Driving forces and new paradigms: efficiency in container shipping


Oscar Pernia, *Director of Product Management (Automation), Navis, San Francisco, California, USA*
Manuel Perez, *Director of Product Management (Engineering), Xvela, San Francisco, California, USA*

Container shipping operations are changing and efficiency is now of paramount importance to both shipping lines and container terminal operators. Operational practices, tools and industry paradigms are being tested by fundamental forces at every turn. Because of this, shipping lines and container terminals are developing innovative ways to achieve more reliability, connectivity and integration. This is pushing out the current boundaries for efficiency and removing current beliefs of the container shipping industry as operating in the 'Stone Age'.

In the near future, container terminals, and ports in general, will operate more like airports in terms of real-time management and in terms of cost, risk and contingency management. With over 90% of all cargo being delivered across the world's oceans, it is a vital requirement to use technology to improve all shipping related processes and to create a 'pit-stop' engagement and culture between shipping lines and container terminals.

In this article, we will look at industry signals, operational strategies and key performance indicators (KPIs) that container terminals and shipping lines need to focus on; leading to an articulation of how cooperation and engagement between shipping lines and container terminals will become of critical importance.

Driving forces in the shipping industry

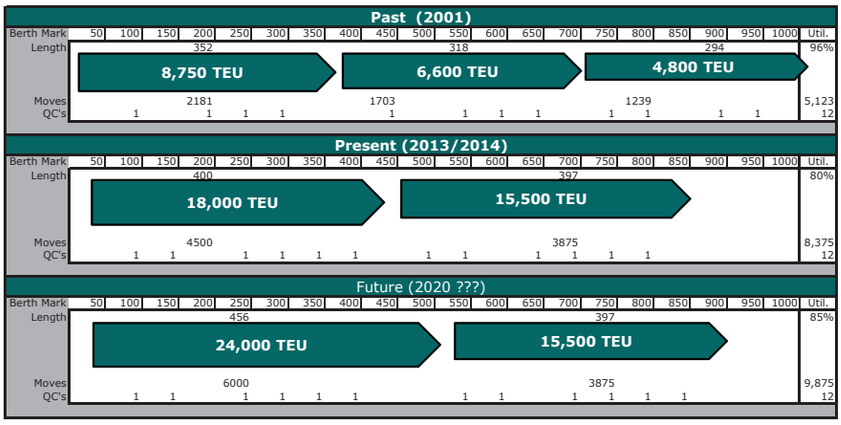
The following forces are testing current operational practices:

- **Globalisation:** Today, it is clear that we are facing a new economic reality. The consolidation of concepts such as economies of scale and 'just in time' production has opened a new framework for trade and logistics activities in general, and for container shipping in particular
- **Service excellence:** Shipping capacity is consolidating in order to optimise shipping costs and offer reliable 'door-to-door' services, within tight cost controls and delivery schedules
- **Operational Risk Management:** Increasing vessel size and capacity, tight cost controls and shipping line alliances are trends that we see continuing. These factors make it increasingly difficult for terminal operators to effectively manage their operational costs while meeting the demands of their customers
- **Sustainability:** Public pressure and demand for a 'green' and sustainable shipping industry will continue, pushing many sites to reduce energy consumption and pollution
- **Technology:** New paradigms for planning, monitoring, controlling and optimising shipping activities are today a reality with new tools and techniques that can be applied across all areas of the supply chain

From these industry signals, it is clear that there is a strong need for shipping lines and container terminals to collaborate and work together to improve the efficiencies both are striving for.

Increased competition for ports and terminals

Ports and container terminals now have to adapt to increasing competition. Quality of service is the determining factor to maintain and capture customers. The following are metrics that our industry is currently focused on achieving:



Source: Andy Lane

Driving Forces Effecting Operational Practices
Globalisation
Service Excellence
Operational Risk Management
Sustainability
Technology

Figure 1

- **Reducing vessel call time:** Terminals should achieve high performance and consistent quay crane productivity. The new mega-vessels are demanding performance above 40 container moves per hour per crane, and berth productivity of 300 container moves per hour in order to move these vessels quickly
- **Saving cost:** In order to reduce costs, shipping lines are building larger ships and making alliances with other lines. This trend is creating competition for ports and container terminals to reduce costs and improve operational efficiency and terminal capacity
- **Ensuring schedule reliability:** Today, terminals offer warranties in their contracts for berth windows. Also, shipping lines are aiming for a 'pit stop' engagement with container terminals across the whole vessel voyage and demanding flexibility to keep slow steaming strategies. There are currently no plans in the foreseeable future for the lines to speed up

- **Delivering full operational control:** Providing 100% real-time container traceability, and full control over the vessel voyage and 'pit-stop' plans. This will ensure delivery quality and performance via internal productivity and efficient operational procedures

Within today's highly global and highly competitive container shipping industry, most players have realised the value of investing in operational improvements. Of course, wherever investments are made on increasing capacity or performance, there must be an analysis of the returns. Operational risks and contingencies must be well managed.

