# Cargo Time Release Study

## Annex for Final Report (Phase 1)

26 May 2015

Homeland Security

Science and Technology

*Prepared for the*
Department of Homeland Security
Directorate for Science and Technology
Capability Development Support Group (CDSG)
Operational Requirements and Analysis Office (ORA)

## HOMELAND SECURITY STUDIES AND ANALYSIS INSTITUTE

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HSSAI's research is undertaken by mutual consent with DHS and is organized as a set of discrete tasks. This report presents the results of research and analysis conducted under

**Task 15-13, DHS Cargo Time Release Study, Phase 1**

The purpose of this task is to conduct phase 1 of the two-phase DHS time release study that measures the average time taken between the arrival of goods at the border and their release by the government. This task will develop the data collection and analysis methodology for the time release study.

The results presented in this report do not necessarily reflect official DHS opinion or policy.

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An FFRDC operated by Analytic Services Inc. on behalf of DHS

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# STUDY PLAN FOR THE CARGO TIME-RELEASE STUDY

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# 1. INTRODUCTION AND BACKGROUND

This study plan describes work intended for execution under phase 2 of a cargo time-release study (TRS). Phase 1 of this study was to conduct research and analyze potential sources of data in order to develop a plan for execution of the TRS during phase 2. The primary result of phase 1 was preparation of this study plan.

## 1.1. Background

Executive Order 13659, "Streamlining the Export/Import Process for America's Businesses," signed by President Barack Obama on 19 February 2014, directs all U.S. federal agencies with a role in trade to complete development of a single electronic system for receiving and processing all export and import cargo, known as the International Trade Data System (ITDS), by December 2016. ITDS, which is being developed as part of U.S. Customs and Border Protection's (CBP) Automated Commercial Environment system, will provide a single electronic window that eliminates paper processes and duplicative reporting requirements. Executive Order 13659 also directs agencies to measurably improve supply chain processes and the identification of illicit or noncompliant shipments. To accomplish this, as well as to assess the impact of the deployment of ITDS, the U.S. government must first establish a baseline measurement of current processes.

The Department of Homeland Security (DHS), in partnership with other key agencies with border responsibilities, seeks to complete a TRS that measures the average time between the arrival of goods at the border and their release by the government. This TRS would establish baseline trade facilitation performance measurements; help to identify bottlenecks, inefficiencies, and other potential areas of improvement in the cargo release process; assess newly introduced and modified techniques, procedures, technologies, and infrastructure;[1] and inform recommendations to trade processes.[2] It will be particularly informative as the U.S. government works to implement the ITDS and related trade process improvements as required by Executive Order 13659.

However, U.S. government agencies currently have limited insight into the average length and causes of cargo delays at the border. CBP's current import system receives inconsistent and sometimes incomplete time-of-arrival data. Time of release is also not consistently available, particularly when a hold and subsequent release is the result of another agency's actions. As a result, assessing the length and common causes of cargo delays may require multiple data collection methods and combination techniques, possibly including manual collection, and the involvement of multiple agencies and filers. Similarly, a major part of the task team's role may be to determine not only the availability of data, but also how those data could or should be combined or evaluated to

[1] World Customs Organization, *Time Release Study* (Brussels: World Customs Organization, 2011), 9. Other reasons to conduct a TRS per the WCO can be found on page13 of the same report.

[2] Shingo Matsuda, "The Time Release Study as a Performance Measurement Tool for a Supply Chain and an International Corridor," *World Customs Journal* 6, no. 1 (2012): 80.

provide a more comprehensive understanding of current release times, as well as the context in which they occur.

## 1.2. Purpose and Objectives

The purpose of this study plan is to describe phase 2 of a two-phase TRS. This plan for execution of the TRS is based on the first phase of the study, which analyzed other TRS methodologies and available data to develop the data collection and analysis methodology in this study plan. The purpose of this study plan is to execute the TRS to yield a baseline measure of cargo time to release for imports into the United States.

To develop this study plan, the task team drew upon established TRS methodologies, including those provided by the World Customs Organization (WCO).[3] The WCO recommends that TRSs include three phases: preparation, collection and recording of data, and analysis of data and generation of conclusions.[4] The first phase of the task covered preparation and planning for the TRS, resulting in this study plan. This study plan covers data collection and analysis.[5]

Based on our findings in the first three steps, this study plan is based on the following questions:

- What existing data would be used for analysis in phase 2?
- What additional data should be collected?
- How will additional data be collected from PGAs?
- What locations and sites serve to provide data samples?
- How will the data be analyzed once collected?

[3] An example of one such reference point would be World Customs Organization, *Guide to Measure the Time Required for the Release of Goods*, version 2 (Brussels: World Customs Organization, 2011).

[4] Ibid 14.

[5] In the course of this work, shortfalls in available data may yield recommendations for data to collect for future TRS.

# 2. SCOPE AND GOVERNANCE

At the direction of DHS, this TRS includes analysis of goods arriving by sea, air, and vehicle ports of entry. It excludes consideration of imports via mail, because differences in import procedures for postal cargo render that domain unrepresentative. Consideration of rail imports and imports via courier services were considered during phase 1, but it remains unclear whether rail and courier services (as a separate import mode) will be included in the scope of phase 2.[6] Initially, CBP directed the task team to exclude rail on the assumption that acquiring necessary data would be too time consuming for the time available for this task. But some stakeholders have expressed an interest in including rail, and the study team has been able to gain some data on rail. As a result, the study team expects to include rail if possible. The high volume of in-bond cargo, along with the realities of operational holds on a portion of a train manifest, may limit accuracy of time release data for the rail-freight mode. The study team and guidance committee have yet to determine whether courier services may easily be separable within the volume of cargo arriving by air.

The scope of TRS methodology is highly dependent on data provided by CBP, as well as partner government agencies (PGAs)[7] with the ability to hold cargo at the border. Following guidance of government,[8] the study team plans to examine the following nine partner government agencies PGAs for closer consideration during the TRS (in alphabetical order):

- the Agricultural Marketing Service (USDA/AMS),
- the Animal and Plant Health Inspection Service (USDA/APHIS),
- the Consumer Product Safety Commission (CPSC),
- the U.S. Environmental Protection Agency (EPA),
- the U.S. Fish and Wildlife Service (DOI/FWS),
- the U.S. Food and Drug Administration (FDA),
- the U.S. Food Safety and Inspection Service (USDA/FSIS),
- the Fisheries service of the National Oceanic and Atmospheric Administration (NOAA-F),[9]

[6] This scope issue will be resolved in consultation with the government oversight committee as the data analysis in phase 2 matures.

[7] There are 47 PGAs involved in customs work. Reference: ACE Business Office, *Automated Commercial Environment Program, Concept of Operations*, v 8.0 (Washington: U.S. Customs and Border Protection, May 2013).

[8] Keith Devereaux, private communication, as e-mail to Jennifer Jacobs (copying DHS stakeholders who critically defined the scope of the effort), March 19, 2015.

[9] Formerly called the National Marine and Fisheries Service

- and the National Highway Transportation Safety Administration (DOT/NHTSA).

As appropriate and if available, data may be collected from port authorities and private-sector organizations.[10] The task team may, depending on the amount and type of available data and in consultation with the oversight committee, further scope the study to ensure that any analysis conducted can be fully evaluated.

Finally, though the study will include data from across the U.S. government, it will not look at the specifics of policies or procedures, except insofar as they affect the overall time to release cargo from customs. Though the study team will consider data measures that may inform prospective analysis of policies or procedures, this study only considered how to measure various times within the cargo operations.

## 2.1. Government Oversight Committee

In phase 1, the study team guided the formation of a working group consisting of critical personnel who will be involved in the task. This group included personnel from CBP and the Border Interagency Executive Council (BIEC), which represents other government agencies heavily involved in cargo processing. The working group's tasks included helping the study team to identify relevant data and data sources. The working group assisted the study team with identification of relevant subject matter experts (SMEs) and facilitating access to the SMEs and other sources of data. Additionally, the BIEC served as SMEs through this phase of the study, providing advice throughout the effort and helping to shape the methodology for phase 2.

