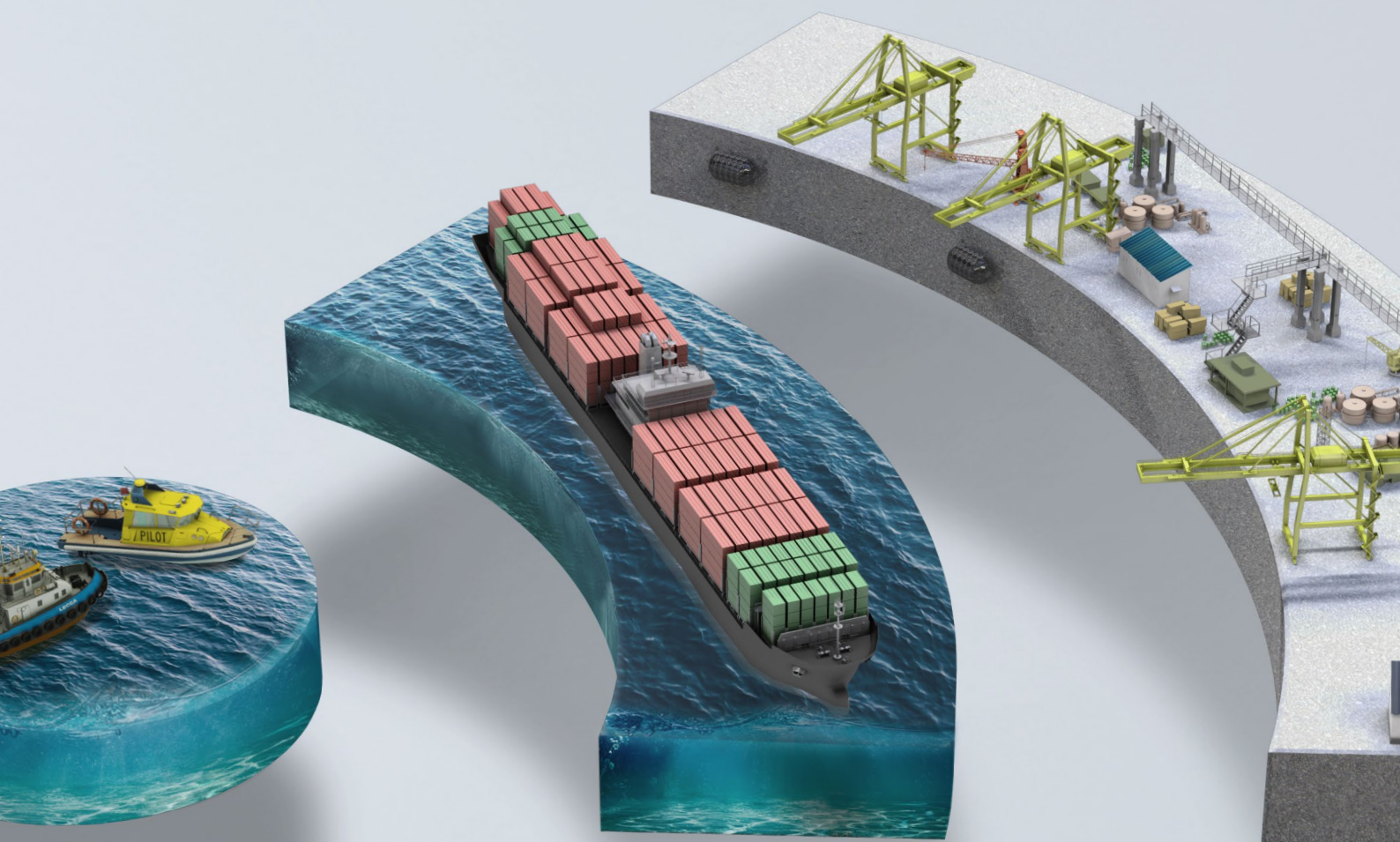


# Preparing for the Port of the Future



# Introduction

**Preparing for the Port of the Future discusses the opportunities available to marine industry stakeholders through ‘smart’ technologies, process automation, and the capture, analysis and effective utilization of Big Data.**

The shipping industry is at a crossroads in its evolution. Traditionally so conservative, the sector can ill afford to continue to ignore the advances of technology. Increasingly digitally driven infrastructure, data capture and analysis and equipment automation present an opportunity for stakeholders to get smart and evolve competitively.

Trelleborg set out to discover the current state of play in ports and terminals, to assess just how digitally mature the industry is now, how far we are from the Port of the Future ‘vision’, and what we need to do to make the vision a reality.

