



Centre for Maritime Digitalisation (C4MD)

*Advancing A*STAR capabilities in computational modelling,
simulations and AI for safe, efficient and sustainable maritime.*

An Important Node in the Maritime R&D Ecosystem

Singapore's vision for maritime is to be a "Global Maritime Hub for Connectivity, Innovation and Talent". In the Sea Transport ITM (2025), innovation and digitalisation straddle across two main pillars – Innovation and Digitalisation & Productivity.

Innovation Pillar

- Grow Singapore as a leading MarineTech hub
- Provide an enabling environment to accelerate innovation
- Deepen maritime R&D capabilities

- Leverage port technology and automation
- Enable global digital connectivity and platform interoperability
- Enhance business productivity via digital solutions

Digitalisation & Productivity Pillar

The Maritime Transformation Programme (MTP) is a key driver of the Sea Transport ITM initiatives and seeks to leverage the National Research Foundation (NRF) Research, Innovation and Enterprise Funds (RIE Funds) to grow maritime research and development (R&D) capabilities and transform the sector.

As the central node in the maritime R&D ecosystem, A*STAR's Centre for Maritime Digitalisation (C4MD) will facilitate and catalyse the collaboration with research performers, including Singapore Maritime Institute (SMI) funded Centres of Excellence (CoEs) and Programmes to develop new capabilities and solutions for the agency and industry.

OUR MISSION



Advance A*STAR capabilities in **computational modelling, simulations and artificial intelligence (AI)** for safe, green and sustainable maritime



Become a **translational research centre** to develop innovative digital solutions for maritime sectors



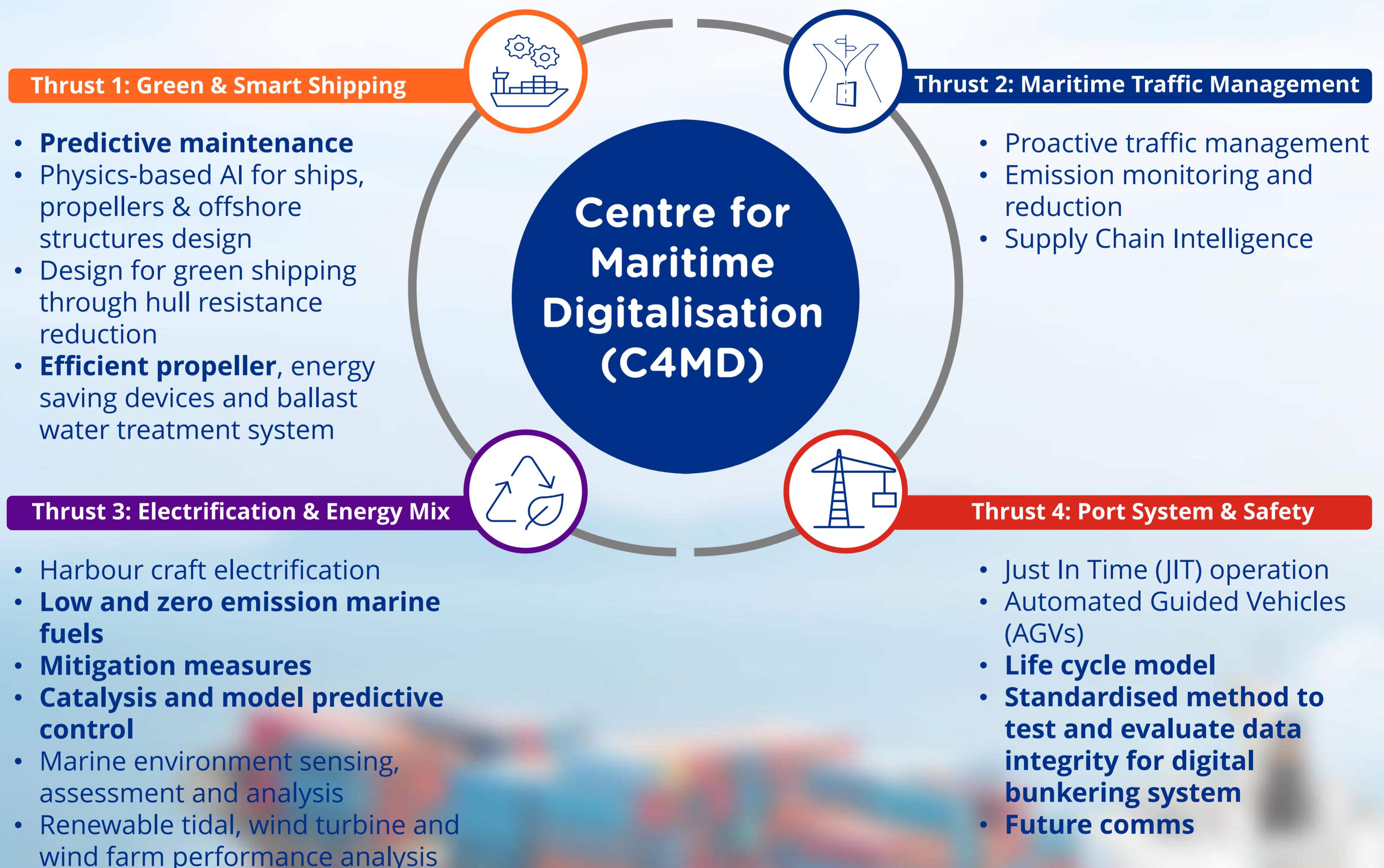
Strengthen collaboration between A*STAR RIs and SMI funded COEs and Programmes to develop new research capabilities for **co-innovation across the value-chain**

