Maritime Digitalisation Playbook
A digitalisation guide for Maritime Singapore

Jointly presented by:
Joint Foreword by MPA and SSA

Dear Members of Maritime Singapore,

The global maritime industry is at the cusp of a digital revolution. Advancements in digital technologies have given us unprecedented abilities to collect, store and process large amounts of data. Today, many aspects of maritime commerce and operations are conducted via digital platforms, efficiently and effectively. However, not all of us are convinced of the returns from digitalising early due to pressing challenges with skills shortages, system interoperability, and cybersecurity.

Yet, from time to time, unprecedented world events provide us with the impetus to re-examine our existing positions and devise new strategies for recovery and growth. The recent COVID-19 crisis has reminded us that global supply chains are not immune to shocks and the importance of supply chain resiliency. Despite these unforeseen disruptions, the maritime community is still enabling world trade and delivering essential goods, with those that are more digitalised being in a better position to do so as they have greater visibility and control of their supply chains. We are heartened to see more maritime companies embracing digital technologies, such as telecommuting tools and cloud computing, to sustain operations while not compromising on safety of their employees, customers and vendors.

The months ahead will be tough for us as we grapple with the evolving COVID-19 situation and plan for post-crisis recovery. During these difficult times, we encourage you to keep an eye on the future by pressing ahead with digitalisation and positioning ourselves for new growth frontiers.

This is where the Maritime Digitalisation Playbook (MDP) comes in. A collaboration between the Maritime and Port Authority of Singapore (MPA) and Singapore Shipping Association (SSA), this timely Playbook aims to help maritime companies uncover opportunities in digital transformation and highlight some first steps that one could take. The three sections of the Playbook – Discover, Framework, and Resources – are a systematic approach that can help you organise and execute your plans.

Guided by the Sea Transport Industry Transformation Map (ITM) and supported by like-minded digital leaders in our Circle of Digital InOvators (CDO) network, we are working towards realising our vision of Singapore as a Global Maritime Hub for Connectivity, Innovation and Talent. Digitally mature maritime companies are an indispensable part of that vision, and digital readiness will help companies thrive in that future. With the full breadth of support provided, we are ready to partner you on your digitalisation journey today!

Mr. Kenneth Lim
Chief Technology Officer
Maritime and Port Authority of Singapore

Mr. Steen Brodsgaard Lund
Chairman of Digital Transformation Committee
Singapore Shipping Association
Organisation of the Maritime Digitalisation Playbook (MDP)

The “Discover: Digitalisation in Sea Transport Sector” section presents an overview of the state of digitalisation in the Sea Transport sector, based on the nation-wide Digital Acceleration Index (DAI) study commissioned by the Infocomm Media Development Authority (IMDA). You can find out more about drivers of digitalisation at global and sectoral levels as well as the benefits of levelling up on the digitalisation front.

In “Framework: An approach towards Digitalisation”, you will find a Digital Transformation Framework that guides you through the “why”, “what” and “how” of your digitalisation journey. Companies that participated in the DAI study will find this section familiar as their results can be mapped to this Framework.

Finally, the “Resources: Supporting your digitalisation journey” section outlines the various avenues of government support available and explains how the supplementary materials in the Annexes can be used. These materials include DAI results, technology scans and case studies for key maritime subsectors; a template for you to articulate your digital transformation plan; and a self-assessment checklist for companies that did not participate in the 2020 DAI Study.

1: The personalized DAI results for the organisations that participated in the DAI survey will be sent to the respondent who completed the survey in May/June 2020. More information about the DAI survey can be found on Slide 5. If your organisation did not participate in the DAI survey, the Self-Assessment Checklist (refer to Annex A2) can be used to estimate your organisation’s digital maturity.
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1.1 State of Digitalisation in Sea Transport

Results from the 2020 DAI sectoral survey
• Sea Transport MNC/LLCs vs. SMEs
• Priority areas for Digitalisation
Between January and March 2020, over 200 maritime organisations participated in the Digital Acceleration Index (DAI) survey to assess their digital maturity. This was part of a 3-year survey commissioned by IMDA to assess the state of digitalisation of organisations in Singapore.

End-to-end digital framework (35 dimensions, industry-specific)

**BUSINESS STRATEGY DRIVEN BY DIGITAL**
- Vision
- Ambition
- Priorities & alignment
- Roadmap

**DIGITIZE THE CORE**
- Customer offer & Go-to-market
- E2E customer journeys
- Research & product development
- Digital marketing
- Personalization
- Next-generation sales
- Digitally driven pricing

**CHANGING WAYS OF WORKING**
- Leadership & culture
- Organisation & governance
- Skills & people
- Agile@Scale
- Digital transformation accelerator

**LEVERAGING THE POWER OF DATA & TECHNOLOGY**
- Data strategy
- Data governance
- Artificial intelligence
- Digital & data platforms

**NEW DIGITAL GROWTH**
- New digital services/products
- Degree of digital disruption
- Lighthouses & prototyping
- Start-up incubation, VC, M&A

**INTEGRATING ECOSYSTEMS**
- Digital ecosystem go to market
- Digital ecosystem operating model

**For each dimension, choose which stage resembles the as-is maturity in the organisation**

**DAI score**
- **Digital maturity (1-100)**
  - Starter: 0-8
  - Literate: 9-17
  - Performer: 18-24

**Validation by >100 global topic experts**
**Regular update to keep up with fast moving digital trends**
**Partnerships with leading universities**