This report discusses the potential future of shipping, through an interview with renowned Futurist, Gerd Leonhard, one of Wired magazine’s top 100 most influential people of 2015.

It is also informed by the results of an industry wide survey, which was carried out by Trelleborg in the third quarter of 2016. The survey was intended to understand the current level of digital maturity in the marine industry.

Calling on the views of global port, terminal and shipping stakeholders, we’ve explored the evolution of digital technologies in ports, and stakeholder perspectives on whether we are really doing enough to prepare for the Port of the Future, and importantly, the data capture and sharing that will enable it.

## **CHAPTERS:**

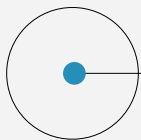
# The state of play

## RHETORIC > REAL ACTION

Broadly speaking, ports and terminals are talking the talk on automation and Big Data, but not acting to embrace either. There's a real understanding of the significance and opportunities of these new technologies.

Data will become the new business currency: ports, terminals and vessels alike should be gathering data now, to analyze and act upon to be best placed for the future.

However, there is seemingly no rush to do so.



**92%** of ports and terminal respondents think Big Data will somewhat or significantly impact the shipping industry

## HESITATION > EVOLUTION

Despite understanding the benefits of automation and digitization, there seems to be an element of hesitation in ports and terminals.

**Only 29%** of those surveyed electronically track and standardize data on pilot performance and adherence to approach routes.

**Almost 80%** track time at berth. However, less than 30% monitor mooring line tension and even fewer (16%) collect data on fender loads.

Data currently being collected by ports and terminals is really only the bare minimum in understanding the status of vessel and berth. To glean real insight into real time conditions and support decision making, more in depth insights are required.



## PORTS > VESSELS

There is disconnect between the digital maturity of ports and terminals and the factors that shipping lines feel are important. For example, only 21% of ports and terminals have insight into speed and angle of berthing, but 75% of vessel stakeholders surveyed consider this information essential to safe operations.

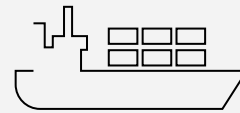
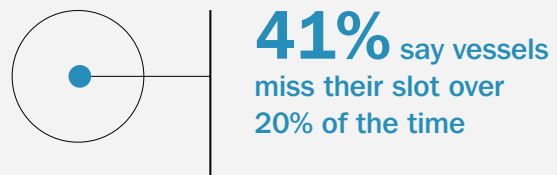
This suggests that, although the use of digital technologies in landside operations have matured considerably in recent years, facilities haven't been as quickly upgraded on the jetty side: optimizing port approach and vessel turnaround through automation still holds the promise of major efficiency gains for port owners and operators, and shipping lines alike.

Only 36% of ports and terminals claim to have seen increased pressure from shipping lines in terms of the importance placed on automation. But, the data certainly suggests that the shipping lines are beginning to value new technologies. In fact, half of the vessel stakeholders surveyed feel that port and terminals are immature in the implementation of Smart technologies, and lagging behind the technology available.

From container terminals, to LNG, to bulk, the industry as a whole will benefit from ensuring optimum alignment and optimized throughput. For example, the ability to use GPS data to align manifolds and vacuum mooring systems on bulk liquid vessels and terminals (oil, LNG, food, oils, chemicals) would save valuable time, and also be beneficial when the industry starts to look at autonomous or remote guided vessels.

# Inefficiency reigns

A current lack of data capture – and lack of standardization of available data – inhibits efficiency. As evidenced by how many vessels miss their slots, and how much time is wasted.

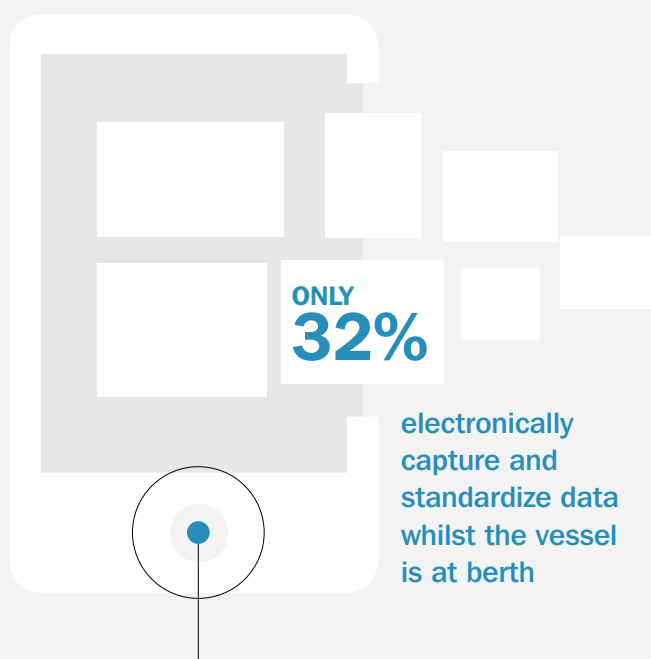


The amount of lost time and productivity evidenced is staggering and especially worrisome against the backdrop of an industry that is facing pressure to become more competitive.

