California Governor's Office of Business and Economic Development

California Containerized Ports Interoperability Grant Program

Program Report
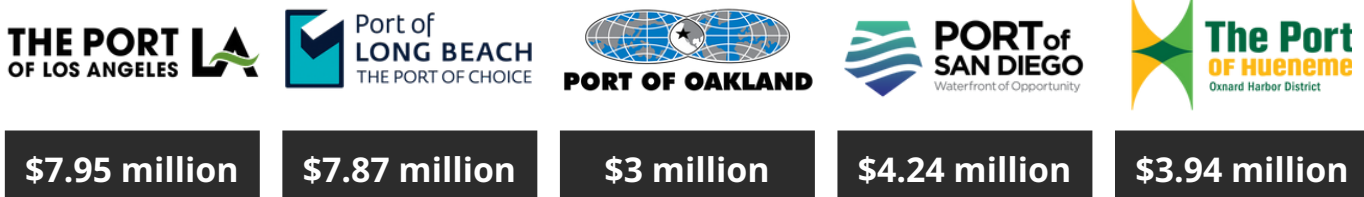July 2024

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EXECUTIVE SUMMARY

The California Containerized Ports Interoperability Grant Program represents a groundbreaking $27 million investment in California's goods movement and supply chain. In coordination with the California Governor's Office of Business and Economic Development, Build Momentum and Insight Softmax Consulting administered the first-of-its-kind Program, funding ten critical data interoperability projects at five eligible containerized ports in California: Port of Los Angeles, Port of Long Beach, Port of Oakland, Port of San Diego, and Port of Hueneme. The projects funded under the Program will drive statewide economic, supply chain, and environmental benefits in alignment with four key objectives:

1. Federal Alignment: Ensuring that port proposals and data systems align with federal goals and initiatives related to goods movement, efficiency, and environmental benefits.

2. Emissions Reductions: Improving efficiencies through data management to drive emissions reductions, achieving regional, state, and federal climate goals.

3. Economic Competitiveness: Addressing the economic competitiveness of California ports through comprehensive data management and organization.

4. Stakeholder Engagement: Facilitating broad community and port ecosystem stakeholder engagement to ensure equitable participation, knowledge sharing, and benefits.

The Program transformed the approach to grant administration through proactive collaboration with applicants. Build Momentum and Insight Softmax Consulting established a Technical Advisory Committee in early stages of development, ensuring that Program funds thoroughly addressed challenges facing the port ecosystem. Available throughout project scoping and proposal development, these technical experts guided ports toward achievable and meaningful project outcomes.

The projects funded through this Program incorporate artificial intelligence (AI), climate resiliency and emissions reduction measures, data infrastructure expansion, small business integration, and new data standard development. The Program will revolutionize interoperability across the five California ports, meeting the unique needs of each location while prioritizing cross-facility engagement and knowledge sharing. Importantly, this Program will serve as a replicable model for similar investments in port data interoperability across the United States, demonstrating achievable efficiency improvements and emissions reductions associated with comprehensive data management.

TOTAL AWARD AMOUNTS

THE PORT OF LOS ANGELES	Port of LONG BEACH THE PORT OF CHOICE	PORT OF OAKLAND	PORT of SAN DIEGO Waterfront of Opportunity	The Port OF HUENEME Oxnard Harbor District
$7.95 million	**$7.87 million**	**$3 million**	**$4.24 million**	**$3.94 million**

1 BACKGROUND

California is the preeminent global goods movement gateway in the United States, responsible for handling over forty percent of all containerized imports and over thirty percent of all containerized exports in the Nation. In June 2022, Governor Gavin Newsom signed the California Budget Act of 2022, which included a historic and far-sighted multi-billion-dollar state investment to support and enhance goods movement and the supply chain,[1] including port and freight infrastructure, climate adaptation and resilience, workforce training, zero-emission vehicle deployment, grid support and grid reliability, and port data system development.

Through this Act, the Governor and the California Legislature are investing in strengthening the state's supply chain following the COVID-19 pandemic, which exacerbated interoperability challenges shared by California industries. With supply chains becoming more complex, data systems, software, and other technologies can help all parties that facilitate and do business with port complexes to operate more efficiently. To advance this effort, in 2023 the state allocated $27,000,000 through the Act to provide direct grant support to containerized ports via the California Containerized Ports Interoperability Program (Program). Utilizing existing data from the U.S. Army Corps of Engineers and the Waterborne Commerce Statistics Center, GO-Biz determined five California containerized ports to be eligible applicants (Applicants) to the Program to develop cloud-based management systems: Port of Hueneme, Port of Long Beach, Port of Los Angeles, Port of Oakland, and Port of San Diego.

GO-Biz contracted Build Momentum (Momentum) to design, build, and administer the grant program and award funds to the specified Applicants to the Program. Momentum, in partnership with Insight Softmax Consulting (ISC), conducted research on existing data initiatives within this space at the state and federal levels to incorporate alignment into the structure of the grant program guidelines. Momentum and ISC established a Technical Advisory Committee (TAC) of industry experts–with representation from GO-Biz, ISC, DataCRT, Latacora, and Cloud303–to support the development of the grant program framework, including writing the grant solicitation and scoring criteria and determining final awards.

1.1 CALIFORNIA PORT DATA PARTNERSHIP

The five eligible California ports reached a Memorandum of Understanding (MOU) on April 26, 2023, that defines how they will work together to help achieve real-time interoperability among the containerized ports in California.[2] The MOU launched the "California Port Data Partnership" to support improved freight system resilience, goods movement efficiency, emissions reductions, and economic competitiveness. Defined in the MOU, interoperability refers to the ability of a port's computerized and cloud-based data systems to securely share information and expedite information exchange across port users and relevant transportation service providers, including other port or public sector-based, computerized, and cloud-based cargo data systems as needed, in support of operational improvement, efficiency, and emissions reduction. In the spirit of the MOU, the California Containerized Ports Interoperability Grant Program presents a unique opportunity for the state to invest in early efforts to advance collaboration across the ports in their pursuit of interoperability.

1: Legislative Statute: https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202120220SB193
2: California Ports MOU: https://business.ca.gov/wp-content/uploads/2023/04/CA-Port-Data-MOU-Final-04-26-2023.pdf

1.2 PROGRAM OBJECTIVES

The Program aims to support cloud-based port data system development at California's containerized ports and support emerging data aggregation and analysis to improve freight and supply chain efficiency. Increased interoperability will allow the ports to securely share information and expedite information exchange across port users and relevant transportation service providers. The Program will drive statewide economic, supply chain, and environmental benefits, supporting operational improvements, efficiency, and emissions reductions at California ports. The development of data management systems will provide a replicable model for other ports across the United States, incentivizing data system collaboration and improving efficiencies in goods movement. Key Program objectives include:

FEDERAL ALIGNMENT	Ensuring that port proposals and data systems align with federal goals and initiatives related to goods movement, efficiency, and environmental benefits.
EMISSIONS REDUCTIONS	Improving efficiencies through data management to drive emissions reductions, achieving regional, state, and federal climate goals.
ECONOMIC COMPETITIVENESS	Addressing the economic competitiveness of California ports through comprehensive data management and organization.
STAKEHOLDER ENGAGEMENT	Facilitating broad community and port ecosystem stakeholder engagement to ensure equitable participation, knowledge sharing, and benefits.

1.3   MOMENTUM

Momentum is an independent grant services consulting firm with nearly two decades of experience developing and administering grant funding awards for forward-thinking organizations working to deploy transformative energy, transportation, and emission reduction technologies. Momentum has been a critical partner in developing the frameworks in various granting programs, including CalTestBed, in partnership with the California Clean Energy Fund, the University of California Office of the President, and the Los Angeles Cleantech Institute (LACI). Momentum has developed and administered grant funds in partnership with dozens of the world's most innovative agencies and companies, including the Sacramento Municipal Utilities District (SMUD), Southern California Gas Company, Mid-American Energy Company, Port of Long Beach, Electric Power Research Institute (EPRI), CALSTART, and Wells Fargo's IN2 Accelerator. Momentum led project management and Program development for the California Containerized Ports Interoperability Grant Program, leveraging its extensive experience in grant funding, administration, and project management in the maritime sector.

1.4   INSIGHT SOFTMAX CONSULTING

ISC works at the forefront of technology with deep expertise in data science, data engineering, cloud computing, and infrastructure software. ISC builds bespoke data science and engineering solutions to solve real business problems, acting as a client's data team or augmenting their in-house team. For example, ISC contributed software engineering, data science, infrastructure, and project management to the BMW ChargeForward project. This pilot program explored the benefits of intelligent charging for electric vehicles by optimizing their contribution to electrical grid stability. For the California Containerized Ports Interoperability Grant Program, ISC is responsible for research, outreach, framework development, review, monitoring, and reporting. ISC also managed the initial development and coordination of the TAC and provided oversight throughout the proposal review and scoring phases.

