Berth Optimization: Reducing Time Alongside

Photo Courtesy of Lou Vest

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EXECUTIVE SUMMARY

This document outlines the importance of collecting data for the berth optimization process. It highlights the need for stakeholders to establish key performance indicators (KPIs) and implement measures for continuous improvement. The goal is to enhance communication, visibility, analysis, and historical reporting among all stakeholders involved in the time alongside while a vessel is in berth.

Key Considerations:

1.**Value Stream Mapping**: Team members collaborate to diagram and notate all process steps and key communications from the beginning of the berthing process to the end.

2**. Data Gathering & Measurement:** To reduce the time spent alongside, systems must be in place to accurately collect and store port activity data as that data is needed to calculate the critical measurements.

3. **Key Performance Indicators (KPIs)**: The project team should examine all the information collected for the cargo transfer and agree on the select KPIs that are most reflective of the process **<u>AND</u>** are measurable with the current technology

4. **Operational Discipline & Improvement Process:** Recognizing that enhancing efficiency is a collective journey, participation from various stakeholders is crucial. Engagement in discussions that foster continuous improvement is encouraged.

This paper serves as a foundation for further exploration into enhancing the berth optimization process. The Greater Houston Port Bureau invites interested parties to contribute to these vital discussions. For more details, stakeholders are encouraged to contact the Bureau directly.

INTRODUCTION

This document focuses on recommended methodologies and processes that terminals, carriers, and other stakeholders can use to systematically improve communication and operational efficiencies while the vessel is alongside. Inefficiencies alongside can result in millions of dollars of costly delays to terminals, carriers, and charterers. Further, these delays and inefficiencies can negatively impact schedule reliability.

This document is part of a Greater Houston Port Bureau document series aimed at identifying and standardizing best communication practices in the Port of Houston. The information within was gathered and consolidated over various stakeholder meetings that included a wide range of industry experts and key port stakeholders.

Port calls are complex, and they involve many stakeholders working in close collaboration. The efficiency of a given berth call is influenced by the quality of the pre-arrival preparations and the Greater Houston Port Bureau documentation covers that topic in detail. This document assumes that pre-arrival activities have been conducted appropriately.

Attempts have been made to present practical data and process suggestions for reducing time alongside that can be applied to a wide range of port call operations to drive efficiency and operational excellence.

Suffice it to say, while this document encourages a focus on efficiency via key performance indicator (KPI) tracking, safety remains paramount. Stopping work to protect people, equipment, and the environment is always more important than achieving a metric.

VALUE STREAM MAPPING (VSM)

Often, in complex processes and operations, expertise is siloed across various roles and organizations. Each role, team, or organization knows their operations well, but they each may have certain blind spots with respect to the overall process.

VSM is a "lean" technique that can be applied to wide array of business processes. The methodology is designed to:

- Visualize the actions required to bring a product or service from start to finish.

- Create a "big picture" to map out the product or service so that it is clear to all stakeholders.

- Identify improvements and create an improved "future picture.

- Provide a common language for talking about a process.

To create a VSM, stakeholders are brought together in workshop meetings to discuss and align on the current "as is" process. Team members collaborate to diagram and notate all process steps and key communications from the beginning of the process to the end. The output diagram can vary depending on the process and organizations involved, but the typical outputs are in the format of a flowchart or swim-lane diagram visual.

