STM_Validation_D1.2
Demonstration plan for PortCDM Test Beds
2015.12.28

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DOCUMENT STATUS

Approval

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<th>Name</th>
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<tr>
<td>Activity 1 active members¹</td>
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Document History

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<tr>
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¹ CIMNE, Costa Crociere, Cyprus University of Technology, Finnish Transport Agency, HiQ, Ministry of Infrastructure and Transport, Norwegian Coastal Administration, Port of Barcelona, Swedish Maritime Administration, Svitzer Sweden AB, Transas, Valenciaport Authority, Valenciaport Foundation, and Research Institutes of Sweden (RISE). Kvarken ports, Port of Stavanger as active participants
Authors

<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Lind Mikael, Haraldson Sandra, Karlsson Mathias</td>
<td>RISE Viktoria</td>
</tr>
<tr>
<td>Ferrus Clari Gabriel, Gimenez Maldonado José,</td>
<td>Valenciaport Foundation</td>
</tr>
</tbody>
</table>

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1 Introduction

This document contains an overall demonstration plan, built upon participating ports’ demonstrations plans for the implementation of PortCDM for the purpose of validating the PortCDM concept.

The following ports’ demonstration plans are consolidated in this compiled demonstration plan:

<table>
<thead>
<tr>
<th>The Nordic Testbed</th>
<th>The Mediterranean Testbed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port of Gothenburg</td>
<td>Port of Barcelona</td>
</tr>
<tr>
<td>Kvarken Ports (Umeå and Vaasa)</td>
<td>Port of Valencia</td>
</tr>
<tr>
<td>Port of Stavanger</td>
<td>Port of Civitavecchia (Italy)</td>
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<tr>
<td>Port of Oslo</td>
<td>Port of Venice (Italy)</td>
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<tr>
<td>A Norwegian Port (TBD)</td>
<td>Port of Naples (Italy)</td>
</tr>
<tr>
<td>Port of Limassol (Cyprus)</td>
<td>Port of Genoa (Italy)</td>
</tr>
</tbody>
</table>

This overall demonstration plan is built upon each participating port’s more detailed demonstration plan defining focus for the project period, divided into three iterations. The main purpose with the overall demonstration plan is to provide an overview of different aspects of PortCDM that will be validated during the period of the STM validation project (2015-2018).

The PortCDM Concept strives towards enabling an enhanced coordination on several areas i.e. collaboration areas in figure 1. The starting point is to establish the collaboration on arena #1, which means a focus on the internal coordination between the key actors involved in a PortCall as important basis to enable efficient port operations. This figure 1 is an expression for enabling collaboration in different areas such as between port and the sea voyage (collaboration arena #2), between the port and hinterland transports (collaboration arena #3), and between ports (collaboration arena #4). The latter collaboration arena is of special concern in short-sea shipping. In the demonstration plan each ports’ plans are positioned in relation to collaboration arenas according to the figure 1 below.

1.1 Other deliverables from PortCDM testbed during the STM Validation project

Activity 1 - PortCDM testbeds, has been arranged in four sub activities:


- **Sub activity 1.2: Demonstration of the Port CDM concept** which was reported upon in Viktoria Swedish ICT, Valenciaport Foundation (2015) Demonstration plan for PortCDM
Test Beds in STM validation project 2015-2018, STMVal_D1.2, as a delivery for M1.2.1 – M1.2.13

- **Sub-Activity 1.3: Refinement of the Port CDM concept** which is reported upon through this report: Lind M., Haraldson S., Ward R., Bergmann M., Andersen N-B., Karlsson M., Zerem A., Olsson E., Watson R., Holm H., Michaelides M., Evmides N., Gerosavva N., Andersen T., Rygh T., Arjona Arcona J., Ferrus Clari G., Gimenez Maldonado J., Marquez M., Gonzalez A. (2018) Improving port operations using PortCDM (Final PortCDM concept description incl. generic specification of identified services), STMVal_D1.3, as a delivery for M1.3.1

- **Sub-Activity 1.4: Collaboration for definition and sharing of Port CDM commonalities** which was reported upon in Lind M., Haraldson S., Watson R.T., Ludvigsen P., Bergmann M., Andersen N-B. (2016) Role and routine of the PortCDM Council, STMVal_D1.4, as a delivery for M1.4.1

Further, the annex to this report contains a list of the numerous publications that have been generated during the conduct of the project.
Figure 1 The four collaborative arenas assisted by PortCDM²

