2024 Mock IMO Assembly

# Guideline for the mitigation of maritime digital divide for the era of climate change





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Background and Problem analysis





## Background



#### Shipping emissions are headed in the wrong direction

Carbon dioxide emissions by main vessel types, tons, 2012–2023





Note: The group "other" includes vehicles and roll-on/roll-off ships, passenger ships, offshore ships and service and miscellaneous ships.

Source: UNCTAD based on data provided by Marine Benchmark, June 2023. • Get the data • Download image



## **Problem of digital divide**



## **Problem analysis**

#### Annex 2: Trade digitalization by countries in different groups (%)<sup>10</sup>

Annex Table 1: Average implementation rates of trade digitalization in Developed Economies

2023 2021			2021			
Developed economies	Trade digitalization index (TDI)	Paperless trade (PT)	Cross-border paperless trade (CPT)	Trade digitalization index (TDI)	Paperless trade (PT)	Cross-border paperless trade (CPT)
Andorra	42.22%	42.22	0.00	42.22%	42.22	0.00
Australia	93.33%	60.00	33.33	93.33%	60.00	33.33
Austria	88.89%	57.78	31.11	86.67%	55.56	31.11
Belgium	93.33%	55.56	37.78	91.11%	53.33	37.78
Bulgaria	82.22%	53.33	28.89	82.22%	53.33	28.89
Canada	75.56%	48.89	26.67	73.33%	46.67	26.67
Croatia	82.22%	55.56	26.67	71.11%	51.11	20.00
Cyprus	68.89%	53.33	15.56	55.56%	46.67	8.89
Czech Republic	80.00%	55.56	24.44	77.78%	53.33	24.44
Estonia	86.67%	55.56	31.11	77.78%	48.89	28.89
Finland	75.56%	51.11	24.44	75.56%	51.11	24.44
France	68.89%	46.67	22.22	68.89%	46.67	22.22
Germany	82.22%	53.33	28.89	77.78%	51.11	26.67
Greece	66.67%	48.89	17.78	51.11%	37.78	13.33
Hungary	75.56%	51.11	24.44	60.00%	40.00	20.00
Iceland	51.11%	51.11	0.00	N/A	N/A	N/A
Ireland	86.67%	55.56	31.11	80.00%	53.33	26.67
Italy	73.33%	51.11	22.22	73.33%	51.11	22.22
Japan	88.89%	57.78	31.11	88.89%	57.78	31.11
Latvia	57.78%	53.33	4.44	N/A	N/A	N/A
Lithuania	71.11%	51.11	20.00	64.44%	48.89	15.56
Luxembourg	82.22%	53.33	28.89	37.78%	28.89	8.89
Malta	66.67%	53.33	13.33	57.78%	48.89	8.89
Netherlands	95.56%	57.78	37.78	88.89%	55.56	33.33
New Zealand	95.56%	57.78	37.78	95.56%	57.78	37.78
Norway	75.56%	57.78	17.78	73.33%	55.56	17.78
Poland	57.78%	46.67	11.11	55.56%	44.44	11.11
Portugal	86.67%	55.56	31.11	73.33%	46.67	26.67
Slovenia	75.56%	53.33	22.22	N/A	N/A	N/A
Spain	84.44%	57.78	26.67	82.22%	57.78	24.44
Sweden	84.44%	55.56	28.89	62.22%	42.22	20.00
Switzerland	82.22%	48.89	33.33	82.22%	48.89	33.33
United Kingdom	82.22%	53.33	28.89	75.56%	51.11	24.44

Source: Author's calculation based on The UN Global Survey on Digital and Sustainable Trade Facilitation, 2023. Available at untfsurvey.org

Note: Paperless trade (PT) and cross-border paperless trade (CPT) show the percentage points contributed by PT and CPT measures, respectively, to the TDI. The maximum value for PT is 60 and CPT is 40 percentage points. N/A means data is not available.