Sustainability is another critical concern. We are seeing huge efforts to reduce emissions both within ports and at sea. It's important, then, that facilities do more to slash vessel idling times and reduce carbon footprints. Smart technologies, when implemented cohesively across port approach, berthing and departure could elicit huge efficiencies for ports and play an important role in creating a more sustainable environmental future for the industry.

What's more, shipping lines will begin to demand more precise scheduling and seamless turnaround in order to meet increasingly stringent emissions targets and reduce fuel costs: ports must be able to deliver on this front to compete.

The lack of data may mean port operators are failing to understand the root cause of delays, unable to clearly define problems and therefore solutions they need to find. It also means ports and terminals run the risk of unnecessary human error issues and lack of transparency if there is an incident.



Acting now to make existing unstructured data useful may be an effective first step for ports and terminals. The standardization and analysis of data will be critical to future competition. Ultimately, this will mean automated collection, analysis and action. For now, standardizing what's already available is an essential first step: that means starting to audit, digitize and normalize metrics and formats.

## Technology and its benefits

The ultimate intention when introducing smart technologies is to inform decision making, refine processes and produce better results than existed before. With this in mind, port and terminal stakeholders were asked whether they store vessel data to inform future berthing scenarios.

### 24% automatically store vessel data and proactively analyze it to inform future decision making

---

There is a huge degree of variation across industry. Whilst the fact that almost a quarter do so is encouraging, this practice is potentially only happening at more digitally mature ports. In this example of smart data use, there are still many stakeholders that have the opportunity to better use technology to elicit efficiencies.

As well as optimizing efficiency, there are opportunities to address environmental concerns, improve safety, enhance decision making and refine maintenance through automation and data collection. It's interesting that so few see environmental value in automation. By refining schedules, a facility can reduce idle waiting time and its carbon footprint.

As shipping operators seek to meet emissions targets and ultimately reduce their own fuel consumption and costs, those that can truly deliver efficiency across the entire port environment – from the moment the vessel approaches to its departure – will be best placed to compete.

Automation in vessel turnaround must evolve to keep pace with the digital maturity we're already beginning to see emerge on the landside. Ultimately, the entire port environment must be aligned and connected to ensure seamless, optimized operations. Considering the opportunities of automation from vessel approach will enable maximum efficiencies, cost savings, safety and sustainability for port operators and shipping lines alike.

# The mood of the industry

There's a subdued atmosphere in the industry at the moment. Years of overinvestment and subsequent overcapacity are coming back to haunt shipping lines. According to Drewry, the industry is expected to lose \$5 billion this year. This, of course, has a knock-on effect for ports and terminals.

Great pressure to reduce costs will lead to further consolidation in the industry, which we are already beginning to see with alliances between shipping lines. In turn, these powerful alliances are putting increasing pressure on ports to invest in new and upgraded infrastructure, and increasing competition between ports, as shipping lines use their considerable power to push for ever more favorable conditions.

Megaships also create a need for expanded infrastructure to handle peak volume: meaning more investment for ports, which shipping lines are not prepared to bear.

On the challenges facing port operators due to new mega-containerships, APM Terminals' chief executive Kim Fejfer said the need for change in the port sector "has been more pronounced in the past two years than in the past twenty".

In addition, shipping lines and terminals alike face pressure from authorities to reduce carbon emissions. In such a context, efficiency gain and value creation should be top of the agenda for everyone in the ecosystem.

Whilst ports and shippers are starting to recognize the importance of digitization and Big Data to improve operations, there are relatively few looking at the big picture and developing a strategy to harness the full benefits available.



**...even the mega-ports are often powerless against mega-carriers; so imagine the power that carriers can exert vis-à-vis mid-sized ports that are really dependent on just one carrier or alliance.**

The Iron Grip of Container Lines on Ports,  
**Olaf Merk**

# The endless opportunities

To see how the industry might change over the coming decade, Trelleborg interviewed Futurist Gerd Leonhard to find out his perspective. Here are his predictions.