## 2 Overall orientation

Each of the participating ports will perform three iterations. Port of Gothenburg and Port of Valencia will use their already established PortCDM solution as a basis for their further application of PortCDM. In the table below depicts a summary of the focused iteration.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>The Nordic Test bed</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Port of Gothenburg</td>
<td>• Involvement of more actor</td>
<td>• Enhanced synchronization with VM</td>
<td>• Cont. impr. of the portCDM implementation</td>
</tr>
<tr>
<td></td>
<td>• Expansion towards full coverage of port calls</td>
<td>• Focus on port-to-port collaboration (short-sea-shipping) with Port of Brofjorden, Port of Halmstad?, Port of Helsingborg?, Port of Rotterdam?</td>
<td>• Hinterland integration</td>
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<tr>
<td></td>
<td>• More process steps (bunkering, sludge disposal, berth shifting)</td>
<td>• Cont. impr. of the portCDM implementation</td>
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<tr>
<td></td>
<td>• More automatic connections</td>
<td>• Eliciting requirements for integration with VM</td>
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</tr>
<tr>
<td></td>
<td>• Eliciting requirements for integration with VM</td>
<td>• Cont. impr. of the portCDM implementation</td>
<td></td>
</tr>
<tr>
<td>Kvarken Ports (Umeå and Vaasa)</td>
<td>• Set up PortCDM implementation in Umeå as a basis for enhanced coordination within the port (incl. connection to Single Window)</td>
<td>• Cont. impr. in Umeå</td>
<td>• Cont. impr. in Umeå and Vaasa</td>
</tr>
<tr>
<td></td>
<td>• Establish technical solution for the “small port”</td>
<td>• Develop interfaces to existing systems</td>
<td>• Explore integration with VM and ice planning</td>
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<tr>
<td></td>
<td></td>
<td>• Set up PortCDM implementation in Vaasa as a basis for enhanced coordination within the port</td>
<td>• Port-to-port collaboration between Vaasa and Umeå</td>
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<tr>
<td></td>
<td></td>
<td>• Collaboration with NLC-ferries (Vasaline) with VM integration</td>
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<tr>
<td>Port of Stavanger</td>
<td>• Set up PortCDM for cruise vessel approaches as a basis for enhanced</td>
<td>• Expansion of the types of vessel approaches</td>
<td>• Port-to-port collaboration (ports not yet defined)</td>
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<tr>
<td>STM VALIDATION 1.2 – Demonstration plan for PortCDM TestBeds</td>
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<tr>
<td><strong>Port of Oslo</strong></td>
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<tr>
<td>• Terminal-driven setup of PortCDM as a basis for enhanced</td>
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<tr>
<td>coordination within the port</td>
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<tr>
<td>• Exploration of market-driven incentives for PortCDM</td>
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<tr>
<td>• TBD based on the outcomes from iteration #1</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>• TBD based on the outcomes from iteration #2</td>
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<tr>
<td><strong>Port of Limassol</strong></td>
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<tr>
<td>• Set up PortCDM implementation as a basis for enhanced</td>
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<tr>
<td>coordination within the port</td>
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<tr>
<td>• Integration with a new forthcoming port community system</td>
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<tr>
<td>and possibly integrate PortCDM SIP as part of that</td>
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<tr>
<td>• Transform the PortCDM implementation to enhance</td>
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<tr>
<td>collaboration in the Limassol privatization process</td>
<td></td>
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<tr>
<td>• Port-to-port collaboration with Mediterranean ports</td>
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<tr>
<td>participating in the STM validation project</td>
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<tr>
<td>• Port-to-port collaboration with ports in Greece, Israel,</td>
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<tr>
<td>Egypt, and Lebanon</td>
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<tr>
<td>• Expand with port calls related to container traffic</td>
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<tr>
<td>• Port-to-port collaboration with port of Civitavecchia</td>
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<tr>
<td>• Expand with port calls related to liquid traffic</td>
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<tr>
<td>• Enhanced port-to-port collaboration with Mediterranean</td>
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<tr>
<td>ports participating</td>
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<tr>
<td><strong>Port of Barcelona</strong></td>
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<tr>
<td>• Set up PortCDM for cruise vessel approaches as a basis</td>
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<tr>
<td>for enhanced coordination within the port</td>
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<tr>
<td>• Expand with port calls related to container traffic</td>
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<tr>
<td>• Port-to-port collaboration with port of Civitavecchia</td>
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<td>• Expand with port calls related to liquid traffic</td>
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<tr>
<td>• Enhanced port-to-port collaboration with Mediterranean</td>
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<tr>
<td>ports participating</td>
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</tbody>
</table>
| Port of Valencia | • Cont. impr. of the established PortCDM implementation by developing new automatic connectors  
• Explore the use and maintenance of PortCDM SIP  
• Encourage terminals and shipping agents to use PortCDM on daily basis | • Expansion to include smaller operations  
• Include actors without digital infrastructure (e.g. linesmen) | • Port-to-port collaboration with the port of Sagunto and Gandia  
• Port-to-port collaboration with Mediterranean ports participating in the STM validation project  
• Hinterland integration enabled by parallel projects |
|---|---|---|
| Port of Civitavecchia | • Integration between PortCDM and PIL  
• Set up PortCDM for cruise vessel approaches as a basis for enhanced coordination within the port  
• Establish integration with voyage management for approaches made by Costa Crociere | • Port-to-port collaboration with Mediterranean ports participating in the STM validation project | • Port-to-port collaboration with ports that Costa Crociere make port approaches to |
| Port of Venice | • Integration between PortCDM and PIL  
• Set up PortCDM for different types of vessel approaches as a basis for enhanced coordination within the port | • Cont. impr. of the PortCDM implementation  
• Expansion to include slot-times for opening/closing the lock  
• Expansion to include slot-times for canal passages | • Establish integration with voyage management |
<table>
<thead>
<tr>
<th>Port</th>
<th>TBD</th>
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<tbody>
<tr>
<td>Port of Naples</td>
<td>TBD</td>
</tr>
<tr>
<td>Port of Genoa</td>
<td>TBD</td>
</tr>
</tbody>
</table>