#### Annex Table 4: Average implementation rates of trade digitalization in Pacific Islands

	2023			2021		
Pacific Islands	Trade digitalization index (TDI)	Paperless trade (PT)	Cross-border paperless trade (CPT)	Trade digitalization index (TDI)	Paperless trade (PT)	Cross-border paperless trade (CPT)
Fiji	31.11%	26.67	4.44	26.67%	24.44	2.22
Kiribati	26.67%	17.78	8.89	4.44%	4.44	0.00
Micronesia	13.33%	13.33	0.00	13.33%	13.33	0.00
Nauru	17.78%	17.78	0.00	17.78%	17.78	0.00
Palau	15.56%	15.56	0.00	15.56%	15.56	0.00
Papua New Guinea	22.22%	22.22	0.00	17.78%	17.78	0.00
Samoa	17.78%	17.78	0.00	17.78%	17.78	0.00
Solomon Islands	28.89%	17.78	11.11	28.89%	17.78	11.11
Tonga	28.89%	24.44	4.44	24.44%	20.00	4.44
Tuvalu	20.00%	11.11	8.89	15.56%	8.89	6.67
Vanuatu	53.33%	44.44	8.89	53.33%	44.44%	8.89

**Source:** Author's calculation based on The UN Global Survey on Digital and Sustainable Trade Facilitation, 2023. Available at untfsurvey.org

*Note:* Paperless trade (PT) and cross-border paperless trade (CPT) show the percentage points contributed by PT and CPT measures, respectively, to the TDI. The maximum value for PT is 60 and CPT is 40 percentage points. N/A means data is not available.

#### **Differences in TDI**



## **Problem analysis**

- Unitary implementation
- Need for environmental and social safety index
- Need for index related to support to mitigate digital divide

#### **"Trade Digitalization Index:**

A new tool for assessing the global state of play in the digitalization of trade procedures"



<Paperless Trade> : This refers to the automation of trade procedures within a country. Key elements include

Automated customs systems: Digital platforms for customs declarations.
 Electronic submission of customs documents: Submission of import/export permits, certificates of origin, and cargo manifests digitally.
 Electronic payment systems: E-payment for customs duties and fees

<Cross-border Paperless Trade> : These are measures aimed at facilitating international trade through electronic exchanges. Key elements include

•Electronic exchange of customs declarations between countries. •Electronic certificates for health and safety (Sanitary and Phytosanitary certificates).

•Laws for electronic transactions: Legal frameworks that support electronic document exchanges

#### an index that focuses only on the digitization of trade procedures



## **Problem analysis**

- Unitary implementation
- >>
- Need for environmental and social safety index
- Need for index related to support to mitigate digital divide

Project/policy	focus	Process stage	Target countries	Donor country	Support type
Maritime Single Window (MSW)	Digital communication simplification between ship and port	All IMO ports by 2024	All IMO members, particularly SIDS and LDCs	None	Technology (digital platform), education
GreenVoyage-2050	Reduction of greenhouse gas emissions in the maritime sector	Phase 2 (2024-2030)	SIDS, LDCs, developing countries	Norway, EU	Technology transfer, funding support, education
Global MTCC Network (GMN)	Promotion of energy efficiency and low-carbon technologies	Ongoing since 2017	Africa, Asia, Pacific, Latin America, Caribbe an	EU	Technology transfer, capacity building, education
SMART-C Projects	Digital technology and environmental protection	2023-2027	Asia-Pacific, SIDS	Korea	Funding support, technology transfer, education
e-Navigation	Digitalization for enhancing mariti me safety and efficiency	Ongoing	Global maritime nations	None	Technology (real-time data system)
IMO CARES Project	Supporting decarbonization in developing countries	Ongoing (2024-2025)	SIDS, LDCs, Africa, Caribbean	Saudi Arabia	Technology transfer, funding support
IMO Maritime Technology Global Challenge	Advancement of innovative decarbonization technology	2023-2024	Africa, Caribbean, SIDS	EU, MTCCs	Funding support, technology transfer
FAL	Simplification of maritime procedures	New update in place by 2024	All IMO members	None	Data sharing, regulation
MARPOL Annex VI Amendments	Regulation of greenhouse gas emission reduction	In place until 2024	Global, Emission Control Areas (ECAs)	None	Environmental regulations
IMO CARES Marine Technology Challenge	Accelerating decarbonization in the maritime sector	2023-2024	Africa, Caribbean, SIDS	Saudi Arabia, EU	Funding support, technology transfer
Future Fuels and Technology (FFT) Project	Support for future fuel and technology strategies in the maritime sector	Pilot project (2024 onward))	Global, SIDS, LDCs	Norway, EU	Technology, innovation
SWiFT Initiative	Improvement of port digitalization	Ongoing since 2022	Central ports (e.g., Angola)	Singapore	Technology (prototype), education

