THE CERTAINTY OF BERTH UNCERTAINTY
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**INTRODUCTION**

As a result of increasing pressure to improve supply chain predictability, creating certainty around the berth time of a container ship in a port is one of the main challenges the industry is facing today. Innovative ways of providing visibility and transparency to port operations, along with various initiatives from port authorities and other governmental entities, are accelerating the process toward a new way of doing things in the berth management field.

So let’s start with who’s who in the berth management game. Although there are different models, we will focus on those ports with one or more container terminals, where the terminal is the entity dealing with the different ocean carriers to assign priorities and allocate the berth position on a day-to-day basis. This happens regardless of whether the port authority eventually controls the standard berthing windows or approves individual berth positions (more or less formally than an operational acting role). This scenario is also applicable to the port authority that owns and controls the terminal(s), where the internal roles are somewhat separate.

The timeline of the port stay is determined by several factors:

- Duration of the port stay is the crux of the matter. Assuming the quay (draft and length) and the crane height/reach already fit the ship, the duration of the port stay is the crux of the matter. The container terminal is the “host.” When the carrier and the terminal agree on a standard berthing window, they both commit to a specific period of time where the carrier just needs to show up on time and the terminal allocates a berth position. What could possibly go wrong?

- The port authority is traditionally the “landlord.” Port authorities and other governmental entities also regulate the traffic, assign priorities (i.e. passenger ships vs. container ships), supervise standard berthing windows (or oversee “First Come, First Served” policies), create and implement the regulatory rules, and undertake many other activities that directly or indirectly affect berth management.

**ANALYSIS OF BERTHING WINDOWS**

As simple as it might look, the berthing windows assigned to operate ships in a container terminal are indeed a complex matter. Assuming the quay (draft and length) and the crane height/reach already fit the ship, the duration of the port stay is the crux of the matter.

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**PORT STAY HOURS = number of moves / BMPH**

If we can establish that the terminal has an identifiable average crane productivity, or Crane Moves Per Hour (CMPH) that we can use as a reference, then we can agree that:

\[ \text{BMPH} = \frac{\text{CI} \times \text{CMPH}}{1} \]

Thus, the duration of the port stay depends on the BMPH, CI and move-count.

<table>
<thead>
<tr>
<th>Scenarios</th>
<th>Planned CI</th>
<th>CMPH</th>
<th>Moves</th>
<th>BMPH</th>
<th>Calculated Working Hours</th>
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</thead>
<tbody>
<tr>
<td>Berth Window</td>
<td>6.3</td>
<td>30</td>
<td>4000</td>
<td>190.5</td>
<td>21</td>
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<tr>
<td>Change the CMPH</td>
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<td>24</td>
<td>4000</td>
<td>152.4</td>
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<tr>
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<td>30</td>
<td>4000</td>
<td>153.0</td>
<td>26</td>
</tr>
<tr>
<td>Change the Moves</td>
<td>6.3</td>
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<td>5000</td>
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</tr>
</tbody>
</table>

We can conclude that as long as a carrier and a terminal agree on a berthing window based on estimated time of berthing (ETB), estimated time of departure (ETD) and number of moves, they are also inherently agreeing on the number of cranes to be deployed according to a predetermined CI.

**WHAT COULD GO WRONG?**

Container operations in a port are constantly subject to labor constraints, bad weather (especially winds), or machinery fatigue resulting in breakdowns and maintenance windows of shore-to-sea cranes or yard equipment. Dredging works also alter the operating conditions of the terminal.

On top of all that, the “visitors” (carriers) call a port in the context of an interconnected network of ports also affected by these challenges, port after port, resulting in a “domino effect” dynamic. Rough seas, bad weather, and engine breakdowns may also affect carriers between each port call.

> CI is also defined as “the sum of all crane working hours divided by the working hours of the longest crane.” CI is a dimensionless number that reflects the deployment ratio of the cranes. The number of cranes deployed during the operations will necessarily be equal to or greater than the CI. If the CI is equal to the number of cranes deployed, the move count is 100% balanced across all cranes, meaning each crane performed the same number of moves.

A Maximum number of cranes assumed by the carrier when planning the ship

> Crane work-plan from the terminal, including the actual number of cranes deployed and duration of the longest crane (i.e. the crane that works the most hours during operations)
Even if you could control all of the above, you’re still left with the variable of the move count. Move-count uncertainty is the result of market fluctuations and seasonality, as well as situations where the ship leaves cargo behind to reach next port or a canal slot on time. Move-counts are unpredictable in the long-term and consequently the move-counts specified in a berthing window agreement are definitely just a guideline.