To formalize their role in the study, the study team has sought formal oversight by a subcommittee of the BIEC to ensure government guidance on critical assumptions and methods applied during execution of this study plan. This approach decreases the risk of overlooking critical data sources or neglecting a significant stakeholder point of view.

[10] These data may be especially useful to establish time values for cargo that has no holds or reviews placed, thus has limited time data entered in the Automated Commercial Environment or PGA databases.

# 3. GENERAL APPROACH

In phase 1, the study team identified government data sources that may inform the purpose of the phase 2 study—establishing a performance baseline for the customs system for imports. The team sought data sources that were representative of the general performance of the system—for instance, those that capture data over a sufficiently long time span and volume of cargo traffic to preclude bias by random occurrences.[11] It seems likely that we will have access to relevant data for essentially all ports of entry. If so, it will not be necessary to constrain our analysis to a subset of locations or sites.

During execution of the study, as much of the identified data as possible will be collected and added to a database to be used for analysis. In general, various queries to the database will then be defined to measure times to release. However, these queries will be refined to group times to release for different populations of goods and correlations that may highlight critical effects on these times to release. For example, in phase 1 we learned that the complexity of the cargo process required a good understanding of the relevant processes, as well as the data collected during cargo processing. As a result, the study team identified that data for the different transportation modes may have strikingly different meaning in the data collected. As a first step, then, the study will be subdivided into the analyses shown in table 1.

**Table 1. Decomposition of the TRS into different sub-analyses**

| | Sea | Air | Truck | Rail |
|---|---|---|---|---|
| Direct | $t_1$ | $t_3$ | $t_5$ | $t_7$ |
| In-bond | $t_2$ | $t_4$ | $t_6$ | $t_8$ |

We intend to further characterize the data that we receive along other relevant parameters, both through summary statistics and in our time-to-release results. Additional detail on the application of this general approach is provided in the next two major sections.

[11] We note that this scoping choice might bias the task team toward sources with automatic, as opposed to manual, data collection methods, since these data are collected with greater fidelity over a longer duration.

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# 4. ASSUMPTIONS AND CONSTRAINTS

The assumptions and constraints on the execution of the TRS reflect our heavy reliance on government data available for the study and its applicability to known cargo-release processes. When relevant processes are not clearly linked in the data, assumptions to establish proxy measures will be used. These additional assumptions will be developed during the course of study execution. The list of assumptions will be maintained by the study team and shared with the government oversight committee and other SMEs as needed.

The study-wide assumptions are:

- The study team will continue to have adequate access to critical personnel within CBP and PGAs, to learn about critical cargo-release processes and data that may be available.
- Port operations and PGA processes are defined well enough to form the basis for a measurement methodology.
- There is sufficient granularity in the data to account for differences across transportation modes and context of shipment (e.g., whether the cargo is shipped in-bond).
- There is sufficient granularity in the data to allow for division by other characteristics that may provide insight into cargo-release processes.

The constraints on phase 1 included:

- Our knowledge of CBP and PGA processes is subject to ongoing support provided by SMEs supplied by the government.
- The study's results will rely strongly on the data provided by the government.
- The resources and schedule for study execution may limit the amount of finer-grained analysis seeking to provide deeper insight into cargo-release processes.

For phase 1 of the TRS, the study team enjoyed excellent input from various government sources. As a result, these assumptions and constraints had little impact on the execution of phase 1.

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# 5. METHODOLOGY

As noted in the general approach, the methodology is straightforward: collect the relevant data, assemble it into a database to use for the analysis, then query the data to generate measurements of time to release.

The primary measure of time to release will be the difference between the arrival of cargo at a port and the release of the associated entry and removal of any holds by CBP. Most PGAs operate through CBP or have their clearance as a requirement of CBP entry release or removal of CBP holds. Therefore, data collected by CBP recording the actions of its customs officials should generally suffice for calculating times to release. For goods transiting in-bond across the country to an inland port of entry, some PGAs, such as APHIS, require CBP intervention at the port of arrival while others, such as EPA, require CBP action at the port of entry. Any calculation of time to release would have to account for processes at both ports.

The PGAs with warrant to act independently of CBP complicate this picture, and their actions will need to be accounted for through independent data collection. A few, such as FDA, have the capacity to place holds on goods independent of CBP. Additionally, FSIS and AMS both require importers to present specific types of goods to their inspectors for clearance after CBP release but before entry into commerce. Prior to CBP releasing entries on those types of goods, these PGAs simply require that the filer (either the importer or the broker) present documentation proving that the PGA is aware that the goods are arriving in the United States. Representatives of these PGAs expressed varying levels of confidence that even this requirement is regularly enforced by CBP. Therefore, the study team needed to collect data from these PGAs as well as from CBP to ensure that the team calculated an accurate baseline time to release.

Even with these data from CBP and the PGAs, there are unavoidable complications that affect the precision of any estimates gleaned from them. Data in many fields are entered manually, often hours after the action recorded took place. Additionally, some fields, in both CBP and PGA data, record only dates, rather than dates and times, which necessarily blunts the precision of estimates that rely on these fields. Further, as will be discussed later, different modes of transit entail differing types of delays, which may not be reflected in datasets built to be mode-agnostic. All of these factors will make any time-to-release estimate less precise and could additionally bias those estimates in one direction or another. The study team will endeavor to point out these complications and control for them where able.

## 5.1. Data Already Collected

The study team received sample or full data sets from four PGAs as well as from CBP. These data sets all included time entries for various activities of interest, along with other secondary variables for characterizing the data. In particular, we sought times, characterization of the imports affected by each PGA, whether the arrival included in-bond transit, and descriptors of the importer or broker. From the other five PGAs, we have received or hope to receive at least the six-digit HTS codes that an agency targets or

regulates. When combined with CBP data on imports, following the HTS code, these data may be used to estimate the proportion of imports under the auspices of each PGA. Alternatively, we may need to use SME estimates of import volumes.

### *5.1.1. CBP Data*

The study team has been working closely with the Automated Commercial Environment data team to identify appropriate data sets for the TRS. The study team anticipates collecting data on all consumption entries other than those bound for foreign trade zones (i.e., entry types 1, 2, 3, and 7)[12] for fiscal year 2014. For each entry, the data should include a potential start time for time to release (for instance, arrival time or entry submission time) as well as potential stop times (holds removed or entries released). Preliminary surveys of the data suggest that most observations have an arrival time from one source or another; the remaining few that do not will be dropped from the study. Additional categorical data for each entry will help us characterize the product(s) included in the entry, the method that the product transited to and through the United States, and the importer or broker filing the entry.

### *5.1.2. PGA Data*

Data from PGAs supplement the data received from CBP. Time data from PGAs whose actions are required for release from the port of entry will be used to provide a potential alternative stop point for calculating time to release. For instance, if the last FDA action taken on an entry occurs later than all stop points from the CBP data, then that would be the stop point we use. Time data from PGAs whose actions occur after the release from the port of entry will be used as secondary start and stop points to calculate an additional delay to add to the time to release. So, for instance, a shipment that leaves the port and arrives at an FSIS inspection station after a couple of days for a day-long inspection will receive an additional day in the final time to release. Table 2 describes the data received during phase 1 and how the study team generally anticipates using this data.

[12] Entry types 1, 2, 3, and 7 refer to imports that make entry as general consumption goods, quota or visa limited goods, goods covered by antidumping or countervailing duties, and goods covered by a combination of quotas/visas and antidumping/countervailing duties, respectively.