1.5   TECHNICAL ADVISORY COMMITTEE

Momentum and ISC leveraged strategic partnerships to support Program development. The TAC comprises industry experts from GO-Biz, ISC, DataCRT, Latacora, and Cloud303, who supported the development of the proposal framework and scoring criteria. With different experts evaluating port needs from their unique perspectives, the TAC holistically reviewed needs and proposals.

- **Cloud303** is a leading provider of cloud infrastructure and support services, offering extensive expertise in optimizing cloud environments to drive scalability, reliability, and performance. With a strong focus on cloud technologies, Cloud303 helps businesses harness the full potential of the cloud to achieve their strategic objectives.
- **DataCRT** specializes in data engineering and excels in addressing interoperability challenges between diverse data systems. With their deep expertise, DataCRT offers comprehensive solutions for integrating, transforming, and harmonizing data from various sources, empowering organizations to unlock valuable insights and confidently make data-driven decisions.
- **Latacora** is a trusted name in cloud security, offering a wide range of expertise in protecting cloud-based infrastructures. With in-depth knowledge of networking, database security, and cryptography, their approach helps mitigate risks, safeguard sensitive data, and ensure the integrity and confidentiality of their cloud environments.

1.6   PROJECT TEAM COORDINATION

Momentum coordinated meetings with GO-Biz and ISC throughout the project, facilitating collaboration among partners during the development of the Application Manual, port stakeholder engagement, and proposal review. The team met weekly to discuss timelines, review deliverables, and identify any challenges associated with project administration. Proactive coordination among the grant management team allowed Momentum, GO-Biz, and ISC to flexibly address changes to the project schedule and fund distribution. The partnership between GO-Biz, Momentum, ISC, and the TAC represents an innovative approach to grant program design and implementation with technical expertise at the forefront of the decision-making process. Together, these groups are highly equipped to lead the state's strategy to address supply chain and interoperability challenges facing California's containerized ports. Through this first-of-its-kind program, the project team skillfully guided the Applicants throughout project design and development to maximize funding potential.

> **Collectively, the projects funded through this program incorporate artificial intelligence (AI), climate resiliency and emissions reduction measures, data infrastructure expansion, small business integration, and new data standard development.**

1.7   PROJECT TIMELINE

The timeline from project kickoff to award announcement is described in Figure 1. Each step is described in further detail in Section 2.

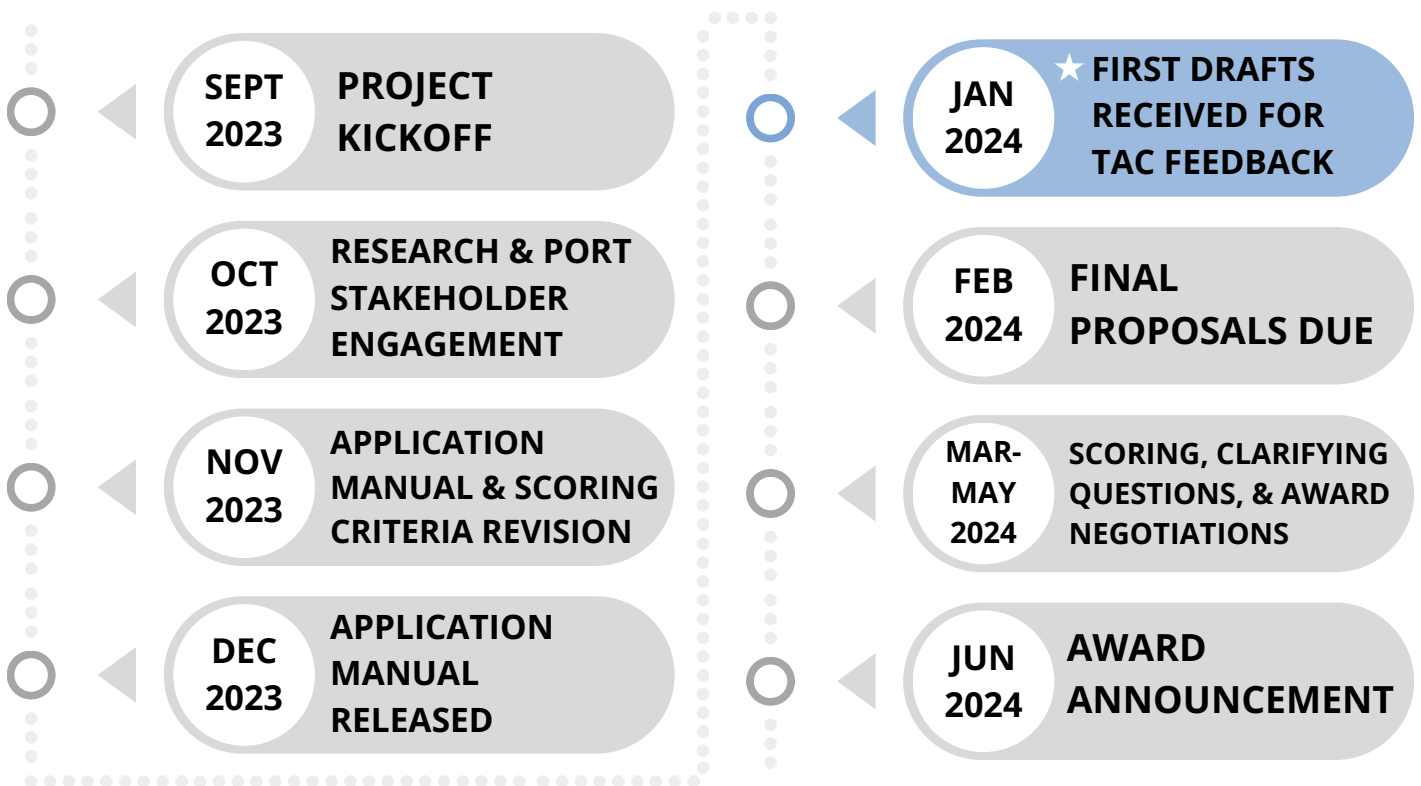|	
SEPT 2023 — **PROJECT KICKOFF**	**JAN 2024** — ★ **FIRST DRAFTS RECEIVED FOR TAC FEEDBACK**
OCT 2023 — **RESEARCH & PORT STAKEHOLDER ENGAGEMENT**	**FEB 2024** — **FINAL PROPOSALS DUE**
NOV 2023 — **APPLICATION MANUAL & SCORING CRITERIA REVISION**	**MAR-MAY 2024** — **SCORING, CLARIFYING QUESTIONS, & AWARD NEGOTIATIONS**
DEC 2023 — **APPLICATION MANUAL RELEASED**	**JUN 2024** — **AWARD ANNOUNCEMENT**

Figure 1 - Project Timeline

2   AWARD PROCESS

The innovative grant administration and award process pioneered by Momentum and ISC involved several stages of research, outreach, revision, and review. Momentum facilitated team coordination and led overall project management and Application Manual development while ISC led the research, outreach, and scoring processes.

2.1   RESEARCH AND OUTREACH

ISC led the research process independently, beginning with reviewing published materials from the Federal Maritime Commission's (FMC) Data Subcommittee on Marine Transportation Data Systems. Reading documentation and recorded stakeholder interviews provided a foundation for key terminology, stakeholders, and prevalent data issues facing ports. ISC continued its research utilizing this baseline information, focusing on data standardization, data formats, port regulations, climate, and emissions standards in the shipping industry, software systems available to ports, drayage issues, and terminal operations. ISC documented all research efforts using the Notion note-taking app and shared them with the TAC.

After initial research efforts, ISC and the TAC began conducting outreach with the ports through large group meetings and individual port workshops. Miro Boards were an essential part of the outreach documentation process; the online tool allows all meeting attendees to record their comments instantaneously and collaboratively, encouraging high engagement and interaction throughout the meetings. During the individual port workshops, the TAC asked the ports questions about their operations, processes, data systems, and cross-port stakeholder collaboration. Utilizing this information, ISC and the TAC led a gap-analysis workshop with port leadership to learn about issues facing current data systems, their ideal future state, and potential projects. The TAC followed these meetings with questions and further discussion on each port's technical expertise, software development, data engineering, cloud architecture and computing, and cybersecurity.

