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Reducing idle time with collaboration and data sharing

by

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Introduction

This concept note explores the nature of the different types of delays encountered by ships in ports and attempts to estimate the loss of value, using containerships as an example. Three categories of delay are identified: before entering the port, time where the ship is sitting at its berth waiting to commence cargo operations, and the time lost from when the last container is handled by the terminal to until the ship starts leaving the port/terminal.

The second half of the article suggests how the use of collaboration and the sharing of data using systems based on Port Collaborative Decision Making (PortCDM), developed as part of the Sea Traffic Management (STM) concept, could ameliorate the waste of resources and loss of opportunities.

Idle time from port to berth

In 2017, a total of 71,202 hours of idle time waiting to enter ports was recorded from 38,425 container ship calls at Europe's so-called Tier 1 and Tier 2 Ports[1]. This is an average of 1.85 hours per ship call.[2] Depending upon the "value of an hour", this might represent a cost reduction opportunity in excess of USD100 million per year. And this is merely for container ships, it is only in Europe, and it is only for idle time waiting to enter ports. Additionally, there are other delays, idle times and suboptimal use of resources that occur during port visits. Cumulatively, this underperformance represents even more significant lost opportunity costs. We have described

[1] Lind M., Michaelides M., Watson R.T., Andersen N-B., Bergmann M., Haraldson S., Andersen T., Ward R., Sancricca M., Gerosavvas N., Heidecker A., Lane A., Gimenez J., Ferrus Clari G., Gonzales A., Marques Richarte M., Voskarides S., Pouros G., Deoslad I. (2018) Extending the efficiency boundary from ports to hubs: A new role for container terminal operators, Concept note #15, STM Validation Project

[2] JOC/HIS-Markit database

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some of the significant causes of delays including idle time and their impact in earlier Concept Notes.[3 4 5]

Idle time data for the 55 European ports that we have classified as Tier 1 and Tier 2 ports is as depicted in the figure below.

It should be noted that in Europe the period between June and October is the traditional peak season (stocking for Christmas) when the call-size (average container moves per port call) increases as most ships are sailing at almost 100% utilisation. June and July are also months where labour can be short due to summer leave being taken, which can reduce productivity and increase the length of a ship's port stay.

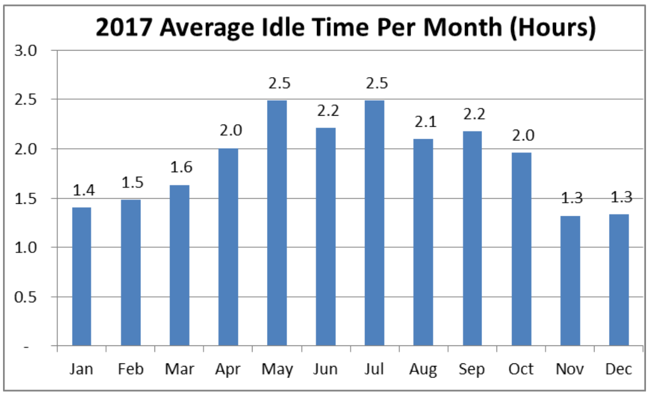

Figure 1: Idle time for 55 European Tier 1 and Tier 2 ports

Root-causes of port to berth delays

There can be several reasons for ship idle/waiting time at ports. However, at the macro-level the list can be reduced to only three types:

1. Port or Terminal Congestion – During the 2001-2006 period, port congestion was rife throughout the world, as global demand was growing at 10-15% per year and ports/terminals were struggling to bring new capacity on line to meet the escalating demand. However, since 2008, triggered by the global financial crisis, container demand growth has been far more modest at 3-5% per year and the ports/terminals have generally had sufficient capacity on hand.

When port or terminal congestion prevails, it is all the more important that idle time is minimised through closer collaboration and better communication between all the parties involved by sharing relevant data dynamically.