A new reality

For the reasons above, the industry focus has turned to big data and business

Shipping Line & Container Terminal	
Shipping Lines	**Container Terminals**
Network Optimisation	Maximise Berth Productivity
Increase Rate & Vessel Utilisation	Maximise Equipment Performance
Minimise Port Stay	Maximise Yard Utilisation
Maximise Vessel Stowage Robustness for Sailing Conditions	Minimise Operating Expenses
Minimise Contingency Costs	Improve Annual Handling Capability

Figure 2

intelligence and how both of these can be used to analyse operations and improve decision making. Our industry has created meaningful and timely metrics that document real-world container shipping performance, and changes in the metrics can be tracked over time. Traditionally, there was a lack of connection between operational and profitability metrics, which was a huge problem for managing the trade-off between shipping line and container terminal interests.

Tools that support strategic, tactical and real-time decisions for shipping lines and container terminals must focus on the KPIs that we are trying to impact:

KPIs for shipping lines:

- **Network optimisation:** Reducing operational costs around bunker consumption, keeping slow steaming strategies and minimising terminal/port expenses
- **Increase rates and vessel utilisation:** Keep competitiveness in an 'overcapacity market', push performance through network optimisation, create more reliable schedules that are easier to execute
- **Minimise port stay:** As well as subsequent indicators around crane split, crane's make-span, over-stowage and stowage density
- **Maximise vessel stowage robustness for sailing conditions:** Special emphasis on lashing conditions, bottom space and reefer plugs
- **Minimise contingency costs:** Get the required flexibility to handle berthing window buffers and stowage planning changes

For container terminals:

- **Maximise berth productivity:** Vessel call sizes are rising and terminals need to boost productivity in order to accommodate more vessels in their congested berths
- **Maximise equipment performance:** Expensive investment in equipment needs to be compensated by cranes and vehicles performing with new levels of speed and efficiency
- **Maximise yard utilisation:** Terminal operators should focus on how they are utilising land, as well as optimising parameters, including dwell time or yard occupancy fundamentals
- **Minimise operational expenses:** Manage regional differences in stevedoring cost and smooth these costs to reach an overall target relating to profitability and business health
- **Improve annual handling capability (per area unit and per quay length unit):** Manage throughput relative to the area the terminal occupies, and monitor the level of activity in creating additional business

So, with these factors in mind, container shipping companies are changing their organisations to have a patient approach with a long-term perspective on process improvement. The expected benefits are fewer vessel delays, enhanced on-time performance, and reduction in lost revenue costs due to additional bunker fuel used to catch-up from a delay.

Our industry needs to set operational targets that go well beyond our current performance and we need to work together to meet these goals.

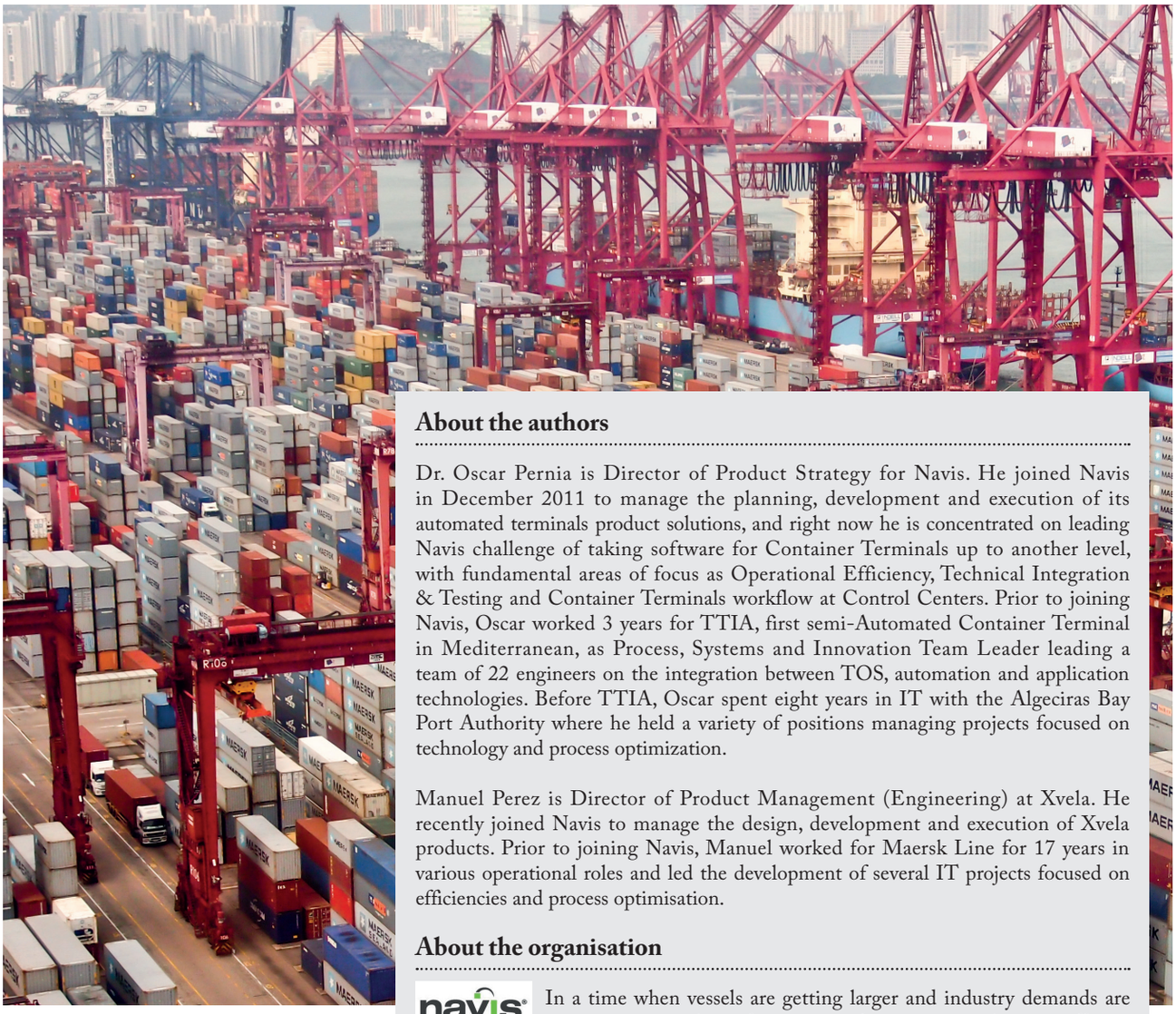
Shipping line and container terminal engagement