Leveraging A*STAR's Areas of Strengths to Support MTP's Priorities

The Maritime and Port Authority of Singapore (MPA) has outlined 5 Strategic Research Thrusts¹ for the MTP, aligned with the Singapore Maritime R&D Roadmap. These are:

1. Efficient and Intelligent World-Class Next Generation Port
2. Strategic Sea Space and Maritime Traffic Management
3. Smart Fleet Operations and Autonomous Vessels
4. Effective Maritime Safety & Security
5. Sustainable Maritime Environment & Energy

Tapping on A*STAR's capabilities in computational modelling, simulations and AI, C4MD will help to support and drive MTP's priorities in the following areas:

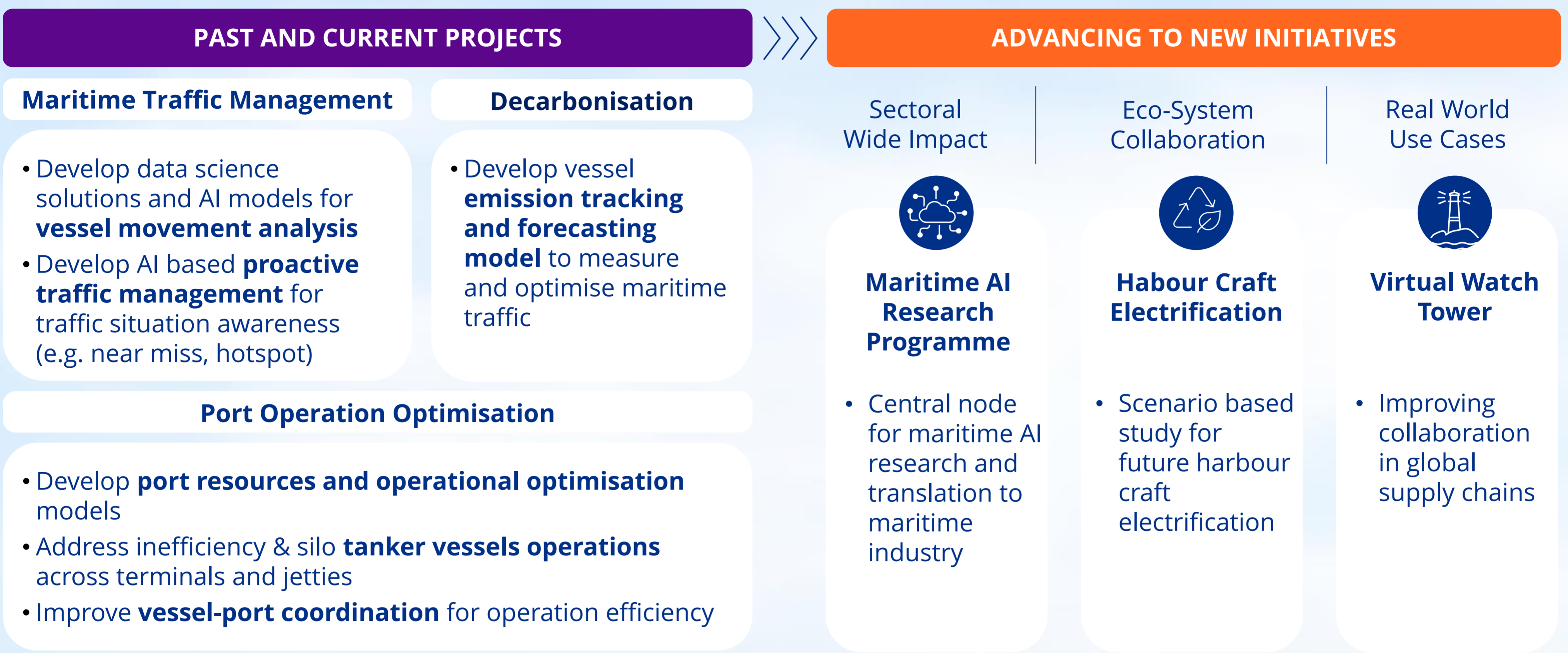


^{#1}: <https://www.mpa.gov.sg/maritime-singapore/innovation-and-r-d/maritime-innovation-ecosystem/maritime-transformation-programme>

MARITIME AI PROGRAMME

Anchoring Digital Excellence in Maritime Research

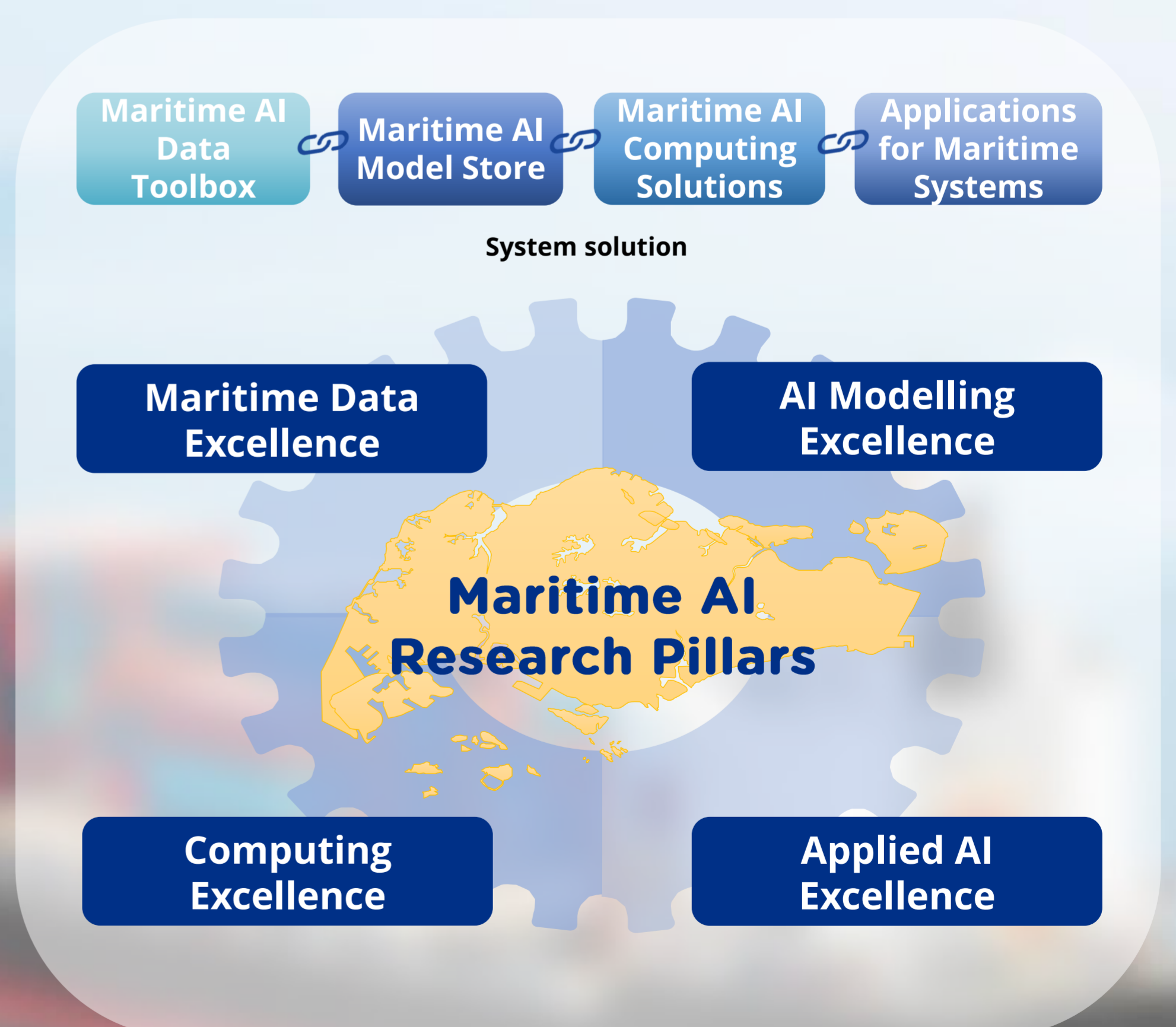
With our deep AI expertise and experience in maritime R&D, C4MD will lead the development of digital excellence in maritime R&D. Through quality collaborations with industry partners, we have driven impactful innovations in past and current projects in the realms of **maritime traffic management, decarbonisation** and **port operation optimisation**.