2. Weather related delays – In the November to February winter period in northern Europe, fog, snow, high winds, et cetera can all result in the relatively sudden temporary closure of ports, which can then lead to an increase in ships' idle time.

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[3] Lind M., Watson R.T., Bergmann M., Ward R., Andersen N-B., Jensen T., Haraldson S., Zerem A., Rosemann M. (2018) Digitizing the maritime eco-system - Improving door-to-door coordination via a digitized transport chain, Concept Note #11, STM Validation Project

[4] Lind M., Michaelides M., Watson R.T., Andersen N-B., Bergmann M., Haraldson S., Andersen T., Ward R., Sancricca M., Gerosavvas N., Heidecker A., Lane A., Gimenez J., Ferrus Clari G., Gonzales A., Marquez Richarte M., Voskarides S., Pouros G., Deosdad I. (2018) Extending the efficiency boundary from ports to hubs: A new role for container terminal operators, Concept Note #15, STM Validation Project

[5] Lind M., Bergmann M., Haraldson S., Watson R.T., Michaelides M., Herodotou H., Voskarides S. (2018) Port-2-Port Communication Enabling Short Sea Shipping: Cyprus and the Eastern Mediterranean, Concept Note #5, STM Validation Project

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While ports cannot realistically plan for suddenly inclement weather, longer-range forecasts continue to improve and should therefore be factored into the planning process.

3 Terminal Facilities delays – these are most commonly caused by sudden and unexpected equipment breakdowns or by poor planning caused by unknown upstream delays that leave terminal operators unable to plan and allocate appropriate levels of resources, such as manpower or appropriate cranage or berths. Of course, it is often the equipment with the heaviest work burden that suffers from the most unexpected breakdowns – which can in turn cause an immediate impact on idle time of arriving ships arriving subsequently.

Idle time after berthing

Idle time after berthing is the period between when a ship arrives at its berth and when its cargo operations commence. This can be impacted by last-minute changes to actual arrival times where the terminal was not fully prepared in terms of available resources. There are many other unrelated causes, and not least the shift changes as highlighted below.

The 2017 data indicates that the average time between arrival at berth and commencement of cargo operations (first container lift) was 1.55 hours.[6] This is a process which ideally should never exceed 30 minutes. Accordingly, there is more than an hour lost on average per visit. This time could amount to an industry wide loss in excess of USD50 million per year.

Ship time of arrival is another cause of lost time. If a ship arrives more than half way through a shift and certainly if it arrives just a few hours before a shift change, it is often the case that work will not begin until the next shift takes over. Shift changes usually occur between: 06:00, 14:00, 22:00, or 07:00, 15:00, 23:00, or 08:00, 16:00, 00:00. However, our 2017 data shows that more than 50% of ship arrivals recorded were outside these shift-change times.

Idle time after terminal operations

Idle time after terminal operations is the period between when the last container is loaded or discharged and when the ship actually commences its journey from the berth and out of the terminal/port.

Delays are most commonly caused by:

- Channel not clear
- Pilot delayed in boarding
- Tug boats unavailable
- Main engine not ready

[6] IHS-Markit database

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- Crew still ashore
- Delayed repair (or maintenance)

Our 2017 European data indicates an average delay on departure of 1.52 hours. However, if properly planned, the completion process should not last longer than 30 minutes. This means that a further average loss of about one hour per port call is likely. This amounts to another potential loss of perhaps USD50 million, with an absence of good communication and collaboration being a major root-cause.

Reasons for the different types of idle time waste

The root cause for the significant amounts of idle time in most ports is that berth and port traffic planning are highly manual processes, which are not standardized. Basically, every port call is treated as a unique event calling for many individual decisions, and these are often made on a less than fully informed basis. One Scandinavian terminal operator describes the high-level process as:

> *"Customers confirm their* [operational time] *windows the week before arrival on Fridays for the entire week- We man up* [Plan] *after the request or if the changes are too big and we can't manage, we work out a solution with the specific customer already in advance to avoid as many late surprises as possible.*
>
> *Then the day before arrival there is a final confirmation and that's also when we make the final ordering of labour needed."*

A relatively static once-a-week, seven-day forward plan for berth and port traffic planning, such as described, is always going to be vulnerable to disruption to a port and will have a downstream impact.