Holding individual workshops and private internal debriefs provided space for the TAC to interview and compare the state of each port while upholding privacy and security for each organization. Through these outreach meetings, the TAC formed an understanding of the unique operating cultures of each port, the starting places for data systems and needs, and the real potential for collaboration and interoperability. For example, some ports lacked foundational systems that would allow them to contribute to a fully interoperable ecosystem. In such cases, the TAC found that Program funding could prepare the ports for future collaboration and interoperability by advancing their systems to meet the capabilities of other, more enhanced organizations. The workshops also provided context for political tensions and competition between ports that posed interoperability and data-sharing challenges. Synthesizing all of this information, ISC and the TAC met with the ports again to discuss shared data gaps, potential collaboration, and suggestions for ways to work together successfully.

Throughout the research and outreach process, the TAC remained highly available to the ports through email, phone, and virtual meetings. The TAC generally responded to emails and requests for assistance within one business day. Additionally, the TAC established an email distribution list for communications with the ports to ensure that any project-related information reached all the ports and GO-Biz.

2.2   STAKEHOLDER ENGAGEMENT TOOLS

The TAC utilized collaborative tools to facilitate stakeholder discussions and maximize engagement and participation. Figures 2 and 3 demonstrate the Miro Board[3] utilized by the TAC during port meetings. Attendees were able to provide real-time responses to questions via virtual sticky notes.
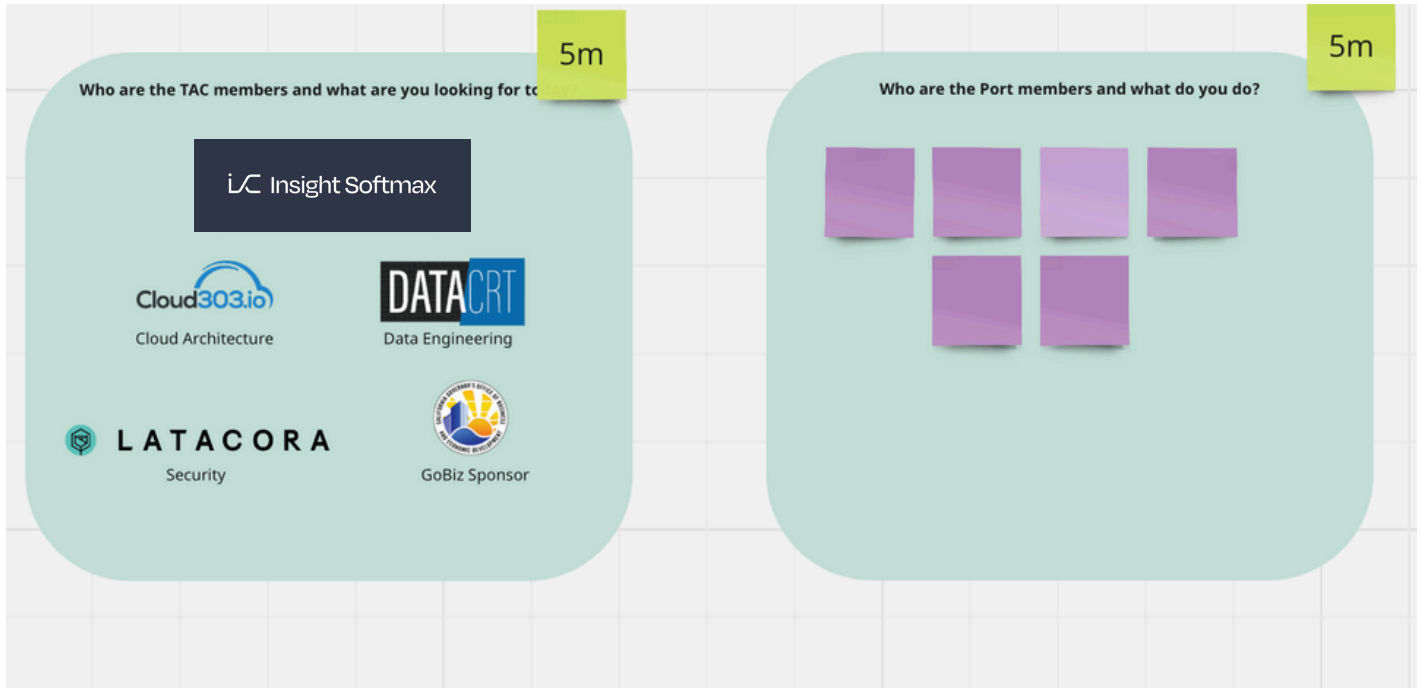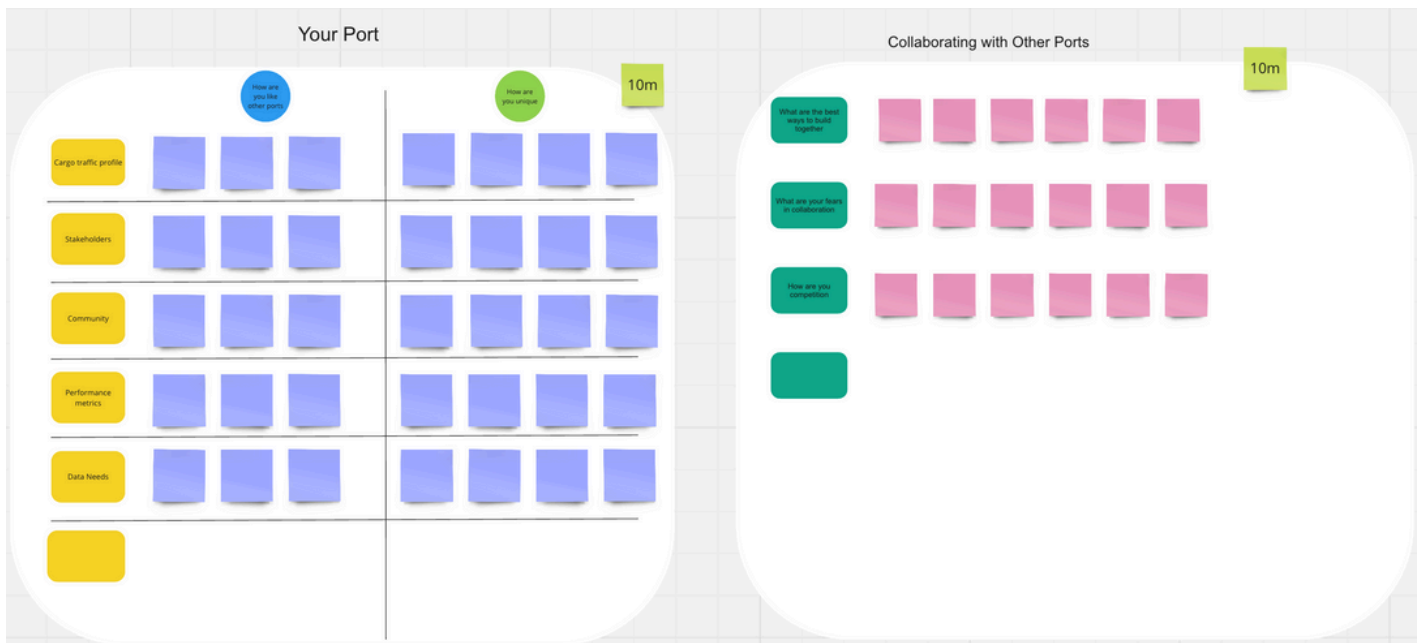

Figure 2 - Miro Board Example

Figure 3 - Miro Board Example

3: Miro Board: https://miro.com/app/board/uXjVKMfiEGQ=/

2.3 APPLICATION MANUAL DEVELOPMENT AND REVIEW

Immediately following the port outreach period, the TAC began collaboratively assembling proposal guidelines in alignment with Program goals. The TAC intended each proposal to address one key theme or project, with all project tasks aligned with a singular objective. In the spirit of equity, the ports were limited to three proposal submissions for three distinct projects. Individual TAC members contributed to developing the proposal guidelines based on their expertise to ensure that proposals addressed all necessary technical details. Relevant technical sections included:

SOFTWARE DEVELOPMENT	**CYBERSECURITY**
DATA	**CLIMATE IMPACTS & REGULATION**
CLOUD ARCHITECTURE	**PROJECT MECHANICS**

With input from the TAC, Momentum developed the Application Manual for the grant program.[4] The manual included a brief Program description and objectives, guiding principles for proposal development and funding allocation, applicant and project eligibility, application submission instructions, and the application scoring process. Applicants were required to submit a 25-page Proposal Narrative for each project, with a limit of three applications per port. The Proposal Narrative addressed the port's overall vision for future data interoperability, current systems and challenges, and the proposed solution. Narratives included scopes of work divided into a series of logical, discrete, and sequential tasks with associated milestones and deliverables, each corresponding to an itemized budget and project timeline. In addition to the technical sections listed above, Narratives also addressed relevant legal and regulatory initiatives, environmental data, labor protections, project team qualifications, collaboration, risks, and metrics. Applications and questions were submitted via email, and Momentum maintained a Program website and public FAQ document that were updated frequently throughout the proposal development and award process.[5]

