

Improving Port of Houston Efficiency through Application of Pre-Arrival Process Best Practices.



Photo Courtesy of Lou Vest



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Application of Pre-Arrival Process Best Practices

1. INTRODUCTION

1.1 Importance of Pre-Arrival Process on Port Efficiency

Given the length of the Houston Ship Channel, navigational restrictions, and frequent inclement weather, an efficient port call is essential for maintaining Houston's competitiveness. In addition to optimally scheduling port visits, improving pre-arrival vessel processes can reduce operational delays and increase port throughput. Every hour saved in procedural delays yields additional cargo capacity.

On a typical vessel call, arrival preparations account for 10% of the port call, and this time increases significantly if equipment or communication failures occur. More predictable arrivals improve transit reliability and reduce the volume of tank storage required for liquids.

Among port of Houston stakeholders, the most common challenge cited is the lack of "shared information." Today, bilateral information sharing can occur rapidly between agent-ship, inspector-terminal, agent-pilots, customs-agent, and the like. However, delays still occur, as not all parties are kept abreast of the information they need to plan and act in a timely manner. This is further complicated by the rapid pace of cargo trading, which may change a planned visit within a few hours of arrival at the anchorage or even during transit through the Ship Channel.

1.2 Scope and Objectives of the Pre-Arrival Process Whitepaper

The Greater Houston Port Bureau's Efficiency Committee has pursued port efficiency for several years. Their efforts have included implementing PortXChange's PilotTracker, developing the Port Call "Subway Map" and associated data dictionary, developing performance KPIs, along with several other initiatives to:

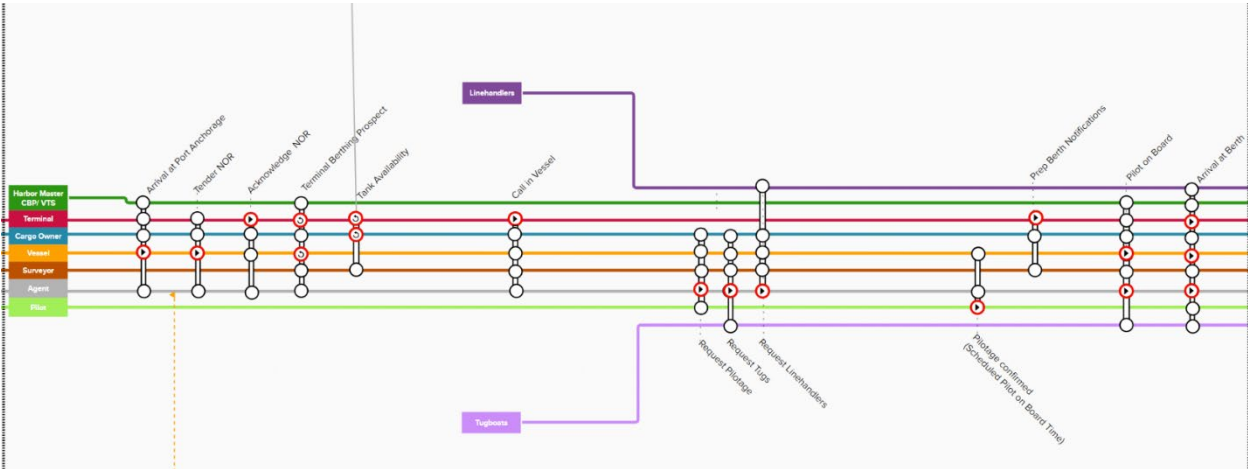
- Improve data sharing
- Standardize terminology
- Improve communications

This white paper seeks to identify and propose solutions for reducing pre-arrival issues which will optimize the "last 12 hours" before a vessel arrives at a dock¹ as follows:

- To document the various processes and challenges of the processes currently in place
- To identify "best practices" and where they exist
- To propose potential solutions where possible

¹This document primarily focuses on the 12 hours until berthing or from arrival, future iterations of this workgroup could consider review of the 96 hours prior to arrival and determine if additional efficiencies can be found during that time frame.

FIGURE 1 - Pre-Arrival Major Steps



Key Elements of the Pre-Arrival process:

• Arrival at Port Anchorage • Tender Notice of Readiness (NOR) • Acknowledge NOR • Terminal Estimations • Tank Availability • Call in Vessel • Request Pilotage • Request Tugs	• Request Line Handlers • Pilot confirmed (Scheduled Pilot on Board Time) • Prep Berth Notification • Pilot on Board • Arrival at Berth
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1.3 How to Use this Document

This white paper is organized into 12 sections:

- Section 1 is an introduction.
- Sections 2 through 5 describe the current process, participants, current state of technology, pain points, and current state of information.
- Sections 6 and 7 enumerate the best practices, solutions, and the value of improved information.
- Sections 8 and 9 focus on implementation challenges and considerations.
- Sections 10 through 12 provide case studies, references, and a final white paper summary.

1.4 Arriving to the Solutions

Many discussions and industry participants were involved in developing this white paper. Efforts were also made to ensure alignment with the International Maritime Organization (IMO) and the International Port Call Optimization Task Force.

2. THE CURRENT PROCESS

2.1 Overview of the Pre-Arrival Process

The pre-arrival process begins when the vessel arrives at anchorage and encompasses all activities up to berth arrival. However, issues arising during pre-arrival are often linked to the chartering process. Hence, in this process discussion we include the chartering process as an essential element of the pre-arrival process.

