumption.

The integration of digitalization and sustainability also creates new business opportunities. For example, smart energy solutions or digital platforms for material sharing and recycling can open new markets and provide added value to customers.

We are living in an era of investment and innovation

Companies must be prepared to invest in new areas of expertise, technologies, and solutions to remain competitive and address the challenges of our time. Investments can take the form of direct financial investments or investments of time and expertise.

Companies can engage with development communities, gaining a better understanding, insights, and support while finding partners to assist them. Companies can also invest in enhancing their technological capabilities through research and development in various areas.

Innovation plays a vital role in this industrial transformation. New ideas, products, and services can open up markets, increase efficiency, and reduce environmental impact. Sustainable innovations can enhance a company's reputation and provide added value to stakeholders.

As a result, a stronger industry emerges

When sustainability and technological development combine, the result is not only a more responsible but also a stronger and more efficient industry. It is crucial to view investments as opportunities, as well-targeted investments can yield significant returns in the long term, strengthening a company's position in the market.

Of course, every change comes with its challenges. Companies must invest in new technologies and train their workforce to use them. Additionally, data security and privacy must be considered as companies increasingly move their operations to the cloud. Collaboration with stakeholders, whether suppliers, customers, or government representatives, is essential to ensure that technological solutions become sustainable and efficient.

Sustainability must be deeply integrated into technological solutions, and industrial decision-makers should recognize these opportunities and adapt their thinking and strategies accordingly. Only then can companies be part of the solution, not the problem. ◣

Jani Moisala
B.Sc.

Jani bridges the gap between business and technology. As the Director of Cooperation and Opportunities, he focuses on networking, connecting individuals and creating new business. His expertise is evident in evolving technical business landscapes.
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How can companies prepare for significant change?

If a company wants to remain competitive in a rapidly changing environment, it must prepare for future changes. Preparation involves more than just making technological investments; it also encompasses developing expertise, adapting corporate culture, and, above all, creating a vision for where the company is headed.

1. The first step in implementing change is recognizing what is changing and why. This requires continuous monitoring of markets, technology, and customer behavior, as well as scenario planning. The company must also actively listen to its employees, customers, and other stakeholders to gain a comprehensive understanding of its business environment.

2. Developing expertise is one of the most critical factors for successful change. Embracing new practices and technologies often requires acquiring new skills and attitudes. This applies not only to technical staff but also to management and other key personnel.

3. Adapting corporate culture can be challenging but is essential. Culture defines how a company operates, makes decisions, and responds to changes. The company must foster a culture that encourages innovation, risk-taking, and continuous learning.

4. Last but not least, a company needs a clear vision of its future. This vision guides decision-making, investments, and strategic direction. Without a clear vision, a company may lose its way and competitiveness.

A New Era in Maritime Maintenance Management

Navigating Elomatic's Manta APM

Text: Nico Lehtinen
Images: Elomatic, iStock

In the journey towards green shipping, energy efficiency and decarbonization continue to stand out as critical factors. To ensure the maritime industry plays its part in achieving sustainability and complies with IMO and EU rules and regulations, efficient maintenance management is imperative. Elomatic has taken a significant step forward with the development of Manta Asset Performance Management (APM) system, which promises tools to improve operational efficiency, reduce downtime, and enhance sustainability.

The maritime industry is facing significant challenges. It is clear that both the European Union and the IMO on a global scale are deeply committed to environmental protection, making decarbonization a top priority. In the aftermath of MEPC80, international benchmarks have been established, following EU's lead in creating a strong regulatory framework and ambitious environmental goals with the maritime industry now striving to achieve a 20% reduction in all greenhouse gas (GHG) emissions by 2030, 70% reduction by 2040 and Net-Zero by 2050.

The exposure to these regulations, carbon pricing, and CII ratings will be essential commercial considerations for any ship owner or operator. They will need support in developing innovative and sustainable solutions to comply with tightening upcoming rules. In this evolving scenario, digital technologies such as asset performance management systems assume a pivotal role by facilitating the efficient use of resources, lowering emissions, and consequently boosting the competitiveness of shipping companies.

Optimizing existing assets

Ships and vessels require regular upkeep and maintenance to run efficiently. For shipping operators, the safety of the lives and cargo onboard as well as the security of their assets are critical. A shipping company can incur significant losses if the ship has an unexpected breakdown, therefore, there is simply no room for error when it comes to ship maintenance and repair.

This is where the value of APM systems becomes evident, serving as vital tools for improving transparency to ship's operations enhancing safety, reducing costs, and supporting sustainability initiatives. These types of systems enable shipping companies to operate more effectively in a highly competitive and regulated industry while also reducing their environmental impact.

