

# CALL FOR JOINT INDUSTRY PROJECTS TO DIGITALISE BUNKER SECTOR

## Objective

1. MPA has launched an open call for joint industry projects (JIP) to encourage our bunker industry, technology community and adjacent sectors to accelerate the digitalisation of Singapore's bunkering sector. This call seeks to enhance bunker operations with the objectives of building up confidence in electronic documentations/processes within the sector and demonstrating value in terms of improving efficiency/productivity and transparency.

## Development Areas / Scope

2. The proposed solutions and digital documentations must conform with relevant regulations and legislation such as Singapore's Electronic Transactions Act.

3. We like to invite committed industry stakeholders to submit proposals in one or more of the following development areas:-

### A. Industry Solutions (B2B)

Applicant and its partners to develop and test their commercial and operations solutions that enhances operations efficiency, transparency and event visibility from oil terminals to bunker suppliers/craft to receiving ships. These could include the demonstration of technical/ operational feasibility and value of adopting electronic workflows and digitalised documentation for bunker delivery and other bunkering documentations<sup>1</sup>, optimisation of terminal and bunker craft scheduling & utilisation, etc.

Proposed solutions must carry out API testing with Common Data Infrastructure (CDI)<sup>2</sup> to ensure that they are CDI-compatible. More details can be found in ANNEX.

### B. Automated & Secured Regulatory Reporting

Applicant and its partners to develop and test systems to transfer bunker data and event data accurately, reliably and securely from source (e.g. Mass Flow Meter (MFM), IoT devices etc) to MPA, as part of automated regulatory reporting, via digitalBunker@SG API gateway with minimum data hops or point-of-failure in between. The project must demonstrate end-to-end data integrity, cybersecurity and operational feasibility when transferring such information from source to MPA. Such information will be upheld as the single source of truth for regulatory reporting purposes. *(Note: MPA's digitalBunker@SG API*

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<sup>1</sup> Bunker Delivery Note (e-BDN), meter reading record form, meter totaliser report, bunker requisition form, stock movement logbook, note of protest, survey statement of fact, pre-delivery safety checklist, certificate of quality (COQ), bill of lading / certificate of quantity (CQ) and sales contract.

<sup>2</sup> Common Data Infrastructure (CDI) aims to connect local & global supply chains ecosystems via a trusted, secure & easy-to-use data sharing infrastructure to enhance stakeholders' productivity & supply chains' resilience. CDI may be connected via two methodologies; either directly from source system or via an API Gateway. CDI uses REST API with API requests to and from CDI made over HTTPS.

*gateway is planned to be ready for field trials by Q4 2021/ Q1 2022. See para 13 below for info.)*

### **C. Development/Enhancement of Hardware & Software to Enable Automated and Secured Data Transmission from MFM system**

Applicant and its partners to develop/enhance and test for interoperability of their new/existing hardware and software systems (e.g. edge device, bunker computer, data logger, encryption units, 4G/LTE transmission devices, modem, etc) to facilitate the electronic capturing, storage and eventual transfer of raw data from the MFM system to MPA and B2B. The hardware and software development should to comply the Code Of Practice For Bunker Mass Flow Metering (MFM), SS648: 2019 standards. Where there are variations due to digital concept of operations, the applicant should highlight the required variations to SS648: 2019. The applicant will engage credible MFM system provider(s) to collaborate on this development/enhancement scope.

4. The development areas for the JIP are given in ANNEX A, and applicant is free to apply for one or more of the areas or to propose other digitalisation projects that will contribute to the above objectives.

5. The lead applicant needs to engage relevant industry stakeholders to validate its proposal and solicit participation and contributions from bunker supplier(s), bunker craft operator(s) and technology developer(s), and/or other value chain stakeholders such as bunker surveyor(s), oil terminal(s), receiving ship(s) and MFM system provider(s) in the JIP submission.

6. Successful applicants are expected to participate and contribute towards standards development upon near completion/ completion of the JIP.

7. Successful applicants and projects do not predicate MPA's endorsement/ deployment intent and are subject to MPA's assessment and discretion on the project outcome.

### **MINT Fund Criteria and Funding Support**

8. The Maritime Innovation & Technology (MINT) Fund will provide funding support level of up to 50% or possibly up to 70% (for high impact project) of the qualifying project costs. The MINT Fund's criteria are as follows

#### **9. Eligibility Criteria**

- Qualifying Organisation: Applicant must be incorporated under the Companies Act (Cap.50) and operating in Singapore, with a minimum paid-up capital of 50% of the total project costs; Classification societies appointed as Recognised Organisations under the Merchant Shipping (Authorised Organisations) Regulations.
- Qualifying Project: Each project should comprise of technology developer, licensed bunker suppliers, licensed bunker craft operators and bunker

buyers, with letter(s) of intent on their participation and/or contributions to the project. Proposal should include company profiles and participating personnel from all entities in the joint industry project, including their involvement and contribution. All work should be conducted in Singapore to qualify for funding support.