2.1.1 Chartering Process

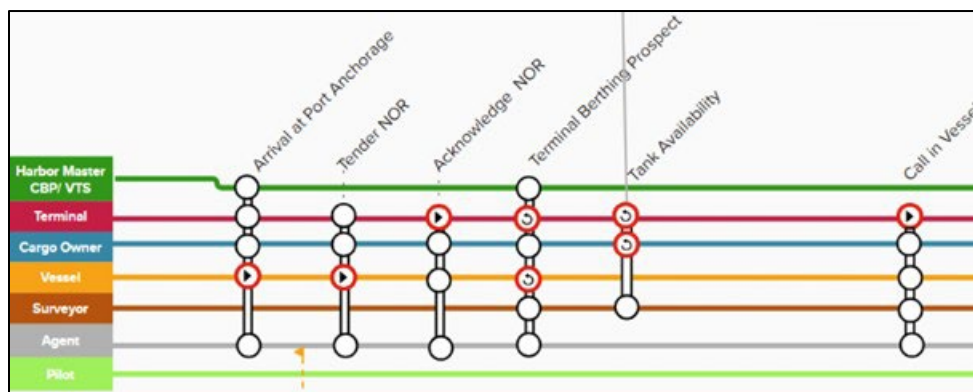
The current pre-arrival process aims to ensure ship compatibility once a customer secures a cargo spot at a terminal. When a cargo deal is finalized, the customer nominates a quantity and assigns a specific dock space and then nominates a ship to match the designated dock. The beginning of the pre-arrival process—vessel selection and approval—can occur anywhere from 6 weeks to just hours prior to vessel arrival.

As part of vessel nomination, the ship undergoes a review for its history and terminal fit, including draft and flange size, culminating in the completion of the approval process. Notably, these steps are regularly conducted electronically without direct communication with the ship, ship managers, or vessel agents. The electronic data may claim a specific flange size is available, but it may not be physically present. If these issues are not identified and addressed during pre-arrival, they can cause delays at berth.

2.1.2 Arrival at Anchorage to Tender Notice of Readiness (NOR)

The subsequent step involves the vessel's arrival at anchorage. Upon the vessel's arrival, several approvals are required before port entrance may be granted, this is documented by a NOR.

- 96 hours before arrival to a U.S. Coast Guard (USCG) Captain of the Port Zone, an Electronic Notice of Arrival (eNOA) is required and triggers USCG and Customs and Border Protection (CBP) vetting activities.
- USCG may require an offshore security boarding based on the ship's previous ports of call or time elapsed since trading in the United States.
- A vessel's material or mechanical condition may prohibit the vessel from entering the port until the observed issue is addressed.



- CBP may have pending actions depending on the ship's cargo and the crew's visa status.

*Note: Some vessels will come directly in and not anchor to conserve fuel but are still subject to the same vetting by USCG and CBP prior to entering the USCG Captain of the Port Zone.

2.1.3 Tender NOR to Call-In Vessel

- Terminal estimations
- Tank availability

When a vessel is at the customary anchorage/location and is ready for cargo operations, the carrier (or agent on the carrier's behalf) will issue a NOR to the terminal(s) the carrier needs to call. The NOR is crucial as it marks the start of laytime, which is the period allowed for loading or unloading cargo.

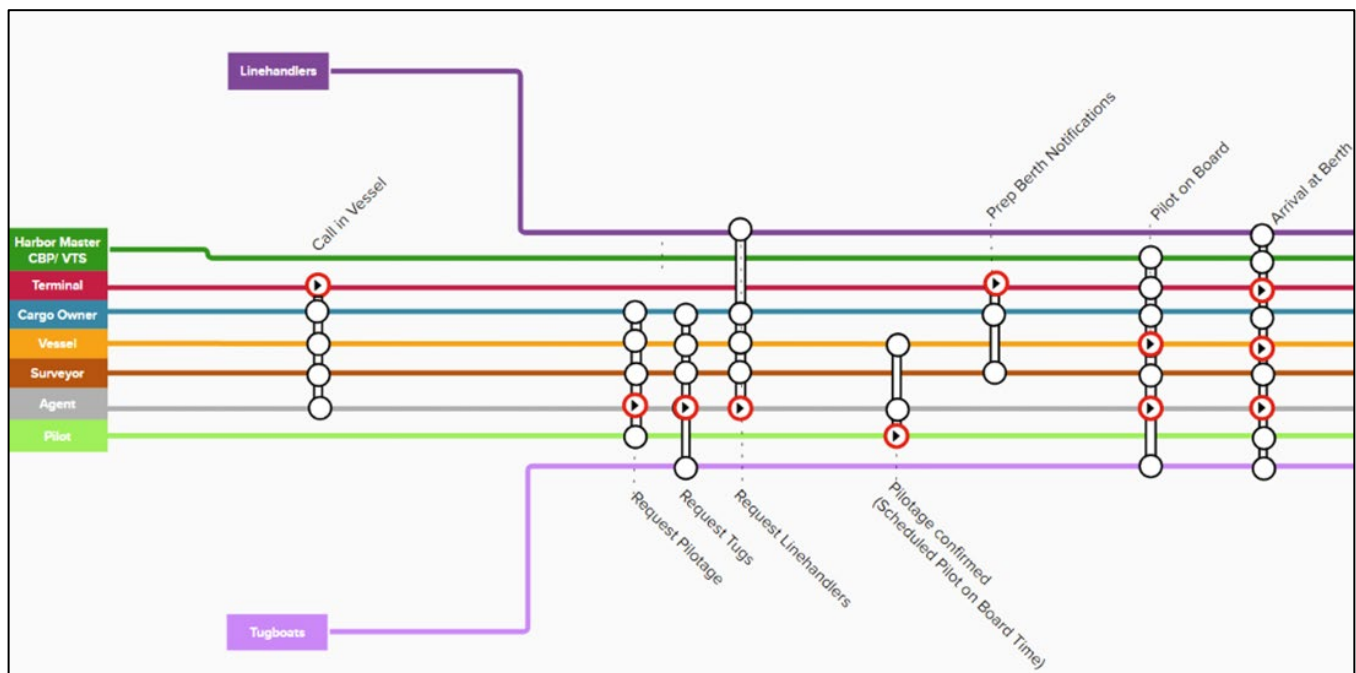
When the terminal receives the NOR, several actions are kicked off, including but not limited to:

- Acknowledging receipt of the NOR
- Checking terminal and tank availability
- If the ship falls within the laycan date, the terminal notifies the agent of the expected berth time availability. An agent, on the shipowner's or cargo owner's behalf, typically initiates the vessel call-in.

2.1.4 Call in Vessel to Arrival at Berth

Upon the terminal calling the vessel in, the agent also requests:

- Pilotage
- Tugs
- Line handlers
- Orders inspectors as well as notify the CBP



Behind the scenes, preparations are ongoing to welcome the ship's arrival. This includes ensuring cargo readiness for immediate transfer upon arrival or, in the case of discharge, readiness of the receiving tank either at the terminal or on board the vessel. This process involves ongoing coordination with all parties, including cargo inspectors, CBP, and the terminal.

If a liquid or gas terminal, the terminal will need to ensure tank readiness, prepare lines, coordinate with cargo surveyors, and manage the dock schedule. The vessel should prepare the tanks/lines, create

transfer plans, and communicate those plans to the terminal for further review and comment. If any additional equipment is needed (i.e., filters, spool pieces, reducers, etc.), that should be agreed upon prior to arrival. Optimally, both the vessel and terminal should strive to optimize the cargo transfer in all aspects so the vessel can spend the minimum amount of time alongside. USCG/ CBP inspections may also need to be managed if applicable.

In parallel, the agent and terminal are actively involved in monitoring the vessel's progress, including tracking when the pilot arrives on board. this tracking is currently available through the Port Bureau's PilotTracker system.

The vessel is considered to have arrived at berth when it is fully secured at the dock - All Fast.

The goal of good pre-arrival preparations is to identify issues and agree on all items that can be planned/aligned before the vessel is alongside. If the vessel and terminal initiate these activities once the vessel is alongside (which, unfortunately, still happens), the preparatory activities delay cargo transfer.

2.1.5 Arrival at Berth (All Fast) to Cargo Commencement

A rule of thumb for ship arrivals and departures is that cargo commencement may be expected approximately four hours after arrival. This time is needed to accommodate activities like gangway rigging, cargo sampling, tank inspections, pre-transfer meeting (regulatory requirement), and hose/arm/crane rigging and preparation. Similarly, before departure, after cargo completion, parties anticipate at least four hours for cargo verification, sampling, pilot and tug ordering, and line handling.

Increasing communication among terminals, agents, and ships, during the pre- arrival process, ensuring mutual agreement on exact specifications required for the ship to commence cargo operations promptly will reduce delays and should result in time saved from arrival at berth to cargo commencement.

Essential steps in the process to get to cargo commencement are:

- CBP clearance for the vessel - either electronic or via an actual visit
- Conduct key meeting to complete the Declaration of Inspection (IMO calls this the Ship Shore Safety Checklist)
- Verify clearance from inspector to begin transfer
- Connection of shore loading arm or hoses
- Cargo commencement

If issues are anticipated and corrected prior to All Fast and the above activities are conducted in parallel as much as possible, cargo commencement can happen in less than the four-hour window.

2.2 Key Players and Their Roles

- i. **U.S. Customs and Border Protection** must determine if the vessel can be cleared electronically or requires a site visit. The key determinants of this decision are the crew member's visa status, cargo documentation, the last port of call, or the time since the last U.S. port call.
- ii. The **U.S. Coast Guard** is responsible for port security and ensuring the seaworthiness of vessels. They may deny port entry or require boarding the vessel to assess its condition.
- iii. **Agents** are responsible for coordinating all agencies, service providers, and terminal scheduling on behalf of the ship owner.
- iv. **Inspectors/ Surveyors** are responsible for verifying the cargo's quantity and quality on behalf of the cargo purchaser. This includes both vessel cargo and onshore products.

- v. **Cargo Owners** communicate the cargo nominations to their respective service providers (i.e., carriers, terminals, surveyors). Escalations will be referred back to the cargo owner for issues such as disagreements, problems with quantity or quality, or significant delays.
- vi. **Carriers** ensure that the vessel arrives within the laycan, the crew maintains adequate rest hours, the vessel remains in good condition, etc. In some cases, carriers have port operations groups that specialize in optimizing port rotations and operations.
- vii. **Terminals** are responsible for safely and efficiently transferring cargo from/to the vessel. Their role, as far as we are concerned, is to optimize the overall process so that cargos are available quickly and vessels do not experience delay at berth.

3. PRE-ARRIVAL INFORMATION – CRITICAL TO EFFICIENCY:

To improve any system or process, determining the key performance indicators 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.

3.1 Vetting, Vessel Information & Questionnaires

Vetting is not a regulatory requirement, but it is a standard industry practice among many charterers and some terminals. The practice employs a combination of public (i.e., Port State Control inspections, public incident information, etc.) and private information inspection schemes such as Ship Inspection Report Programme (SIRE) and Chemical Distribution Institute (CDI) as well as screening against the Office of Foreign Asset Control (OFAC) Prohibited Party lists. Typically, the standard of acceptance is with the charterer of the vessel.