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## Solution and Realization Plan







## Solution

## 1. Maritime Technology Gap Formula

**Final Score** = (0.25×Dependency on Maritime Trade) + (0.15×Port Infrastructure Level) + (0.10×Marine Accessibility) + (0.15×Education and Research Environment) + (0.15×Economic Size) + (0.20×Climate Vulnerability)

Score	Criteria	
10	Level 4	
7	Level 3	
4	Level 2	
1	Level 1	



## **Solution**

## 1. Maritime Technology Gap Formula

**Basic formula form** =  $(p1 \times C_{DMT}) + (p2 \times C_{PI}) + (p3 \times C_{MA}) + (p4 \times C_{ERE}) + (p5 \times C_{ES}) + (p6 \times C_{CV})$ 

- p1 + p2 + p3 + p4 + p5 + p6 =1.0 (100%)
- Each weight p1 to p6 is adjustable and can vary depending on the specific context of the analysis or the focus of the research

- Each component is divided into four levels based on specific criteria, and depending on the level achieved, a score ranging from 1 to 10 is assigned

 $\begin{array}{l} C_{\text{DMT}}: \text{ Dependency on Maritime Trade} \\ C_{\text{PI}} \text{ I: Port Infrastructure Level} \\ C_{\text{MA}}: \text{ Marine Accessibility} \\ C_{\text{ERE}}: \text{ Education and Research Environment} \\ C_{\text{ES}}: \text{ Economic Size (GDP)} \\ C_{\text{CV}}: \text{ Climate Vulnerability} \end{array}$ 

#### **TEAM Bick Wave**

## Solution

#### **1. Maritime Technology Gap Formula**

Final Score = (0.25×Dependency on Maritime Trade) + (0.15×Port Infrastructure Level) + (0.10×Marine Accessibility) + (0.15×Education and Research Environment) + (0.15×Economic Size) + (0.20×Climate Vulnerability)

Table1. Dependency on Maritime Trade

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Score	Criteria	Examples
10	shipping-to-exports ratio > 3.15	Afghanistan, Albania, American Samoa, Andorra, Angola
7	0.89 < shipping-to-exports ratio $\leq$ 3.15	Argentina, Armenia, Azerbaijan, Bahrain, Bangladesh
4	shipping-to-exports ratio $\leq$ 0.89	-
1	Least dependent on maritime trade	-

*\*Source: World Bank, GDP (current US\$), 2019 \*Source: World Bank, Container Port Traffic (TEU: 20-foot equivalent units), 2020. \*World Bank, Exports of Goods and Services (% of GDP), 2020.* 

#### maritime trade dependency





#### 1. Maritime Technology Gap Formula

#### Table2. Port Infrastructure Level

Port Infrastructure Level

Score	Criteria	Examples
10	Liner Shipping Connectivity Index (LSCI) $\leq$ 0.00	Afghanistan, Barbados, Belize, Bhutan
7	0.00 < Liner Shipping Connectivity Index (LSCI) $\leq$ 8.13	Angola, Bahrain, Bolivia, Botswana
4	8.13 < Liner Shipping Connectivity Index (LSCI) $\leq$ 32.61	Bangladesh, Brazil, Chile, Colombia
1	Liner Shipping Connectivity Index (LSCI) > 32.61	China, Germany, Japan, United States

\* Source: ND-GAIN Country Index, 2024, University of Notre Dame

#### Table3. Education and Research Environment

Education and research

Score	Criteria	Examples
10	Education Expenditure ≤ 1.71	Afghanistan, American Samoa, Chad, Haiti, Somalia
7	$1.71 < Education Expenditure \leq 3.63$	Albania, Angola, Bangladesh, Cambodia, Ecuador
4	$3.63 < Education Expenditure \leq 4.80$	Algeria, Brazil, India, Morocco, Vietnam
1	Education Expenditure > 4.80	Australia, Denmark, Japan, United States

\* World Bank, Government Expenditure on Education (% of GDP), 2024.