**Note. Digital Acceleration Index is a survey conducted by the Infocomm Media Development Authority. The DAI 2020 survey was conducted between Jan – Mar 2020. Individual results will be given to participating organisations in May - Jun 2020. If your organisation did not participate in the DAI survey, the Self-Assessment Checklist (see Annex A2) can be used to estimate your organisation’s digital maturity.**
In Singapore's Sea Transport sector, MNC/LLCs are Digital Literates, while SMEs are mostly Digital Starters

MNC/LLCs are stronger in operations, ways of working and data & technology

<table>
<thead>
<tr>
<th>Subsector</th>
<th>MNC/LLCs</th>
<th>SMEs</th>
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<tr>
<td>Shipping Line</td>
<td>34</td>
<td>14</td>
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<tr>
<td>Ship Management</td>
<td>35</td>
<td>23</td>
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<tr>
<td>Ship Agency</td>
<td>NA¹</td>
<td>20</td>
</tr>
<tr>
<td>Harbour craft</td>
<td>NA¹</td>
<td>21</td>
</tr>
<tr>
<td>Maritime Technology</td>
<td>NA²</td>
<td>52</td>
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<tr>
<td>Maritime Services (e.g. insurance, law, ship finance)</td>
<td>NA²</td>
<td>27</td>
</tr>
<tr>
<td>Port Services</td>
<td>NA²</td>
<td>16</td>
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</tbody>
</table>

Source: IMDA DAI assessment

Refer to Annex A1 for DAI scores of these four subsectors

1. Largely SME sector 2. Small sample size

1.1 Discover – Digital State in Singapore
Sea Transport MNC/LLCs are Digital Literates

Sea Transport MNC/LLCs are scoring higher in strategy, and aspire to improve execution and enablers.

### DAI building blocks

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
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<tbody>
<tr>
<td>Strategy</td>
<td>Business strategy driven by digital</td>
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<tr>
<td>Digitise the core</td>
<td>Customer offer &amp; Go-to-market</td>
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<td>Operations</td>
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<td>Support functions</td>
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<tr>
<td>New growth</td>
<td>New Digital Growth</td>
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<tr>
<td>Enablers</td>
<td>Changing ways of working</td>
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<td></td>
<td>Leveraging the power of data &amp; tech</td>
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<tr>
<td></td>
<td>Integrating ecosystems</td>
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</tbody>
</table>

### Focus on execution – Digitise the core and enablers like ways of working, data and technology and ecosystems

1. All scores are based on self-reported survey answers, peers refer to organisations in the same sector.
   Source: IMDA DAI assessment
Sea Transport SMEs are Digital Starters

Sea Transport SMEs are also scoring higher in strategy, with room for growth across all building blocks.

<table>
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<tr>
<th>DAI building blocks</th>
<th>Score</th>
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<tr>
<td><strong>Strategy</strong></td>
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<td>Integrating ecosystems</td>
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<tr>
<td><strong>DAI Total</strong></td>
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</table>

Focus on consistent increase across building blocks, including strategy.

1. All scores are based on self-reported survey answers, peers refer to organisations in the same sector.
Source: IMDA DAI assessment
Sea Transport MNC/LLCs: Need to focus on data, platforms, ways of working

Graph indicates dimensions with largest target gap (y-axis) and highest importance (x-axis)

Top 5 Dimensions with largest gaps and highest importance

- Data strategy
- Data governance
- Digital transformation accelerator
- Digital & data platforms
- Leadership & culture

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1. Determined by gap between current digital maturity and target state of organisations in three years
2. Respondents asked about presence of a dedicated unit that owns and drives digital transformation at scale

Source: IMDA DAI assessment
Sea Transport SMEs: Need to focus on strategy, cybersecurity and data

Graph indicates dimensions with largest target gap (y-axis) and highest importance (x-axis)

1. Determined by gap between current digital maturity and target state of organisations in three years

Source: IMDA DAI assessment
1.2 The Value Of Being Digital

Understanding why Digitalisation is Crucial

- Why digitalise in Sea Transport?
- Evidence of digitalisation benefits
Research shows that going digital pays off
Across sectors, digital performers and leaders outperform their peers

Cross-industry analyses of 2015-2018 CAGR for each metric (where DAI score and public market figures are available)

1. Increased performance
   EBITDA growth [%]

   - Starter: 3.5
   - Literate: 3.9
   - Performer/Leader: 5.9
   - +30%

2. Deeper focus on innovation
   R&D expenditure growth [%]

   - Starter: 4.1
   - Literate: 3.6
   - Performer/Leader: 11.9
   - +70%

3. More value creation
   Total enterprise value growth [%]

   - Starter: 2.6
   - Literate: 3.6
   - Performer/Leader: 5.9
   - +51%

1. Compound annual growth rate (CAGR); 2. Earnings before interest, tax, depreciation and amortization (EBITDA); 3. Research & development

Note: n = 224, cross-industry, n for starters = 64, n for literates = 105, n for performers & leaders = 55. For a reliable sample size base, Digital Performer and Digital Leaders aggregated to one category

Source: S&P Capital IQ, Digital Acceleration Index Global Database
Five reasons why digitalisation needs to be a key agenda in your organisation today

