CATALYSING MARITIME INNOVATION

Kenneth Lim
CTO, MPA
The Singapore Maritime Cluster is a key enabler of Singapore’s economic growth.

- Contributes to more than 7% of Singapore’s GDP, and employs over 170,000 people in over 5,000 maritime establishments.
- Connected to 600 ports worldwide in 123 countries, with more than 120,000 ship calls annually.
- Home to more than 140 of the world’s top shipping groups.

### 2018 Performance

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Container Throughput</td>
<td>36.6 mil TEUs</td>
</tr>
<tr>
<td>Bunker Sales</td>
<td>49.80 mil tonnes</td>
</tr>
<tr>
<td>Ship Registry Tonnage</td>
<td>88.8* mil GT</td>
</tr>
</tbody>
</table>

World’s Largest Transhipment Hub, 2nd Largest Container Port by Volume

Top Bunkering Port

5th Largest Ship Registry
Strategic blueprints to transform the maritime industry

Vision

Maritime Singapore to be a Global Maritime Hub for Connectivity, Innovation & Talent

Targets (by 2025)

- VA Growth: $4.5 bil
- Employment Growth: >5,000 good jobs

IMC2030 Advisory Committee
Deepening maritime capabilities through Centres of Excellence

COE in Modelling and Simulation for Next Generation Port (C4NGP) @ NUS

Port Optimisation & Digital Twin of Port

COE for Maritime Energy & Sustainable Development (MESD) @ NTU

Energy Management; Emission Management; Sustainable Maritime Operations

COE for Maritime Safety (CEMS) @ SP

Maritime Navigation; On-Board Human Operations

- Advanced Navigation Simulation Systems
- Human Machine Interface
- Advanced Navigation Research Simulator
- Head-mounted displays for VR Training
- Autonomous Vessels – Regulations
- Training & Assessment Systems
- Assistive System to improve Situational Awareness
Growing maritime tech enterprises and start-ups

PIER71: Port Innovation Ecosystem Reimagined @ Block 71

Launch of PIER71 – Maritime Start-up Accelerator Programme

Smart Port Challenge Workshops
Growing maritime tech enterprises and start-ups

Legend:
- International Partners for Start-up Ecosystem
- International MOU Partners for R&D

Outreach to Start-ups through NUSE

SMI-Uni of Turku MOU on R&D Collaboration

MPA-RCN MOU on Research Collaboration

Outreach to Start-ups through NUSE

MPA-POR MOU on exchange of information and research promotion

Talent-sourcing and impact programme RAINMAKING INNOVATION

Co-creators for SPC 2018

Outreach to Start-ups through NUSE

Joint Marketing to start-ups
Living Labs as a platform for experimentation and test-bedding

To provide an enabling environment for port and maritime innovation and local capability development

1. **Future Ready Our Port**
   - Future proofing our port through innovation and accelerated development of new operation concepts and systems

2. **Build Local Capabilities**
   - Develop local technological capabilities within our maritime industry in key niche areas; and export solutions to global markets

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**Initiatives under the 4 focus areas**

- **Autonomous Systems & Robotics**
  - Sea agency test capability framework for test-bedding of autonomous vessels, drones and systems

- **Smart & Innovative Infrastructure**
  - Multi-purpose testing platforms for innovative mooring, building and mooring of marine facilities

- **Data Analytics & Intelligent Systems**
  - Applications for next-gen vessel traffic management systems

- **Safety, Security & Environment**
  - Technologies for detection, monitoring of marine hazards and cybersecurity

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**Public Agencies**

- PSA Singapore
- MPA Singapore

**Private Sector Partners**

- Research Institutes
- Universities

**Companies**

- Technology & Capital

**Infrastructure, Policies & Standards**

- Public Agencies

**Infrastructure**

- Global Markets
- Export

**Deploy**

- Lead Adoption in Domestic Market

**Testbed**

- Singapore as a Reference Site

**Develop**

- MARITIME INNOVATION LAB

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**MPA Singapore**

PSA Living Lab and JP Living Lab to test new terminal operating concepts and technologies
Building and catalyzing industry capabilities

Future Vessel Traffic Management

Maritime Situational Awareness

E-Navigation

Collaborative Planning & Coordination

Maritime Single Window

Integration of data & services

Autonomous Systems and Vessels

Just in Time Operations

A digital platform to enhance vessel turnaround time & service delivery

Remotely-Assisted Pilotage

Autonomous Tug
Promoting industry digitalisation

Additive Manufacturing Opportunities

MPA and NAMIC are developing the AM Ecosystem for Maritime Sector
On-site AM facility to enhance terminal resilience and reduce equipment downtime; JIP on Feasibility of AM for Marine Parts

Blockchain Applications

Electronic Bills of Lading
- Seller’s Bank
- Buyer’s Bank
- Electronic Bill of Lading
- Buyer
- Seller
- Shipper
- Freight Forwarder
- Port

Certificate of Competence for Seafarers
- CoC Issuing Authorities
- Company X
- Seafarer
- Ship

Other applications using blockchain:
- Ship Registration
- Bunkering
Strengthening the cybersecurity intelligence community

Singapore as a Hub for Maritime Cybersecurity

**Strengthen Cyber Resiliency**
- Set up Maritime Cybersecurity Monitoring Centre

**Industry Engagement**
- Knowledge-sharing, education & training

Ongoing ecosystem development
- Systems Owners
- IHL & Research Institutes
- Classification Societies
- Marine Systems/Equipment Providers
- Cybersecurity solutions Providers
- "Research" - "Test bedding" - "Solutions Development" - "Education & Training" - "Centre of Excellence"

Technology research with IHLs, system owners, industry partners (e.g. SUTD, PSA, Wartsila)

Forming a Network of Ports on Cybersecurity

**International Partnerships**
- MOU
- Participation in each other’s exercises
- Cyber alerts/ news

**Port Authorities Focal Points**
- Port of Rotterdam
- HPA
- Port of Antwerp
- Port of Yokohama
- Port of Barcelona
- Port of Los Angeles
- Port of Montreal

ChainPORT Working Group
- Port of Rotterdam
- HPA
- Port of Barcelona
- Port of Los Angeles
- Port of Montreal
Maritime Transformation Programme – Setting strategic directions

Maritime Transformation Programme Focus Areas

- Efficient & Intelligent World Class Next Generation Port
- Strategic Sea Space & Maritime Traffic Management
- Smart Fleet Operations & Autonomous Vessels
- Effective Maritime Safety & Security
- Sustainable Maritime Energy & Environment

Public-Private Partnerships:
Inaugural Maritime Innovation and R&D Dialogue – 12 March 2018
Innovation approach has evolved from projects to ecosystem-building.

Projects  
Programmes  
Ecosystem-building

Sustained innovation and capability development
Maritime Singapore – Innovating for success
Thank you