The Application Manual was sent to ports during the early stages of development, allowing ports to provide input and ask questions before the solicitation was released. The TAC developed a scoring methodology consisting of two main scoring categories: technical alignment and Program alignment. Technical alignment, worth up to 40 points, corresponded to how well respondents addressed the technical components of the proposal and the TAC's confidence in the plan. Program alignment, worth up to 60 points, holistically reviewed the proposal's potential impact on California's port data interoperability ecosystem. This methodology facilitated an equitable review of the proposals with consideration for the varied maturity of port data systems, resources, and technical expertise. The TAC innovated the proposal review process by allowing ports to submit a draft early to receive high-level feedback before final submission. The TAC aimed to evaluate draft proposals for alignment with Program goals and bring attention to concerns surrounding project implementation or the likelihood of success. Each TAC member reviewed the draft Scope of Work, project description, and specific technical areas privately, followed by a group discussion of each proposal. The TAC shared feedback with each port to incorporate into their final submissions. The TAC also provided high-level cross-port feedback to all ports.

4: Application Manual: https://docs.google.com/document/d/1TKp-YBo71h-sJOJXCpDk004g4YlUjcjHC1DPiM2uLbg/edit?usp=sharing
5: Program Website: https://buildmomentum.io/ca-port-data-interoperability-grant-program/

2.4 PROPOSAL SCORING

ISC created a detailed scoring rubric for TAC members to complete during final proposal reviews. Addressing technical and program alignment, each TAC member scored each proposal and commented on each criterion. TAC members first reviewed and scored proposals individually to prevent bias or comparison with other reviewers, and the sheets auto-calculated scores. Reviewing individually and as a group took two weeks, and individuals spent approximately three hours reviewing each proposal in depth.

After the individual review process, an aggregated scoring workbook was developed, providing a platform for the team to review scores and focus on areas of high variance. The TAC spent one hour discussing each proposal's scores, merit, and confidence. Following these group discussions, the TAC posed final clarifying questions to the ports. Upon receiving responses, the TAC reviewed the new information and updated proposal scores.

When determining final awards, the TAC considered each proposal's overall score, the project's role in the overall port data interoperability ecosystem, and the use of funds and budget efficacy. The TAC adjusted budgets as necessary, ensuring that funds allocated to specific tasks and subtasks were appropriate for the project's success. The TAC provided three possible awarding scenarios with an overall recommendation to GO-Biz for final decision-making. Section 3, below, describes the final award decision. After award announcement and contracting, the TAC is responsible for two critical tasks throughout project implementation:

> **1. Technical Mentorship and Mediation**
> The TAC's board of experts will be available to the ports for ad hoc technical guidance to support project success, including review of technical materials. The TAC may also assist in technical mediation for systems integration, acting as an intermediary for state interests to facilitate communication and collaboration among private and port stakeholders.
>
> **2. Project Status Report Gathering**
> The TAC will review quarterly reports for each project and ensure that projects remain on schedule. The TAC and GO-Biz will receive ongoing demonstrations of work in progress to provide feedback in alignment with Program and state interoperability guidelines.

The TAC was critical to the proposal development phase, ensuring that projects were scoped reasonably and within achievable timelines. This level of hands-on guidance and insight is unprecedented in grant programs of similar size and scope. In addition to their availability throughout initial proposal development and review, the TAC remains a vital resource throughout implementation. The TAC's leadership will contribute to individual project success and overall interoperability objectives, holding each port accountable for their key outcomes and deliverables. The TAC will guide ports through implementation, review, revision, and reporting to maximize project benefits and achieve state-level goals.

3 GRANT AWARDS

The TAC received ten proposals from the five eligible ports with a total funding request of $42,192,990, exceeding the amount available. Table 1 describes the number of proposals received from each port, the requested funding amount, and the final amount awarded.

Table 1 - Total Grand Award Amounts

Port	Requested Amount	Funding Awarded	Total Port Funding
Los Angeles	$3,520,000	$1,320,000	**$7,950,000**
Los Angeles	$3,055,000	$2,930,000	
Los Angeles	$4,500,000	$3,700,000	
Long Beach	$8,800,000	$3,675,000	**$7,875,000**
Long Beach	$5,995,000	$2,950,000	
Long Beach	$1,295,000	$1,250,000	
Oakland	$1,599,990	$1,375,000	**$3,000,000**
Oakland	$1,625,000	$1,625,000	
San Diego	$4,950,000	$4,240,000	**$4,240,000**
Hueneme	$6,853,000	$3,935,000	**$3,935,000**
Total	**$42,192,990**	**$27,000,000**	

Figure 4 describes the percentage of total Program funds received by each port. Prioritizing equity in award decisions, the TAC considered several key factors:

- Twenty-foot equivalent unit (TEU) volume
- Vessel dwell times
- Container dwell times
- Truck turn times
- Demonstrated data needs
- Interoperability improvements proposed
- Application scoring rubric
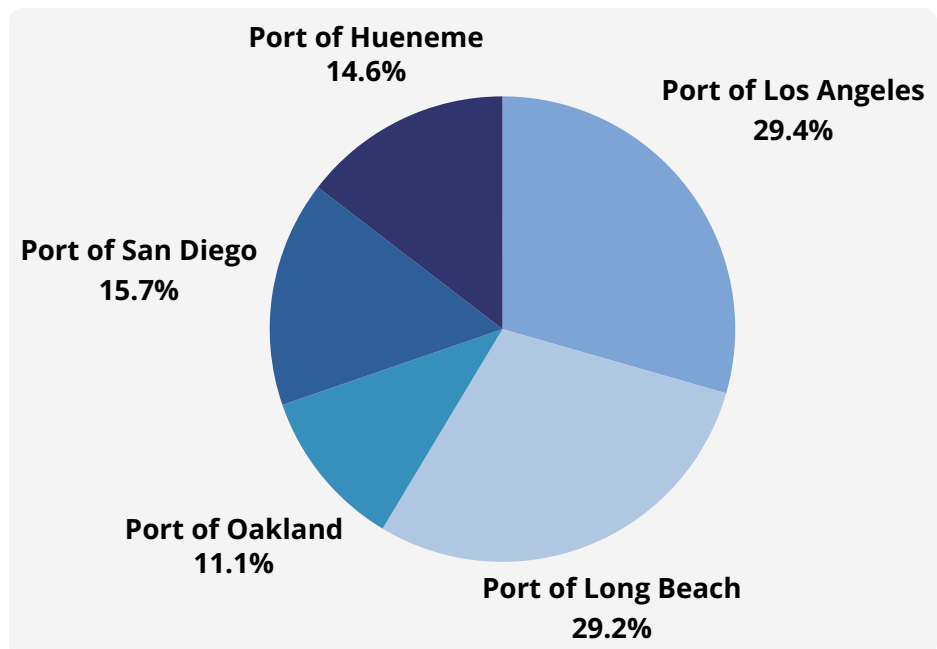- Impact to California port ecosystem

Figure 4 - Percentage of Funds Allocated to Each Port

3.1 PORT OF LOS ANGELES

The Ports of Los Angeles (POLA) and Long Beach in the San Pedro Bay handle approximately 40 percent of all containerized cargo entering the US and 30 percent of containerized exports annually. POLA is a recognized steward of California's environment; in 2017, the San Pedro Bay Ports adopted the most recent update of the Clean Air Action Plan (CAAP), which set greenhouse gas (GHG) emissions reduction goals from mobile sources operating in and around the port complex. The CAAP contains specific measures to reduce GHG emissions from primary mobile sources. Namely, POLA aims to reduce GHGs by 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050. The Port of Los Angeles has already entered into agreements with several ports in Asia to create green shipping corridors that will accelerate deployments of net-zero ships across the Pacific Ocean and greener terminal equipment and partner ports. In alignment with these internal, regional, and global goals, POLA submitted three projects to the California Containerized Ports Interoperability Grant Program to drive interoperability and emissions reductions across California ports.