**Organisations who digitalise will ...**
- Be able to offer more competitive offerings
- Increase customer engagement and reduce churn
- Adhere to new rules and standards more nimbly
- Have the means to adjust and course-correct for global events
- Connect with and be entrenched in maritime digital ecosystem

**Organisations who ignore digitalisation will ...**
- Be slow to react, having relatively subpar offerings
- See customers leaving for competitors that meet their needs
- Be at risk of regulations and being significantly affected by new rules
- Be vulnerable during events that cause economic downturns
- Be unable to benefit from digital ecosystem and risk displacement

**In maritime context, this could mean ...**
- Analysing business trends and customer needs in order to offer competitive freight rates
- Improving cargo visibility throughout voyage through track and trace
- Using analytics to optimise bunker procurement and consumption of compliant fuels
- Using analytics to optimise fleet deployment and de-risk supply chains for customers
- Reduction in transaction cost and time associated with trade documentation

*These are illustrative, non-exhaustive examples.*
Digitally-ready organisations are best-positioned to thrive in the future

This future of Maritime Singapore is guided by the Sea Transport Industry Transformation Map (ITM)

**Vision**
A Global Maritime Hub for Connectivity, Innovation and Talent

**4 Key Pillars of Transformation**

**Innovation**
Build a vibrant innovation ecosystem to drive competitiveness and new growth areas

- Create an enabling environment for innovation
- Build capabilities of local technology solutions providers and start-ups
- Partner stakeholders to develop and enhance maritime R&D capabilities

**Productivity**
Build a highly-automated and digital maritime environment

- Leverage technologies and automation to enhance business processes and workflows
- Drive productivity transformation through Maritime Cluster Fund

**Jobs & Skills**
Develop a future-ready Maritime workforce

- Strengthen & build manpower pipelines
- Redesign job roles and reskill workers for the future
- Promote awareness of maritime careers

**Internationalisation**
Support maritime organisations to grow into global champions

- Facilitate access to markets of interest
- Build capabilities of local maritime organisations

For more information on the Sea Transport ITM, please refer to [www.mpa.gov.sg/web/portal/home/maritime-Singapore/industrytransformation](http://www.mpa.gov.sg/web/portal/home/maritime-Singapore/industrytransformation)
Digitalisation is a pre-requisite to benefit from current and upcoming digital platforms and ecosystems.

<table>
<thead>
<tr>
<th>Trade operations and financing</th>
<th>Trade documentation and authentication</th>
<th>Port clearance and access to services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manage physical movement and tracking of goods, improving real-time visibility for shippers and logistics service providers</td>
<td>Handle all trade related paperwork within encrypted platforms</td>
<td>Allow one-stop access for regulatory clearance to speed up port handling time</td>
</tr>
</tbody>
</table>

**Benefit**

- Enable trade financing and compliance solutions in a common portal to ease process for customers
- Ensure the legitimacy and origin of trade documentation for faster approval
- Enable digital shopfront for booking, facilitating JIT¹ and increased productivity for port services and shipping lines

**Examples** (note: list is not exhaustive)

- CALISTA, TradeLens
- Networked Trade Platform, TradeTrust
- digitalPORT@SG™, digitalOCEANS™

¹ Just-in-Time
digitalPORT@SG™ and digitalOCEANS™ will usher in the next phase of maritime digitalisation in Singapore and promote greater connectivity among the global community

Launched in October 2019, Phase 1 of digitalPORT@SG™ will streamline regulatory transactions (i.e. B2G) onto a single portal. In 2H2020, work will commence on Phase 2 development. When completed, it will facilitate the ordering of marine services and just-in-time operations in Port of Singapore.

The full benefits of digitalisation could only be harnessed if there are harmonised data standards. Hence, MPA launched the digitalOCEANS™ initiative to champion the development and adoption of common data standards and common exchange APIs to facilitate port clearance across the world.

B2G Exchanges
- Port Community Systems (e.g. PortNet, JP Online)
- E-Navigation Systems (in collab. with IMO, IHO, IALA)

B2B2G Exchanges
- Supply Chain Digital Platforms (e.g. CALISTA, TradeLens)

G2G Exchanges
- Multilateral / Bilateral agreements with other port authorities to eliminate the need for double-entry of data and facilitate exchange of certificates

1.2 Discover - Value of being digital
1.3 Maritime Sector Landscape

Key Global Trends Driving Digitalisation
Global trends propelling the maritime sector towards digitalisation

Four key trends driving organisations to digitalise

**Shifts in global trading system and consumer preferences**

Uncertainties in international relations (e.g. US-China trade war, Brexit, COVID-19, etc.), are becoming more frequent, requiring players to more nimbly react to or pre-empt trade volatilities through dynamic pricing and capacity deployment.

Supply chains are evolving (reshoring, de-risking of supply chains, etc.), requiring players to digitalise for greater transparency, so as to manage complex supply chains better.

Service standards are rising (e.g. e-commerce), forcing shippers (and therein shipping lines) to also rise up to meet these increasing customer demands (e.g. to track and trace cargo).

**Overcapacity and blurring of business models**

Headwind of overcapacity driving pressures on margins, leading to …
- Consolidation of shipping lines
- Move into higher margin segments of value chain (e.g. logistics)
- Collaboration between shipping lines … all of which require digitalisation to enhance communication and reduce transaction costs

Customers becoming competitors (e.g., e-commerce firms disintermediating forwarders and entering logistics), forcing players to differentiate their offerings.