_In Italic: Assumptions made on discussions with the ports / proposal from our side_

To summarize, the focuses in the different iterations for the different ports are depicted in the figure 2 below.

![Collaboration arenas vs. Focus in the different ports](image-url)

**Figure 2 Collaboration arenas vs. Focus in the different ports**
3 The participating ports contribution to the validation of the PortCDM concept

Below different aspects for creation a diverse basis for the validation of the PortCDM concept are brought forward. As can be seen from this list multiple dimensions will be explored. This is just preliminary and most likely the different ports will contribute to these dimensions continually when more insights are gotten from the application of PortCDM.

3.1 Complementing the process logic

The total amount of PortCDM tests means that the knowledge will continually be developed related to the process logic of port calls. Each of the ports will have their adoption of PortCDM and make an expansion of it throughout the project by introducing more states to use for arriving at optimized port calls by distributed coordination. This also means that each port’s specific requirement will be acknowledged and brought into consideration for the refinement of the generic state chart (the metro map) (depicted in the figure 3 below).

Figure 3 Times spent at berth for the same ships visiting the same ports multiple times

At this point some specific expansions have already been mentioned, such as:

- At the Kvarken ports: Ice breaking and ice navigation (as part of VM)
- At Valenciaport: Refuelling, Phyto – sanitary controls, Terminal operations, Shipping agents
- At Port of Venice: Slot times for canal passages, Slot times for opening/closing the lock
- At Port of Gothenburg: Bunkering, Sludge disposal, Berth shifting, Terminal operations
- At Port of Oslo: Terminal operations
At several of the ports different types of vessels are focused giving rise to challenge which states that are relevant to use for the particular type of vessel approach. In e.g. the ports of Stavanger, Barcelona, and Civitavecchia cruise vessel approaches are focused enabling possibilities to share experiences of which states to include in such port calls. In the table below the different types of cargo being transported specifically identified by the port.

3.2 Enabling resource optimization – enhanced coverage of port calls

In order to reach full utilization of PortCDM all port calls need to be covered engaging the actor’s that have a desire to optimize their resources. In most of the ports including all terminals performing berth at and all types of vessels covers such expansion. Resource optimization related to;

- berth use is especially brought forward by Port of Stavanger.
- canal use is especially brought forward by Port of Venice.
- pilot, terminal and tug use is especially brought forward by Port of Gothenburg
- tug use is especially brought forward by Port of Valencia

3.3 Integration with voyage management

Several ports have announced their interest in integrating with voyage management. It is preferred that this integration is performed via some shore-based centre. In this way direct-communication with the vessels is avoided since such integration requires connectivity to many instances.

Specifically;

- In Port of Gothenburg a direct link between PortCDM and Transas shore-based infrastructure is desired. It is estimated that such integration will cover many of the approaches made to Port of Gothenburg.
- At the ports in Italy a direct link between PortCDM and the Costa Crociere’s fleet operating centre
- Integration between Costa Crociere’s fleet operating centre and implementations of PortCDM in the ports that Costa Crociere is making port calls to

3.4 Expansion towards other ports

Several ports have announced an interest in expanding the scope towards other ports. This means that operative collaboration will be set up between several ports and also become a drive for the further dissemination of the PortCDM concept to new ports. The identified ports so far are:

- From Port of Gothenburg to Port of Brofjorden, Port of Halmstad, Port of Helsingborg, and Port of Rotterdam
- From Valenciaport to Port of Sagunto and Port of Gandia
- From Port of Limassol to Ports in Greece, Israel, Egypt, and Lebanon
- And between the Kvarken ports (Umeå and Vaasa)
In the Mediterranean test bed several ports have a desire to establish port-to-port collaboration with ports (in the Mediterranean) participating in the STM validation project. To be noted is also that the integration with the fleet operating centre of Costa Crociere will enable integration with (possibly) all ports that Costa makes approaches to.