Ship questionnaires as requested by the charterer, terminal, etc., are sent to the vessel owner at the time of vessel nomination. This preliminary information enables the charterer to determine whether the ship is capable of carrying the correct cargo at the agreed-upon loading or discharge rates. The vessel owner also references the specific terminals handbook that the ship's agent distributes. Below are examples of typical questions employed by vessel schedulers and exchanged among multiple parties to ensure vessel, terminal, and cargo compatibility.

Example Ship Questions

• Vessel agent details • Vessel name • IMO number • Vessel owner • Vessel operator • LOA in meters & feet • Beam in meters & feet • Max draft in meters & feet • COC expiration date • Vapor-tightness certificate • Liquid manifold size	• Intended load quantity (bbl) • Cargo tank capacity (bbl, cbm) • Minimum safe air draft height (ft) • Number of generators & operational status • Number of cargo pumps & operational status • Number of compressors & operational status	• Last product(s) in tanks • Expected load/discharge rate (BPH, MTPH) • Pressure/Vacuum valve lift at/setting. Vapor drop chart • Tank vapor header safety valve discharge path • Max. allowable working pressure - product manifold • Ship's Q88
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• Vapor manifold size	• Overfill protection devices & status	• Does the vessel expect CBP / Immigration at dock • Bunkering needed at dock
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This process is made easier by the vessel owner keeping popular questionnaire formats up to date (e.g., Q88, CDI, VPQ, SIRE, VPQ). These standard industry forms are digitally available and contain detailed ship particulars. The carrier sending a standard questionnaire to a counterparty is often effective at fielding any questions that the counterparty might have.

3.2 Cargo Details

Accurate, timely, and specific cargo information is crucial for ensuring safe and efficient operations, as well as maintaining product quality assurance. Delays can occur when current information is not readily available, and preparations based on incorrect information must be addressed.

Product Information	• Product type (hydrocarbon-crude, intermediate, refined product; chemical) • Specifications and grades • Additives or special characteristics • Safety requirements (MSDS)
Quantity and Volume	• Product quantity specifications • Volume measurement method (e.g. barrels, gallons, litres, cubic meters, tons) • Calibration details of storage tanks and transfer equipment
Sampling & Testing Requirements	• Sampling procedures and locations • Testing methods and standards for assessing product quality (e.g., API gravity, flash point, density, sulfur content, ...)
Documentation	• Bill of lading • Certificates of analysis • SDS (Safety Data Sheet) • Product specification and quality standards
Storage and Handling Conditions	• Storage conditions-temperature and pressure • Handling procedures during loading, unloading, and transfer
Logistical Information	• Origin and destination of the product • Mode of transportation (e.g. pipeline, vessel, truck, rail) • Loading and unloading facilities

3.3 Crew Information

CBP and USCG require crew information at least 96 hours before port entry. An initial eNOA for a vessel traveling from a non-U.S. location is required to be accepted by the local USCG at least 96 hours prior to the vessel's arrival at the load port. Updates are required at 72 / 48 / 24 hours before arrival, as well,

even if the ETA remains the same. The agent collects this information in advance to expedite the clearance process.

A standard part of vetting inspections is to review the crew information (e.g., time in rank, time onboard, training, etc.). Crew matrix information may be available via tools like SIRE VPQ and/or CDI VPQ.

3.4 Regulatory Compliance

Vessels carrying hydrocarbon or chemicals must complete an annual inspection with USCG, which is documented in a Certificate of Compliance (COC). Cargo loading or discharge can't commence without a valid COC. As a result, terminals typically do not call in a vessel without a valid COC. Vessels without a valid COC will either require a cargo waiver, proceed to layberth, or have terminal permission to perform a COC inspection alongside.

3.5 Security Clearance for Port Entry (CBP and USCG)

The Office of Foreign Asset Control of the Department of the Treasury is responsible for monitoring vessel traffic from sanctioned countries like Venezuela, Syria, and Iran. CBP and USCG are tasked with checking past ports visited as well as identifying suspected crew members. CBP or USCG may require an offshore boarding before giving a vessel port clearance if suspicious activities have been identified, or if the vessel has not traveled to the U.S. within the last two years. These boardings will delay NOR Tender.

4. TECHNOLOGIES ENABLING EFFICIENT PRE-ARRIVAL INFORMATION EXCHANGE

As mentioned in the previous sections, information is crucial to marine transportation. In addition to “static” information, such as vessel name and cargo, much information is “dynamic,” and the frequent updating of participants in a cargo’s movement is essential. Historically, this was accomplished with paperwork. In today’s environment, radio, telephones, emails, and proprietary data interchanges essentially serve to enable information flows while solutions are emerging for more sophisticated technology platforms to ensure that all participants in a cargo movement “see together, know together, and act together.”

Unlike other ports, the port of Houston does not have a harbor master who mandates data standards and technology for communicating among marine transportation participants. The industry has created several standalone solutions. The Port Bureau is currently sponsoring PilotTracker while several technology companies are attempting to get traction in the local market for their solutions. Continued Ship Channel expansions are expected to grow the number of vessels calling on the port of Houston, placing further stress on marine operations and highlighting the need for efficiency.