Proliferation of maritime-tech startups through increasing interest from VCs² and larger corporates.

**Advancement and emergence of new technologies**

Increasing global connectivity (e.g. cheaper VSAT connectivity, 5G, edge computing, etc.) allows for vessels to become ubiquitously connected.

Proliferation of data technologies (cheaper storage, processing, cloud, etc.), enabling large volumes of data to be collected & processed.

Emergence of new technologies (AI/ML, blockchain, IoT, etc.) drives new use cases for better productivity and service delivery, as well as the need for new technology standards.

**Evolving emphasis on sustainability and risk**

Increasing emphasis on sustainability and clean fuels requiring players to better track bunker consumption, emissions and/or retrofit ships.

Heightened fears on privacy and data security, requiring players to adopt strict cybersecurity standards.

Beyond Environment, increasing focus on Social & Governance too, leading to digitalisation of areas such as supply chain provenance and seafarer safety.

1. Environmental, Sustainability & Governance (ESG); 2. Venture Capital (VC)

Source: Expert interviews, BCG analysis
Global trends requiring maritime sub-sectors to digitalise
These trends may have upstream or downstream impact on other players, necessitating their digitalisation as well

- Intensifying competition among ports, leading to increasing focus on digitalisation (e.g., harnessing data to reduce port congestion and limit delays)
- Increasing data collection to provide customers with greater supply chain visibility and control
- Increasing adoption of digital technologies to automate labourious tasks, which in turn reduces human error, enhance workplace safety and just in time services

1. Environmental, Sustainability & Governance (ESG); 2. Venture Capital (VC)
Source: Expert interviews, BCG analysis

Increasingly integrated ecosystem requiring modernization of IT infrastructure, standardization for interoperability, and additional cybersecurity safeguards
Changing demographics of workforce—increasingly difficult to replace workers in certain segments of the maritime value chain
1.4 Global Technology Scan

- Key digital trends in Sea Transport
- Examples of use-cases and their potential impact
New technologies are becoming technically and commercially viable

Is your organisation using any today?

**Existing opportunities**

Existence of clear use cases that have been operationally or commercially deployed by global maritime leaders

Potential to further embed into maritime operations and maximize value

- Digital platforms
- Advanced analytics
- Internet of Things
- Robotic process automation
- Cyber security

**Next frontier**

Multiple clear use cases but majority are still in POC² or trial stage, and have not been fully operationalized

**Over the horizon**

Few, select use cases and a majority of them are still in POC²/trial stage, and years away from operationalization

1. Virtual Reality (VR) / Augmented Reality (AR);
2. Proof of concept (POC)
**Examples of digital opportunities within Sea Transport sector**

### Existing technologies with high potential

**Category**
- **Planning**
  - **Fleet Deployment**
    - Network optimization
    - Cargo optimization
    - Route optimization
  - **Technical Management**
    - Planned/condition-based maintenance
    - Inventory management
  - **Vessel Operations**
    - Software automation of previously manual, paper-driven processes
    - Security assurance of customer data, operational data
    - Quicker isolation of cyber attacks and incidents
- **Operations**
  - **Cargo Operations**
    - End-to-end, real-time supply chain visibility
    - Stowage Planning
    - Empty repositioning
    - Threat detection and prevention
  - **Ecosystem platforms**
    - Booking sites
    - Digital freight forwarders
    - Chartering platforms
- **Commercial**
  - **Organisation platforms**
    - Online, one-click booking
    - Personalized, dynamic pricing
    - Tracking of customer issues
    - Cargo-tracking dashboard
- **Support**
  - **Private/public procurement platforms**
  - **Digital marketing platforms**
  - **Business intelligence tools**

### Prospective technologies with high potential

**Category**
- **Blockchain Technology**
- **Artificial Intelligence**
- **Virtual/ augmented reality**
- **Autonomous ships and drones**

**Planning**
- **Supply chain provenance**
- **EZE status tracking through a unique identifier on DLT**
- **Customs clearance and auditing**
- **Cross-platoons supply chain platform**
- **Trade transaction platform**

**Operations**
- **Advancement and sophistication of current analytics through AI/ML techniques to improve fleet utilisation, operational efficiencies and commercial management**
- **Using AR/VR for marine surveys and inspections**
- **Using drones for inspections under water or confined spaces**
- **Unmanned vessels**
- **Delivery of documentation/supplies via drones**

**Commercial**
- **Insurance and claims handling**
- **Invoice and payment management (smart contracts)**

**Support**
- **Private/public procurement platforms**
- **Digital marketing platforms**
- **Business intelligence tools**

Refer to Annex A1 for digital opportunities within Shipping Lines, Ship Management, Ship Agency and Harbour Craft subsectors.