So, what could possibly go wrong? Just about everything.

Accordingly, carriers build significant buffers in between ports to lessen the impact of likely delays. The carrier usually plans for the lowest speed over long legs, and sometimes sails even below it – essentially building in such a substantial buffer that even if everything possible went wrong, the ship would still arrive on time, without spending a single extra penny. Speeding up before or after a port call is not always a drama, although sometimes it incurs an unbearable amount of money (even with the lowest bunker prices) and unacceptable CO2 emissions.

Ships arrive (or could arrive) on time more frequently than statistics show. In many instances, if the carrier has the right information in their hands, the ship receives instructions to slow down due to lack of berth, or the ship actually arrives on time in the vicinity of the port, only to drift for a while until the berth and pilot are available.

When talking about berth management, our industry faces a huge disadvantage.

Many look to the air industry for answers. However, while the shipping industry has a lot to learn from that industry in terms of terminology and operational standardization and coordination among the different parties involved in the airport environment, it is simply not comparable.

It is not only that shipping is a “slow motion” industry. When talking about berth management, our industry faces a huge disadvantage. Airlines are not limited to the amount of gates and jetways (passenger boarding bridges) at each airport because once landed, planes can be “parked” in different areas of the airport far away from the gates and still discharge freight or passengers. This multiplies the options for planning the number of planes that can be operated at the same time, basically restricted by the air traffic and airport tracks, compared to the handful of ships that can berth at the same time in the majority of terminals for as long as a full day.

THE NAME OF THE GAME

Having visibility of the actual location of the ships and understanding the required speed to the relevant port has become a very easy task using the right technology. In the same way, estimating the speed needed to reach the next port on time (for the current terminal/port) is within arm’s reach. It is no longer a bargaining chip in the hands of the carrier at the time of negotiating a port call. Even bunker or CO2 omissions can be calculated roughly to evaluate the convenience of prioritizing one or the other; there is no reason to ignore the sustainability aspects of effective and responsible berth management.

Thus if we consider that:

- The certainty of making a port on time (or not) is more predictable every day
- Move-count in the mid-term can now be forecasted with higher levels of accuracy due to earlier visibility provided by real-time cloud collaboration
- Increasing the individual crane productivity of a terminal is a major long-term endeavor

Then we can only conclude that the name of the game within berth management is improving the stowage plan. The distribution of the cargo that can facilitate the right number of cranes with a balanced number of moves per crane is what determines the Berth Productivity (BMPH) and consequently the port stay of the ship.

The ability to dynamically adjust plans to deviations that occur during stowage execution is crucial, and it is only possible if there is a real-time exchange of information among the relevant parties.
But a good stowage plan is the just the beginning. The ability to dynamically adjust the plan to deviations that occur during stowage execution is crucial, and this “dynamic planning” is only possible if there is a real-time exchange of information among the relevant parties.

If, for instance, the estimated time of cargo completion (ETC) is not accurate and/or provided in a timely manner, the coordination of the participants in the departure of the ship currently berthed will be messed up, along with the arrival estimation to the next port of call, the arrival of the next ship to berth in the same position and so on, making the plan inoperable.

THE ROLE OF THE PORT SERVICES

The Port Authority needs to be more than a “Landlord.” Although there are multiple models to run a port and most local/governmental entities involved can be independent, public or private, for the remainder of this paper I will confer the Port Authorities the coordination role toward all those port services that are involved in a ship call at a container terminal.

Let’s assume the ship arrives at the port on time, the terminal has a berth available, and the amount of moves and amount of cranes (CI) is adequate to guarantee the completion of the operations within the agreed terms. Still, the effect of the port services can undermine the entire effort.

Situations where the pilot is not ready to board the ship on arrival, other ships (i.e. passenger) are prioritized, the ship has completed operations however tugs or linesmen are not available, and so on, happen more that they should. In most cases, port services under the port authorities’ umbrella have quite sufficient resources to guarantee a smooth flow of ships in and out of the port. It is the lack of coordination and data transparency that hinder the orchestration of the vessel call.