**Table 2. Data the study team received during TRS phase 1**

| PGA | % of imports affected | Estimate time delay using: | Notes |
|---|---|---|---|
| DHS/CBP | 100% | CBP data | Primary data source for most other PGAs as well |
| HHS/FDA | % of total entries in FDA data | FDA and CBP data | FDA final action used as stop point if later than CBP |
| CPSC | % of total entries in CPSC data | CPSC and CBP data | CPSC exam used as stop point if later than CBP |
| USDA/APHIS | APHIS HTS codes as % of total entries or estimates from SMEs | CBP data | Holds are thru CBP, no additional time data required |
| USDA/FSIS | % of total entries in FSIS data | FSIS and CBP data | FSIS custody time added to main time to release |
| DOI/FWS | % of total entries in FWS data | FWS and CBP data | FWS clearance used as stop point if later than CBP |
| USDA/AMS | AMS HTS codes as % of total entries | SME elicitation | Est. AMS custody time added to main time to release |
| DOC/NOAA-F | NOAA-F HTS codes as % total entries | CBP data | Holds are thru CBP, no additional time data required |
| DOT/NHTSA | NHTSA HTS codes as % of total entries or estimates from SMEs | CBP data | Holds are thru CBP, no additional time data required |
| EPA | EPA HTS codes as % of total entries or estimates from SMEs | CBP data | Holds are thru CBP; unclear as yet whether additional data required |

## 5.2. Additional Data Collection

Given the constraints and data already in hand, the study team aims to collect data primarily from CBP, with supplemental data from PGAs where necessary and available. The study will use a shipment (which is the combination of an entry with a valid bill) as the primary unit of observation, but records from these disparate sources will be combined using entry number as the common key. Many of the PGAs consider their data at a level lower than the entry, which will require some aggregation or careful parsing of the data.

For the full study, we will consider data from the entirety of fiscal year 2014 (1 October 2013 to 30 September 2014). A full year of data allows for the best control for seasonal fluctuations in trade. Because our study will involve primarily automatically collected data, this approach is feasible.

### *5.2.1. Customs and Border Protection*

The study team has been working in cooperation with CBP to determine the exact data we will need to complete phase 2 of the study. However, we do know that, for shipments with no PGA involvement with the cargo outside of CBP custody (a significant majority of shipments), these data will be our only source of information. Additionally, for most records, CBP data will serve as the primary source for start times (combination of shipment arrival times and entry submission times) and stop times (combination of entry

release time and hold release time). CBP data will also serve as the primary source for secondary information for characterizing cargo. These data will include items like the size of importer, HTS code, flags for perishable goods/hazardous materials, or the type of exam performed (if any). These data will allow the study team to ensure we have a representative sample, will serve as the basis of various sub-sample analyses, and will help future studies determine to what extent their conclusions are comparable to our own. Finally, the CBP data will provide the information on mode of transit and in-bond status, which will serve as the initial vectors along which the study team will calculate the time to release.

### *5.2.2. Food and Drug Administration*

The study team has received a full FY14 sample from FDA. The fields for this data set include entry numbers, product code, mode of transit, port of entry, entry date, date of final FDA action, and nature of final FDA action. Note that although the sample includes more than 30 million records, it does not account for more than 30 million unique entries. This is because the FDA tracks its data at a sub-entry level, though the recorded final actions and times appear to be the same for those records with the same entry number. Instead, it seems that the division at the sub-entry level is to differentiate entries with multiple product codes. Therefore, entry number can be used to link records in the FDA data to those in the CBP data, with mode of transit and entry port codes used to confirm the link. It is also useful to note that the final action times for the FDA are solely in terms of dates, rather than dates and times. This is of interest because, for those shipments with entry numbers in the FDA data set, final FDA action could serve as another potential stop point, provided the final FDA action comes later than the related entry release and hold overrides from the CBP data. The remainder of the fields in the FDA data set can be used to supplement the CBP data in characterizing our sample.

### *5.2.3. Consumer Product Safety Commission*

Similar to the FDA, the study team has received a full FY14 sample from CPSC. The fields for this data set include entry number, exam date, arrival date, requested action, and targeting code from CPSC's targeting system. The entry numbers in the CPSC data set are all unique, so they can be readily used to link to the CBP data. The arrival times from the CPSC sample are frequently blank and are of uncertain provenance, so the study team will likely stick with the arrival times as reported in the CBP data. The arrival times, along with exam times, are also reported as dates, as opposed to dates and times. This is of interest because, similar to with the FDA, exam times will be used as an alternative stop point for shipments in the CPSC data set if the exams occurred after entry release and all holds were removed. In some cases, goods receive a provisional release from CBP, and CPSC instead inspects the goods at the importer's warehouse off-site from the port. Because we only have a date for the inspection, we cannot parse out when these goods left the port and when CPSC returned to begin the inspection process. Therefore, our estimates will include the trade's transit times and will more accurately reflect the performance of the trade-government system. Information on targeting and requested CBP action will complement the information from CBP data in further characterizing our sample.

### 5.2.4. Fish and Wildlife Service

The study team received one week's worth of sample data (from a week in late January 2015) from FWS to confirm the utility of their data. FWS intends to send a full set of FY14 data to be used in the main study. The fields in this sample data set include entry number, date and time cargo was presented to FWS, date and time cargo was cleared by FWS, and filer's predicted arrival date. Because FWS has no linkage to CBP systems, entry numbers were those reported by the filer rather than by CBP. As such, 8 percent of the entry numbers were completely indecipherable and an additional not insignificant percentage could be simply inaccurate. This, in additional to some duplicative entry numbers, will complicate the linkage of FWS data to CBP data, but will likely only truncate the sample of usable FWS data rather than proscribe its use entirely. As importers must present some goods to FWS for inspection and clearance before entering into commerce, the reported clearance times will be used as an alternative stop point if they are later than all CBP actions.

### 5.2.5. Food Safety Inspection Service

The study team received sample data from FSIS covering the period from 1 January to 1 March 2015 to confirm the utility of their data. As with FWS, FSIS still intends to send a full data set of FY14 data to be used in the main study. The fields in this sample data set include entry number, HTS code, lot number and weight, date and time that a lot was presented, type of inspection and completion date, and final disposition of lot. "Lot" refers to the unit of observation used by FSIS, which is a subunit of shipment. It appears that lots are mostly used to determine the inspections to be performed and that all lots with the same entry number have the same presentation time and clearance dates. However, the study team will check to ensure that this pattern holds in the full sample to make sure this data can be appropriately linked to CBP data during the study. Additionally, though importer presentation has a date and time associated with it, the completion of inspection is recorded only as a date. This is of interest because importers must present some goods to FSIS for inspection and clearance following CBP release but before entering into commerce. Thus, the study team will find the difference between the last inspection date (as most lots have more than one inspection) and the presentation date, and add that time to the calculated time to release from CBP data for the relevant shipments.

### 5.2.6. Agricultural Marketing Service

The study team has received a list of HTS codes relevant to AMS. AMS does not keep any centrally stored data on the goods it inspects or when those inspections take place. This is of interest to the study because importers must present some goods to AMS for inspection and clearance following CBP release but before entering into commerce. To estimate the added delay this process causes, the study team intends to reach out to SMEs from AMS and its deputized state offices to estimate the average time that inspections delay goods from entering into commerce. These estimates will be added onto the calculated time to release from CBP data for shipments with HTS codes within AMS's scope. The study team is currently working with AMS to solidify the list of SMEs with

whom the study team will speak. The method for aggregating these estimates (e.g. by location or by product type) will depend on the SMEs the study team talks with and the estimates they are able to provide.

## 5.3. Data Analysis

The five key data points that the WCO considers crucial are times for the "arrival of goods, start of unloading, start of placing goods in temporary storage, registration of Goods Declaration, release of goods."[13] This compares to the more than 16 time points that the WCO recommends collecting data on for a full TRS.[14]

However, the CBP and PGA data sources do not contain enough information to satisfy the WCO's simplified study, so some adjustments and assumptions must be made on the part of the study team. For instance, for the primary time to release, we assume the start time for calculating time to release to be arrival times across all shipments, including for those shipments where businesses submit their entry after release. This delay, while not the fault of the government, is still a delay because of government policies. Importers that submit insufficient entry documentation have delays that count toward time to release, as should those that submit no documents at all. Further, these sort of delays are the exact sort that will be most affected by ITDS, so they are especially worthwhile for us to capture. That said, we will also separately calculate the time from entry submission to release to track how long these shipments take to clear following entry submission. Additionally, delays generated due to filer errors (e.g., for late or incomplete documentation) will be secondarily reported separately from those due to government action (e.g., for compliance assurance).