Launched in October 2022, the **Maritime AI Programme** was initiated to develop a central node for driving a coordinated effort for Maritime AI research, build capabilities for the maritime industry and facilitate industry-wide adoption of AI and other related advanced digital technologies.

A*STAR's Institute of High Performance Computing (IHPC) will lead the development of Maritime AI in four pillars over two phases:

1. **Maritime Data Excellence**
2. **AI Modelling Excellence**
3. **Computing Excellence**
4. **Applied AI Excellence**



MARITIME AI PROGRAMME

AI and Big Data Intelligence - The Future Engine for Maritime Growth

Through the Maritime AI Programme, we hope to develop technologies that could help streamline and advance maritime operations through “AI-aided” maritime transformations, particularly in the following areas:

Decarbonisation

- Emission monitoring and reduction
- Fuel consumption & carbon intensity indicator (CII) optimisation
- Launch boat ubernisation

Safety

- Collision avoidance
- Manned/unmanned mixed traffic
- Next-generation port

Efficiency

- Predictive maintenance
- Supply chain resilience
- ETA prediction & Just-in-time (JIT) optimisation

Leveraging maritime data and AI toolkits, the programme aims to develop advanced AI algorithms, tools and applications that will lead to quantifiable performance improvement for industry partners and all use cases, particularly in:

1. Maritime Traffic Safety

- Safe navigation at strait and crowded waters, next generation vessel traffic services (VTS)