*Source: Expert interviews, BCG analysis*
2. Digital Transformation Framework

2.1 Why – Define the vision
2.2 What – Digitize the core and build new digital offerings
2.3 How – Solidify the foundation
Digital Transformation Framework
Digital transformation requires a holistic approach and understanding the why, what and how

<table>
<thead>
<tr>
<th>WHY</th>
<th>Define the vision</th>
<th>Business needs</th>
<th>Inspiration</th>
<th>Pace</th>
<th>More details on Slide 25</th>
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<th>Digitalise the core</th>
<th>Planning</th>
<th>Operations</th>
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<td>Planning</td>
<td>Operations</td>
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<td>Commercial activities</td>
<td>Support functions</td>
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<table>
<thead>
<tr>
<th>WHAT</th>
<th>Build new digital offerings</th>
<th>Strengthen and disrupt the core</th>
<th>Create new businesses</th>
<th>More details on Slide 28</th>
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<th>HOW</th>
<th>Solidify the foundation</th>
<th>Structure &amp; processes</th>
<th>People</th>
<th>Data &amp; systems</th>
<th>Partner ecosystem</th>
<th>Change mgmt.</th>
<th>More details on Slide 29</th>
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Use the DAI\textsuperscript{1} to identify your starting point and the gaps in your digital ambitions

Note that the DAI\textsuperscript{1} dimensions can be mapped onto the Digital Transformation Framework, helping you to prioritise your digitalisation initiatives.

<table>
<thead>
<tr>
<th>WHY</th>
<th>DIGITIZE THE CORE</th>
<th>NEW DIGITAL GROWTH</th>
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<tbody>
<tr>
<td>Vision</td>
<td>Customer offer &amp; Go-to-market</td>
<td>Operations</td>
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<tr>
<td>Ambition</td>
<td>E2E customer journeys</td>
<td>Digital supply chain</td>
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<tr>
<td>Priorities &amp; alignment</td>
<td>Research &amp; product dev\textsuperscript{2}</td>
<td>Procurement</td>
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<tr>
<td>Roadmap</td>
<td>Digital marketing</td>
<td>Service operations</td>
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<td>Personalization</td>
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<tr>
<td>Leadership &amp; culture</td>
<td>Data strategy</td>
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<tr>
<td>Organisation &amp; governance</td>
<td>Data governance</td>
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<td>Skills &amp; people</td>
<td>Artificial intelligence</td>
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<td>Agile@Scale</td>
<td>Digital &amp; data platforms</td>
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<td>Digital transformation acc\textsuperscript{3}</td>
<td>LEVERAGING THE POWER OF DATA &amp; TECHNOLOGY</td>
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<td>World Class Tech Function</td>
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<td>Digital delivery (DevOps)</td>
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<td>Internet of things</td>
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<td>Cybersecurity</td>
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<th>HOW</th>
<th>CHANGING WAYS OF WORKING</th>
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<td>Data strategy</td>
<td>Digital ecosystem go to market</td>
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<tr>
<td>Data governance</td>
<td>Digital ecosystem operating model</td>
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<tr>
<td>Artificial intelligence</td>
<td>INTEGRATING ECOSYSTEMS</td>
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<tr>
<td>Digital &amp; data platforms</td>
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Start today!

Use the DAI to guide your approach in digitalising your organisation.

If you have not taken the DAI survey, refer to Annex A2 for more information on the Self-Assessment Checklist.

Also – do participate in the 2021 DAI survey!
WHY: A clear vision is essential to ensure your organisation is on board

Set a clear vision that takes into account your business needs and digital ambitions, coupled with realistic milestones. Thereafter, communicate this to everyone in your organisation.

Business needs

• Can you identify current pain points within your operations, examining end-to-end: both as a customer and as an employee? (e.g. back-and-forth communication with customers, low employee engagement)

• Are there new competitors that could displace your business/threaten your competitive advantage. If so, how would you want to respond?

Inspiration

• Have you looked at potential technology use cases that could be applied to your organisation? Refer to Annex A1 if you have not!

• Have you scanned your business environment for digital inspirations?

Pace

• Have you thought realistically about how fast your organisation can transform?

• Have you established a timeline that is bold, but yet pragmatic?

• Have you used the self-assessment checklist to assess the digital maturity of your organisation? Refer to Annex A2 if you have not. Also, do participate in the 2021 DAI survey!
### WHAT: Digital solutions can support your organisation’s core business processes

Examine how digital solutions can be deployed across your organisation’s work flow to deliver your services more efficiently and effectively.

<table>
<thead>
<tr>
<th>Planning</th>
<th>Can your organisation use <strong>data &amp; analytics</strong> to optimise workflow – e.g. using data to forecast resources required?</th>
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<tbody>
<tr>
<td>Operations</td>
<td>Can you incorporate the use of technologies to <strong>digitalise core business processes</strong>? – e.g. automating paper-driven tasks</td>
</tr>
<tr>
<td>Commercial activities</td>
<td>Can you leverage on technology to <strong>reach new customers</strong>? – e.g. using online channels for digital marketing</td>
</tr>
<tr>
<td>Support functions</td>
<td>Can you <strong>digitalise support functions</strong>? – e.g. automating billing</td>
</tr>
</tbody>
</table>

For a more comprehensive list of potential digital opportunities, please see Annex A1.
WHAT: New digital offerings to bolster existing services and potentially establish new revenue streams
Look beyond your current business and see what new services and customers can be served

Strengthen and disrupt the core
Offer a new service to your existing customers through digital means

- Have you thought about what other organisations are doing to serve their customers?
- Does your customer asking for new services from you that you are not providing?

