

## Using PortCDM data to increase the efficiency of financial transaction processing

by

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### A multitude of voyage expenses

A voyage requires many services, each of which generates expenses that need to be tracked, validated and classified to create a system of record. Subsequently, these data can be analysed to determine, for example, the profitability for each voyage and customer, and identify actions for improving performance.



Figure 1: Costs associated to sea transport generated by a multitude of actors

of the sheer variety of vendors, documentation and related risks (e.g. fraud and sanction).

Delays in the processing of payments increases the industry's costs because a service provider might need bank funding to cover the gap between service delivery and receipt of the associated payment. If all outstanding debts were paid within a day or so of delivery, everyone would be better off – perhaps, except the banks.

Shipping companies must diligently assess each claim because past experience indicates that some of them could be fraudulent, excessive or even involve sanctioned parties. It follows that this assessment process and any subsequent payment will be delayed when there is insufficient data to quickly validate a claim.

A highly connected maritime sector with enhanced transparency of service delivery could provide the required data to validate many of the financial claims more efficiently and promptly. For example, if a shipping company had access to a port’s system of record it would be able to see when and where a specific ship received services from a pilotage company, tug service, linesman provider, and so forth. Validation of port call expense claims is an important potential by-product of the spatial-temporal data collected under Port Collaborative Decision Making (PortCDM) – as one of the enablers of the Sea Traffic Management (STM) concept.

The idea of using the digital records provided by unrelated systems to support cost calculation and verification is not unknown to the maritime industry. An established example is the “Pay-As-You-Sail” (PAYS) licensing model for electronic charts, where ships can carry all the electronic chart data for the region in which they are sailing, so that they can deviate or adjust their voyage to avoid such things as bad weather or late changes in destination, but are only charged for the charts that are actually used during a voyage. Ship optimization software can identify in advance what charts are required and the ship’s mandatory Automatic Identification of Ships (AIS) signal provides a verifiable record of the route sailed during the voyage. These records are then used to calculate the payments due for the charts used. Thus, we see that the chart vendor can use the AIS spatial-temporal data to calculate the chart usage fee, and the shipping company can use the same data to validate the fee for the charts.

In this concept note, we review some existing practices for the calculation and verification of financial claims and elaborate on how increased data sharing could raise processing efficiency and lower the potential for fraud exposure and mitigate potential associated compliance risks. The key, we assert, is to enable matching of the records of a ship’s voyage with the associated accounts received for services rendered during a port call. Essentially, certain expenses can be validated by matching the spatial-temporal data that defines the voyage and the associated financial claims.

**The cost drivers of sea transport – a process-driven characterization**

The costs associated with operating ships are diverse, non-standard and involve high levels of complexity. At the macro level, costs can be divided into the following categories:

Category	Description
Ship costs	The costs of operating the asset, which if owned would be interest on any associated purchase loans and depreciation (fixed or capital expenses) or the time-charter lease cost which is then more semi-fixed or operating expense related
Crew costs	For chartered ships, these are either “wet” (crewing costs where the crew is employed by the vessel owner) or “dry” (where the charterer will either need to source a crew from a third party or deploy its own employees)
Daily running costs	Includes ship maintenance, provisions, auxiliary engine fuel, etc

Fuel	Also referred to “bunkers” is the fuel used by the ship
Canal dues	Costs associated with transiting the various interconnecting channels around the world, for example Suez, Kiel or Bosphorus Strait, etc
Cargo handling	Costs directly associated with loading or discharging cargo, which may also include storage and other related costs
<b>Port expenses</b>	<b>Costs incurred by a ship (not the cargo) for entering and leaving the various ports called during a voyage</b>

In this concept note, we will focus exclusively on the Port Expenses, which can be further subdivided as shown in the following table.

**“Standard” Port Expenses**

There are some expenses that are Incurred for nearly every port call. We indicate which cost items could be readily augmented with spatial temporal data of the service provide when invoicing documentation is created.