As stated earlier, the stop time will be the latest of entry release time, hold removal time, and the time of the last pre-release PGA action. Any post-release PGA activities required for entry into commerce will be appended to this primary time-to-release calculation.

In addition, some entries are submitted and cleared prior to arrival. In theory, these shipments, which represent the bulk of all shipments entering the United States, have no delay due to government processes. If we had access to the data points recommended by the WCO, we could calculate delays due to such trade activities as unloading or in-bond transit. However, for these "pre-cleared" shipments, the last data point we have is the arrival time. Therefore, for the main calculation, we will use arrival time as both the start and stop point, making the calculated time to release zero. However, our discussions with stakeholders suggest that businesses and the government would also be interested in some additional time metrics for these shipments. For businesses, it is useful to know how far in advance of arrival these shipments clear, so we will report the difference between the arrival time and the traditional stop point. For the government, it is useful to know how long it takes for these shipments to be processed, so we will also report the difference between the entry submission time and the traditional stop point.

[13] World Customs Organization, 38.

[14] Ibid., 40.

Another attempt to simplify the data will be the calculation of eight separate times to release by mode of transit and in-bond status. This is to accommodate procedural differences between each of the modes of transit and between direct and in-bond shipments. The insufficiency of available data affects each of these differently, and each may thus require different accommodations. These separate times to release can be aggregated up to an overall average time to release, though, given the caveats of each section, this may not be recommended.

The following subsections will discuss how time to release will be calculated by mode of transit and for in-bond shipments and the complications that could arise with our approach.

### *5.3.1. Seaborne Cargo*

The bulk of imports come into the country through seaports, but the peculiarities of the data available for sea cargo will require the study team to make adaptions to the generic approach for calculating a time to release. Figure 1 represents the timeline that will guide development of study assumptions and calculation of time to release for directly shipped seaborne cargo.

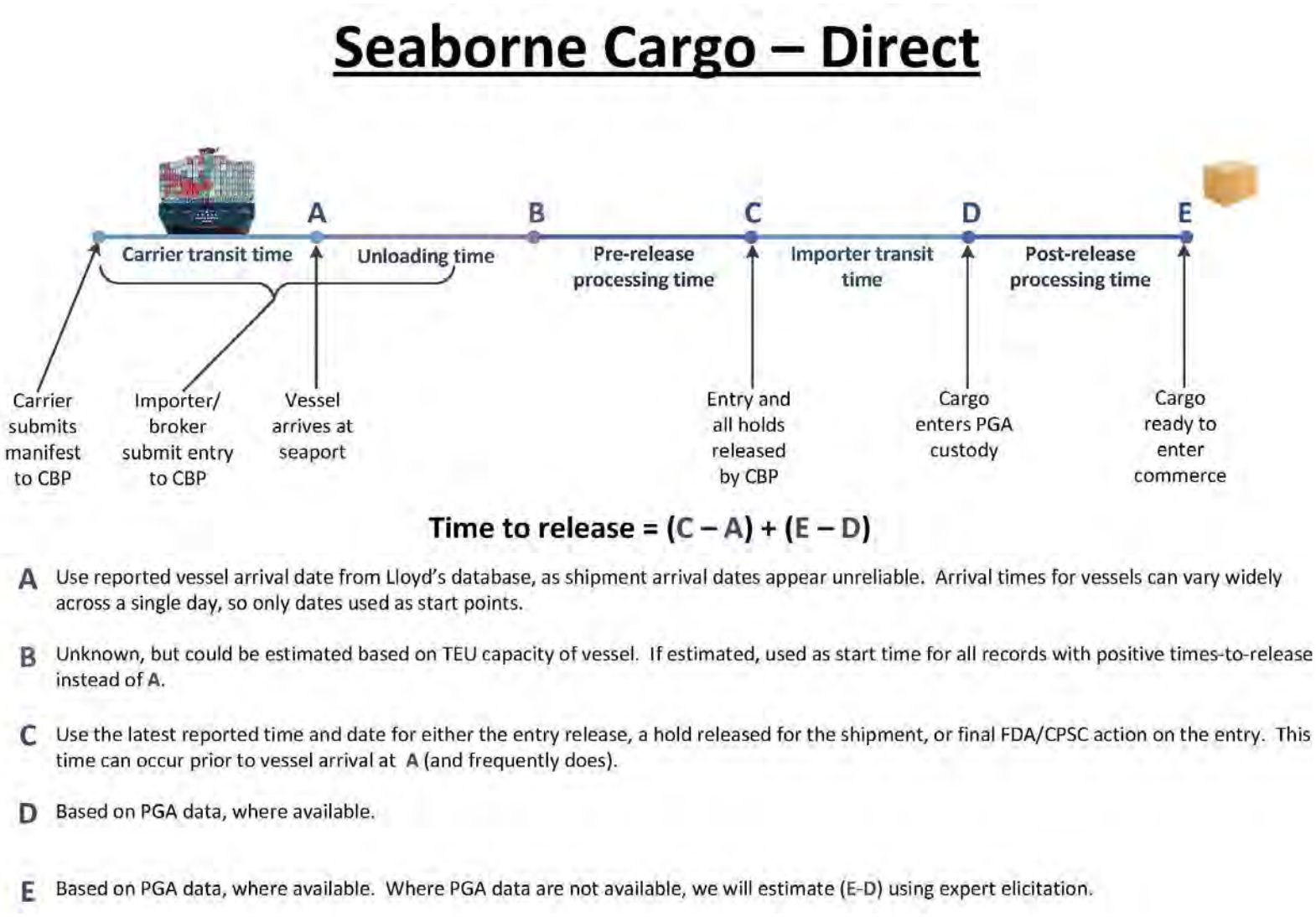



**Figure 1. Timeline diagram for seaborne cargo, shipped directly**

For each of these observations, the study team will likely need to make important study assumptions, then analyze (to the extent possible) the validity of the assumptions. Example of critical assumptions to establish include:

- Actual arrival dates and times directly tied to entry numbers in CBP's database show significant variation. Shipments arriving at the same seaport on the same vessel can have arrival times almost a month apart. This leads us to doubt the reliability of shipment level arrival times for the sea domain. Instead, we will use vessel arrival times from the Lloyd's database, reported for insurance purposes, which can be linked to entry number by vessel name in manifest data in the CBP database.

- A vessel, along with its entrained containers, can be legally arrived at any point in the lengthy arrival process, from the moment the vessel reaches the breakwater to the time the first container leaves the vessel. This gives a window of potentially more than 12 hours in which a port official can declare a vessel arrived. Additionally, ships can stay several days at anchor before shifting to dock. This makes the vessel arrival times unreliable to use as start points. One could assume that all the variation in declared arrival times washes out in aggregation, though it might be more defensible to argue that only arrival dates are of use in seaborne cargo.

- Bulk, break-bulk, and roll-on/roll-off cargo are quite different from containerized sea cargo. They are rarely delayed by CBP, can have different processes for resolution of holds, and often are intentionally delayed by actions of the importer (as these goods are not very time sensitive). As such, it makes sense that these cargo types should have their time to release measured separately from the other types of sea cargo, if at all.

- Unloading times, which include all times between when the vessel has officially arrived and the cargo can be processed by CBP, are unknown and potentially much longer than a single day. The Port of Long Beach, one of the busiest in the United States, claims to be able to unload an 8,000 TEU ship in about three days.[15, 16] Presumably smaller ports could take longer. In addition to unloading time, there can be delays at the port following unloading as cargo transits from a terminal to a container examination station. As stated above, the WCO sees times for the start and stop of unloading as a key element for calculating time to release. Unfortunately, neither CBP nor any of the PGAs collects unloading times for sea cargo. The lack of these data points will skew the estimated time to release higher than the true value. This lack will also make it impossible to disambiguate the processing time from the unloading time for cargo that requires some delay at the port. We could directly estimate unloading times if we had times for when the

[15] CBP felt that this time estimate might be optimistic in some cases.

[16] Port of Long Beach, *Cargo Movement in Focus*, 2008. Available at http://www.polb.com/civica/filebank/blobdload.asp?BlobID=3512. Accessed 5 May 2015.

goods became available to the importer (another key WCO data point). Unfortunately, this is not tracked either.