3.1.1 PROJECT 1: CALPORTS - MOBILE APPLICATION

POLA proposes the California Ports Mobile Application (CalPorts), enabling information sharing to be available to select California ports for elective participation. Enhanced visibility of container movement information will help cargo owners optimize the flow of goods and reduce the time and cost associated with moving cargo. CalPorts will provide data on the status of cargo, which will help reduce the risk of delays and disruptions and enable public and private sector actors to anticipate operational issues better, thereby reducing congestion and improving the overall efficiency of the supply chain. CalPorts will also provide a platform for sharing information on environmental performance and connect port users to the Department of Transportation Freight Logistics Operations Works (FLOW) information via an API. The funds from this program will build the foundation for CalPorts, including data modeling, ingestion, and backend supporting work. Ultimately, CalPorts will offer features that achieve operational goals and enhance port security. These features include a Ports Control Tower providing status updates and insights into terminal operations, a Ports Instrument Cluster offering a mobile view of congestion and performance, a Bird's Eye View offering a statewide view of equipment and movement, and FLOW, an access-controlled section allowing participants in the DOT FLOW program access to federal data.

Key Outcomes and Metrics
The allocated funding for this project will support the core data foundation work of creating an API-only layer to provide base-level FLOW data inputs. The scope of this project, including the establishment of stronger relationships with other California ports, will pave the way for POLA to further develop CalPorts and solicit its usage to other ports. POLA intends to make this application easy for other ports to send data into through an API interface and plans to cover the hosting costs. The project aligns with federal goals to achieve greater operational efficiency and emissions reductions by reducing turn time and queue time. CalPorts is ultimately intended to improve POLA's economic competitiveness by increasing efficiency and productivity. In the near-term, the project strongly supports stakeholder engagement by facilitating opportunities for POLA to establish relationships with other California ports and socialize the capabilities of CalPorts.

Table 2 describes the project tasks, associated award amounts, and total project funding. Project metrics include:

- **Container Volumes and TEUs:** Quarterly and annual comparison of container volume.
- **Port efficiency:** Turn time, queue time, and empty container management will be measured monthly, quarterly, and annually.
- **Usage of the App:** The number of users consistently using and benefiting from the application and information on specific common use cases.
- **Collaboration:** Participation of stakeholders within CalPorts and participation with FLOW as measured by, at least, the number of participating ports and impacted FLOW endpoints.

Table 2 - POLA Project 1 Budget

Task Description	Award Amount
Discovery	$120,000
Data Ingestion and Integration	$400,000
Data Modeling and Foundation	$800,000
Total	**$1,320,000**

3.1.2   PROJECT 2: TRUCKING APPOINTMENT SYSTEM WITH AI ENHANCEMENT

POLA's Trucking Appointment System with AI Enhancement project proposes to initiate the second phase of its Trucking Appointment System, an extension of the currently in-development appointment system that integrates transparent cross-terminal scheduling with near real-time container tracking data provided by the Port Optimizer™ Track and Trace system. By combining these two applications into a single platform, POLA will improve the ease and efficiency of identifying and moving available containers via a scheduling module that shows all available appointments across the entire port complex, complete with the ability to manage all appointments. The system will build on the data foundation established as part of the Track and Trace module, which ingests and aggregates direct data feeds from shipping lines, marine terminals, dray providers, chassis providers, and Customs and Border Protection. Additionally, the design of the current system may extend itself to integration of other port trucking appointment system data feeds, particularly with Port of Long Beach. The two San Pedro Bay Ports are currently in negotiation to build a long-term business model that will fulfill the needs of truckers.

Key Outcomes and Metrics
In addition to improved stakeholder collaboration, the TAC expects that a set of technical alignment resources will come forth as a result of the project, with a focus on standardization, definitions, and architectures. Increased efficiency will result in less congestion and greater productivity, in alignment with Program objectives.

POLA will track and report on operational efficiency impacts including turn time and queue time. Table 3 describes the project tasks, associated award amounts, and total project funding. Project metrics include:

- **Container Volumes and TEUs:** Quarterly and annual comparison of container volume.
- **Port Efficiency:** Turn time, queue time, and empty container management will be measured monthly, quarterly, and annually.
- **Usage of the App:** The number of users consistently using and benefiting from the application and information on specific common use cases. This may include user signup rates, time-of-day usage patterns, and usage time.
- **Collaboration:** Stakeholder participation within the Trucking Appointment System.
- **Appointment KPIs:** Metrics such as appointment utilization, cancellation, and misses will show how appointments are used in the San Pedro Bay Port Complex.
- **Container Metrics:** Container velocity measurements, including dwell and turn times.

Table 3 - POLA Project 2 Budget

Task Description	Award Amount
Discovery	$95,000
Data Ingestion and Integration	$310,000
Data Modeling and Foundation	$750,000
Trucking Appointment AI	$850,000
UX Development	$250,000
UI Implementation	$300,000
QA	$250,000
Total	**$2,930,000**

3.1.3   PROJECT 3: CARBON INTENSITY GATEWAY

POLA's Carbon Intensity Gateway project proposes to develop and deploy a Carbon Intensity Gateway by building on the foundation established through POLA's CAAP, Air Emissions Inventory, the Environmental Management System, the Clean Truck Program collaboration with Port of Long Beach, and the Alternative Maritime Power Program. These programs provide a variety of significant data feeds that can be ingested and accessed via a single Carbon Intensity Gateway. This new portal will provide a near real-time Green Asset Score based on rail, trucking, vessel, and on-port equipment particulate and GHG emissions to users. With this score and an AI backed model, the portal will help users select optimal routes that balance cargo speed and emissions impact. Currently, data resides in separate documents and locations using multiple formats and is not readily retrievable. The Carbon Intensity Gateway will streamline data access by simplifying retrieval to a single source view. POLA is considering making this software available to other ports, though the licensing approach for open access (i.e., open source) has not yet been committed to.

Key Outcomes and Metrics

POLA will unify existing efforts and data sources and augment the intelligence gathered, holistically addressing existing limitations. The project will expand stakeholder coordination, streamline data access, and optimize freight movement. The Gateway will display easily understandable information on Scope 1, 2, and 3 emissions to help users such as Beneficial Cargo Owners (BCOs) to understand their carbon footprint within the supply chain and fulfill their reporting requirements. Data currently available in reports represent fixed-era historical views. The portal will utilize historical data and real-time information to generate simulation models to determine the sensitivity to inputs such as routes, low-carbon infrastructure rollout, and emissions reductions. Lastly, the Gateway will use statistical simulations and predictive models powered by a collaborative effort with San Diego State University to feed users scenarios to improve and optimize intermodal freight voyages. Predictive modeling will be valuable in identifying areas of concern, evaluating the effectiveness of emissions reduction strategies, and promoting sustainable development within ports. Table 4 describes the critical project tasks, associated award amounts, and total project funding. Project metrics include:

- **System Capacity:** The ability to handle traffic volumes during regular/peak periods.
- **Travel Time Reliability:** A measure of a network's predictability, considering congestion, incidents, and weather conditions that can cause delays or disruptions.
- **System Adaptability:** The ability of a transportation network to adapt to changes in demand, technology, or other factors that can impact services. This metric considers new technologies, flexibility to adjust based on demand, and response to disruptions.
- **System Redundancy:** The availability of alternative routes or modes in the event of disruptions to the primary network considering the number and location of alternative routes, availability of transit or other modes, and ability to switch between modes.
- **Environmental Impact:** A measure of sustainability that considers factors such as energy consumption, emissions, and the impact on local ecosystems.

Table 4 - POLA Project 3 Budget

Task Description	Award Amount
Discovery	$220,000
Data Ingestion and Integration	$480,000
Data Modeling and Foundation	$1,100,000
Optimal Routing AI	$500,000
UX Development	$550,000
UI Implementation	$550,000
QA	$250,000
Deployment	$50,000
Total	**$3,700,000**

3.2   PORT OF LONG BEACH

The Port of Long Beach (POLB) handles over $200 billion in trade annually and supports 2.6 million jobs nationwide. POLB serves 175 shipping lines with connections to 217 seaports globally. In 2022, the Port handled over 9.1 million container units. As a critical gateway for trans-Pacific trade, efficiency is vital for the timely and cost-effective movement of a wide range of products, including consumer goods, electronics, automobiles, and industrial equipment. Given POLB's role in the US supply chain, investments must work to modernize and digitize the systems that support the Port and its 100,000+ BCOs, steamship operators, truckers, stevedores, and terminal operators. In 2021, POLB started to pilot and develop the Supply Chain Information Highway (SCIH) to build a collaborative system that provides cargo owners, BCOs, shippers, and more with low-cost and easily accessible supply chain information. POLB's three proposals to the California Containerized Ports Interoperability Grant Program build on the SCIH pilot to expand and improve freight data exchange systems.