Using a trained VSM facilitator that is agnostic to the current process can be helpful as they can ask questions with fresh eyes and challenge existing processes. If stakeholders are remote, various digital tools such as Visio, Excel, Whiteboard, etc. can be used to notate the discussion. If stakeholders are physically present, sticky notes and whiteboards are additional options.
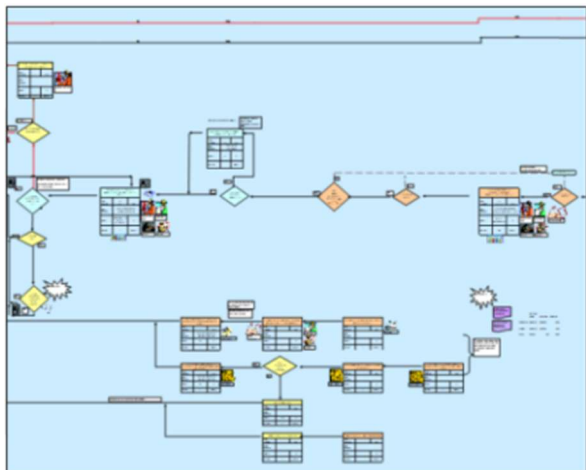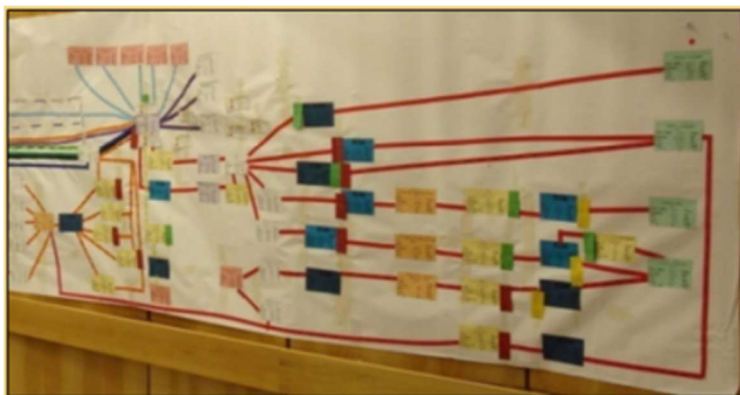

Figure 1: Example of digital VSM

Figure 2: Example of in-person VSM

Typically, in the process of developing the current process map, stakeholders discover issues and inefficiencies. These are important inputs to the next step, which is to create a "future state" map that documents the new and more efficient way the process should work.

For the purposes of this document, these "current state" and "future state" discussions can help organizations identify key performance indicators, baselines, and goals which are the subject of the next sections.

DATA GATHERING & MEASUREMENT

To improve any system or process, determining the key performance indicators (KPIs) and then employing consistent data collection and analysis are critical steps. To reduce the time spent alongside, it is foundational that systems are in place to accurately collect and store port activity data as that data is needed to calculate the critical measurements described later in this document.

Optimum Data Collection

Given the complexity of port calls, setting up the optimum data collection and analysis may involve working collaboratively with key stakeholders. For example:

- Surveyors may have the most accurate information related to when samples were taken and/or when sample results were reported.

- Carriers may have the most accurate information related to ship operations such as NOR tendered, all fast, etc.

- Terminals may have the most accurate information related to terminal operations, such as pump starts, gangway operation, maintenance delays, pigging, etc.

- Cargo owners/charterers may have important clarifications related to cargo quantity, cargo type, handling instructions, etc.

- Agents who may represent either the vessel or the charterer, depending on the contractual agreement.

Technology

Many technologies are available now, and many continue to develop in an aim to assist with data collection and analysis. These things include, but are not limited to:

- Tablets and wearable technologies

- Voice recognition

- Pump / valve indication

- Flowmeters

- Ocular technologies / AI

Before starting to make decisions on KPI's, attention should be given to data quality and validation. Just because data appears to be available, it may not be accurate and/or accurately named.

While there is always room to further improve data collection and analysis to drive even better results, significant results can often be achieved with rudimentary technology. The lower tech the solution, the more important it is to prioritize foundational time stamps to reduce workloads and ensure the best data quality. In short, port call stakeholders are encouraged to not let technology / data limitations stop them from pressing forward with optimization efforts.

KEY PERFORMANCE INDICATORS (KPIs)

Depending on the type of cargo transfer, the exact key performance indicators (KPIs) can vary. It's important to consider the quality and granularity of the data set in comparison to the objectives of the observation.

The project team should examine all the information collected up until this point and agree on the select KPI that are most reflective of the process **AND** are measurable with the current technology.

Consideration should be given to the number of KPI's. It's recommended to break the port call into key sections that are granular enough to be insightful. More KPIs can provide more granularity, but there is a limit to the number of KPIs that can be tracked until the law of diminishing returns starts to apply. While advanced digital systems may expand the number of tracked KPIs, a general suggestion is to keep them to less than seven. Additional KPI's can always be added later.

KPI Joint Ownership

A joint ownership approach of the KPI is not essential. However, it is recommended for multiple reasons:

- The discussions to agree upon and establish KPI's can clarify roles, responsibilities, and expectations.

- Working towards KPI improvements becomes a shared mission, breaking down communication silos and improving cooperation.