Furthermore, it is widely recognized that a significant portion of the decarbonization efforts in the coming decade will stem from optimizing vessel's existing assets. Optimizing route planning and voyages could potentially reduce energy consumption by around 8%, while optimizing maintenance activities with the support of an APM system such as Manta could achieve approximately 2% savings, if not more. Though these percentages may seem insignificant, they are not. Every improvement counts. Over the course of a decade, the most significant savings and impacts are expected to come from advancements in technology and infrastructure, like synthetic fuels, biofuels, and ship upgrades.

Enabling full control of vessels

As ships grow in complexity, the data they generate becomes increasingly challenging to manage, making sustained investment in software engineering crucial. What is even more significant from Elomatic's perspective is providing tools to measure the impact of investments in new technology and compare results across different operating styles, utilizing fleet-wide data, as we do. This key objective is to empower shipowners and operators to maintain full control of their vessels and continuously optimize their performance.

There are several key factors we need to take into account when considering investment in asset performance management systems:

> ❚❚ **It is widely recognized that a significant portion of the decarbonization efforts in the coming decade will stem from optimizing vessel's existing assets.**

- **Efficient Maintenance Management:** APM streamlines the maintenance and repair processes for ships. It helps in the planning, scheduling, and tracking of maintenance tasks including dry-docking, ensuring that critical components and systems are in optimal condition. This efficiency is vital for reducing downtime and avoiding costly breakdowns at sea.
- **Cost Reduction:** By optimizing maintenance activities, APM can help shipping companies reduce operational costs. It enables proactive maintenance, preventing the need for expensive emergency repairs and overhauls. This, in turn, contributes to cost savings.
- **Safety and Compliance:** Ensuring the safety of crew members and compliance with maritime regulations are top priorities for the shipping industry. Modern software technologies can simplify the inspection processes with classification societies, reducing unnecessary pauses across the operation and improving safety through continuous asset monitoring.
- **Asset Lifecycle Management:** APM assists in tracking the lifespan of ship components and equipment. It helps companies make informed decisions about repair, refurbishment, or replacement, optimizing the lifespan of assets and reducing waste.

Taking all of this into account, Elomatic has been working on the development of Manta APM, a ground-breaking system which was developed in collaboration with the expert software company, Silo AI and with the support of DNV and Bureau Veritas, among other stakeholders. Our aim with this software is to revolutionize technical operations across the maritime sector.

Minimizing downtime and breakdowns

Downtime and breakdowns within the marine industry translate into significant losses of time, money, and operational resources – an outcome that is imperative to prevent. Through collaborative efforts with industry stakeholders and a deep understanding of the critical challenges faced at each operational stage, the development of Manta APM has made significant progress. These insights have underscored the importance of embracing a proactive approach to asset maintenance.

For instance, the software collects and analyses data from across multiple systems identifying irregularities and problems before they develop into serious failures. This comprehensive data collection enables us to make highly precise predictions about potential ship breakdowns and schedule maintenance proactively. When breakdowns occur during a voyage, they can lead to delays due to repairs or the high expenses associated with acquiring spare parts in ports lacking established suppliers. Predictive maintenance offers early warnings to ship staff about failing machinery, allowing them to take proactive measures well in advance.

> **❚❚ Predictive maintenance offers early warnings to ship staff about failing machinery, allowing them to take proactive measures well in advance.**

What makes Manta APM unique?

Manta stands out from other similar APMs because it combines Elomatic's engineering expertise with the additional services we offer, from life cycle support and consultancy to design and project management. Our strong engineering background brings a unique perspective to the software, ensuring that it is tailored to the specific needs and challenges of the industry. The emphasis on user experience and data integration is paramount, aligning with our commitment to supporting emissions reduction efforts.

Ease of use is a key advantage of Manta APM. The design of the platform allows easy data input and management, making it accessible to a wide range of users, including employees both on ships and onshore. Therefore, both onshore users and chief engineers onboard can benefit from the data in the same way. They can analyze the entire fleet, make informed investment decisions, plan dry dockings more accurately, and have a better understanding of the ship's technical operations.

Modularity is another highlight of Manta APM, which offer customers the flexibility to only purchase the modules that are necessary for their specific needs. This approach ensures that the software can be easily tailored to match the unique requirements of each customer.

Future plans

Manta APM represents a significant step forward in maritime maintenance management. Its development will be rolled out in two phases. Phase 1 focused heavily on software development and is set to culminate with the launch of Manta by the end of 2023. Phase 2 will concentrate on improving data analysis, enhancing existing features, and conducting software testing in collaboration with partners.

The development of an innovative solutions such as Manta APM seamlessly integrates Elomatic Marine's digital services and aligns with our ambition to minimize the environmental impact and operating costs of shipping, whilst expanding the customer base, encompassing both shipyards and ship owners. We are continuously developing the product in order to better serve shipowner and operator customers in their technical, environmental, and operational challenges.