#### 10. Project Evaluation Criteria

Proposals will be evaluated by MPA and relevant agencies and industry associations based on the proposed scope and the following factors

- Relevance & Impact to Maritime Industry
- Innovation and Differentiation
- Local Value Capture
- Local Capability Development
- Organisation and team competency

11. More information can be found on MPA website (<https://www.mpa.gov.sg>) and the application form given in this link. For any further questions, please direct to [mint@mpa.gov.sg](mailto:mint@mpa.gov.sg)

12. MPA's decision on the call's outcomes is final.

#### Field Trials/ Integration Testing

13. Field trials/ integration testing with industry systems for regulatory reporting purposes, including digitalBunker@SG are expected to commence in 4Q2021/ 1Q2022. The field trials are open to registered applicants, including those not supported under MINT Fund.

#### Timeline

<b>Issue Call-for-Proposal</b>	<b>20 April 2021</b>
<b>Industry Briefing Session</b>	<p>The industry briefing session requires registration.</p> <p>Applicants interested to attend the industry briefing session, please write in to <b><a href="mailto:mint@mpa.gov.sg">mint@mpa.gov.sg</a> by 7 May 2021</b> to state</p> <ul style="list-style-type: none"> <li>- Organisation</li> <li>- Attendees/ Representatives</li> <li>- Purpose of attending</li> <li>- Questions</li> </ul> <p>Industry briefing is planned for <b>11 May 2021, 10am to 12 pm.</b></p>

<b>Submission Deadline</b>	Interested applicants shall submit the completed proposals using MPA's MINT Fund Application Form to <b>mint@mpa.gov.sg</b> before <b>10 June 2021, 1800 hours (GMT+8)</b>
<b>Proposal Evaluation and Award</b>	<p>Proposals will be evaluated by MPA and relevant agencies and industry associations based on the proposed scope.</p> <p>The panel may seek additional information to elaborate or clarify areas described in the proposal during the review process. Shortlisted applicants will be notified in July 2021 and awarded by August 2021.</p>

## **ANNEX A**

### **A. Industry solutions (B2B)**

i) Electronic Documents, Certificates, Signature, Workflows and Identity Management

#### **Industry Problem/Opportunity:**

1. Currently, there are over 14 documents under SS648: 2019 Code Of Practice For Bunker Mass Flow Metering, to be completed per delivery process. Manual completion of these documents requires human interactions between receiving ship crew, bunker craft crew, and survey personnel which heighten COVID-19 risks. Manual documentation also introduces risks of human error and increases the opportunity cost of delayed transactions. It is an opportunity to enhance/automate the documentation and increase bunker operations resilience and transparency.

#### **Potential Scope:**

2. Collaboration among MFM system provider(s), licensed bunker craft operator(s), licensed bunker supplier(s) and receiving ship (s) to pilot a project to automate and digitalise bunker documentation processes

- a. Open platform development to enable any MFM, respective existing data loggers and sensors (source data) to interoperate on mobile devices
- b. Efficient workflow and system to support international ships stamp/ signature and identity management
- c. Minimises physical contact among parties
- d. Addresses the bunker delivery lifecycle from loading at ex-wharf, ship-to-ship and last mile delivery, where relevant

3. Applicants may consider adopting requirements under Guidelines For The Use Of Electronic Record Books, MARPOL, RESOLUTION MEPC.312(74)<sup>3</sup> for relevant electronic documentations/ workflows. Details can be found on MPA website.

4. Applicant to adopt requirements listed under Singapore' Electronics Transactions Act<sup>4</sup> (ETA) for relevant electronic documentations/ workflows. Details of ETA can be found on AGC website.

5. Solutions must carry out API testing with Common Data Infrastructure (CDI)<sup>5</sup> to ensure that its proposed solution/product is CDI-compatible. Details on CDI will be provided on request.

#### **Expected Outcomes & Benefits:**

6. Electronic workflows and documentations and data transmission that:-

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<sup>3</sup> Adopted on 17 May 2019. Issued under MPA Shipping Circular No.10 of 2020, 5 May 2020.

<sup>4</sup> <https://sso.agc.gov.sg/Act/ETA2010>

<sup>5</sup> Common Data Infrastructure (CDI) aims to connect local & global supply chains ecosystems via a trusted, secure & easy-to-use data sharing infrastructure to enhance stakeholders' productivity & supply chains' resilience. CDI may be connected via two methodologies; either directly from source system or via an API Gateway. CDI uses REST API with API requests to and from CDI made over HTTPS.