The manual processes used for berth and port planning, coupled with a reliance on inherently unreliable forecast data, points strongly to the need to adopt more dynamic, data-based approaches, such as is advocated within contemporary concepts to data sharing.

Port Collaborative Decision Making (PortCDM)

At the core of PortCDM, as one enabler of Port Call Optimization[7], is the exchange of timestamps between involved port call actors for the purpose of reducing waiting times, improving the predictability of different operations, and ensuring just-in-time operations for both the ship and the

[7] Lind M., Bergmann M., Haraldson S., Watson R.T., Park J., Gimenez J., Andersen T. (2018) Port Collaborative Decision Making (PortCDM): An enabler for Port Call Optimization empowered by international harmonization, Concept Note #1, STM Validation Project

port call actors involved. This means introducing procedures to ensure the exchange of data and that the data is available to all the relevant actors.[8]

In previous concept notes, our discussions on PortCDM have concentrated on use cases covering intra- and inter-port collaboration, as well as on ship-2-port, and port-2-hinterland collaboration. In this note, we expand the scope to consider the benefits of PortCDM in the situation of the shipping lines where multiple, sequential port visits are common for many voyages. Particularly, because delays get propagated and the end of a chain of visits suffers increasing levels of disruption and delays. As long as the subsequent (downstream) ports in a chain of visits are not kept informed about progress of the previous (upstream) ports, a planning and scheduling nightmare emerges to the detriment of all the actors involved.

While PortCDM addresses all ship types, including; cruise, ferry, RO-RO, dry and liquid bulk, etc., the focus in this Concept Note is placed on the container ship segment, which is both significant in size, as well as having a reasonably high-level of complexity. As elaborated above, we have relied on data exclusively for major European ports.

The foundational principles of PortCDM

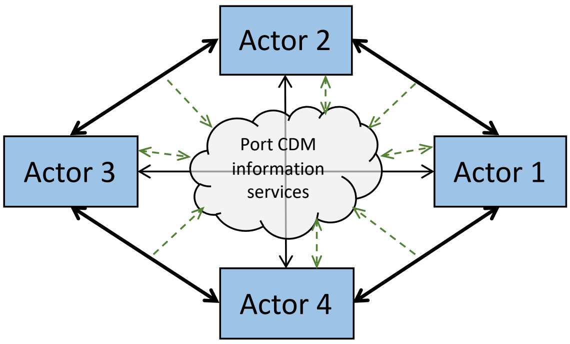

Figure 2: Instant information sharing enabled by a data sharing platform

The overall purpose of PortCDM is to increase efficiency in port call operations for all stakeholders by adopting a universal methodology and associated protocols for data sharing[9] in real-time.

PortCDM builds upon the concept of data being dynamically shared and updated among all the relevant stakeholders involved in port call operations as soon as practicably possible after something in the chain of operations changes.

In this way, PortCDM relies on the owner of data sharing that data among all stakeholders involved, based on appropriate access management[10] rules/agreements.

[8] Lind M., Bertgmann M., Haraldson S., Watson R.T., Park J., Gimenez J., Andersen T. (2018) Creating a Mature Data Sharing Regime – Thriving in the connected ecosystem, Concept Note #4, STM Validation Project

[9] Lind M., Bergmann M., Watson R.T., Haraldson S., Park J., Gimenez J., Andersen T., Voorspuij J. (2018) Towards Unified Port Call Communication – from a project format to a global standard, Concept Note #9, STM Validation Project

[10] Lind M., Bergmann M., Haraldson S., Watson R.T., Park J., Gimenez J., Andersen T. (2018) Creating a mature data sharing regime – Thriving in the connected ecosystem, Concept note #4, STM Validation Project