3.5 Hinterland expansion

In order to enable sea transports as part of the multi-modal transport system hinterland integration becomes important. Two ports will focus on such integration; Port of Gothenburg, Port of Valencia, and Port of Stavanger. Port of Valencia is also bringing such efforts forward in additional projects.

3.6 Market-driven expansion of PortCDM

In MONALISA 2.0 the PortCDM concept demonstrations at Port of Gothenburg and Port of Valencia were initiated by the port authorities. In the STM validation project, two ports have specifically mentioned a desire to further understand incentives for, and to promote the use of, PortCDM by private actors. In Port of Oslo the entrance to PortCDM is made from the terminal operators and in Port of Limassol PortCDM will play a core role in the privatization process.

3.7 Integration with existing systems

There is a desire to establish as many automatic connections as possible between different systems in order to arrive at a low threshold for the use of the PortCDM concept. PortCDM puts demand on that there exists timestamp data to be used for coordinated port calls. In this way PortCDM becomes a filtering mechanism for identifying the presence of estimates and actuals related to timestamps in the ports’ system environment to be shared among involved actors for the establishment of situational awareness. The lack of presence of necessary time stamp information in the existing system environment will either put requirements on developing existing systems for capturing these time stamps or require manual updates of timestamps. The implementation of PortCDM focus on data point integration, defining the state chart to be used in the port based on the process logic, an adapted timeline, establishing PortCDM SIP (as the back-end) preferably bundled to an existing system, and potentially implement a front-end application. The back-end solution provides with the accessibility to diverse PortCDM information services. The front-end application providing images of situational awareness for reaching desired effects is only to be used when existing systems are not adapted. During the project different solutions for the organizational responsibility and architectural position of the PortCDM SIP will be explored. Port of Cyprus and Port of Valencia will potentially explore the PortCDM SIP as part of their port community system.

For the Italian and Norwegian ports it has especially been brought forward that the single window system will open up automatic connections building on the PortCDM message standard to enable sharing of estimates and actuals to other actors. Since these single window systems are present in other ports this also means the barrier to introduce PortCDM in other ports will be low. The same goes for other systems becoming PortCDM compliant being used in different ports. As part of setting up the demonstration effort at each port the constituents of the system environment, spanning over multiple actors, have been identified.
4 Basis for continuous improvement in ports using PortCDM

This compiled demonstration plan covers diverse aspects that will be focused in the different ports participating in the PortCDM validation efforts. This also means that a basis for sharing experiences will be established that would enable enhanced outcomes of the PortCDM application measured by different KPI’s. Further, the standards being used will be validated and different data quality assurance methods will be developed and evaluated ensuring a solid base of data to be used in the use of PortCDM for each port.
5 Basis for deriving this document

- Demonstration plan for Port of Gothenburg
- Demonstration plan for Kvarken Ports (Umeå and Vaasa)
- Demonstration plan for Port of Stavanger
- Demonstration plan for Port of Oslo
- Demonstration plan for Port of NN (in Norway) – awaiting decision
- Demonstration plan for Port of Limassol
- Demonstration plan for Port of Barcelona
- Demonstration plan for Port of Valencia
- Demonstration plan for Port of Civitavecchia
- Demonstration plan for Port of Venice
- Demonstration plan for Port of Genoa
- Demonstration plan for Port of Naples
Annex: Publications related to the PortCDM concept


Lind M. (2016) Port Call Message Standard, version 0.5, ENAV19-6.6, IALA


Lind M., Bergmann M. (2018) Functional Definitions of Port Call Message – The Ability of the Port Call Message Format to address functional definitions for nautical port call information, STM Validation project


Lind M., Haraldson S. (2016) New KPIs will show how ports become more efficient with PortCDM, Newletter December 2016, STM validation project


Lind M., Haraldson S., Watson R.T., Ludvigsen P., Bergmann M., Andersen N-B. (2016) Role and routine of the PortCDM Council, STM validation project


industry more profitable through PortCDM, Concept Note #17, STM Validation Project (https://www.ipcdmc.org/galerie)


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