Create new businesses
Provide a service to new customers through digital means

- Are there adjacent businesses that you could enter into?
- Are there new technologies in the market that you could use to provide a service to new customers?
- Are there new ways of delivering services in other industries that you could learn from?
HOW: Digital transformation requires strong enablers

Securing your organisation's commitment provides a strong foundation for transformation

1. Key Performance Indicators (KPIs)
2. User Interface/User Experience (UI/UX)

Structure & processes
- Is there a clear ownership structure that enables focus on innovation?
- Have you considered adopting agile methodology for working / project management?
- Are there KPIs to foster innovation & entrepreneurship?

People
- Have you thought of attracting and developing non-traditional, ICT talent (e.g. data scientists, UI/UX designers, etc.)?
- Have you considered build-operate-transfer programs?

Data & systems
- Can your systems provide scalability and modularity to allow integration?
- Have you anticipated the need for employee retraining to avoid the pitfall of anchoring to legacy systems?

Partner ecosystem
- Besides developing digital solutions in-house, have you considered participating in the broader maritime innovation ecosystem?

Change management
- Have you considered the pace at which your organisation could adapt and adopt to the introduction of complex digital technologies?
- How do you intend to convince everyone to migrate away from existing processes that are working well today?
Start applying the framework - start your organisation's digitalisation journey

Use the Digital Innovation Implementation Pack provided in the Resources Section to structure your approach

1. Enablers – Understanding what is needed for chosen initiative

- Identify the initiatives to prioritise, the enablers required, and describe in detail what they are

Refer to Annex A4 for the Digital Transformation Proposal Template in .PPT format

2. Implementation Plan

- Create an implementation plan and projected financials to understand resources required and benefits expected

3. Financials

- Assess risks involved and tangible immediate actions to start the initiative

For a guide on how to use the Template, please refer to Annex A3
3. Resources

Supporting your digitalisation journey

• Introducing the Self-Assessment Checklist in Annex A2
• Introducing the Digital Transformation Proposal Template in Annexes A3 & A4
• List of programmes and initiatives you can tap on
If you missed the 2020 DAI survey, we strongly encourage you to start with the Self-Assessment Checklist – and to participate in the 2021 DAI survey!

About the Self-Assessment Checklist

The self assessment checklist assesses your organisation's digital maturity based on 6 blocks, which collectively comprises 35 dimensions/questions. Answer each question based on your current position and your target in 3 years for your organisation.

While this checklist provides you with a quick assessment, it is not a substitute for the DAI. As such, if you have already participated in the DAI, there is no need to fill out this checklist. There is also little need to conduct this self-assessment more frequently than once a year. We would encourage all organisations to participate in the next edition of the DAI in 2021.

Things to look out for

The checklist indicates both the current position and the target for your subsector for each of the 35 dimensions. You can use this to compare to your own answers.

Take note of dimensions in which your organisation has the largest gap in (biggest difference in position between current and target), and prioritise your investments /activities to realise your digital ambitions in these areas.

List of dimensions based on question number

<table>
<thead>
<tr>
<th>Business strategy driven by digital</th>
<th>New digital growth</th>
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<tbody>
<tr>
<td>1. Vision</td>
<td>17. New digital services/products</td>
</tr>
<tr>
<td>2. Ambition</td>
<td>18. Degree of digital disruption</td>
</tr>
<tr>
<td>3. Priorities and alignment</td>
<td>19. Lighthouses &amp; prototyping</td>
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<tr>
<td>4. Roadmap</td>
<td>20. Start-up incubation, VC, M&amp;A</td>
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<th>Digitize the core</th>
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<tr>
<td>5. E2E customer journeys</td>
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<tr>
<td>6. Research &amp; product development</td>
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<td>7. Digital marketing</td>
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<td>8. Personalization</td>
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<tr>
<td>9. Next-generation sales</td>
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<td>10. Digitally driven pricing</td>
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<th>Operations</th>
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<tr>
<td>11. Digital supply chain</td>
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<td>12. Procurement</td>
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<td>13. Service Operations</td>
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<th>Support functions</th>
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<tr>
<td>14. Corporate center</td>
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<tr>
<td>15. Shared services &amp; centers of excellence</td>
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<tr>
<td>16. Customer services</td>
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<tr>
<th>Abbreviations</th>
<th>Current vs. Target</th>
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<tr>
<td>Current position for average SME</td>
<td>Target state for average SME</td>
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Use your self-assessment to plan for your organisation's digital transformation

Refer to Annexe A4 for the Digital Transformation Proposal Template in .PPT format

Identify the initiatives to prioritise, the enablers required, and describe in detail what they are

Create an implementation plan and projected financials to understand resources required and benefits expected

Assess risks involved and tangible immediate actions to start the initiative

For a guide on how to use the Template, please refer to Annexe A3
List of support channels and resources

Do you have these questions about digitalisation? We are ready to help!

### Questions that you may have

**Strategy**
- How does digitalisation fit into our overall business?
- What does a digital roadmap look like?
- How do we convince the organisation to digitalise?

**Prioritise and kickstart**
- How and what do we get started on?
- Are there examples of what other organisations have done that we can use to get inspiration?
- How do we prioritise what area to start digitalising?

**Funding and procurement**
- Where can we find maritime-specific software?
- We’re still using paper – is there basic software that can help?
- Is the Government able to defray costs in certain areas?
- We have an idea – where am I able to find funding?

**Talent and upskilling**
- We’re struggling with hiring of tech talent – where could we find them?
- Are there courses available to upskill our team?
- Are there guides that spell out the skills required?