- a. Enable high integrity, security, timeliness and resilience of reporting to stakeholders, including MPA
- b. Improve operations efficiency and visibility
- c. Allows minimal human intervention and use of papers/materials
- d. ETA compliant and CDI-enabled solutions

**Estimated Project Duration:**

9 to 12 months (including field trials)

ii) Optimisation of Terminal and Bunker Craft Scheduling

**Industry Problem/Opportunity:**

1. Currently, there are frequent rescheduling for i) loadings of bunker onto bunker craft carried out at oil terminals/ floaters, and ii) delivery of bunker from bunker craft to receiving ships, which result in operational inefficiencies. This predominantly stems from the volatile nature of the bunker market, where the order-to-delivery timings and quantities are very fluid and thus highly prone to changes. Last minute nominations to terminals and continuous changes and cancellations are resulting in a lot of (re)work by all parties, which is large manually executed.

2. In turn, the supply chain inefficiencies impact the entire planning of the terminal jetties, which cascades into commercial impact.

**Potential Scope:**

3. Collaboration among terminal operator(s), licensed bunker craft operator(s), licensed bunker supplier(s) to pilot a project on cost effective scheduling solutions that harness event data to support schedule and operations optimisation between terminal and bunker craft, and bunker craft with receiving vessels. Visibility of barge statuses and arrival information (such as ETA, 'NOR' & load quantity information) are expected to deliver operational savings to all stakeholders in the supply chain.

**Expected Outcomes & Benefits:**

- a. Efficient and cost-effective schedule to optimise operations planning between terminal and bunker craft, and bunker craft with receiving vessels
- b. Optimised bunker craft operations

**Estimated Timeline:**

9 -12 months (including field trials)

## **B. Automated & Secured Regulatory Reporting (B2G)**

i) Industry software and hardware development (compliant to SS648: 2019 Standards) for bunker supplier(s) and bunker craft operator(s) to submit complete and accurate bunkering data/records and event data from source directly, securely, timely to MPA.

### **Industry Problem/Opportunity:**

1. Currently, all international and domestic bunker deliveries need to be declared to MPA via digitalPORT@SG™. MPA seeks to enhance this manual process to an automated and secured reporting process that includes both event and bunkering data/ records, including bunker flow profile.

### **Potential Scope:**

2. Collaboration among MFM system provider(s), licensed bunker craft operator(s), licensed bunker supplier(s) to pilot a project that demonstrates end-to-end data integrity, cybersecurity and operational feasibility to transfer bunkering data and vessel timestamps accurately, reliably and securely from source (e.g. Mass Flow Meter (MFM), IoT devices etc) to MPA, as part of automated regulatory reporting via digitalBunker@SG API gateway. The system should address the activities at terminal(s) loading to bunker suppliers/craft, delivery at receiving ships and bunker craft to bunker craft transfer (Ship-to-Ship transfer) carried out in the port.

3. MPA will be providing the data schema (and security requirements) to only shortlisted applicants. Applicants to note that MPA's APIs will be ready in Q4 2021 or Q1 2022.

4. Applicants are expected to address the following factors in their proposal.

- i. End-to-end bunker delivery workflow: System and workflow to address bunkering data and event data from loading at oil terminals to bunker suppliers/craft to delivery to receiving ships
- ii. Operational feasibility: System design to incorporate minimum hops/ point-of-failures in between the data transfer, as well as contingency and fail-safe for operational and technical disruptions, e.g. wireless network failure, hardware failure.
- iii. System integrity: System and workflow to address end-to-end data integrity and cybersecurity from source to MPA's API gateway. Transferred data needs to be accurate, reliable and secured at each stage of data capture, data storage, data processing and data transfer. Applicants need to submit a network diagram.

5. In addition to those described in the main CFP document, applications are required to be accompanied by letters of collaboration with credible MFM system provider(s) with defined responsibilities.

### **Estimated Timeline:**

9 -12 months (including field trials)



## **C. Development/ Enhancement of Hardware & Software to Enable Automated and Secured Data Transmission from MFM system**

### **Industry Problem/Opportunity:**

1. Currently all MFM systems are installed with bunker computer and data logger to process and record all data obtained from the MFM system respectively. The records should include history of operations, batches and critical alarms. These data are secured to prevent tampering and are required to be kept on board for a minimum of 3 months. The data logger is also connected to custody printer for physical bunker metering ticket. There is opportunity to develop/ enhance and test innovative hardware such as edge devices, encryption units, modems, 4G/ LTE transmission devices, data logger and software that enables the data encryption, processing and transfer to MPA and stakeholders.