Many ports are involved in various initiatives to improve this coordination, increasing visibility and creating a standardized framework that provides the foundation of the ports of the future. However, only with the decisive and proactive participation of terminals and carriers and total transparency around the berthing management processes can port coordination truly improve. Only by providing clarity on the arrival times of the ships, visibility of the progress of the terminal operations, and a more accurate ETC prediction will the industry truly benefit from the port authorities’ great initiatives and ongoing efforts.

LIFTING THE VEIL

Transparency and visibility will come because end customers demand it. BCOs, NVOCCs and the rest of the carriers’ customers are, more than ever, under a lot of pressure. End customer expectations have changed dramatically. The Amazon customer experience, instant gratification as sign of our time, the possibility of wanting something and getting it in one’s hands within the next 24 hours, clashes with the reality of the shipping industry that has barely improved productivity and reliability in the last 20 years.

There is no place to hide anymore. Terminal and carrier “secrets” that are carefully protected today, and the operational data that is considered private and confidential, now, will be revealed. New technologies will do this one way or another, with or without the involvement or “blessing” of the industry itself. Precise container tracking, web scraping, ships equipped with cameras streaming live images via the internet, real-time port and terminal satellite views, you name it — if the shipping industry is not able to provide timely and accurate information in a structured and articulate way with the purpose of adding value, the information demanded by the customers of the carrier (and the customers’ customers in turn) will flow in the end by hook or by crook.

Terminals and carriers are condemned to work together and share more information. So the sooner they start, the better.

After many years of carriers and terminals looking for their individual profitability, irrespective of the harm caused to the other, it seems that the only solution carriers have found is to own the terminals (totally or partially) to guarantee that the bottom-line of both businesses are taken into account on every decision. Those carriers with terminals in their portfolio are moving in that direction, while others are acquiring terminals like there is no tomorrow. Those carriers that are simply stakeholders in various terminals are looking to increase their financial presence and/or are embracing partnership initiatives with the hope that this will accelerate the improvements needed.

Ownership of terminals by carriers alone will not guarantee that the dynamics, the mechanisms, the trust between the carrier and their terminals will change to a degree that will produce significant improvements. It may help to overcome the initial resistance of the terminals to collaborate and share data (though this is no guarantee), however in this multi-party environment (multi-carrier, port services, agents, etc.) the industry will need a many-to-many network managed by a neutral party to facilitate the flow of private and shared data in a secure way.

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MOVING TOWARD GREATER BERTH CERTAINTY

XVELA is working on the next generation of berthing planning tools. With collaboration around stowage as the core of the solution in a many-to-many network environment, XVELA is incorporating validated ETA to the port area, based on a ship’s current location and the most frequent route between ports, along with a realistic speed calculation to the next port, which will set the expectations of the needs of the carrier. Removing uncertainty and vagueness around ships’ schedules also brings awareness of the requirements of the carrier versus the potential savings for the terminal, and vice versa. Further integration with the TOS provides real-time visibility on the progress of terminal operations and the possibility of improving the accuracy of the ETC.

This transparency will positively impact the coordination of the port services, providing and receiving information (event based – actauls and estimates) that can more efficiently trigger the synchronization of the different parties involved in a port call.

Visibility of the berthing process, smarter prioritization, ETA validation, data sharing, constant port stay monitoring with higher-level of ETC predictability, and greater efficiencies in the stowage planning between the carrier and the terminal will significantly improve the terminal berthing productivity as well as the berth line occupancy. Combined structured data stored over time will provide opportunities for machine learning and optimization. Energy/fuel consumption and CO2 emissions visibility will not only help to create awareness around costs but more importantly, the effect on the environment and the future sustainability of the industry.

For those parties willing to embrace these changes in berth management, the window of opportunity is wide open.

About XVELA

XVELA provides a transformative, cloud-based collaboration platform and maritime business network that drives transparency, efficiency and profitability to a network of ocean carriers and terminal operators. Through real-time collaboration, shared data and actionable visibility across the vessel rotation, XVELA enables terminals, carriers and their operational partners to work together to better communicate, coordinate and synchronize their operations, starting with stowage planning and quickly expanding to berthing management and port call optimization. The result is a win-win solution that allows both terminals and carriers to forge new efficiencies, improve customer service and reliability, and capture substantial untapped savings across the ocean supply chain.

Backed by Navis, the leading provider of software and services for terminal operators and ocean carriers, XVELA operates as an independent entity focused on enabling collaboration and operational visibility. For more information, visit www.xvela.com or contact us at info@xvela.com.

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