3.2.1   PROJECT 1: ADVANCING SUSTAINABILITY WITH NEAR AND ON-PORT VISIBILITY

POLB's Advancing Sustainability with Near and On-Port Visibility project proposes to extend and enhance the features of its existing Supply Chain Information Highway (SCIH). The project will bring the SCIH capabilities available to importers to the exporter market. This will support a presently underserved set of stakeholders and provide enhanced supply chain visibility, allowing exporters to better plan their logistics. With stakeholder portal integrations, the project will expand the features of login capabilities to several different user classes, including export users, enhancing security and reliability. Additionally, in collaboration with the Alameda Corridor Transit Authority, POLB will integrate a network of cameras and deploy computer vision technology to read container numbers from passing trains, enhancing event data for inbound and outbound cargo. Lastly, POLB will build a data system for consuming vessel AIS data and feed it into an algorithm to determine vessel speed on approach to the Port to encourage better emissions-emitting behavior through modulation of dockage fees. POLB will begin to integrate data feeds with two foreign ports participating in the Green Corridor.

Key Outcomes and Metrics
This project will increase economic competitiveness and sustainability by enhancing POLB's data visibility and tracking. This will benefit exporters, improve stakeholder coordination, and expand opportunities for data sharing. Importantly, POLB plans to open source certain components of the SCIH to other ports. This will allow other ports to freely implement SCIH with their preferred vendor while leveraging the benefits put into the software to date. POLB's Project 3 provides further information on the first test case of open-source collaborative work between two ports. Table 5 describes the key project tasks, associated award amounts, and total project funding. Project metrics include:
- **System Performance:** Data processing speed, system uptime, reliability.
- **Data Quality**: Data accuracy, consistency, schema breakages & changes.
- **Stakeholder Engagement:** User adoption rates, feedback survey results, training program participation.
- **Emissions Reductions:** Once the metrics and definitions have been finalized for the Green Flag and Corridor effort, POLB will monitor the correlation between vessel, truck, and rail operational efficiency and emissions reductions.

Table 5 - POLB Project 1 Budget

Task Description	Award Amount
Advancing Exporter Data Visibility	$750,000
Stakeholder Portal Integration	$430,000
Advancing Rail Tracking and Visibility	$1,000,000
Environmental Green Corridor and Transportation Program	$1,495,000
Total	**$3,675,000**

3.2.2   PROJECT 2: ENHANCED PORT EFFICIENCY THROUGH DATA ANALYTICS

POLB's Enhanced Port Efficiency Through Data Analytics project proposes to expand the Supply Chain Information Highway (SCIH) cargo data exchange and build data quality reporting through the Truck Appointment System. The Truck Appointment System will streamline the scheduling of container pickups by integrating all terminals into a single system and API for the six terminals. POLB is currently engaging in productive discussions with POLA to align this API into a unified solution that would serve the San Pedro Bay. The POLB solution is expected to target efficiencies for carriers and reduce congestion in and around the port complex. If a unified solution is achieved, further efficiencies will be generated.

Key Outcomes and Metrics
The project will support port efficiency by revolutionizing POLB's data analytics capabilities. Streamlining container pickups will improve cargo movement to drive emissions reductions and improve organization. Additionally, the project will increase engagement and coordination among POLB and POLA. Table 6 describes the key project tasks, associated award amounts, and total project funding. Project metrics include:
- **Port Efficiency:** Turn time, queue time, and empty container management measured monthly, quarterly, and annually.
- **System Capacity:** The ability to handle traffic volumes during regular/peak periods.
- **System Performance:** Data processing speed, system uptime, reliability.
- **Appointment KPIs:** Metrics such as appointment utilization, cancellation, and misses will show how appointments are used. In coordination with POLA, this may include tracking for the entire San Pedro Bay Port Complex.
- **Container Metrics:** Container velocity measurements, including dwell and turn times.

Table 6 - POLB Project 2 Budget

Task Description	Award Amount
Truck Appointment System	$2,950,000
Total	**$2,950,000**

3.2.3   PROJECT 3: DRIVING PORT INTEROPERABILITY AND COLLABORATION

POLB's Driving Port Interoperability and Collaboration project proposes to develop a non-containerized data system and new data model standards in partnership with the Port of San Diego by leveraging existing patterns from the Supply Chain Information Highway (SCIH). Additionally, POLB seeks to integrate its back-end systems around this dimension of data. In alignment with Phase 3 of the Port of San Diego's Maritime PortConnect project, POLB will utilize controlled data from San Diego to learn more about implementation nuances, establish a shared governance approach, and pilot sharing to enhance visibility for non-containerized cargo. This effort will involve a discovery process to engage stakeholder groups, identify & develop data standards, establish standards governance, and develop open-source components to be utilized by any of the participating ports. The primary targets will include Roll-on Roll-off (RoRo), Break-Bulk, Dry-Bulk, and Liquid-Bulk cargo data. The resulting data standards will ideally be made open source when complete.

Key Outcomes and Metrics
This project will support data visibility and collaboration, particularly among POLB and Port of San Diego. Lessons learned from developing a non-containerized data system and standards may ultimately be replicated across other ports to improve tracking and visibility for all types of cargo. Table 7 describes the key project tasks, associated award amounts, and total project funding. Project metrics include:
- **System Performance:** Data processing speed, system uptime, reliability.
- **Collaboration:** Coordination among POLB and Port of San Diego and engagement with other port stakeholder groups.
- **Data Standards:** Tracking and reporting on data standards, including the availability of open-source components.

Table 7 - POLB Project 3 Budget

Task Description	Award Amount
Non-Containerized Cargo Data Feeds	$1,250,000
Total	**$1,250,000**

3.3   PORT OF OAKLAND

The Port of Oakland (Port) is a critical global gateway for the vast and diverse San Francisco Bay Area and Northern California Megaregion by supporting more than 500,000 jobs in the state of California, including the economy of the rural Central Valley farming sector. It is the second-largest exporting region in the United States. Handling approximately 2.1 million TEUs, the Port is one of the busiest container ports on the West Coast and one of the top ten in the US. The Port serves as a primary export gateway for agricultural products from California's Central Valley and supports the economy of the rural farming sector. The Port exported $13.6 billion in agricultural products in 2022. Due to supply chain issues exacerbated during the COVID-19 pandemic, Port stakeholders are increasingly looking to port authorities to provide meaningful and reliable real-time information regarding maritime goods movement.

The Port has recently undertaken an initiative, the Freight Intelligent Transportation System (FITS), to enhance data collection and dissemination through the installation of field equipment, facilitate the buildout of an emergency operations/traffic management center (TMC) with Advanced Traffic Management System (ATMS) software, and enable deployment of a web and phone-application (called the Oakland Portal) that will disseminate meaningful information to the public such as truck terminal wait times, container dwell data, and terminal and roadway information. Through the California Containerized Ports Interoperability Grant Program, the Port seeks to enhance the features of the FITS through two distinct projects.

3.3.1 PROJECT 1: CONTAINERIZED PORT EMPOWERMENT INITIATIVE - DEVELOPMENT OF THE INTEGRATED DATA ENVIRONMENT

The Port proposes to build a Port Integrated Data Environment (IDE) that aligns Port staff, stakeholders, and customers while moving up the value chain. The Port will achieve this by enhancing current FITS features, namely the ATMS, Oakland Portal, and the Data Hub (collectively comprising IDE), with new data sets and processes for utilizing and distributing Port-related information. Upstream and downstream stakeholders directly affected by the current silo effect include marine terminal operators (MTOs), ocean carriers, shippers, consignees, customs, brokers, freight forwarders, trucking companies, warehousing companies, railroads, other port authorities, manufacturers, and importers/consumers. The grant funding will enable proactive upgrades, ensuring that the Port's methods for ingesting, processing, and sharing information remain at the forefront of modern data exchange technology.

Key Outcomes and Metrics
Once implemented, automatic data processing and normalization through the Port IDE will eliminate gaps and provide blueprints for other California ports to model its efforts. The project will expand data availability, fusing new datasets into accessible data through the Oakland portal and dashboards. Additionally, the Port's FITS asset management system will aid in the collection of data points and keep the network in a healthy state to increase its reliability. Collectively, these project components will decrease truck turn times, increase intermobility, and reduce emissions in alignment with Program objectives. Table 8 describes the critical project tasks, associated award amounts, and total project funding. Project metrics include:
- **Decreased Truck Turn Times and Queuing:** Truck turn times and traffic queuing before and after the project, with the presumption that better data will change traffic behavior and improve circulation.
- **Increased Intermobility:** Current API or other direct file transfers before the project starts and recorded changes one year after project implementation
- **Improved Stakeholder Perceptions:** Interviews with Port data users (MTOs, BCOs, ocean carriers) post-project implementation to determine perceptions of the Port as a reliable data provider.
- **Environmental Metrics:** Comparison of environmental metrics collected manually versus those collected electronically after project implementation.
- **Data Collection and Storage:** Comparison of current data collection storage to data collection storage after completing the project.