- Learnings and successful practices can be leveraged faster and more broadly.

While it is often preferred to use the most complete data set possible (for instance, measuring the identified KPIs for all ships alongside a given terminal), particularly in a joint ownership arrangement, it may not be possible due to commercial/confidentiality reasons. It is possible to utilize a smaller data set for the purposes of joint discussions and leverage the learnings to operations outside the joint ownership group. For instance, the project data set may only include data related to one carrier's vessels, but the learnings can be applied to all vessels calling that terminal.

KPIs may be industry specific. For instance, the KPIs below are presented as a case study and cover a typical tanker operation whereby things like "Last hose off" are specific to that industry.

Table 1: Example KPIs for Tanker Operations

Name	Description	Unit	Optimum Owner
KPI 1	All Fast - Pre-transfer meeting commencement	Hours	Surveyor
KPI 2	All Fast - Pre-transfer meeting completion	Hours	Carrier
KPI 3	All Fast - First hose on	Hours	Terminal
KPI 4	Pre-transfer meeting completion - First Pumping started	Hours	Terminal
KPI 5	Berth tons per hour (TPH) (from All Fast till Last hose off)	MT	Terminal
KPI 6	Pumping completed - Last Hose off	Hours	Surveyor
KPI 7	Last Hose off - All Clear	Hours	Carrier

KPI 8	Total Non-Cargo Transfer Time (Sum of KPI 2, KPI 4, KPI6, and KPI 7)	Hours	Joint

In general, the KPIs should address:

- The time spent on activities that are not transferring cargo

- The time spent on transferring cargo

- The rate of cargo transfer

KPI Baseline Measurements

Once the applicable KPIs are selected, the next step is to establish a baseline. Baseline measurements can typically be established by analyzing historical information. If historical information is not available, it may be necessary to establish a "measurement" phase whereby the applicable time stamps are gathered/KPI's are calculated for the express purpose measuring the existing performance.

The baselines below are presented as a case study and cover a typical tanker loading operation. (Times are directional and will vary by typical cargos handled and ship types operating at the jetty).

Table 2: Example Baseline Metrics for Tanker Operations

Name	Description	Baseline Metric
KPI 1	All Fast - Pre-transfer meeting commencement	<0.5 Hours
KPI 2	All Fast - Pre-transfer meeting completion	<1.3 Hours
KPI 3	All Fast - First hose on	<2 Hours
KPI 4	Pre-transfer meeting completion - First Pumping started	<2 Hours
KPI 5	Berth tons per hour (TPH) (from All Fast till Last hose off)	>300 MT/Hour
KPI 6	Pumping completed - Last Hose off	<1.5 Hours
KPI 7	Last Hose off - All Clear	<2 Hours
KPI 8	Total Non-Cargo Transfer Time (Sum of KPI 2, KPI 4, KPI6, and KPI 7)	<6.8 Hours

OPERATIONAL DISCIPLINE & IMPROVEMENT PROCESS

As mentioned previously, this process will yield better results and will be more sustainable if it involves all key stakeholders and approaches improvements with an "end to end" mindset. Once stakeholders have aligned on the process and performance metrics, it's important to bring the key stakeholder group together on a regular basis to review the metrics and discuss challenges/opportunities.

The above is best achieved with the following:

- A project scope or control plan document detailing roles, responsibilities, metrics, and methodology for review.

- An identified facilitator / regular meeting series.

- Participants from the respective stakeholder organizations in a position to effect changes as applicable.

- An established single master version of the KPIs.

Below illustrates an example Excel tracking chart. The KPIs are listed in columns. Each week, the metrics are compiled and placed in the applicable cell. Based on the respective targets, the KPIs are color coded green, yellow, and red. Associated comments and action items are logged.