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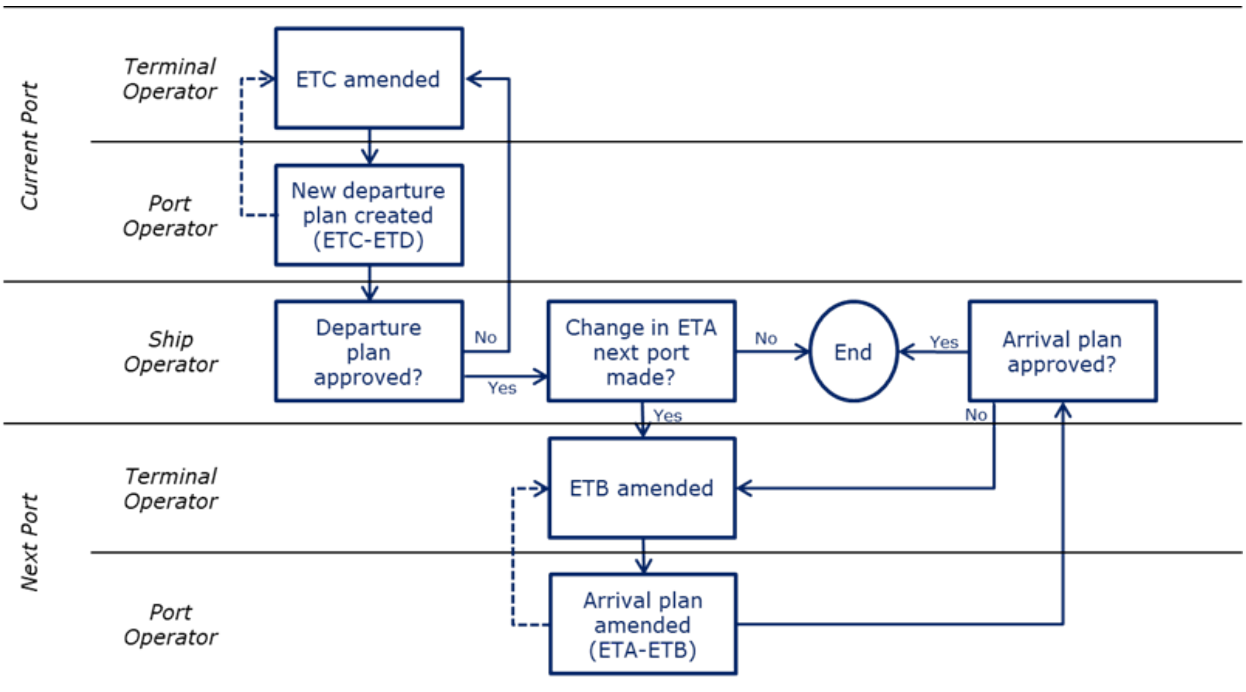
PortCDM to minimise idle time

Many, if not most, of the causes of idle time in the port call operational chain are the consequences of a combination of imprecise planning based on unreliable data about the upstream progress of events and a failure to inform downstream actors when timings and schedules necessarily change. Furthermore, delays at one port, or even in one part of the port call cycle, can easily result in a cascading sequence of delays further down the port visit chain unless timely notification is provided to those affected.

Implementing PortCDM can improve accuracy, timeliness and reliability of data through real-time sharing and translate into better resource planning and a reduction in idle time. In this way, PortCDM is an important tool for cost reduction because it can facilitate substantial reductions in idle time.

The Dynamic PortCDM process

When planning a new port arrival, or where an existing plan is no longer achievable, and assuming that this is due to delays at the current (upstream) terminal, the following flow chart illustrates how the PortCDM process and its data streams would assist decision makers. This process will be elaborated further in a future Concept Note.