4.1 Existing Technology and Application Platforms

Automatic Identification System (AIS)	• The automatic identification system, or AIS, transmits a ship's position. The IMO requires large ships to broadcast their position to avoid collisions. • Several fee-based services provide AIS information to companies including Transocean
Pilot Tracker	• Sponsored by the Port Bureau, PilotTracker provides select information about a vessel, including when a pilot is expected on board the vessel, AIS information, NOR time, etc.

	• This information is pushed out to subscribers according to filters to trigger their workflows and preparations for a vessel arriving at the dock.
Emissions Insider	• Calculates emissions produced at points along a voyage based on a well-tested algorithm, which considers fuel burned, engine type, pump start/stop, shore power, etc.
Terminal Management Systems	• Terminals along the Houston Ship Channel employ multiple systems. The specification of these systems is beyond the scope of this white paper.
Multi-Point Data Exchange	• This service acts as a hub for information exchange by creating a single application programming interface (API) between a data provider/receiver and the hub. The exchange operator maintains and updates the APIs as needed. This eliminates the effort required to maintain multiple APIs for communicating with all counterparties and service providers necessary to support marine transportation. The exchange operator does not own the data. • One provider is Next Port International
Single Point Data Exchange	• Many industry players have established APIs to send and receive data from their service providers. Suffice it to say that the larger providers are regularly sending information to agents and cargo owners, and in some cases, providing limited access to their internal systems to update data.

Many other technologies and applications exist (e.g., UAB, VesonIMOS Platform, Haugen Voyager, ...) and government-sponsored information sources that are beyond the scope of this paper.

With the recent surge in popularity of Artificial Intelligence (AI), triggered by the release of ChatGPT, AI is receiving considerable attention.

4.2 Data Standardization

No single standard for data exchange exists along the Houston Ship Channel. Further discussion of data sharing and shared access for various parties would need to be explored as this would require updated communication protocols and enhanced security measures. Currently, each operator and provider may store and transmit data as they see fit.

4.3 Port Bureau Efficiency Committee Information and Plans

The Port Bureau's Efficiency Committee has drafted several white papers and guides to establish a standard for Houston that is harmonized with evolving international standards. The reader may access...

- Subway Map: visual architecture of the physical and information flows related to a port call
- Data Dictionary: standard for key terms applicable to vessel and channel operations
- Surveyor Communication Document: guide for efficient information exchange with surveyors and related parties

The Efficiency Committee has teams assigned to develop documents for terminals, agents, and carriers.

5. SUMMARY AND PRIORITY OF PAIN POINTS:

Delays are common due to the number of parties involved, current communications practices, equipment issues, weather, and the regulatory and security framework associated with port entry. In other words, delays are highly diverse coming from all parts of this complicated system. Our working group has identified a host of issues that often result in delays:

5.1 Communications

Marine logistics has existed for centuries as a paper process. Electronic communications have greatly improved information flows, but the process continues to follow historical practices.

Point-to-Point Communications	Information communicated via radio, phone calls, and email often updates only one or two organizations. Other organizations that need to know voyage or equipment status may be left out.
Amount of Information	As highlighted in Sections 3.1 and 3.2, each voyage has a substantial amount of information associated with it. Updating each organization's system with the initial information and any changes takes considerable effort, especially if the process is manual.
Multiple Information Paths	- Without a single point for validation, participants in the pre-arrival process receive updates from multiple parties. Depending on the timeliness of these updates and the communication paths they take, conflicts may arise among the different information sources. - These "miscommunications" can occur externally when someone fails to communicate a change to another party (or that party fails to receive that information). Similarly, miscommunications can occur internally when information fails to reach the intended recipient within an organization. Ultimately, it's about providing the correct information at the right time to the right person.
Net-Change vs. Full Update	Some pre-arrival participants communicate the complete set of information, which has its challenges, as mentioned above, while others only choose to send what has changed or what they deem as necessary. This limited set may not reflect the latest view of the voyage.
Information Sharing Obstacles	With the high level of cargo trading activities, many organizations hesitate to share information, fearing that such information might give away a commercial trading advantage. Information sharing delays and/or not sharing information impact efficient operations.

5.2 Equipment

Cargo movement and transfers are dependent on equipment, and deficiencies, either known or occurring in the moment, impact port efficiency.

Unreported equipment deficiencies	• Vessel selection and vetting are often conducted electronically without putting eyes on the vessel. Required equipment may no longer function, flanges may be missing, or gauge ports may not be accurately reported. • One common issue for chemical traffic is missing size reducers, which creates delays in cargo transfers while everyone searches for the correct one.
Mechanical failures - vessel	• Once a vessel is called to dock, it is often assumed that the vessel will arrive in a standard time. Mechanical failures, maintenance, or outages that delay pilot boarding, affect many participants in the pre-arrival process.
Mechanical failures - shore-side	• Upon reaching the berth, shoreside equipment failures/outages and other operational failings impact both the current cargo transfer and subsequent cargoes.
Incorrect drafts reported	• An incorrect draft after the vessel is called requires a re-routing of the vessel.

5.3 Regulatory Processes

USCG and CBP are vital in safeguarding our ports and country. However, their limited staffing and strict processes can introduce delays.

Failure to notify CBP 96 hours before arrival at Anchorage	• CBP will often electronically clear a vessel and avoid delays. However, if the vessel (or agent) fails to submit the required information on time, the vessel will remain in anchorage and be unable to tender a NOR.
Port State Control Boarding	• If a vessel has not had an inspection, or had a U.S. port call in 12 months, or recently visited a designated country, a Port State Control Boarding is required and needs to be scheduled, preferably before arrival at the anchorage, with the USCG.
Certificate of Compliance Inspection (COC)	• Ships cannot transfer hydrocarbons unless the COC is valid. The COC requires an onboard inspection every 10-15 months.
Customs Border Protection	• Customs may require a cargo inspection at the dock. If the appointed time is not well coordinated, immediate cargo transfer is prohibited.