**Develop and implement**
- We have an idea, who should we approach to develop the solution?
- Can a team work with us to digitalise our operations?
- Are there maritime-focused accelerators?

**Partnerships & Ecosystems**
- How could we learn from others in driving digitalisation?
- I have an idea and I don’t mind partnering others to co-develop the solution. Where should I go?
- What digital platforms should I plug myself into?

### Available avenues of support

- **Learn from leading experts by attending industry events** (e.g. Singapore Maritime Technology Conference, SSA Tech & Demo Day)
- **Upskill yourself on digital strategy, operations technology road mapping, and change management with co-funding support from SkillsFuture Series**
- **To understand global use cases, and how your peers are prioritising their digitalisation efforts, refer to the Global Technology Scan section (see above; more details in annexes)**
- **Leverage Sea Transport Industry Digital Plan to holistically understand digital roadmap & solutions**
- **Get bespoke advice from an expert through the SME Digital Tech Hub**

- **Maritime Innovation and Technology (MINT) Fund** provides up to 50% on qualifying expenses related to maritime R&D and maritime technology product development
- **Maritime Cluster Fund (Productivity Development)** provides up to 70% co-funding support on qualifying expenses for customisation of maritime solutions
- **Sea Transport Industry Digital Plan Grant** and **Productivity Solutions Grant** provide up to 70% co-funding ($30k cap per FY) for local SMEs to adopt pre-approved maritime sector-specific solutions and generic business capability solutions respectively

- **Search for talent through MyCareersFuture.sg and Maritime Singapore Connect**
- **Groom in-house talent through Maritime Cluster Fund (Training@MaritimeSingapore) or Tech Skills Accelerator (TeSA), which provide co-funding support for training courses and on-the-job training (for TeSA only)**
- **Skills Framework for Sea Transport** and **Skills Framework for ICT** provide reference job descriptions and skills requirements for key maritime and ICT job roles

- **Get matched with solutions providers via the Maritime Innovation Opportunities**
- **Get help on digital project management services under SME Go Digital Programme**
- **Participate in PIER71 activities, MINT Fund Call-for-Proposals and MPA Joint Industry Programmes**

- **Join the Circle of Digital Innovators (CDO) network**
- **Form a consortium under the Partnerships for Capability Transformation (PACT) scheme**
- **Onboard existing ecosystem platforms (see next page)**
List of programmes and initiatives to support your digitalisation journey
Click on the links below to find out more!

**Raising Awareness**
- **Events & Seminars**
  - MPA – [Singapore Maritime Technology Conference](#)
  - SSA – [Tech & Demo Day](#)
  - SMF – [Maritime D/Coded Tour](#)
  - SMI – [SMI Forum, Seminar, Breakfast Series](#)
  - IPI – [TECHINNOVATION](#)

**Digital Resources**
- SMI – [Singapore Maritime R&D Roadmap 2030](#)
- IMDA/ESG/MPA – [Sea Transport Industry Digital Plan](#)
- ESG – [Tech Depot @ SME Portal](#)
- IPI – [Online Marketplace](#)
- WEF – [Redesigning Trust Toolkit](#)

**Advisory & Consultancy**
- [Singapore Business Federation (SBF)](#)
- Association of Small and Medium Enterprises (ASME) – [SME Digital Tech Hub](#)
- ESG – [SME Centres](#)
- IPI – [Innovation Advisors Programme](#)
- SMEs Go Digital – [Digital Project Management](#)

**Building Digital Capabilities**

**Digital Roadmapping**
- A*STAR – [Operations & Technology Roadmap (OTR) Programme](#)

**Technology Development**
- MPA – [Maritime Innovation & Technology (MINT) Fund](#)
- A*STAR – [Tech Access](#)

**Technology Deployment/Customisation/Adoption**
- MPA – [Maritime Cluster Fund (Productivity Development)](#)
- IMDA/ESG/MPA – [Sea Transport Industry Digital Plan](#)
- ESG – [Productivity Solutions Grant (PSG)](#)
- SMEs Go Digital – [Pre-approved / Start Digital Solutions](#)
- A*STAR – [A*celerate](#)

**Talent Recruitment**
- IMDA – [Tech Skills Accelerator (TeSA)](#)
- SMF – [Maritime Singapore Connect Office](#)
- WSG – [MyCareersFuture.sg](#)

**Talent Development**
- IMDA – [Tech Skills Accelerator (TeSA)](#)
- SSG – [SkillsFuture Series](#)
- WSG – [Professional Conversion Programme (PCP) for ICT](#)
- [Skills Framework for Infocomm Technology](#)
- [Skills Framework for Sea Transport](#)

**Partnering and Plugging In**

**Innovation Platforms**
- SMI – [R&D Grant Call](#)
- MPA – [MINT Fund/Call-for-Proposals (CFP)](#)
- MPA – [MINT Fund/Joint Industry Programme (JIP)](#)
- MPA – [PIER71](#)
- MPA – [Maritime Innovation Workshop](#)
- [Maritime Living Labs (MPA, PSA, JP)](#)
- [Maritime Centres of Excellence (COEs)](#)
- IMDA – [Open Innovation Platform (OIP)](#)
- ESG – [Partnerships for Capability Transformation (PACT)](#)
- PSA – [UnboXed](#)