### **Potential Scope:**

2. Collaboration among MFM system provider(s), licensed bunker craft operator(s), licensed bunker supplier(s) to pilot a project to develop/ enhance and test for interoperability of their hardware and software systems (e.g. bunker computer, data logger etc) to facilitate the electronic capturing, storage and eventual transfer of raw data from the MFM system to MPA. This includes events data (including history of operations, batches and critical alarms) and digital records/forms from bunkering operations.

3. The hardware and software development should comply to the Code Of Practice For Bunker Mass Flow Metering (MFM), SS648: 2019 standards. Where there are variations due to digital concept of operations, the applicant should highlight the required variations to SS648: 2019.

4. The project requires the collaboration between the applicant and credible MFM system provider(s).

### **Expected Outcomes & Benefits:**

5. New and/or enhanced hardware and software that securely capture, store and wirelessly transfer data from MFM system, events data and electronic records/ forms from bunkering operations.

### **Estimated Timeline:**

9 -12 months (including field trials)

## **Common Data Infrastructure Scope of Integration**

### **Executive Summary:**

1. Common Data Infrastructure (CDI) has the vision to connect local & global supply chains ecosystems via a trusted, secure & easy-to-use data sharing infrastructure to enhance stakeholders' productivity & supply chains' resilience. The project can choose to connect to CDI via two methodologies; either directly from your source system or via an API Gateway. CDI uses REST API with API requests to and from CDI made over HTTPS.

### **Overview of CDI:**

2. In April 2020, the Emerging Stronger Taskforce (EST) formed to explore ways to help the Singapore economy bounce back from the disruptions caused during the COVID-19 pandemic. In June 2020, the EST convened Singapore Together Alliances for Action (AfA) tasked to look at 7 key areas of economic growth. The AfA on Supply Chain Digitalisation was formed to examine how industry players can participate meaningfully in the digital economy, to co-create a supply chain future that is trusted, efficient and resilient. In July 2020, public and private sectors brought together to pilot a Common Data Infrastructure (CDI) to tackle pain points by facilitating trusted and secure data sharing between industry players.

3. CDI has the vision to connect local & global supply chains ecosystems via a trusted, secure & easy-to-use data sharing infrastructure to enhance stakeholders' productivity & supply chains' resilience. CDI will look to achieve this vision through augmenting existing data sharing systems and platforms by connecting the supply chain end-to-end, creating visibility and transparency, linking importers/exporters, shipping companies and financial institutions. Both large and small companies will be provided the means to exchange data in an efficient, trust and secure manner.

### **Technical specifications / requirements for integration with CDI:**

4. In order to integrate to CDI, the project will need:
- Pitstop's endpoints - CDI will provide the list of endpoints to invoke/initiate;
    - to pull of a data element, or
    - to push a data element to another participant
  - Project's endpoints - please provide the list of endpoints for the pitstop to invoke;
    - to push a data element to the source system, or
    - to pull a data element from the source system
  - Data Elements Schema - the list of data elements that can be exchanged via CDI. The two items above should be used in conjunction with the list of Data Elements to know each data element's ID and the payload schema that should be sent.

## API Reference

5. CDI API is organized around REST. CDI API has predictable resource-oriented URLs, accepts form-encoded request bodies, returns JSON-encoded responses, and uses standard HTTP response codes, authentication, and verbs.

## Authentication

6. For the prototype environment, CDI API uses static JWT Token to authenticate requests. CDI will provide the developer with one token for the entire development process. Participants can authenticate via bearer auth (e.g., for a cross-origin request), use `-H "Authorization: Bearer test_4eC39HqLyjWXXXXXXXXzdp7dc"` instead of `-utest_4eC39HqLyjWXXXXXXXXzdp7dc`.

7. All API requests must be made over HTTPS. Calls made over plain HTTP will fail. API requests without authentication will also fail.

## Pitstop Endpoints

8. This section details the API definitions at the Pitstop that the participant can invoke to interact with CDI. In general, the CDI API can be categorized into:

- Utility endpoints that every participant needs to call, i.e. `GET /config`.
- Attachment endpoints that participants can interact with to upload / download to the pitstop if dealing with attachments.
- Data element endpoints to:
  - push data that is being produced, or
  - pull data that is being consumed from CDI by calling the corresponding endpoint.

## Participant's Endpoint

9. This section details the API definitions that we expect from a CDI participant. These APIs will be invoked by the Pitstop to push or pull data to the participant's source system. In general, the API can be categorized into:

- Utility endpoints that the participant can create, i.e.
  - `GET /health` for the pitstop to make health checks,
  - `GET /notify` for the pitstop to notify of any acknowledgements
- Data element endpoints to:
  - push data to the source system, or
  - pull data from the source system by calling the corresponding endpoint

10. Both Pitstop endpoint and participant's endpoint details can be found in the Open API Specification that we will provide upon onboarding.