5.4 Insufficient Planning, Documentation, and Coordination or Operational Issues

The pre-arrival process requires considerable coordination among all parties. A delay or error by one party can have a ripple effect on the other parties. This is complicated by customers' changing priorities and cargo trading at the last possible moment.

Incomplete Notice of Arrival	• Vessel not yet on USCG "cleared to enter list".
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Delay in Reporting Material and/or Mechanical Failures Onboard the Vessel	- Requires a Letter of Deviation for inoperable Radar, depth finder, navigation receiver, gyrocompass, steering gear, or other equipment. - Failure of shipboard equipment previously affirmed in the questionnaire (e.g., only one of three ship service generators is functioning).
Last Minute Notifications	Each service provider (e.g., surveyor, line handler, pilot) needs time to plan and optimize their business. Last-minute notifications may delay the specific cargo and impact other work as priorities are reshuffled.
Incorrect Information	Incorrect information (e.g., vessel arrival times, tanks for sampling, manifold size, installation of blinds or reducers, ...) can and will introduce delays.
Tank Changes	Tank changes, whether to optimize or accommodate a prior delay, introduce further confusion into the pre-arrival process. This requires coordination to ensure the tank is ready to receive product or that the surveyor has tested the correct tank.
Cargo Not Present	This can result from miscommunication or delays in truck, railcar, or pipeline movements.
Dock Availability	Often the result of a prior delay, either from another voyage or issues with the current voyage.
Performance Standards	If performance standards such as loading or discharge rates are not adequately specified and confirmed, then delays may occur as performance does not meet the plan.
Customer readiness/nomination	When a vessel tenders NOR, it relies on the customer to be ready and nominate. This is especially true for parcel tankers where multiple cargo owners need to be ready to get in line to nominate their cargo.
Vessel Activities Awaiting Call In	A vessel master may choose to bunker, discharge bilges, clean tanks, perform maintenance, ... while waiting for a call in. These activities may delay call in.

5.5 Labor

The aging marine workforce and tight labor markets have impacted the entire logistics chain. Not only are there trucking delays, but shortages of surveyors can affect the timeliness of inspection results. As service providers attempt to manage costs, they also need to balance that with service availability (number of inspectors assigned to multiple jobs).

5.6 Weather

Storms and fog present significant challenges for the port of Houston, given the long channel that ships must navigate and the restriction on navigation to daylight hours. While the industry has proven resilient to weather events, each one creates unique issues and affects the efficiency of a port call. Heavy winds can affect the arrival or departure of the pilot. Fog events typically occur from November to April, disrupting normal channel operations. Unplanned closures due to channel obstructions, such as vessels

anchored, loss of propulsion, a sunken vessel blocking the channel, or pollution events, all impact smooth channel operations.

6. RECOMMENDED SOLUTIONS AND BEST PRACTICES

Delays are encountered with CBP, causing uncertainty if the vessel “cleared customs” and is authorized to begin cargo transfer, leading to delays on ship arrival. Upon clearance, CBP issues a TPE number, which authorizes the vessel to undertake cargo operations. With this number, vessels and terminals do not need to wait for CBP agents to arrive.

Surveyors are frequently cited for delays in the commencement of cargo operations and for the departure of ships. Research conducted by the Port Bureau has found that many of these delays have their root cause in miscommunication or a lack of communication. Some of these miscommunications are caused by one-on-one communication that excludes the entire group, including agents, terminal personnel, cargo surveyors (inspectors), government agencies, and cargo schedulers. In other cases, the inspector/surveyor may not be in timely possession of information on the cargo loading sequence, shore tank number, or which dock/dock line is designated.

Inspectors’ and surveyors’ duties often begin 24 hours or more before ship arrival. Surveyors need to perform tasks such as, but not limited to, creating a Certificate of Adequacy, Shore Tank Gauging/Sampling, and dock pipeline preparation (conditioning). For more detailed best practice information related to surveyor communications and the scheduling of COC inspections, please see the Port Bureau document: https://assets.noviams.com/novi-file-uploads/ghpb/PDFs-and-Documents/efficiency/GHPB_WP_-_Pre-arrival_Best_Practices_-_Surveyor_Communications.pdf.

For effective pre-arrival communications, the following documents should be delivered 24 hours before arrival, following a widely adopted standard format. This format should communicate key information to agents, terminal personnel, cargo surveyors (inspectors), government agencies, and cargo schedulers. This information should function as final instructions for tank designation, dock line preparation, dock mooring instructions, cargo size connection and compatibility, and CBP Clearance status.