Figure 3: Example KPI tracking spreadsheet

Tracking efforts might further visualize the KPIs' changes and trends over time. Below provides another example.
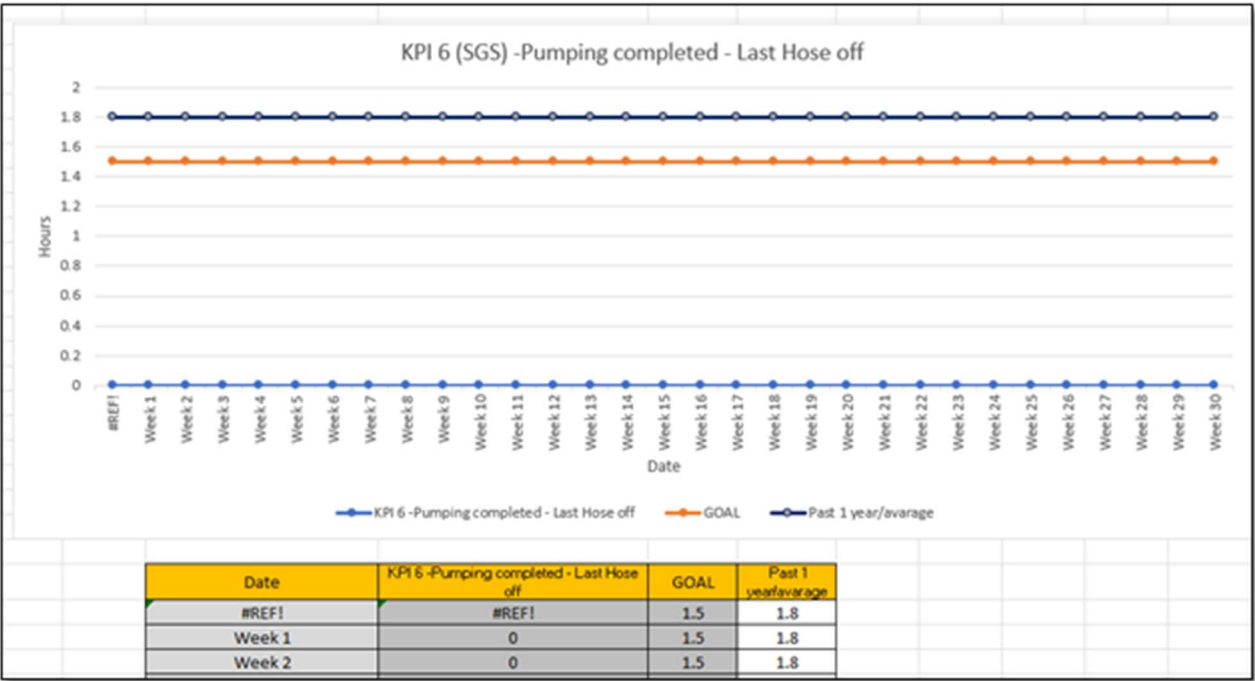

Figure 4: Example KPI trends

While, at its onset, these efforts to improve time alongside might be stood up as a project/involving a project team, expediting and enhancing the results comes from integrating the KPIs' targets into stakeholder management systems.

To say the above in another way, if the established KPIs are only discussed within a project team, when the project is over, performance improvements are likely to backslide. If the established KPIs are baked into each stakeholder's respective management system, the results are more likely to be sustainable.

Ways that the above might be achieved:

- KPI targets are adopted, discussed, and tracked by the respective operational teams. For example, a terminal operations team might integrate reviews of key observations and KPIs from the previous day's performance into their daily operations meetings. This visibility and understanding can go a long way to aligning every member of the team to the same focus and expectation.

- Control plan actions and responsibilities are baked into normal operational processes and procedures (For example, RACI diagrams, swim lane diagrams, standard operating procedures, etc.). Control plan documentation typically covers things like:

    o Roles and responsibilities

    o KPI's definitions, calculations and measurement systems

    o Acceptance criteria and any applicable methodology for tightening criteria over time

    o Communication/publishing protocols, i.e. where are these metrics posted and how often are they updated.

- When it appears that good habit strength has been achieved, reevaluations of the current KPI targets should be made to continuously drive improvements.

- As management and measurement systems improve, they should be increasingly made to be real-time and/or predictive. Real-time alerts when systems detect a delay and/or detect a delay is likely can bring further operational excellence.

COMMON INEFFICIENCIES

Coordinating stakeholders from different organizations to work with maximum efficiency is challenging. While each company is likely to be interested in efficiency, efforts to make their own operations more efficient (in a silo) run the risk of sub-optimizing what is best for the system to work most effectively.

A big part of what this paper is recommending is aligning the various stakeholder companies to a shared process and a shared understanding of what success looks like.