Gerd anticipates huge changes throughout logistics and infrastructure in the industry over the next decade. Sweeping, global changes that will have big impacts on both the goods we transport, and how we transport them.

## DISRUPTION DUE

In fact, he states that it's 'completely obvious' that logistics in shipping – and the areas around it – are ripe for disruption. And not from the players you would expect. No longer the domain of big shipping companies: disruption will come from start-ups and big technology companies. It's easy to see how this is already happening when one considers Amazon, and how far the company is on the way to owning its own logistics operation. Similarly, the announcement that Maersk is teaming up with Chinese company Alibaba to allow customers to reserve spaces on its vessels shows that this change is already happening within the shipping industry.

Disruption will come from non-traditional players: those that understand data and smart technologies, rather than the 'old' shipping business model.

## SMART PORTS FOR SMART CITIES

Moving forward, 'smart' ports will form integral parts of 'smart' cities. The port will be a critical part of a city's holistic infrastructure and eco-system, driven by Big Data and Artificial Intelligence. Human decision making will be limited to creative, emotional and political issues, as more routine tasks are increasingly automated away.

Relationships between ports themselves will also change. Whilst ports currently operate as separate businesses, they will begin to collaborate. The future isn't about doing one thing best, it's about connecting to others that are leading in adjacent and relevant fields. This will mean a more flexible approach to partnerships with clients, other suppliers, competitors and start-ups: who will be the competitors of the future.

**Gerd Leonhard,**  
Futurist



## COLLABORATION WILL BE KEY

This idea of hyper-collaboration is going to be critical. Individual organizations will need to look outwards to new sources to gain the skills they need. For example, shipping companies making deals with telecoms companies to best utilize data and enhance it for efficiency. Shipping companies will have to collaborate with others in order to make themselves indispensable, otherwise they will quickly be dispensed of. It's what Gerd calls Digital Darwinism, and technology is making it possible to identify the weak species.

There will also be a drastic change in the shipping business model, with shipping lines and terminals becoming part of one logistical platform. This will necessitate a Shipping OS, whereby all stakeholders can upload their data to a common platform, and access each other's. This shipping OS will form the bedrock of the hyper-collaborative structure and, as such, data collection and access will be as important as data ownership.

## FUTURE LEGISLATION

There will be common languages and platforms, which will require standards and compatibility that we can't legislate for yet. Stakeholders will share and trade data, gaining more value from the data they receive from others than they could glean from their own, siloed information.

At the same time, technology will increasingly propel ports around the world towards a Port of the Future model. These smart ports will be hugely more efficient and sustainable, with emissions, noise and waste all reduced. Sustainability will continue to be a critical consideration. In fact, its importance will only grow. Positively, there will be abundant and cheap clean energy in the form of solar power, to power facilities and vessels whilst reducing emissions. The current pollution factor in shipping is not sustainable, in terms of pricing, cost or regulation.

## BREAKING BARRIERS

Whilst technology is the driving force and the enabler, it is also the current barrier to change. Tools and processes are increasingly mature, but not to the extent that a fully-fledged drive towards the Port of the Future vision is yet possible.

There are infrastructure issues and computing limitations to be solved. However, once these are overcome – which Gerd predicts will be within the next three to eight years – the connectivity and storage will be available to really propel forward.

Specifically, those issues are gaining greater connectivity in remote areas (at sea) through better satellite coverage, faster connectivity (above and beyond 5G, 6G), and cloud storage capacity, which needs to improve massively since one ship will use one gigabyte of data per minute.

It seems a lot to overcome to begin to implement the Port of the Future ideal. However, if all this is available within the next three to eight years, that's not long to wait for a real sea change.

And there will be a real sea change, to business models, logistics and infrastructure. If you're in the shipping business, you're about to get into the technology business.

- **Digitization**
- **Mobilization**
- **Screenification**
- **Disintermediation**
- **Automation**
- **Intelligization**
- **Anticipation**
- **Virtualization**
- **Robotization**
- **Humanization**



# The gap to bridge

Encouragingly, the survey showed that vessel and port and terminal stakeholders alike agree on the importance of Big Data. However, the current state of play is significantly bleaker, with rhetoric in danger of outweighing action.

A gulf is emerging between where progressive stakeholders know they need to be, and where the industry actually is.

How will we bridge that gap? There are plenty of practical steps that ports and terminals should take now to both optimize current operations and gear up for the future.