Recommendation	Details
Improve communication of cargo details to inspection companies, more than 48 hours before ship arrival	- Engage surveyors earlier in the process and ensure access to the latest information about the vessel’s cargo and docking instructions at least 24 hours before arrival. - Communicate to inspectors which pipes and tanks will be used for the cargo movement up to 48 hours before ship arrival. - Define the communication path, from the customer to the specific inspection site. https://assets.noviams.com/novi-file-uploads/ghpb/PDFs-and-Documents/efficiency/GHPB_WP_-_Pre-arrival_Best_Practices_-_Surveyor_Communications.pdf
Share Pilot Tracker vessel movement data with necessary stakeholders	- Integrate PilotTracker data into the digital platform. Ensure the inspector, agent, and terminal are jointly advised on the vessel ETA. - PilotTracker provides near real-time data on ship movements in the Houston Ship Channel, which can be helpful to waterside facilities and cargo owners. PortXchange - Greater Houston Port Bureau

Inform all stakeholders of approvals for port entry	- Collect and disseminate all port entry information (<i>Note: this might be a service that the Port Bureau could perform.</i>) - USCG: “Vessels Cleared to Enter” list - CBP: “Acceptable to board” list
Begin key document exchange before arrival	- During the pandemic, the USCG allowed “no contact” Declaration of Inspection (DOI) and Declaration of Security (DOS). Authorize and accelerate this process by reviewing essential documents before ship arrival. - Many of the digital processes developed during the pandemic have been retained to enhance efficiency and safety. USCG continues to support digital submissions and electronic documentation where feasible, reflecting a shift towards more modernized and flexible procedures. However, these streamlining efforts should be extended.
Agents to clear the ship using the Customs Border Protection “Vessel Entry and Clearance System (VECS)” and share the vessel clearance data with all parties.	CBP recently delivered an updated system for the Gulf Coast and deployed the Vessel Entrance and Clearance System (VECS) for ALL PORTS in Texas. CBP has also begun publishing training videos and quick tutorials to https://www.CBP.gov/vecs.
Timely dock schedules	Regularly published dock schedules are critical to optimizing vessel traffic.
Timely Ship Arrival at Dock ETA for Inspection Companies	The inspection company must receive real-time updates on the vessel's exact ETA through vessel tracking systems.
Communicate Port Efficiency improvements to stakeholders	Organize training sessions for all stakeholders to familiarize them with new systems and procedures, including the VECS and standardized data formats. This will help reduce communication gaps and improve overall efficiency.
Advanced sharing of data – all information should be shared 24 hours before Harbor Pilot boarding	- While many of the voyage details were previously exchanged, sharing all information 24 hours before harbor pilot boarding ensures all information gaps are refreshed. The final details should be communicated to the ship, agent, terminal, dock scheduler, and cargo inspector. - Additional advisories received from CBP, and USCG, including DOI, DOS, and CBP clearance information, should be shared as well to ensure a CBP boarding process does not hinder cargo operations.
Establish a centralized information hub for all stakeholders, including agents, terminal operators, cargo inspectors, government	- Exchange key information between ship and shore 24 hours before the ship arrives at berth. - Provide a visual display of the vessel depicted at the future berth with detailed berth information and shore manifold specifications.

agencies, and cargo schedulers.	• Verify ship acceptability. Ensure there is no inoperable equipment that affects cargo operations or any deficiencies requiring a letter of deviation from the Coast Guard.
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7. BENEFITS OF IMPROVED PRE-ARRIVAL INFORMATION PROCESS:

Process Improvement	Benefit
Decreased time at dock, resulting in additional dock capacity	• Typically, 8 hours of each ship's port visit is allotted for final determination of details, which could be sorted before vessel arrival and departure. • If 2 hours of delay were removed from an average ship visit, 5% more ships could conduct commerce at the same dock.
The ship and shore are ready to commence cargo operations immediately	• Example of final pre-arrival briefing to ship: The ship must be capable of connecting to two 16"/400mm ANSI 150 raised surface flanges and two 10"/250mm for vapor collection; all cargo tanks are entirely inert, with an oxygen content of less than 8% by volume. The terminal operator is responsible for monitoring the oxygen levels in the cargo tanks. • Reduce delays and variances.
All stakeholders agree on cargo quantity, options, and handling instructions	• All interested parties have the most up-to-date cargo orders, eliminating the need for verification of changes to orders. • Reduce delays and variances.
The status of CBP and USCG permission or actions has been widely communicated to stakeholders	• Informed of needed security boarding before port entry • Informed of USCG operational control imposed (Captain of the Port order, or Letter of Deviation) • Informed of the status of CBP clearance to board the ship and begin cargo operations • Status of ship held Certificate of Compliance, issued by USCG, certifying its ability to commence cargo operations • Reduce delays and variances

All the aforementioned recommendations and benefits hinge on three forms of waste typically identified in lean speak:

- Defects: these arise from inconsistent processes, miscommunications, and highly variable activities.
- Over Processing: checking and re-checking information to ensure that one has the latest status of the shipment.

- Waiting: due to the defects, delays are created.

7.1 Time and Cost Savings

Docks already lose several hours after the departure of one ship while awaiting the next. Ship particulars, Q88 or Gas Form C, and berth fit information were previously exchanged at the time of ship nomination and fit a wide range of ships in the category; resulting in ship approval; most parameters are confirmed (length, width, draft), but a further check needs to be verified just before vessel arrival to be certain the vessel is immediately ready to perform cargo operations. This includes a manifold match to the terminal and fully operational equipment on the ship at the time of berth arrival. If the ship cannot immediately perform, the dock is inefficient. Some examples: ships don't have necessary cargo manifold adapters to match the terminal, diminished capacity for receiving or delivering cargo, the onboard electrical system is not fully functional, and regulatory action is pending on the ship.

8. IMPLEMENTATION CHALLENGES AND CONSTRAINTS:

8.1 Commercial Impact

Carriers and customers are reluctant to publicly share operational vessel and facility schedules, product information, and quantities, as this information may provide competitive insights and could influence cargo trading strategies worth significant sums of money.

Vessel information, however, is widely available, such as automated ship position information. Subscription services like KPLER offer data with real-time monitoring of tenders, diversions, and installation outages and capacities. Consequently, the aforementioned issues have less relevance.