2. Smart Port Operation

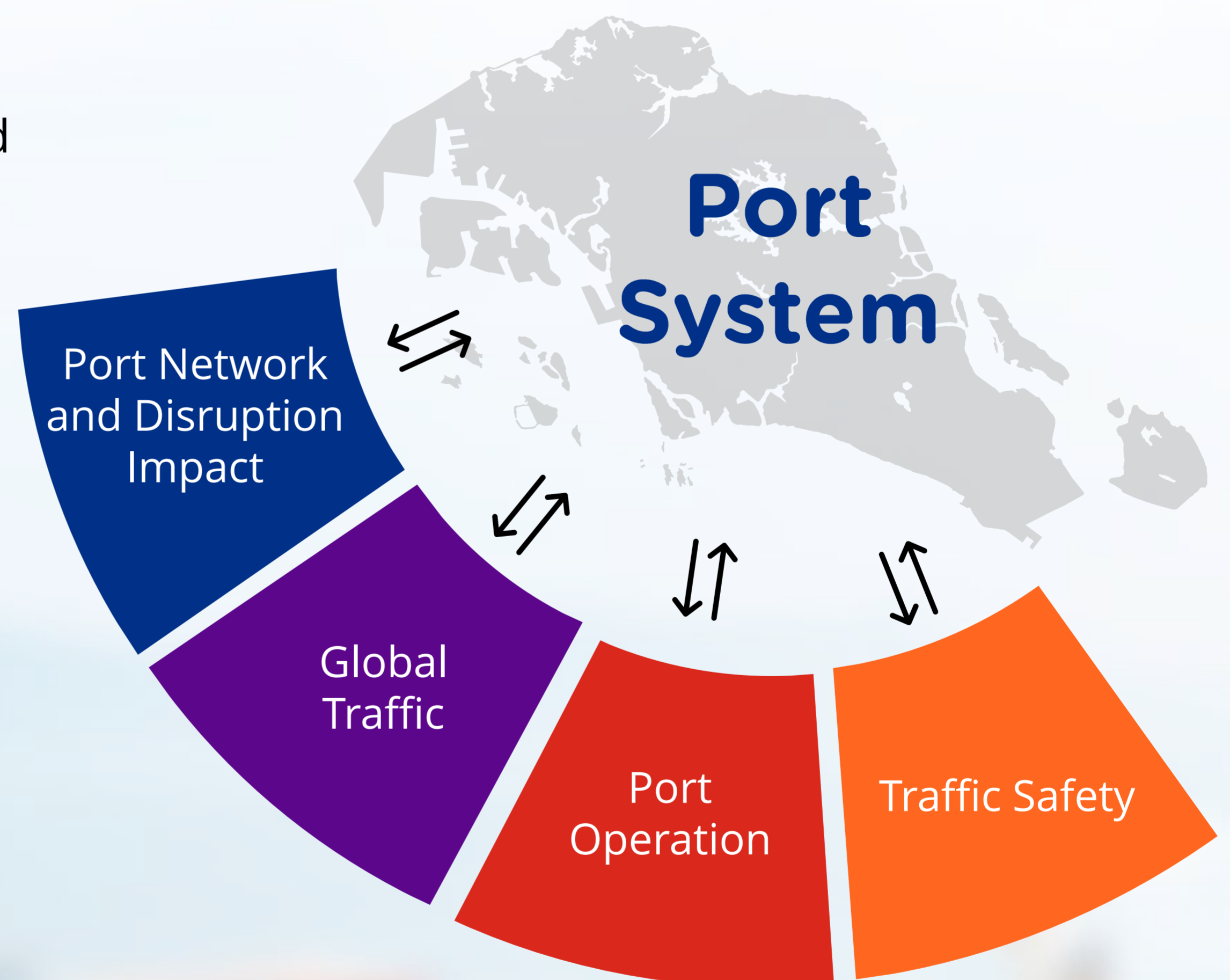
- Vessel operation events, situation prediction

3. Global Maritime Traffic

- Vessel & fleet operation and route patterns

4. Global Maritime Port Network

- Port network analytics and text mining for maritime risks



MARITIME DECARBONISATION

Pursuing Digital Excellence in Maritime Decarbonisation

Given the current projections for the increase in global temperatures and the critical need to address greenhouse gas emissions, the International Marine Organisation (IMO) has set stringent targets for transition to a low carbon future.

In line with the global commitment towards zero carbon and maritime decarbonisation, C4MD strives to develop innovative digital solutions for safe, efficient and sustainable maritime.

The combination of advanced computational fluid dynamic (CFD) modelling and AI algorithms has led to the advancement of digital solutions which have paved the way towards maritime decarbonisation over the years.