Table 8 - Port of Oakland Project 1 Budget

Task Description	Award Amount
Travel, Budget Reporting, Etc.	$210,000
Cloud Storage Capacity	$70,000
Centralize Data Collection	$300,000
Asset Management, Design, and Development	$300,000
Port-Only Private View Development	$484,990
Total	**$1,364,990**

3.3.2 PROJECT 2: UNIFIED TERMINAL APPOINTMENT SYSTEM

The Unified Terminal Appointment System (UTAS) project proposes subscribing to a new unified marine terminal appointment feature set. While the Port's three MTOs use the same appointment system (Advent eModal), the interface for each MTO is distinctly different. The objective is to enable a seamless and consistent user experience for truck dispatchers, drivers, and beneficial cargo owners (BCOs) through a software as a service (SaaS) platform accessed via the Port's Oakland Portal, operated and owned by Advent eModal. The new features will enable a more standardized process, language, and definition across the terminals concerning container availability, return instructions, and appointment status. The Port will create a new layer on top of the existing terminal appointment systems, consolidating their APIs into one interface that truckers can interact with. Fundamental components of an agnostic system that will support flexible and efficient appointment scheduling and management within port ecosystems include:

- **A centralized hub** or platform that acts as an intermediary connecting the appointment systems of different terminals within a port.
- **Application Programming Interfaces (APIs)** will provide seamless communication and data exchange between the centralized hub and the various appointment systems at different terminals, enabling real-time transfer of appointment data, cargo information, and scheduling details.
- **The appointment scheduling User Interface (UI)** will provide a user-friendly interface accessible to various stakeholders, allowing users to view and manage appointments, check cargo status, and make scheduling requests. This will include a Mobile App for ease of appointment management.
- **Integrations to support existing data exchange** will ensure that all relevant information is available in one place, namely the Oakland Portal & Data Hub.
- **Reporting and analytics tools** will give stakeholders insights into appointment performance, resource utilization, and operational efficiency.

Key Outcomes and Metrics
The project will enable the Port to achieve enhanced operational capabilities, increase drayage efficiency, increase fluidity at the gate, reduce under-utilized appointment capacity, and increase the velocity and movement of goods. Table 9 describes the key project tasks, associated award amounts, and total project funding. Project metrics include:

- **Appointment Utilization:** Appointment utilization at the gates should increase and be more uniformly distributed throughout the day, measured by taking the entropy of a histogram (counts-based bar chart) or distribution for each hour of the day.
- **Canceled Appointments:** The number of canceled appointments should increase as truckers have overlapping invalid appointments canceled by the system. Overall, canceled appointments should happen less frequently.
- **Missed Appointments:** The number of appointments missed will decrease because it's easier to change them for users
- **Total Number of Appointments:** If the Port can move cargo through the bay faster, more appointments will likely be scheduled, and it will be easier for users to schedule appointments.
- **Dual vs Single Moves:** Measured as a ratio, the number of dual moves should improve because it is easier for truckers to identify these opportunities.

Table 9 - Port of Oakland Project 2 Budget

Task Description	Award Amount
Agnostic Portal	$600,000
Terminal 1-3	$525,000
Mobile application/integration	$350,000
Project Management	$150,000
Total	**$1,625,000**

3.4   PORT OF SAN DIEGO

The Port of San Diego (POSD) is essential to San Diego's economic vitality. It serves as a steward of the San Diego Bay, managing its valuable economic, social, and environmental resources on behalf of the people of the state of California. The Port's most recent economic impact study estimated that 37,324 waterfront jobs were created by port activity in 2021, and the port generated an estimated $9 billion in economic output in San Diego County. The Port has two cargo terminals, the National City Marine Terminal (NCMT) and the Tenth Avenue Marine Terminal (TAMT). NCMT is primarily operated by Pasha Automotive Services and mainly handles roll-on/roll-off (ro-ro) cargo, lumber, and military household goods. TAMT serves as an omni-terminal with cargo consisting of refrigerated container cargo, bulk, break-bulk, and heavy lift project cargo. In their application to the California Containerized Ports Interoperability Grant Program, POSD aims to streamline data management systems to achieve a more efficient maritime supply chain in California.

3.4.1   PROJECT 1: MARITIME PORTCONNECT

The Port's Maritime Department has a data system for financial transactions associated with vessel calls, vessel services, and cargo handling and movement at TAMT; no other comprehensive data systems exist to support maritime operations or terminal management. The Port does not have complete visibility into tenant operations on the terminals.

Port staff currently handle berth reservation requests, cargo planning and yard management, gate appointment management, vessel tracking, and services and equipment coordination using manual processes. Heavy reliance on manual data entry creates three overarching problems: 1) Data is not centralized, 2) Data cannot be easily reported or shared across systems, and 3) Data gaps may result in transaction errors related to berth reservations and terminal fees. POSD will begin its digital transformation with the Maritime PortConnect project, a centralized system that can be leveraged to coordinate scheduling and provide access to multiple maritime and cross-functional users, allowing all relevant parties to interact in real-time. This solution will integrate a Port Management Information System (PMIS) with a Terminal Operating System (TOS) to address the challenges affecting vessel/berth scheduling, cargo planning and yard management, gate and appointment management, vessel tracking, and services support, transforming the Port's manual processes to manage operations into a centralized and integrated data system to streamline efficiencies across Port operations. The Maritime PortConnect solution proposes three key implementation phases to accelerate this initiative and achieve the objectives of the Port Data Partnership and the requirements of Senate Bill 193:

- **Phase 1:** PMIS/TOS Solution Implementation
- **Phase 2:** Integrate the current terminal operators into the system
- **Phase 3:** Develop standards for non-containerized cargo in collaboration with the Port of Long Beach (POLB) and implement a Proof of Concept (POC) that consumes, normalizes, and makes this data usable. As discussed in Section 3.2.3, POLB's Phase 3 will leverage a discovery process combined with tightly controlled data from POSD to learn more about implementation nuances, establish a shared governance approach, and pilot sharing to enhance visibility for non-containerized cargo.

Key Outcomes and Metrics

Together, these components will allow POSD to participate in the data interoperability space for the California port ecosystem. Table 10 describes the key project tasks, associated award amounts, and total project funding. Project metrics include:

- **Measuring systems implementation project progress** through standard project management metrics.
- **Measuring adoption progress** by system use and customer satisfaction interviews and surveys.
- **Measuring business and operations metrics**, including efficiency and productivity, cost reduction, improved decision-making, enhanced customer service, competitive advantage, trade facilitation, infrastructure optimization, compliance and risk management, and emissions reductions.

Table 10 - POSD Project Budget

Task Description	Award Amount
PMIS/TOS Solution Implementation	$3,310,000
Terminal Operator Integrations	$430,000
Non-Containerized Standards & Data Processing	$500,000
Total	**$4,240,000**

3.5 PORT OF HUENEME

The Port of Hueneme (POH) is owned and operated by the Oxnard Harbor District, a political subdivision of the state of California. The bustling commercial gateway remains an independent and self-supporting business enterprise. A pivotal component in the intermodal logistics supply chain, the Port of Hueneme is a significant contributor to the economic health of Ventura County and Southern California. POH handles $11.39 billion in annual trade value, delivering $2.2 billion in overall economic impact and $173.2 million paid in yearly taxes. POH also regionally provides more than 20,000 direct, indirect, induced, and influenced jobs. As a terminal operating port rather than a landlord port, POH has experienced remarkable growth over the past decade, surging from virtually zero to handling 260 thousand TEUs and earning the #6 West Coast container port position. POH's application to the California Containerized Ports Interoperability Grant Program aims to overcome challenges associated with manual data entry and in-house data storage systems to create a unified port-wide data storage and sharing system.

3.5.1 PROJECT 1

The Port of Hueneme relies extensively on manual data entry into spreadsheets and an in-house developed system. Notable limitations arise due to the absence of software acting as a centralized source of truth, a data warehouse, or a central repository. This impedes analytics capabilities, as the data is stored in technology unsuitable for multiuser reporting and scattered across diverse sources. To overcome these challenges and participate in the data-driven California port interoperability ecosystem, POH proposes integrating off-the-shelf maritime port/terminal management solutions and backend systems with customized development as needed. This includes robust cloud-based infrastructure for seamless data exchange with partners, encompassing data collection mechanisms for all port operations and integrating information from stakeholders and customers. Establishing a unified port-wide data system will facilitate the seamless sharing of vital supply chain information among stakeholders, ensuring preparedness for cloud-based systems and enhancing interoperability across the supply chain. The project aims to make the Port data-aware, data-savvy, and ultimately data-driven.