#### 1. Maritime Technology Gap Formula

*Arine Accessibility* 

#### Table4. Marine Accessibility

Score	Criteria	Examples
10	Coastline-to-area ratio > 32.77	Norway, Indonesia, Philippines
7	4.45 < Coastline-to-area ratio $\leq$ 32.77	Thailand, Fiji, Sri Lanka
4	0.94 < Coastline-to-area ratio $\leq$ 4.45	Brazil, South Africa
1	Coastline-to-area ratio ≤ 0.94	China, Germany, Japan, India

\* Source: CIA World Factbook 2005.

#### Table5. Economic Scale (GDP)

#### Economic Size

Score	Criteria	Examples
10	GDP less than \$7.48 billion	Chad, Burundi, Niger
7	\$7.48 billion - \$29.38 billion GDP	Bangladesh, Kenya, Ethiopia
4	\$29.38 billion - \$225.54 billion GDP	Philippines, Vietnam, South Africa
1	GDP more than \$225.54 billion	United States, Germany, Japan, China

\* Source: World Bank, GDP data, 2022.





#### 1. Maritime Technology Gap Formula

Climate Vulnerability

Table6. Climate Vulnerability

Score	Criteria	Examples
10	Vulnerability score > 0.358	Afghanistan, Barbados, Belize, Bhutan, Tuvalu
7	0.26 < Vulnerability score ≤ 0.358	Albania, Angola, Bahrain, Bolivia, Botswana
4	0.17 < Vulnerability score ≤ 0.26	Argentina, Bangladesh, Brazil, Chile, Colombia
1	Vulnerability score ≤ 0.17	China, Germany, Japan, South Korea, United States

\* Source: ND-GAIN Country Index, 2024, University of Notre Dame



## **Solution**

#### 2. Selected Countries And Scores

Table7. Scores

Country	Maritime Trad e Dependence Score (25%)	Port Infrastruct ure Tech Score (15%)	Education & Rese arch Score (15%)	GDP Score (15%)	Marine Access ibility(10%)	Climate Vuln erability (20%)	Total Score (Full marks : 10 points)
Solomon Islands	10	10	10	10	1	10	9.25
Kiribati	10	10	10	10	1	10	9.25
Tuvalu	10	10	10	10	1	10	9.25
Samoa	10	10	10	10	1	7	8.55
Bangladesh	7	10	7	7	7	10	8.55
Mozambique	7	10	7	7	7	7	7.8
Sri Lanka	7	7	7	4	7	7	7.4
Mauritania	7	10	7	10	7	7	7.8
Tanzania	7	10	7	7	7	7	7.4
Vanuatu	10	10	10	10	1	10	9.25
Haiti	10	10	10	10	1	10	9.25
Papua New Guinea	10	10	10	10	1	10	9.25
Comoros	10	10	10	10	1	10	9.25
Singapore	10	1	1	1	1	1	3.25
Japan	10	1	1	1	1	1	3.25
Germany	7	1	1	1	1	1	3.0
United States	7	1	1	1	1	1	3.0
United Kingdom	7	1	1	1	1	1	3.0
France	7	1	1	1	1	1	3.0

\*In cases where data was missing (null values), alternative data sources such as news articles, press releases, academic literature, or estimates based on similar conditions in neighboring countries were used to fill the gaps. Additionally, the most recent historical data available was employed when necessary. This approach should be further considered and evaluated in future analyses.





#### 3. Classification of digital technology support type

	Port operation	Navigation	Safety of ship
problem anaylsis	-it is in the <b>port development</b> <b>planning stage</b> and development process stage due to the <b>lack of</b> <b>ports and aging existing</b> <b>facilities</b>	<ul> <li>-frequently <u>using typhoon-prone routes</u> but lacking technology to avoid risks, making it <u>difficult to choose the optimal</u> <u>route</u></li> <li><u>heavily reliant on maritime trade</u>, requiring optimization of navigation and fuel savings</li> <li>-When <u>trying to reduce dependence on</u> <u>foreign ships</u> and technologies by developing domestic ships and technology</li> </ul>	<ul> <li>When there are many <u>risk factors</u> for port entry, such as transporting heavy loads</li> <li>As the shipping industry <u>develops</u> with larger vessels, there is a growing need for safety management for both crew and cargo logistics</li> </ul>
example of countries	overall developing countries such as Bangladesh and Myanmar	Developing countries in the Pacific region where <b><u>the risk of severe weather is high</u></b> Malaysia and Vietnam, etc.	Vietnam, etc.
required technology	<b>real-time monitoring</b> through IOT, implementation of <b>intelligent port procedures</b> , etc	Technologies improving <u>ship location data</u> <u>quality</u> , exploring <u>optimal shipping</u> <u>routes</u> , and 5G and satellite communication technologies	Al-based video safety management technology, obstacle mapping technology, etc.