Cost Item	Description	Charged by:	Cost Criteria	Spatial-temporal
Port Dues	Cost recovery for items such as; harbour conservancy (dredging, etc) buoys or lights or other navigational aids, vessel traffic control and other administration. Many Port Operators are government entities, and therefore these costs are usually recovered to “break-even” as opposed to generating profits.	Port Operator	Ship size, Ship Type, Type of fuel used, Draught, Time of arrival/departure. <sup>1</sup> The actual sum charged might involve several of the aforementioned cost elements. Discounts can also apply based on the number of port calls within a calendar period.	Y
Dockage	The hire of a berth. This is sometimes referred to as “Wharfage”. Wharfage, It is sometimes charged as a royalty per cargo rather than per ship. As such, it is then not considered as a ship or port expense.	Terminal Operator	Ship size multiplied by the duration at berth. Might be assessed hourly, or involve a fixed-fee for a number of hours and subsequent hours alongside added incrementally.	Y

<sup>1</sup> Definitions: Ship Size – Gross Registered Tonnage (GRT), or Dead-Weight tonnes (DWT), or Length, or Beam; Ship Type – Container, Bulk, Ro-Ro, Passenger, etc; Time of arrival/departure – Day versus Night, Weekend, Public Holiday, etc



Cost Item	Description	Charged by:	Cost Criteria	Spatial-temporal
Pilotage	The costs for the embarkation and disembarkation of a pilot to assist with safe navigation. Pilots are more often employed and provided by the Port Operator	Port Operator	Ship size, Ship type, Draught, Time of Arrival/Departure, Method of boarding (launch, helicopter, etc).  The total cost might also be subject to over-time (where the pilot is retained beyond a standard time window – for example on-board waiting for departure).  In some ports separate sea and river pilots might be required.	Y
Towage	The provision of tug-boats to assist berthing or un-berthing.	Port Operator or Towage company	Ship size, Ship type, Draught, Time of arrival/departure,  The total cost would be derived between the quantity and type (power, etc) of the tug-boats required. These might be ordered directly by the pilot or port operator in some cases.  Where tug-boats are retained beyond standard times an additional detention cost might be applied.	Y
Mooring	The securing (or releasing) of ship's mooring lines to/from bollards on the wharf/dock.	Terminal operator Mooring company	Ship size, Ship type, Time of arrival/departure.  In some cases, it might be assessed by the quantity of labour required and/or the time that the labour is deployed.	Y
Husbandry	The cost of hiring a port agent when husbandry is out-sourced. Where provided by own employees this cost would feature under either agency or SG&A cost categories.	Ship Agent	The cost might be based on an agent's retention fee, or ship by ship.	?

**“Standard” Port Expenses are not “Standard”**

In reviewing the publicly available schedules of port tariffs at just a few main (Tier 1 or Tier 2) European ports we have identified a significant lack of standardisation which, in turn, leads to



increased complexity for the accountants working for ship operators:<sup>2</sup>

In the sample of three ports all located within 500 nautical miles of each other, and in three separate EU states, there are very different cost criteria (at least by name) and each applies different calculation methodologies.

Rotterdam	Hamburg	Felixstowe
Port Dues	Port Fee	Conservancy Dues
Waste Fees	Port Environmental Fee	Pilotage
Quay Dues	Demurrage	Towage
Buoy Dues	HPA-Berth fees	Mooring
Dolphin Dues	Towage	
Towage	Mooring	
Mooring		
Port Visit Monitoring		
Vessel Traffic Service		
Fresh Water		

Tariffs highlighted in grey are provided by third parties and not by the port operators directly.

### Ad-hoc Port Expenses

There are also some costs that are incurred based on a specific ship operator's requirements. Again, we identify those that can generate spatial-temporal data for validating associated expenses

Cost Item	Description	Charged by:	Cost Criteria	Spatial-temporal
Bunkers (Fuel)	Provision of main-engine fuel	Bunker brokers or suppliers	Quantity multiplied Unit Cost. A delivery surcharge might also be applied	Y
Other Fuel	Mainly diesel for auxiliary engines	Fuel suppliers	As above	Y
Spare Parts	Acquisition and transportation (delivery) of spare parts for ship maintenance. Items such as flags, charts, etc are included within this category	Spare part suppliers	Retail cost of the spares plus transportation	Y
Provisions	The supply for food and beverages or fresh water	Ship Chandlers. (Fresh water)	As above	Y

<sup>2</sup> Sources:

<https://www.portofrotterdam.com/sites/default/files/general-terms-conditions-port-tariffs.pdf>

[https://www.hamburg-port-authority.de/fileadmin/user\\_upload/HAM\\_pricelist\\_maritime\\_shipping\\_effective\\_as\\_of\\_15March2018.pdf](https://www.hamburg-port-authority.de/fileadmin/user_upload/HAM_pricelist_maritime_shipping_effective_as_of_15March2018.pdf)