- Resolution: Based on discussions with stakeholders, we will include unloading times in sea cargo time to release with the acknowledgment that this will mean overstating the true time to release. These times will instead represent the results of the trade-government system in releasing goods. If possible, we will also attempt to estimate unloading time using vessel container load (in TEUs) as a variable to correlate against, which could improve the accuracy of our estimates but adds more complexity and potentially additionally bias into our estimates. These results will be reported separately from the main result.

### *5.3.2. Airborne Cargo*

These shipments can roughly track with the generic approach to calculating time to release. Start times will still be the shipments' actual arrival times recorded in the automated cargo system (ACS) and stop time will be the latest of the standard collection of data points. Some potential complications include:

- Ports of arrival and ports of unlading can be different for airborne cargo, which can become important for cargo that must be stopped at the border. Because of this, there may be delays at the border that may come prior to the recorded arrival time.

- The sending of release and hold messages to a carrier is dependent on CBP's receipt of a flight departure message (FDM) from the carrier, which is optional. For carriers that do not send a FDM, release and hold messages are sent to the carrier when the aircraft arrives at its port of entry. Additionally, through the permit to proceed process, foreign-originating aircraft can make unscheduled stops at other U.S. airports without offloading cargo. These stops can significantly vary the time in between sending the FDM and the aircraft's arrival at the port of entry. All of these factors can vary the distance between cargo release and aircraft arrival, especially for those imports released prior to arrival. These argue against including the magnitude of pre-arrival release times in calculated times-to-release for airborne cargo.

Figure 2 represents the timeline that will guide development of study assumptions and calculation of time to release for directly shipped airborne cargo.

### *5.3.3. Truck Cargo*

As with airborne cargo, these shipments will roughly track with the generic approach to calculating time to release. The only complication is that truck cargo with insufficient documentation can be turned around at the border rather than held at the port, delays that the data might not capture. We can try to control for this issue by paying attention to the final resolution for the shipment in the data. Figure 3 represents the timeline that will guide development of study assumptions and calculation of time to release for directly shipped truck cargo.