#### 4. Presentation of the stages for selecting partner countries for cooperation

(1) Proportional responsibility for cumulative carbon emissions

set the support rate for each country according to the cumulative CO2 emissions and apply the method of subtracting them according to the annual CO2 reduction rate



Standard: Climatewatch PIK data CO2 emissions in total area (1850 – 2022), EG-TIPS platform

Cumulative CO2 emissions (MtCO2e)	rate	allocation index	Example	After applying CO2 reduction rate
≥ 2000	A	10	China, United States, India	China
≥ 1000	В	7	Russia, Japan	India
<u>≥</u> 500	С	4	Iran, Germany, Saudi Arabia, South Korea, etc.	United States, Russia, Japan, Iran, Saudi Arabia
≥ 300	D	1	Brazil, Australia, UK, etc.	Germany, South Korea, Australia





### 4. Presentation of the stages for selecting partner countries for cooperation

#### (2) Classification of fund or technical assistance

divide the countries that support the technology and the countries that fund it according to the calculated steps

It **requires specialized knowledge and skills**, so it is important to prioritize the selection of countries that can provide technical support.

Countries that do not possess advanced digital technology but are responsible for climate change and have substantial financial resources should be <u>selected as</u> <u>financial contributors.</u>

**Way to** → Proportionally determine the number of technical supported countries

**Realization** — Allocate responsibility for cooperation to the countries through funding



## **Solution**

## 4. Presentation of the stages for selecting partner countries for cooperation





## **Realization plan**

**1. Strategy direction corresponding to the proposal** 





## **Realization plan**

2. Implementation method for IMO project

1) Compliment existing projects



**MSW** Maritime Single Window

- Mandatory establishment of electronic information processing systems in ports
- Requires supports for unprepared countries in digital tecnology





- does not consider the effects of climate change
- Add various indicators considering the environmental impact index along with existing indicators



## **Realization plan**

#### 2. Implementation method for IMO project

2) In new project proposals



#### **Classification and standards**

- When MDTF receives new funding or needs funding
- it categorizes new projects by technology classification and establishes country standards

### • Evaluation of project performance

- Identifying the current situation in developing countries before the project
- Evaluate the performance of the project by measuring changes after the project

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Expected Result and Conclusion





## **Expected result**

1. Short-term and Long-term Expected Outcomes





## **Expected result**

#### 2. Implementation Processes and Examples

Category	Countries	Implementation Process	Short-term Effects
Developing Countries	Solomon Islands, Kiribati, Tuvalu	Introduction of port automation technology.	Trade activation: Increase in trade volume and redu ction in transport costs.
		Application of optimized maritime transport software.	Bridging the technology gap: Increased competitive ness in international maritime trade and trade reve nue growth.
		Provision of maritime education programs.	
Developing Countries	Vanuatu, Haiti, Pa pua New Guinea	Improvement of port infrastructure.	Bridging the technology gap: Increased port efficie ncy.
		Introduction of eco-friendly maritime technologies .	Maritime trade activation: Cost reduction and enha nced international competitiveness.
Developed Countries	Singapore, Japan, Germany	Use of low-carbon fuels.	Reduction in carbon emissions: Improved eco-friend ly image and enhanced ESG scores.
		Minimization of carbon emissions through autom ation technologies.	
	United States, Uni		Economic effects: Improved corporate image and e
Developed Countries	ted Kingdom, Fra nce	Construction of eco-friendly ports.	conomic benefits from higher ESG scores.
		Research and development of technologies for m arine environmental protection.	



## Conclusion





- Update data and utilize direct material
- Consider of special variables where indirect factors hinder digitalization such as culture



- Establish objective standards to bridge the digital divide
- Solutions for inequality gaps and clarifying the responsibilities on environment



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## 2024 Mock IMO Assembly Thank You

Team Bick Wave