## **Louis van Schel, Secretary General at PIANC explains:**

---

“For the World Association for Waterborne Transport Infrastructure, or PIANC, the future is about acquired technologies on the one hand, and new insights and challenges on the other. From e-navigation on inland waterways using River Information Systems (RIS) and remote controlled locks and bridges, to intermodal platforms with integrated logistics management systems: a permanent evolution that reduces environmental impact is already happening.”

“Maritime navigation remains a key source of transport between continents and as such also faces the inevitable electronic revolution and its consequences. New technologies aimed at reducing port waiting times are being developed

and installed, both landside and shipside, in areas such as ship loading and off-loading, yard handling, customs clearance, cargo off-take capacity and hinterland connections.”

“Real-time measuring is a booming business resulting in better support and increased accessibility for ships, for example where (UKC) Under Keel Clearance is concerned. The use of (ECDIS) Electronic Chart Display and Information System will become mandatory very soon through the IMO and this will have a positive impact. However, ever growing ICT involvement requires a cyber risk management strategy too, as stated by the IMO and its (MSC) Maritime Security Committee) and in compliance with the ISPS-code.”

“On top of all this, environmental issues are very important. The environmental footprint of ships and handling, as well as of all material and equipment used in the port sector, must be as low as possible. This needs to be emphasized when designing, producing and maintaining port oriented equipment. Smart solutions will definitely help to reduce costs, both CAPEX and OPEX. Reduced waiting times will lower GHG emissions, while use of alternative fuels, such as LNG, and developments such as cold ironing and onshore power supply will all help to minimize negative environmental impacts. Where possible PIANC intends to continue to be the world leader in drafting guidelines and recommendations which will help our industry realize these goals.”



**Maritime navigation remains a key source of transport between continents and as such also faces the inevitable electronic revolution and its consequences.**

**Louis van Schel,**  
Secretary General  
at PIANC

# Concluding thoughts

Whilst stakeholders individually recognize change is coming, as a market overall, insignificant headway has been made. Perhaps the scale of the anticipated change is daunting, leading to inertia. There appears to be disconnect between how digitally mature ports and terminals perceive themselves to be, and how they are perceived by shipping lines.

Hyper-collaboration will be an important factor in bringing together the views – and data – of both parties, to share insights and drive up efficiency across the industry.

There is huge opportunity within shipping for ports and terminals that have a progressive attitude and take a proactive approach to evolving their infrastructure.

Whilst many of the themes and ideas that Gerd cites seem far flung when considered in the context of today, there are only relatively small barriers in place to them becoming a reality. New partnerships and collaborations are already emerging that will significantly change how the industry operates. The market is ripe for disruption, traditional players must evolve now to ensure they don't get blown out of the water.

Facilities that take practical steps towards automation now will ultimately be best placed in the future. In practice, this means increasingly looking towards automating processes, to reduce human error and refine scheduling, and looking for new opportunities to capture data and build robust datasets.

Much of this data will be gathered from processes and equipment that are already in place. It's about gaining insight into how efficiently the port ecosystem is running, and then identifying areas for improvement. And there's no reason not to start that process now.

Key to success will be taking small steps in specific areas, with the support of a trusted partner who has the data enabled products, technologies and infrastructure to enhance specific port operations for maximum efficiency.

SmartPort



At Trelleborg, we're evolving our business model by building on our current core competencies – from vessel approach, through docking, mooring, transfer and departure – so that we're best placed to support the Port of the Future. We call this SmartPort.

SmartPort uses the latest in data powered marine technology to connect assets, collect data and provide insights that support ports and terminals in their drive towards the Port of the Future vision.



Trelleborg is a world leader in engineered polymer solutions that seal, damp and protect critical applications in demanding environments. Its innovative solutions accelerate performance for customers in a sustainable way.

[WWW.TRELLEBORG.COM/MARINEANDINFRASTRUCTURE](http://WWW.TRELLEBORG.COM/MARINEANDINFRASTRUCTURE)



facebook: [TrelleborgMarineandInfrastructure](https://www.facebook.com/TrelleborgMarineandInfrastructure)  
twitter: [@TrelleborgMI](https://twitter.com/TrelleborgMI)  
[youtube.com/user/TrelleborgMarineandInfrastructure](https://youtube.com/user/TrelleborgMarineandInfrastructure)  
[flickr.com/people/marineandinfrastructure](https://www.flickr.com/people/marineandinfrastructure)  
[linkedin.com/company/trelleborg-marine-and-infrastructure](https://www.linkedin.com/company/trelleborg-marine-and-infrastructure)  
[Thesmartapproachblog.trelleborg.com](http://Thesmartapproachblog.trelleborg.com)