The way shipping lines and container terminals interact and cooperate with each other is improving and this removes the traditional barriers for efficiency. Some factors supporting the removal of those barriers include:

- Improved and more frequent data availability for shipping lines and container terminals. Real-time and accurate data coming from ships and cranes can be used to optimise important processes
- Joint planning centres enabling the shipping lines and container terminals to find the right trade-offs between capacity, performance and operational costs
- Improved capacity management and network cooperation enabling shipping lines and terminals the flexibility to handle berthing windows, related timing and capacity buffers, and to adapt to operational changes coming from schedule changes or emerging equipment demand changes

Conclusion

Just twenty years ago, this industry was planning vessels with stickers and manually monitoring terminal activities and container locations. Today is very different from a business and cultural perspective.



Only with a high level of intelligent operations will the industry:

- Control and reduce operational costs
- Decrease disruption from unplanned downtime
- Minimise port stay
- Improve processes
- Manage the greater industry complexity by managing a shared capacity through alliances
- Improve maintenance and uptime of container moving equipment

The ocean container shipping industry is looking for a much more effective and efficient way to utilise vessel and terminal equipment assets than the current practices allow. To increase operational efficiency means looking at next generation technologies that will enable the operations teams to utilise the strengths of vessel stowage tools, business intelligence tools, and operational performance data from the terminal operating systems and vessel operations to integrate and optimise ocean container shipping operations.

About the authors

Dr. Oscar Pernia is Director of Product Strategy for Navis. He joined Navis in December 2011 to manage the planning, development and execution of its automated terminals product solutions, and right now he is concentrated on leading Navis challenge of taking software for Container Terminals up to another level, with fundamental areas of focus as Operational Efficiency, Technical Integration & Testing and Container Terminals workflow at Control Centers. Prior to joining Navis, Oscar worked 3 years for TTIA, first semi-Automated Container Terminal in Mediterranean, as Process, Systems and Innovation Team Leader leading a team of 22 engineers on the integration between TOS, automation and application technologies. Before TTIA, Oscar spent eight years in IT with the Algeciras Bay Port Authority where he held a variety of positions managing projects focused on technology and process optimization.

Manuel Perez is Director of Product Management (Engineering) at Xvela. He recently joined Navis to manage the design, development and execution of Xvela products. Prior to joining Navis, Manuel worked for Maersk Line for 17 years in various operational roles and led the development of several IT projects focused on efficiencies and process optimisation.

About the organisation

navis In a time when vessels are getting larger and industry demands are increasing, terminals are facing tremendous pressure to be more efficient and productive. Navis understands that as operational processes become more complex, efficiency, collaboration and productivity are essential. As a trusted technology partner, Navis offers the tools and personnel necessary to meet the requirements of a new, and ever-evolving, global supply chain.

XVELA Ocean carriers and terminal operators know that efficiencies can be gained, waste eliminated and revenue increased through better collaboration on vessel stowage planning and execution. But the tools and incentives to change these business processes have been lacking—until now. XVELA is a new company that utilizes the legacy of Navis PowerStow vessel stowage solution to provide a transformative, cloud-based collaboration platform and network to coordinate vessel stowage planning and execution activities.

Enquiries

Navis
55 Harrison Street, Ste. 600, Oakland, CA 94607 USA
+1.510.267.5000
www.navis.com

XVELA
55 Harrison Street, Suite 525, Oakland, CA 94607 USA
+1.510.267.5000
www.xvela.com