<http://hha.co.uk/wp-content/uploads/2016/11/Schedule-of-Dues-and-Charges-2018.pdf>

Cost Item	Description	Charged by:	Cost Criteria	Spatial-temporal
		might be provided by the Port Operator)		
Waste Removal	The disposal of oily and other types of waste generated by the ship.	Waste removal specialists	Various	Y
Crew Medical	Medical services as required by the crew; routine checks, consultations, out-patients, hospitalisation, etc	Medical practitioners	Various	Y
Travel and Accommodation	Related to crew changes	Travel agents, hotels, etc	Various	?
Inspections or Certificate renewal	General ship inspections or the periodic re-issue of IMO certificates	Classification Societies or Surveyors	Various	?

As the preceding tables illustrate, there are multiple opportunities to collect spatial-temporal data that can inform financial claim processing to enhance its efficiency and reduce expenses. We now consider how PortCDM can be extended to support data collection and sharing for cost validation.

**Data sharing for enhanced transparency with PortCDM supporting cost validation**

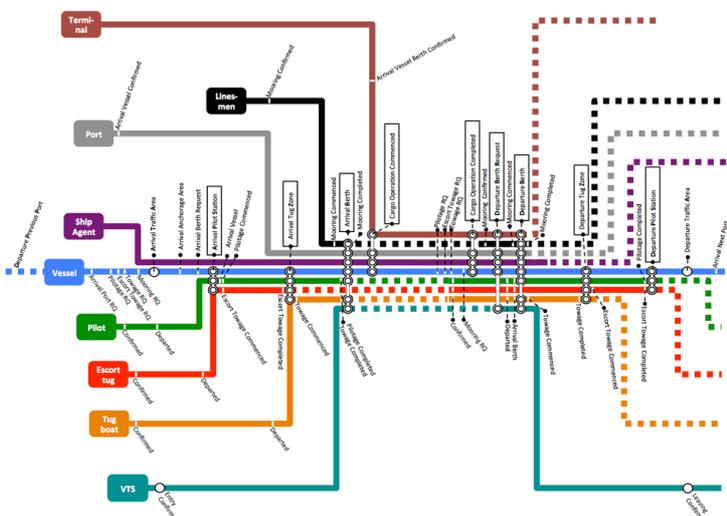


Figure 2: Generic events capturing the port call process

PortCDM can have a beneficial role in reducing the burden of verifying costs billed to ship operators. PortCDM, as one of the enablers of Sea Traffic Management (STM), captures core events in the port call (see the metromap in Figure 3), including spatial-temporal data about each event when relevant, in a unified message format.<sup>3</sup> PortCDM supports the sharing of data related to planned and completed port visit events to enhance collaboration. The system of record created by PortCDM could also be used to validate documentation related to a port, including service charges.

<sup>3</sup> Lind M., Bergmann M., Watson R.T., Haraldson S., Park J., Gimenez J., Andersen T., Voorspuij J. (2018) Towards Unified Port Communications – from a project format to a global standard, Concept Note #9, STM Validation Project





28<sup>th</sup> of September 2018

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The data available through PortCDM includes both planned as well as completed port call events. This foundation data could be available to forecast costs as well as to validate claimed costs associated with port call operations. As described earlier, the PortCDM concept was originally developed to improve the precision in predictability of operations, but in the context of reducing expenses, it could be used as part of the validation process for payment claims.

The International PortCDM Council has been established to support the alignment and harmonization of port call operations. Its charter includes ensuring that the underpinning message format standard is extended as required to support other operational and business needs of the maritime sector. In this context, if PortCDM is to support the validation of service charges, an appropriate standard cost validation framework will require definition in terms of data and processing standards for a global industry. Such a cost validation framework will be elaborated in a future concept note. For now, our goal is to overview the opportunity to extend PortCDM.

#### **Final words – towards a Maritime Enterprise System**

Many organizations have learned that a single integrated database and standardized processes reduce costs and improve decision making. As a self-organizing ecosystem, the maritime sector needs to think of data message standards for all events associated with a voyage so that data can be shared to improve collaborative decision making and be ingested in internal systems to advance efficiency and analytics. Similarly, standards for data processing, including the validation of service charges, can lead to industry-wide efficiency gains. Given that all ships make port visits and PortCDM is an existing conceptual framework with a message standard and international governance structure, we have a springboard for improving the efficiency of other industry processes, such as the validation of service charges levied on ship operators.

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