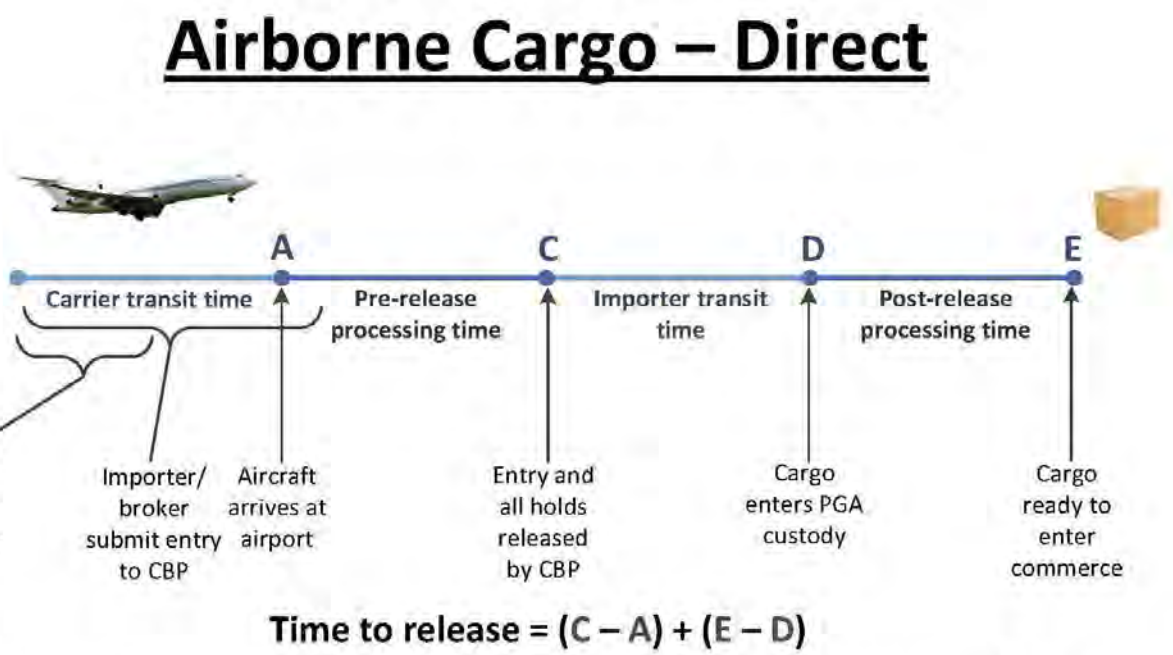



**Figure 2. Timeline diagram for airborne cargo, shipped directly**

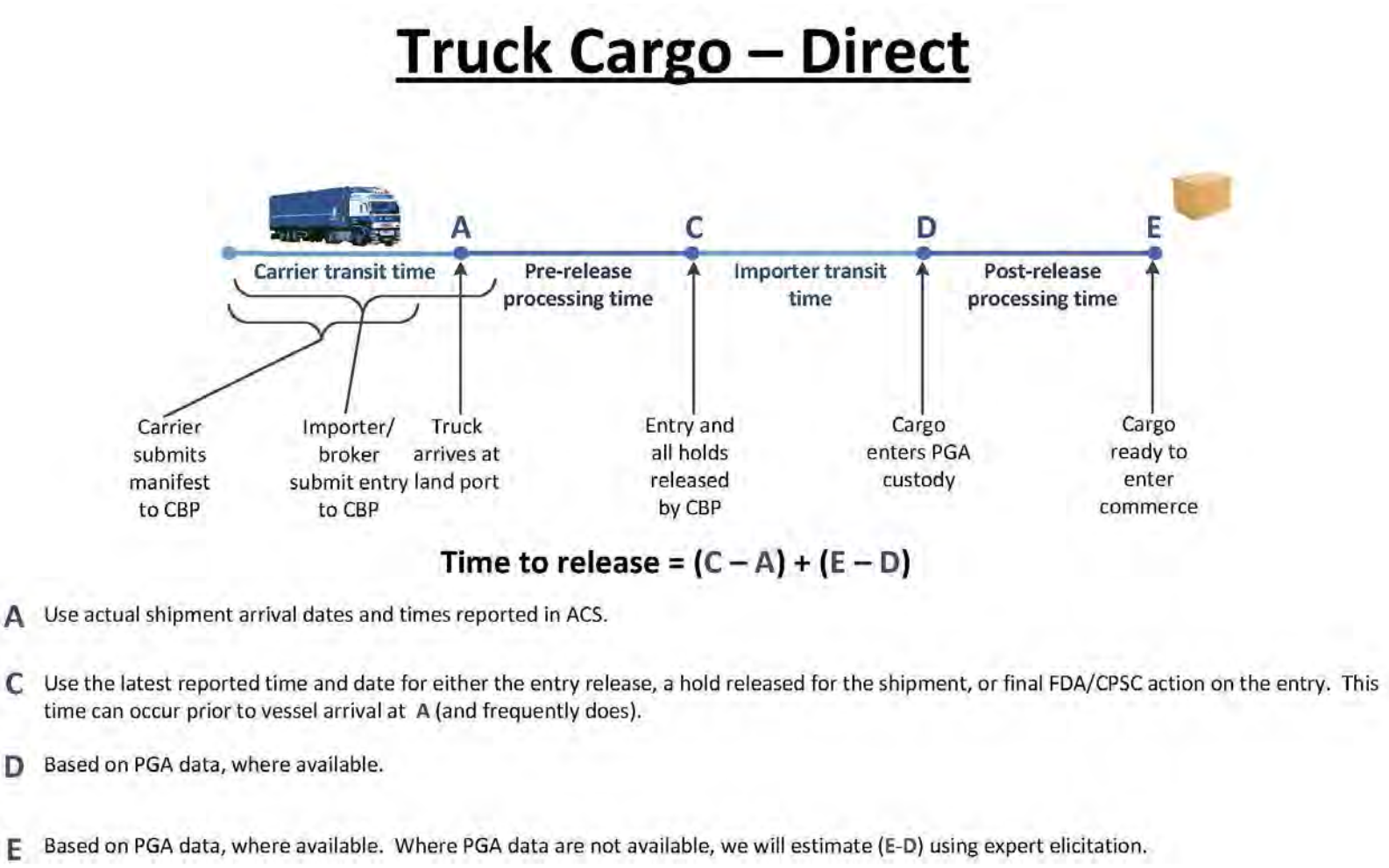



**Figure 3. Timeline diagram for truck cargo, shipped directly**

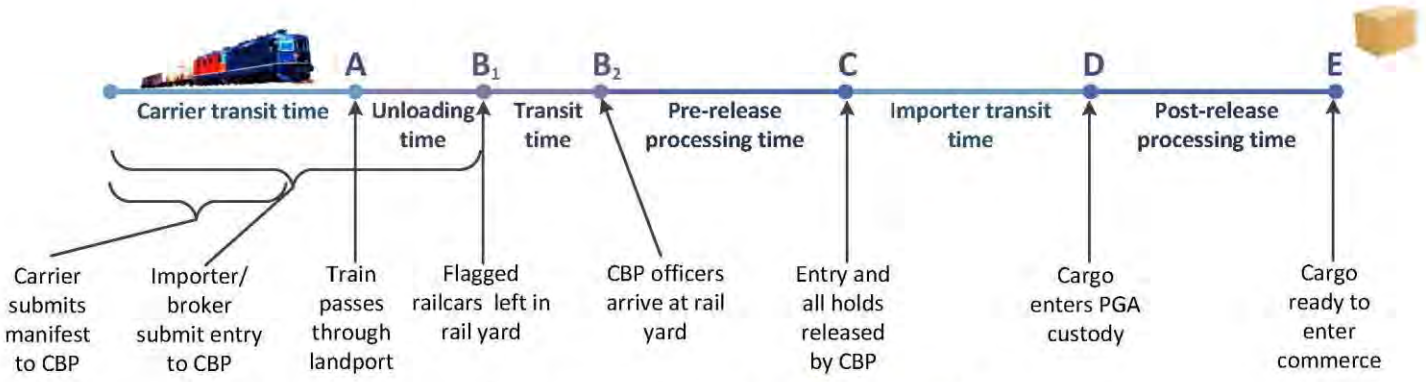
### *5.3.4. Rail Cargo*

Rail cargo offers different complications from the other three modes of transit. Though the start and stop times will likely be the same as with airborne and truck cargo, the recorded times to release will likely remain unreliable. This is because rail cargo of interest is not directly stopped at the border like other types of cargo. Instead, any cars containing cargo that is flagged as being held or requiring additional processing must be delinked from the full train at a nearby rail yard and wait there until CBP can bring an officer to the rail yard to deal with the cargo. Times for trains transiting to nearest rail yard, delinking flagged cars, and then CBP or other PGA officers arriving at the rail yard to deal with the flagged cars are all unknown. This lack of data makes it difficult to parse the delays due directly to government processes. One should also note that the delay for delinking flagged cars affects all cars in a train, not just the flagged ones, an effect that is similarly difficult to measure reliably. As the details of these issues, like the rail yard at which the cars are delinked, are also not recorded, it is difficult to estimate the delays indirectly as well.

- Resolution: Based on discussions with stakeholders, we will not attempt to account for issues involved with delinking cars from trains and waiting for an officer to arrive at the rail yard, with the acknowledgment that this will mean overstating the true time to release.

Figure 4 represents the timeline that will guide development of study assumptions and calculation of time to release for directly shipped rail cargo.

# Rail Cargo – Direct




**Time to release = (C – A) + (E – D)**

**A** Use actual shipment arrival dates and times reported in ACS.

**$B_1$** **$B_2$** Times for trains transiting to nearest rail yard, delinking flagged cars, and then CBP or other PGA officers arriving at the rail yard to deal with the flagged cars are all unknown. Also note that the delay for delinking flagged cars affects all cars in a train, not just the flagged ones.

**C** Use the latest reported time and date for either the entry release, a hold released for the shipment, or final FDA/CPSC action on the entry. This time can occur prior to vessel arrival at **A** (and frequently does).

**D** Based on PGA data, where available.

**E** Based on PGA data, where available. Where PGA data are not available, we will estimate (E-D) using expert elicitation.

**Figure 4. Timeline diagram for rail cargo, shipped directly**

### *5.3.5. In-bond Shipments*

Cargo that moves in-bond before making entry at another port adds another layer of complication to the calculations. The delays from in-bond transit times can be quite lengthy, especially if the cargo is transiting across the country or sit in a warehouse for a portion of the time, and entirely dependent on importer decisions. WCO suggests that customs officials track these times in an ideal TRS and excise them from the reported time to release.[17] CBP does track in-bond departure times (from the port of arrival) and in-bond arrival times (at the port of entry), but these are tracked by in-bond number, which has no direct linkage with entry number. Instead, in-bond numbers are linked to bills, not entries, and it is impossible to tell which entries on a bill correspond to which in-bond number, especially since individual bills can have up to 30 in-bond numbers associated with them. On top of that, in-bond arrivals and departure dates and times are very inconsistent per bill, even for those in-bonds that are going to the same port of entry. Thus the study team does not anticipate sorting out in-bond times per entry.

- Resolution: Based on discussions with stakeholders, we will include in-bond times in estimated time to release, with the acknowledgment that this will mean overstating the true time to release. These times will instead represent the results of the trade-government system in releasing goods. If possible, we will also attempt to estimate in-bond times using dummy variables for port-port pairs (along with a general dummy for in-bond entries for those shipments that go in-bond to a warehouse on-site at a port), which could improve the accuracy of our estimates but adds complexity and potentially bias into our estimates. These results will be reported separately from the main result.

Rail cargo offers an additional complication to in-bond transit. As in-bond rail cargo transits across the country, the carrier can deposit flagged cars at any and multiple rail yards prior to the port of entry, each to be visited and attended to separately by CBP. None of these times and delays can be recorded. As most rail cargo travels in bond, this is an important issue to try to resolve.

Figures 5 through 8 represent the timelines that will guide development of study assumptions and calculation of time to release for in-bond cargo.

[17] World Customs Organization, 40.