**Digital Platforms**
- Customs – [Networked Trade Platform (NTP)](#)
- MPA – [digitalPORT@SG™](#)
- MPA – [Singapore Maritime Data Hub (SG-MDH)](#)
- PSA – [Portnet](#)
- JP – [JP Online](#)

**Standards Development**
- IMDA – [TradeTrust](#)

**Networks & Communities**
- MPA – [Circle of Digital InnOvators](#)
- MPA – [Circle of HR InnOvators](#)
- SSA – [Digital Transformation Committee](#)
4. A Digital Vision for Maritime Singapore
Our Digital Vision:
Enhanced Connectivity with Open Innovation and Digital Talent

A digitalized Maritime Singapore is crucial to our ambition of establishing Singapore as a **Global Maritime Hub for Connectivity, Innovation, and Talent**.

**Connectivity**
A digitalised Maritime Singapore will strengthen the collaboration capabilities of maritime communities through common data standards and systems interoperability; and will thereby enhance global supply chain efficiency and resiliency. From sales booking to network planning; from voyage operations to cargo operations; from technical management to crew management; maritime companies will be digitally connected from one end to the other, providing seamless services to their customers. At the ecosystem level, communications among players across the maritime value chain, in Singapore and abroad, will be streamlined as information will be shared expeditiously in standardised formats through open, trusted, secure platforms.

**Innovation**
A digitalised Maritime Singapore will embrace open innovation and drive the development of maritime technologies that enhances efficiency, safety, and sustainability of maritime operations. Maritime companies will also be at the forefront of product and service innovation - adopting omni-channel approaches in marketing of freight and offering hyper-customised, frictionless experience for cargo owners and shippers.

**Talent**
A digitalised Maritime Singapore will have a multi-skilled workforce that embraces big data analytics, marine cyber-physical systems (e.g. sensors networks, remote monitoring and control, digital twins) and autonomous systems (e.g. unmanned vessels, hauliers & trucks, drones). A learning and innovative maritime workforce will develop new products and services using agile and design thinking methodologies; and leverage upon their extensive industry knowledge with deep technical skills in ensuring the safe and efficient delivery of supply chain solutions.

#DigitalMaritimeSG
We see an acceleration of digital adoption in the past months due to the ongoing COVID-19 pandemic. Disruption and digitalisation will be the new normal for the maritime industry. Many digital technologies that were once considered impossible, are now ubiquitous in our daily lives. These technologies are also being deployed in the maritime space improving efficiency, safety and, in the longer term, sustainability. MPA has been partnering industry players including our SMEs to drive digital transformation. The Maritime Digitalisation Playbook is yet another Maritime Singapore effort to bring the industry to the next level, which will better position ourselves in the recovery phase.

The Maritime Digitalisation Playbook (MDP) is a joint private-public initiative reflecting the efforts that the SSA is bringing to the industry. We are mindful that some companies may find it daunting to embark on the digital journey. MDP is a materialisation of SSA’s thought leadership for the industry - to help companies, especially SMEs, map out business priorities vis-a-vis the digitalisation landscape. We do not want anyone to be left behind, and we strongly encourage our members and maritime companies to take heed of MDP. I call on all CEOs and owners to utilise the checklist and template to help identify their companies’ target gaps. Do tap into the plentiful and useful information under the Resource Section, such as support programmes and initiatives available to companies, to achieve your digitalisation vision.

Harnessing digital technologies is an important strategy for Singapore’s sea transport sector to maintain our competitiveness as a global transhipment hub. IMDA is supporting our partners MPA and SSA in this effort through initiatives such as the Maritime Digitalisation Playbook, the Digital Acceleration Index and Industry Digital Plans. Maritime companies can make use of these programmes to digitalise their business models and processes, and integrate more tightly with a rapidly transforming global economy.

Ms. Quah Ley Hoon  
Chief Executive  
Maritime and Port Authority of Singapore

Ms. Caroline Yang  
President  
Singapore Shipping Association

Mr. Tan Kiat How  
Chief Executive Officer  
Infocomm Media Development Authority
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Steering Committee

Singapore Shipping Association
Steen Brodsgaard Lund (Chairman of Digital Transformation Committee)
Michael Phoon (Executive Director)

Maritime and Port Authority of Singapore
Kenneth Lim (Chief Technology Officer)

Infocomm Media Development Authority
Neo Soon Tee (Cluster Director, Trade & Connectivity Cluster)

Boston Consulting Group
Michael Meyer (Managing Director & Partner, Singapore)
Michael Tan (Managing Director & Partner, Singapore)
Michael Sonderby (Digital Ventures Partner & Director)

Working Committee

Singapore Shipping Association
Haniza Bte Mustaffa – Technical Manager

Maritime and Port Authority of Singapore
Maritime Transformation Office
Dawn Chen – Deputy Director
Shen Wanling – Assistant Director
Viknesh G – Manager
Sun Gangyi – Assistant Manager

Maritime Innovation & Talent Development Department
Wendy Teo – Assistant Director
Jason Ho – Manager

Infocomm Media Development Authority
Trade & Connectivity Cluster
Heng Wei Yeow – Deputy Director
Chan Yew Kee – Assistant Director
Ashley Tan – Manager

Boston Consulting Group
Munal Rathore – Principal
Eric Ong – Consultant
Kok Xuan Liang – Associate
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