This is Elomatic's most ambitious software development venture to date, driven by the collaborative efforts of team members from Canada and Finland. Looking ahead, we envision expanding the digital platform beyond the marine sector and extending its functionality to other business units across the company. We are committed to top engineering, knowledge sharing, and digital innovation as we transition to a more sustainable future.

Accelerating sustainable shipping

Through the optimization of assets, Manta APM will ensure the reliability and efficiency of shipping operations, enhancing shipping companies' competitiveness and cost efficiency. When integrated with broader digitalization initiatives, it will empower key players from across the industry to make data-driven decisions that can result in reduced emissions, improved energy efficiency, and ultimately, a more sustainable and environmentally friendly shipping sector.

Through this software, we are continuing to support the industry's efforts to mitigate climate change and create a greener future. ◢

Nico Lehtinen
Master of Science in Technology

Nico has extensive experience in the marine industry and shipyards. He possesses expertise in various areas, including operational planning, production management, IT development projects, and project management. Currently, Nico works as the Head of the Digital Transformation Office.

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What do you think are the most fascinating opportunities of digitalization in your field?

Guido Schulte | **Managing Director** | Marine & Offshore Energy

There is an ocean of opportunities, and it is hard to choose a few. Nonetheless, years of experience in shipyards have revealed that most of the challenges occur in orchestrating the teams and managing the respective data and information flows accurately and appropriately. In my opinion, digitalization is mainly about helping people to focus on doing the important things better and more quickly.

Large ship design projects are extremely data-intensive, more so than in any other industry. Information originates from thousands of sources, in various formats and maturity levels, often from teams spread across the globe and across multiple time zones. Administrating this vast amount of data poses significant challenges and strains managers, design planners and engineers alike.

This is where smart digitalization can make a huge difference by introducing powerful Product Data Management (PDM/PLM) systems, tailored to the relevant business workflows and integrated into Computer-Aided Design (CAD) and Enterprise Resource Planning (ERP).

Digitalization can also address the challenge of orchestrating the collaborative engineering process and seamlessly integrating it with procurement. The main objective is to ensure that every stakeholder understands their role, allowing for synchronized efforts across all disciplines. With our new digitalized process landscape tool all stakeholders gain deep insights into the design process through a comprehensive visual management overview. This promises significant gains in productivity and cost efficiency.

Kaisa Tuomilehto | **Design Manager** | Automation systems

At this point, I see that Artificial Intelligence (AI) offers the most fascinating opportunities in my field. It provides opportunities to create more intelligent automation systems than ever before, and I believe that it will be a game changer in the green transition.

In the near future, AI will be utilized in the design of industrial automation solutions and it will become an integral part of delivered automation and IT systems. With real-time data analysis and machine learning, these systems can self-optimize, adjusting parameters to changing conditions. This enables industries to achieve maximum output with energy-efficient processes while minimizing environmental impacts. Self-optimized adaptability also increases the longevity and effectiveness of automation solutions.

Furthermore, AI-driven simulations can provide a virtual sandbox for automation engineers to test and refine designs in a more efficient way. This not only saves costs but also allows for more thorough testing, resulting in more reliable systems. AI will be an invaluable tool for engineers in their mission to reshape industries through automation.

Increasing opportunities also come with increasing responsibility. While AI can offer tremendous benefits, it must be used with care and accompanied by robust quality control measures to ensure that its outcomes meet the desired standards of accuracy, fairness, and ethical conduct.

Kaj Rosing | **Portfolio Manager** | Pharma

Digitalization offers numerous fascinating opportunities in the pharmaceutical sector, with the potential to revolutionize drug development, manufacturing, patient care, and overall industry efficiency. Some of the most compelling prospects include:

- AI-driven drug discovery: Accelerating research and repurposing existing drugs.
- Personalized medicine: Tailoring treatments to individual needs with genomics and data.
- Smart manufacturing and supply chain optimization: Enhancing production and distribution.
- Telemedicine and remote monitoring: Improving patient care, aided by AI for drug safety monitoring.
- Patient engagement and adherence: Benefitting from mHealth tools.
- Blockchain: Bolstering regulatory compliance.

We at Elomatic, find the most interesting opportunities in manufacturing and supply chain optimization, along with enhancing supply chain visibility. Implementing Industry 4.0 concepts, including IoT sensors, data analytics, and automation, can elevate efficiency, bolster quality control, and ensure compliance. Real-time supply chain monitoring yields tangible benefits, such as reducing drug shortages, optimizing inventory management, and safeguarding product integrity.

While these opportunities are exciting, they come with their own set of challenges. Digitalization brings with it data privacy concerns, regulatory hurdles, and the need for workforce upskilling. Nevertheless, embracing it has the potential to improve patient outcomes, reduce costs, and drive innovation in drug development and healthcare delivery.

We design solutions that increase the wellbeing of people and the environment.

ELOMATIC

Visions of Tomorrow, Engineered Today