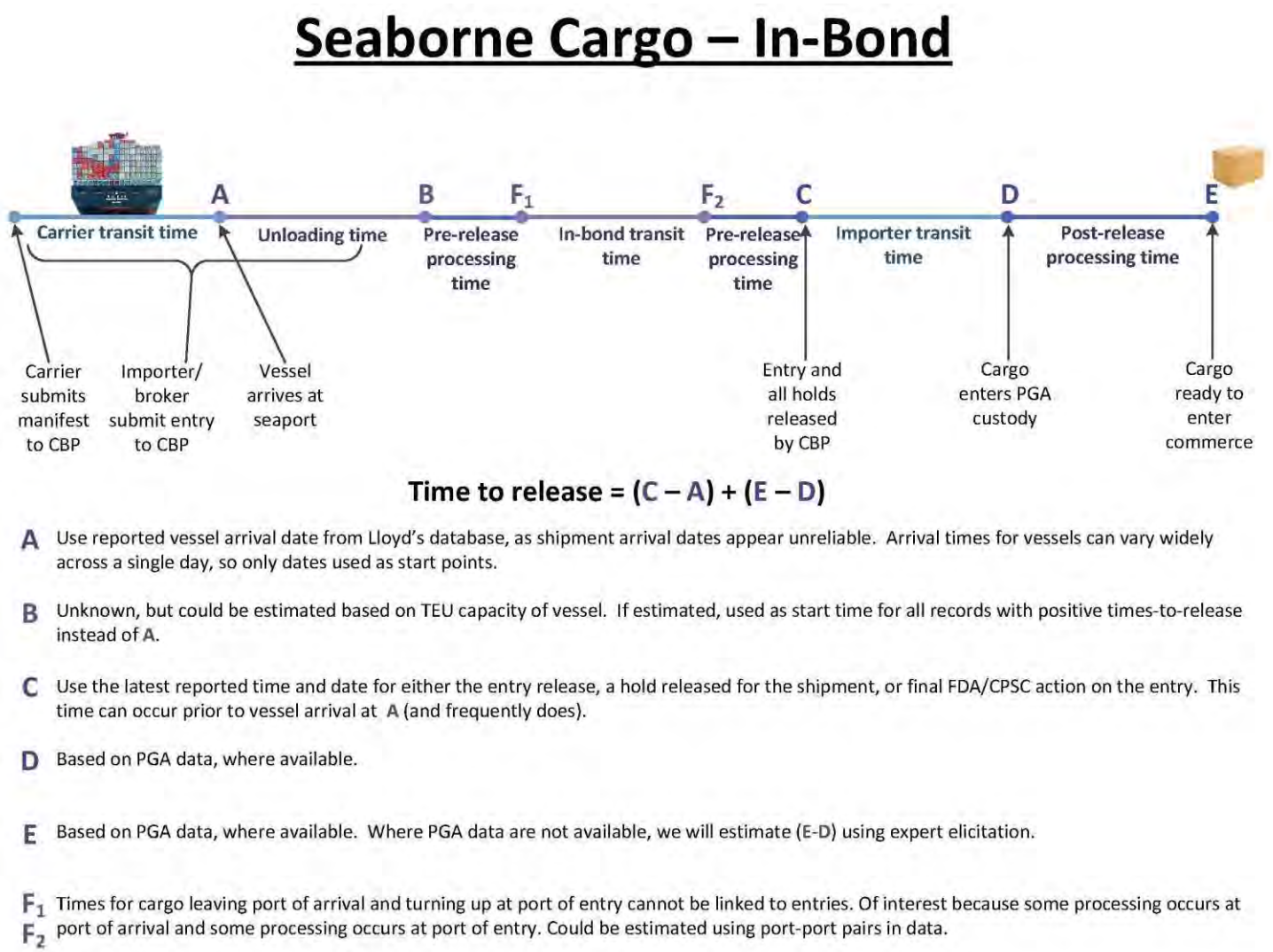



**Figure 5. Timeline diagram for seaborne cargo shipped in-bond**

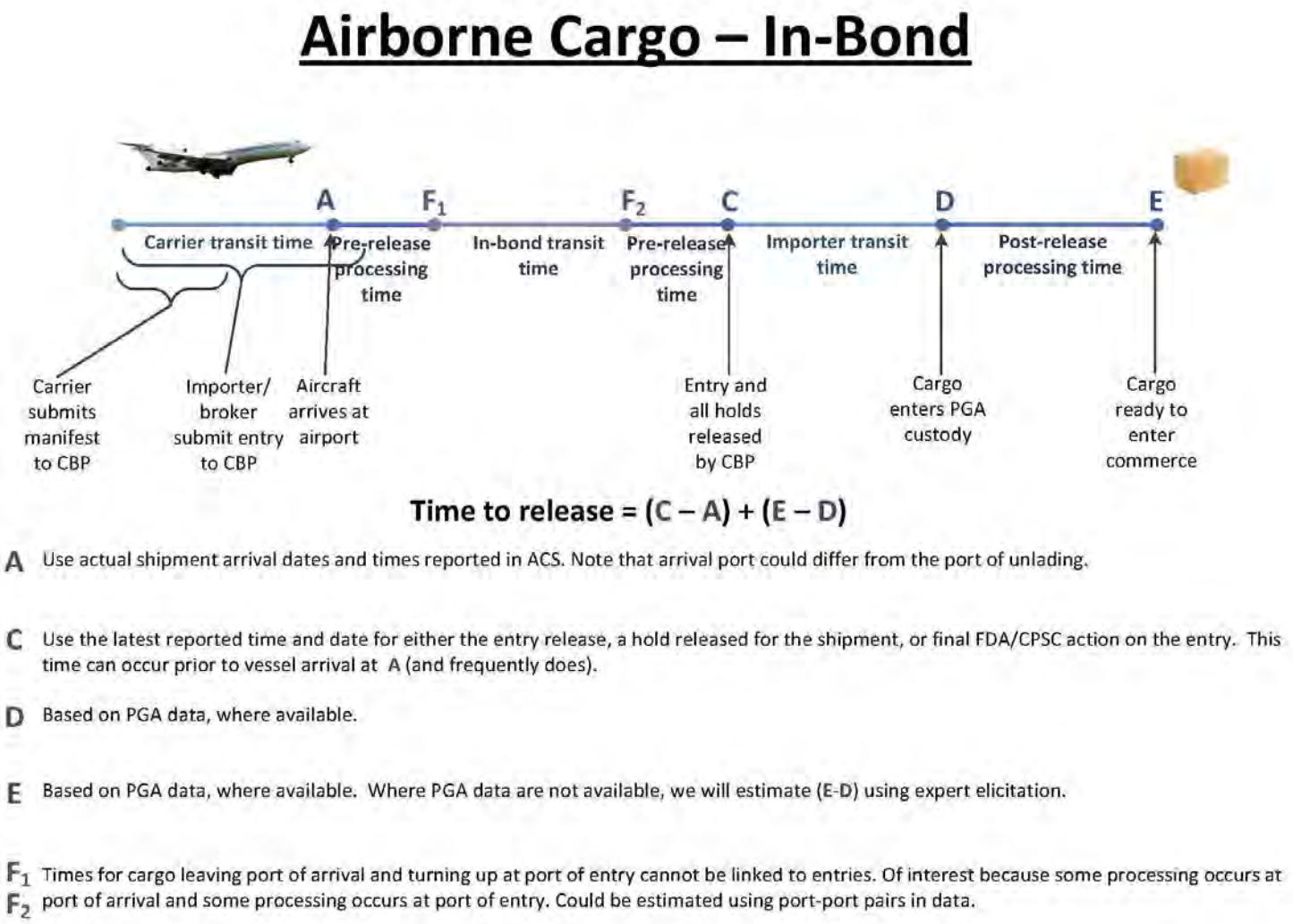



**Figure 6. Timeline diagram for airborne cargo shipped in-bond**

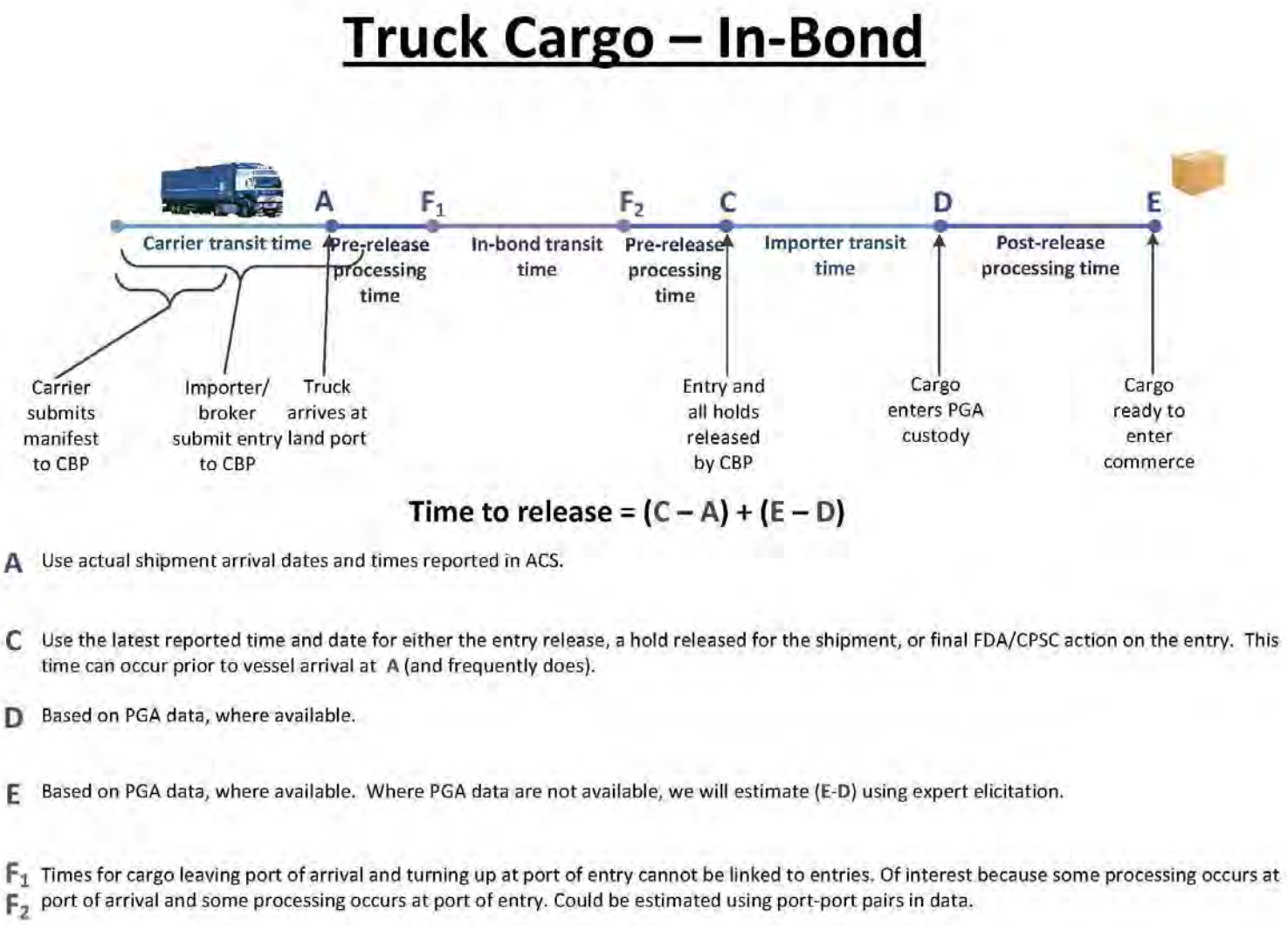



**Figure 7. Timeline diagram for truck cargo shipped in-bond**

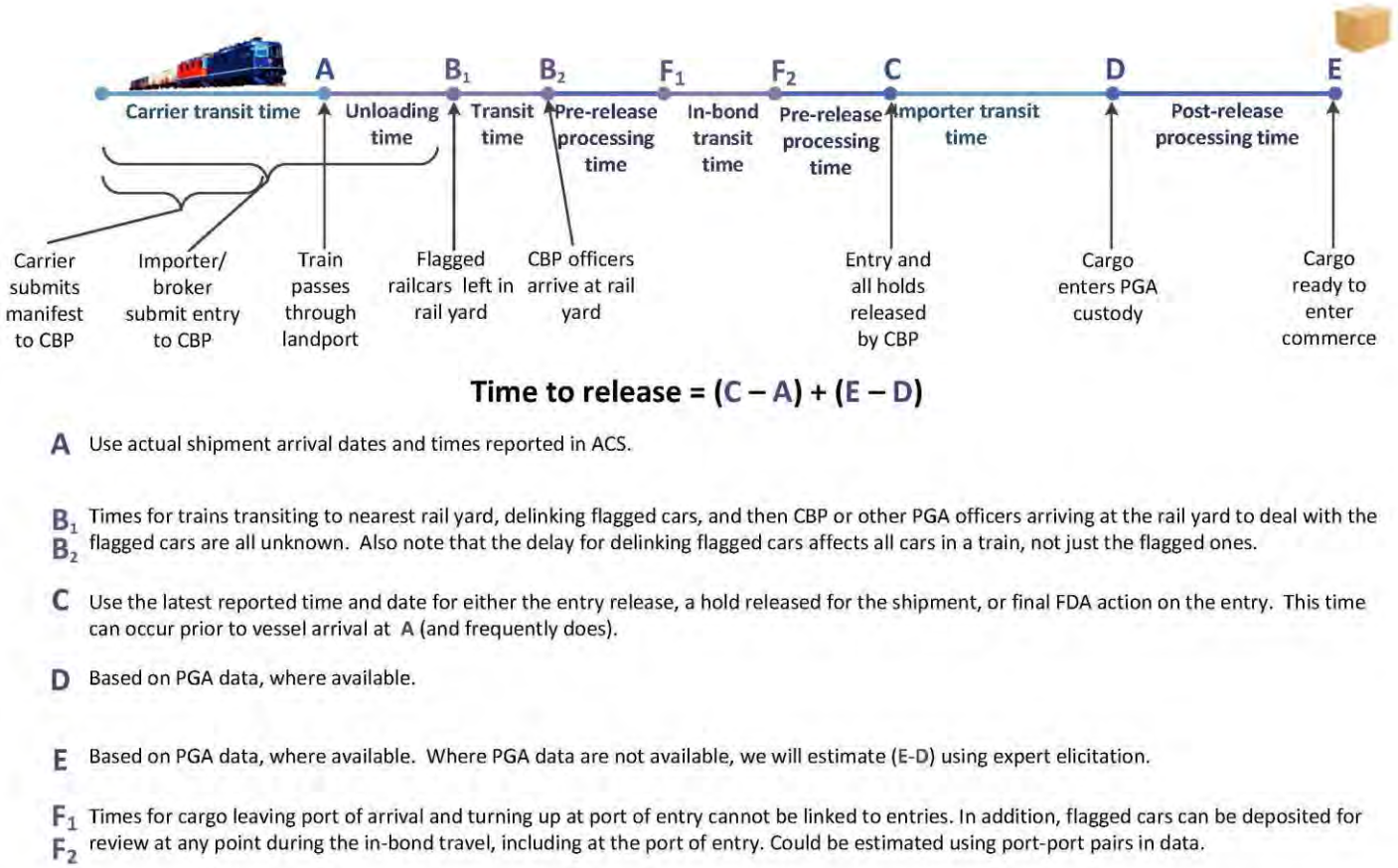



**Figure 8. Timeline diagram for rail cargo shipped in-bond**

### *5.3.6. Secondary Metrics*

In addition to time to release, there are other measures that can be used to estimate the effect of ITDS that might be more apt than time to release, including:

- fraction of entries that are not held up by the government following arrival;
- fraction of cargo with entries submitted prior to arrival;
- fraction of carriers turned away at the border due to insufficient documentation;
- time spent in government delays that could be expected to be affected by ITDS (e.g., entries not released due to insufficient documents).

The study team will include some of these metrics, dependent on data received, in addition to the time to release for future studies to measure the efficiency of the new single-window system.

## 5.4. Cross-checking with Port Visits

During phase 1 of the TRS, we determined that manual data collection as the primary approach to the study would not be the best course. However, as the study team begins to generate results, it may become appropriate to visit one or two ports to see if the results computed make sense given the processes we could observe at the ports.

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# 6. EXECUTION AND SCHEDULE