Communications

Communications is often one of the biggest opportunities for improvement. While it's intuitive that communication is important, achieving effective and efficient communications can be a challenge. There are many pitfalls:

- Timely – Communications are sent/received late compared to when the receiving stakeholder organization needs the information.

- Complete – Communications do not include the full data set needed for the receiving stakeholder organization to properly prepare / execute the given task. This often results in more emails, phone calls, etc., to gather the missing pieces of data.

- Distribution – Communications are sent to the wrong person(s), and/or communications are distributed incorrectly within the receiving company. For example, an email may be received by dispatch/coordinator but doesn't get redistributed correctly to the field operations correctly.

- Method – Communications are sent via a less effective method (i.e., email versus phone, versus, radio, versus web portal).

To help organizations systematically talk through their communication process, the Greater Houston Port Bureau has put together more resources located at: [Port Efficiency - Greater Houston Port Bureau (txgulf.org)](txgulf.org).

Data Triangulation

Data triangulation occurs when the same data sent from the same data source takes different paths to arrive to the receiver at different times. For instance, stakeholder A (Carrier) needs to send a communication to stakeholder B (Terminal) and stakeholder C (Charterer). If stakeholder C is also communicating with stakeholder B, the same information may be arriving to Stakeholder B at a different time. By the time the information is received by Stakeholder B, the communication arriving from Stakeholder C could be a different version of the truth. The result is confusion, delay, and more emails/phone calls to find clarification.
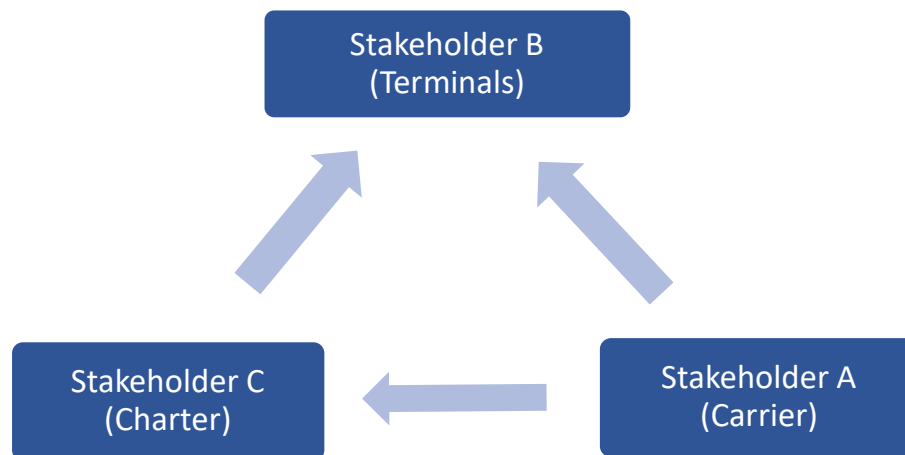

Figure 5: Example of data triangulation

Cargo Transfer Planning

Good prearrival jetty planning can detect issues early which helps to prevent operational delays and helps to improve efficiency.

- Pre-arrival document preparation and exchange – Some documents are allowed to be pre-prepared and exchanged before the vessel is alongside.

- Pre-inspection and pre-purging – This may be more specific to tanker vessels, but where possible, vessels should show up ready to transfer.

- Longest loader – Identifying the which part(s) of the cargo transfer will take the longest prior to the vessel arriving alongside. The "longest loader" should be worked/started first so that the shorter operations can work concurrently.

- Sequential versus simultaneous loading – Good planning in advance of the vessel arrival alongside can organize/increase the number of activities that can be started and operated concurrently. Simultaneous operations can increase the throughput and result in a faster jetty/vessel turnaround time.

- Manpower planning – Prearrival planning can optimize the use of manpower and minimize delays created by the lack thereof.

CONCLUSION

In conclusion, without sacrificing safety and without significant investments in new tools, infrastructure, and systems, it is possible to make significant efficiency improvements. Employing established value stream mapping techniques across stakeholder organizations, developing shared KPI's, and aligning to a shared control plan can unlock and sustain new efficiencies that are not achievable when the same stakeholders operate in silos.

Efficiency is a journey involving many stakeholders. If you want to find out more or participate in the discussions that resulted in this document, please contact the Greater Houston Port Bureau at info@txgulf.org or (713) 678-4300.