Key Outcomes and Metrics
The project's collaborative approach enhances supply chain resiliency, reduces emissions, and fosters sustained economic growth. The project will integrate a readily available maritime cloud-based port management system and establish robust back-end data systems in the cloud, ensuring efficient and secure data management and access. API connections will foster interoperability with other ports and state and federal systems to allow seamless information exchange and collaboration via the Port Data Exchange. Additionally, POH will implement Business Intelligence (BI) and predictive systems to enhance the Port's ability to analyze data and make informed decisions to improve efficiency. Table 11 describes the key project tasks, associated award amounts, and total project funding. Project metrics include:
- **Port Efficiency:** POH will provide a baseline set of efficiency metrics for future comparison.
- **Error Rates:** Data omissions and errors will be reduced with a robust data system to capture the data.

- **Response Times:** Response times to various port and stakeholder needs will be measured and are expected to improve.
- **Processing Speed:** The time it takes for information to be entered into the system and realized through a digital interface will decrease.
- **User Satisfaction:** POH will measure users' satisfaction, including internal port employees, contractors, and customers, with data endpoints/service.
- **Task Completion Time:** POH will measure a baseline of at least five key tasks that port members perform before and after the system is implemented, with the expectation that task completion time will decrease.
- **System Uptime:** Previous system downtime will be measured against a short sample of the new system downtime.

Table 11- POH Project Budget

Task Description	Award Amount
Port Operating System/Terminal Operating System Implementation	$3,310,000
Data Warehouse	$300,000
Application Programming Interface (API) Exchange	$250,000
Business Intelligence Application	$75,000
Total	**$3,935,000**

4 PROJECT OUTCOMES

4.1 KEY TAKEAWAYS

The Program will build the foundation for small ports to participate in the interoperability space. Until now, small ports have been unable to capture data in a meaningful way without significant human effort. Acting as an introduction to digitalization, the Program will enable small ports to build their data systems with the eventual ability to tie those systems together with the larger participating ports. In fact, the Port of Los Angeles is already engaging the Ports of San Diego and Hueneme to collaborate where possible. Larger ports that already have robust data systems will benefit from this Program by targeting ambitious goals through their projects, tackling emissions reductions, stakeholder engagement, compliance, and reporting. Reaching beyond port boundaries, the projects proposed at California's larger ports will benefit stakeholders and users further downstream.

4.2 DATA SYSTEM ENHANCEMENTS

Within the San Pedro Bay Port Complex, the projects funded by this Program represent the first state investment in AI technology to reduce emissions and improve efficiencies. Further, the proposed Trucking Appointment System will benefit small business truckers, particularly within environmentally and economically disadvantaged communities.

The Program will also lead to the creation of new data infrastructure systems at the Ports of San Diego and Hueneme, transforming day-to-day operations currently stifled by reliance on manual data entry. Various new capabilities will enhance operations across all five facilities, reducing congestion and associated emissions by optimizing cargo movement. Several projects incorporate FLOW integration and API sharing, advancing federal partnerships with the Biden-Harris Administration. Collectively, several projects will address key pain points exacerbated by the global supply chain crisis by providing real-time port terminal information for cargo owners, ships, truckers, and rail lines. The development of new data standards will enhance data exchange, supporting domestic and international trade with real-time terminal information access.

4.3   IDENTIFICATION OF SHARED DATA GAPS

The Program administration process allowed the TAC to identify and address shared data gaps through project design and funding allocation. Through this Program, projects will address various gaps or presently duplicated efforts. For example, POLB intends to open-source some of its data ingestion components to other ports, and POLA aims to create a unified framework for ingesting port data and connecting it to the US DOT's FLOW program. The Program will also consolidate trucking appointment systems across terminals and between ports to deliver standardization and simplification for trucking stakeholders. The Port of Oakland is building a Unified Terminal Appointment System, and POLB and POLA are working on components for their trucking appointment system, hoping to bridge common gaps through the integration of their systems to approach a unified solution to serve the San Pedro Bay Port Complex. All participating ports handle some non-containerized data standards, and finding ways to integrate these data points into port operations will enhance the flow of all goods through ports. POSD and POLB are collaborating to generate and make these data standards available to the public. Additionally, several ports handle significant export cargo but need more sophisticated systems for these data flows. POLB intends to build this for their users, which may be replicated by other ports in the future. Ports also voiced a desire to better track emissions from on-port equipment into a consolidated data warehouse and reporting system.

4.4   EFFICIENCY IMPROVEMENTS

The Program will achieve several efficiency improvements, including reduced labor hours involved in data entry and management, improved data consistency and reduced accuracy problems, and increased TEU volumes and velocities. Through more efficient appointment booking capabilities, the ports expect fewer canceled truck appointments. Additionally, the ports expect to spend less time managing truck appointments and to reduce emissions by maximizing optimal dual moves. The ports will track key performance indicators for each metric, as described in the project summaries.

5   CONCLUSIONS

The California Containerized Ports Interoperability Grant Program will revolutionize interoperability across the five California ports, meeting the unique needs of each location while prioritizing cross-facility engagement and knowledge sharing. Importantly, this Program will serve as a replicable model for similar investments in port data interoperability across the United States, demonstrating achievable efficiency improvements and emissions reductions associated with comprehensive data management.

This Program provided Momentum and ISC a unique opportunity to rethink the grant administration process to center the needs and capabilities of applicants, crafting projects that will facilitate immediate collaboration and pave the way for further advancements in interoperability. This equity-centered approach demonstrated how hands-on guidance and technical expertise on the front-end of project development results in carefully scoped, achievable proposals.

Through ten distinct projects, the Program will develop use cases and applications that support operational improvement and expand equitable data access for key stakeholders in the port ecosystem. Projects will develop common data standards, further enhancing the potential for data sharing and interoperability in the future. Additionally, the data system foundations built with Program funds will serve as a starting point for further investment as ports continue to pursue regional, state, and federal funding for system expansion and improvement.

Within the San Pedro Bay Port Complex, the projects funded by this Program represent the first state investment in AI technology to reduce emissions and improve efficiencies. Further, the proposed Trucking Appointment System will benefit small business truckers, particularly within environmentally and economically disadvantaged communities. The Program will also lead to the creation of new data infrastructure systems at the Ports of San Diego and Hueneme, transforming day-to-day operations currently stifled by reliance on manual data entry. Various new capabilities will enhance operations across all five facilities, reducing congestion and associated emissions by optimizing cargo movement. Several projects incorporate FLOW integration and API sharing, advancing federal partnerships with the Biden-Harris Administration. Collectively, the projects will address key pain points exacerbated by the global supply chain crisis by providing real-time port terminal information for cargo owners, ships, truckers, and rail lines. The development of new data standards will enhance data exchange, supporting domestic and international trade with real-time terminal information access.

Individually and as a whole, the projects support the Program objectives of Federal Alignment, Emissions Reductions, Economic Competitiveness, and Stakeholder Engagement. Through comprehensive data management and organization, the projects will improve efficiencies to achieve emissions reductions goals outlined in regional, state, and federal climate resilience plans. Momentum and ISC recognize this Program to be a catalyst for a lasting statewide port collaboration effort. Each project will open up opportunities for collaboration and data sharing that will utilize systems, standards, and processes developed with Program funds.

PROGRAM ACHIEVEMENTS

⭐ Groundbreaking $27 million in state funds allocated to support statewide port interoperability

⭐ First-of-its-kind program with an innovative, equity-centered approach

⭐ Replicable model for additional state and federal investments

⭐ New opportunities for ports to collaborate and lead data system development

APPENDIX

IMPLEMENTATION STATUS OF THE MOU

The award and dispersal of funds to the five containerized California ports marks a significant achievement in implementing the California Port Data Partnership MOU. The MOU aims to support improved freight system resilience, goods movement efficiency, emissions reduction, and economic competitiveness by advancing interoperability among the ports. This Program facilitated discussion and cooperation among the five ports, and the proposal development process and subsequent project implementation stages support the following areas of cooperation identified in the MOU:

- Development of use cases and applications that support operational improvement, efficiency, and emissions reductions;
- Outlining of key alignment points to achieve resultant interoperability with other container ports;
- Ensuring equitable access to data for users;
- Identification of data elements and data sources;
- Identification of external entities in the supply chain for data sharing;
- Development of common definitions and standards for identified data elements;
- Ensuring data security and privacy;
- User discovery and stakeholder engagement;
- Identification of public and private funding resources to support port data system development;
- Increasing public and industry awareness of port data system development; and
- Connecting and liaising with other local, state, and federal entities of government, private industry partners, and other interested parties to support interoperability and port data system development.

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