8.2 Integration with Existing Systems

As we strive for more collaboration and information sharing, the old ways of emails or phone calls create manual efforts and overload schedulers who are already busy. Computer system data exchange presents its challenges, requiring the normalization of data. Today, no standard digital schema exists for a port call. The industry and the Port Bureau are working in that direction, but without a standard digital schema, each pair of companies developing a digital connection is likely doing a bespoke connection. Connecting with another partner means another custom connection that adds time and cost to the equation.

Equally important is the choice of systems. Parties along the Ship Channel will not willingly replace their legacy computer systems to accommodate a common platform that supports all stakeholders.

8.3 Regulatory Framework

8.3.1 International Maritime Organization (IMO) Guidelines

The International Ship and Port Facility Security (ISPS) provides a framework through which ships and port facilities can cooperate to detect and deter acts that pose a threat to maritime security. The code enables the detection and deterrence of security threats within an international framework. This code guides international shipping, and in many ways is equivalent to the USA Marine Transportation Security Act.

8.3.2 Regional and USA Regulations

Marine Transportation Security Act 33 CFR 105 gives the USCG and the Department of Homeland Security (DHS) the authority to regulate vessels and facilities located on or near waterways under U.S. jurisdiction.

Facilities Transferring Oil or Hazardous Material in Bulk 33 CFR 154 applies to each facility that is capable of transferring oil or hazardous materials, in bulk, to or from a vessel, where the vessel has a total capacity, from a combination of all bulk products carried, of 39.75 cubic meters (250 barrels) or more.

9. IMPLEMENTATION CONSIDERATION

9.1 Stakeholder Collaboration

The maximum benefit would be realized if equipment and vessel status were transparent through a common information source to all parties on the “subway map”. Communication among a subset of the stakeholder group leads to information discrepancies. (Stakeholders: harbor, USCG, CBP, terminal, cargo owner, vessel, inspector-surveyor, agent, pilots/tugs/mooring)

9.2 Developing IT Infrastructure

Several companies are proposing a web-based dashboard for scheduling, document management, and communication among all parties involved: agents, government agencies, ship operators, customers, cargo inspectors, and terminals.

Without consistent, well-defined processes, digitization presents its challenges. A large part of the Efficiency Committee’s effort is directed at extracting best practices so those processes can be documented. From there, digital message schemas can be developed so that systems (regardless of the vendor that builds them) can communicate with each other.

9.3 Updating of Protocols and Improving Existing Processes

9.3.1. Low Tech Option

Deploy an updated PilotTracker to a broader port stakeholder group. PilotTracker provides ship movement information but is not subscribed to by enough “involved parties”. Inspector arrival delays would be lessened if a precise vessel ETA was communicated.

- Study the electronic exchange of key documents like Declaration of Inspection (DOI), and Declaration of Security (DOS) prior to vessel alongside, and ensure that regulatory authorities would accept the regular use of the practice.
- Exchange the ship’s and the terminal’s precise manifold fit measurements prior to ship arrival.
- Identify a reliable data source from Coast Guard and Customs and Border Protection to broadcast that the vessel is cleared for entry.

9.3.2. Technical Option

A more comprehensive solution would involve using a third-party software platform as a means of data exchange

- Trial and select an information platform as a central hub for data exchange among stakeholders and vessels.
- Deploy an updated PilotTracker to enhance information capture and sharing.
- Include DOI and DOS exchange prior to vessel alongside.
- Identify a reliable data source from Coast Guard and Customs and Border Protection to broadcast that the vessel is cleared for entry.

10. IN CLOSING

Delays to efficient commencement of dock operations are the result of a pre-arrival process that is not sufficiently thorough. Pre-arrival reviews are conducted electronically, often without direct

communication with the ship, ship managers, or vessel agents. USCG may require offshore security boarding before the ship is allowed entry based on the ship's previous ports of call or time elapsed since trading in the United States. Ships may also be prohibited from entering the port based on material and/or mechanical conditions, and CBP may delay the stakeholders' boarding until the ship is cleared.

The pre-arrival process involves real-time information sharing and **coordination** among all **involved parties**: agents, government, ship operator, customer, cargo inspector, and terminal. The terminal further determines tank readiness or if/when the cargo is scheduled to be in place.

Essential steps in the process for cargo commencement are:

- CBP clearance for the vessel – either electronic or by visit
- Key meeting to jointly (ship/shore) complete the DOI and DOS
- Connection of the shore loading arm or hoses
- Clearance from the inspector to begin the transfer

Several information platforms are emerging that could facilitate informing **the involved parties** of schedule or status changes. PilotTracker is a good start. Additionally, several companies have developed systems to coordinate vessel/terminal status, exchange key documents, and improve overall efficiency.

[Marine Data Hub \(MDH\)](#) streamlines pre-arrival communication by consolidating data from multiple stakeholders into a single dashboard, minimizing email overload. By enhancing an existing platform utilized for over 100,000 annual charterer-to-vessel operator dialogues, MDH guarantees timely access to essential information while safeguarding proprietary data privacy. Its widespread adoption among major oil charterers positions MDH as an effective tool for enhancing port call efficiency.

Upon completing this paper, our next step is to share the findings with port stakeholders to move in a positive direction towards improved port efficiency.

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.

Disclaimer: *PilotTracker is a platform sponsored by the Port Bureau. The Efficiency Committee does not advocate or endorse any one system. The inclusion of specific marine software applications and services is for informational and illustrative purposes only and does not constitute an endorsement of any one technology over another.*