ETA – Estimated Time of Arrival at a Port
ETB – Estimated Time of Berthing at a Terminal
ETC – Estimated Time of Completion at a Terminal
ETD – Estimated Time of Departure from the Terminal

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Data sharing should be driven by the dynamic and transparent use of a simple common user application and message standard, which triggers and prompts the various different stakeholders to review exception alerts and take appropriate action (make amendments to plans) based upon their physical capabilities, preferences, and requirements. As individual plans within ports are amended, automatic planning revision alerts should be triggered. In this way, there could be several or multiple iterative revisions made during a single port call.

In addition to the concept of data sharing between ships and ports and between the different actors within a port, once a port obtains a certain level of maturity is its use of PortCDM,[11] it is possible and desirable to include also the exchange of data between ports. With this additional data sharing, not only will the next port for a ship get an actual time of departure of the incoming ship from the previous port, this information will also come from an independent source other than the ship or ship's agent. This will help improve the quality of data by validating important information through independent sources.

The PortCDM business case for different stakeholders

PortCDM is a global initiative whose full beneficial effects will be achieved when major ports have adopted the principle of data sharing within the port and towards external stakeholders. As we have identified in earlier Concept Notes, there are vast savings potentials in just-in-time operations for visiting carriers (ships, trucks, trains etc.) and for the service providers that support the purpose of each port call and support the movement of ships to/from the berth.[12].Taking this more macro-level view of multi-port visits, different types of stakeholders can benefit in different ways.

Business cases for shipping companies

From a shipping company's point of view, especially for those en-route between different regions in the world, it would be highly beneficial to have up-to-date situational awareness in relation to planning at all destination ports. Plans can then be adjusted progressively and dynamically by providing updated times of arrival well in advance of reaching down-stream ports. This would allow for just-in-time arrival and just-in-time operations upon the arrival of the ship. Consequently, idle time would be reduced, and profits should increase.

Business case for ports

Event driven progress reports of an intended visit enable a port to maintain a realistic and viable plan for a ship's future visit. Impacts on the port and its operators can be anticipated and schedules

[11] Lind M., Andersen T., Bergmann M., Watson R.T., Haraldson S., Karlsson M., Michaelides M., Gimenez J., Ward R., Andersen N-B., Gonzales A., Holmgren B., Zerem A., Rauer F., Sahlberg H., Lindberg J. (2018) The maturity level framework for PortCDM, Concept Note #13, STM Validation Project

[12] Lind M., Rygh T., Bergmann M., Watson R.T., Haraldson S., Andersen T. (2018) Balancing just-in-time operations – coordinating value creation, Concept Note #6, STM Validation Project

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readjusted to reduce idle time. Ports competing to serve the largest shipping lines in the world should recognize that those with the lowest total idle time will be most attractive.

Business case for terminal operators

The business case for terminal operators is also centred on reducing ship idle time. By contributing to a common data sharing platform, terminal operators can support each other. They can learn of progress in the upstream port and inform the downstream port of their progress. It is in their mutual interest to cooperate to all reap efficiency gains from better planning through better data. Terminal operators can improve their resource efficiency and utilisation through working with more dynamic and accurate input information.

Conclusions – final words

Idle time is costly for all – ships, terminals, other port actors, importers, exporters, and ultimately consumers. Widespread adoption of PortCDM is a potential remedy for unnecessary idle time and therefore a boost to profits because it facilitates data sharing about the current and likely future states of a ship. Furthermore, widespread adoption of PortCDM will create valuable network effects, because more adoptees means more accurate and timely data for all other adopters

PortCDM is particularly responsive to distributed data sharing platforms, allowing almost every actor involved in a sea voyage to participate using their existing system setups, spanning from a single actor to conglomerates of actors operating within or across ports.

PortCDM builds upon the fundamental idea that there is an inseparable trinity between the shipping line, the port, and the cargo owner in which the terminal operator play an essential role. Their digitally enhanced connectivity through PortCDM should lead to reducing idle-time thereby enabling a more efficient and sustainable maritime transport chain.

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