The study plan described above will be addressed within project planning parameters described in this section.

## 6.1. Study Team

Table 3 presents the roles of the team members identified to execute the requirements of this task.

**Table 3. Task team members**

| Name | Role |
|---|---|
| **Jennifer Jacobs, PhD** | Task lead |
| **Chris Adams** | Data analysis lead |
| **Taryn Laster** | Coordination, interview, and data request lead |
| **Steven Weiss, PhD** | Advisor to the task team |
| **Howard Smith, PhD** | Task manager |

## 6.2. Data Requests

Thus far, coordination with government personnel able to provide data has been fairly promising. However, if data shortfalls are not addressed, then the study team will work with the government oversight committee to establish a formal process for data requests and delivery.

## 6.3. Government Reviews

The study team will work with the study sponsor, government oversight committee, and ultimately the full BIEC to provide timely review of results. These briefings will allow government input into the team's interpretation of the available data.

## 6.4. Schedule

Finally, the schedule for contractual requirements is shown in table 4.

**Table 4. Critical dates for execution of the TRS. Dates noted from date of award (DOA) of phase 2 funding to support the HSSAI study team**

| Event | Date |
|---|---|
| Last date to deliver data to the study team | DOA + 2 months |
| Executive briefing on time release study results | DOA + 4 months or as agreed upon |
| *Draft* final report*:* time release study results | DOA + 4 months or as agreed upon |
| Final Report: time release study results | DOA + 5 months or as agreed upon |

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