



# MARITIME AND PORT AUTHORITY OF SINGAPORE (MPA)

## TERM PROJECT

Team E

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# 01 PROBLEM OVERVIEW



# How might we leverage digitalization to future-ready and maintain the competitiveness of Maritime Singapore?

## AS-IS

Digitalization adoptions by **20 SMEs** facilitated by MPA

Which equates to roughly 0.4% of the total number of SMES

## TO-BE

At least **100 SMEs** undertake digitalization adoptions

Cultivate a culture of innovation and future-readiness

(Approx 2% of the total number of SMES by 2025)

- Maritime Singapore contributes to about 7% of our GDP and employs about 170,000 people
- MPA has invested heavily into technology to improve operational efficiency – digitalPORT@SG, digitalOCEANS, digitalSHIP, digital bunkering, electronic navigation charts, JIT arrival & departure, OCEANS-X
- Raised >\$68 million investment for R&D through PIER71 startups.
- **MPA aims to incentivize SMEs to adopt technologies to increase productivity by 20% in 5 years.**

**SME**

Spoke to multiple SMEs that represented the different personas & level of IT/digital maturity

**SSA**

Spoke with Digitalization Committee Chairperson about his perspective of the current ecosystem and digital transformation efforts

**MPA**

Consultations with project sponsor and queries regarding industry perspective & resources such as MDP, IDP



# 02 ANALYSIS

# KEY FINDINGS – SHIP AGENTS & SUPPLIERS

## RESOURCES



- Lack of a quality technical team with digital transformation capability (Manpower)
- Lack of upskilling opportunities due to time constraints & multitasking (Information/Education)
- Lack of budget and risk tolerance (Funding)

## URGENCY



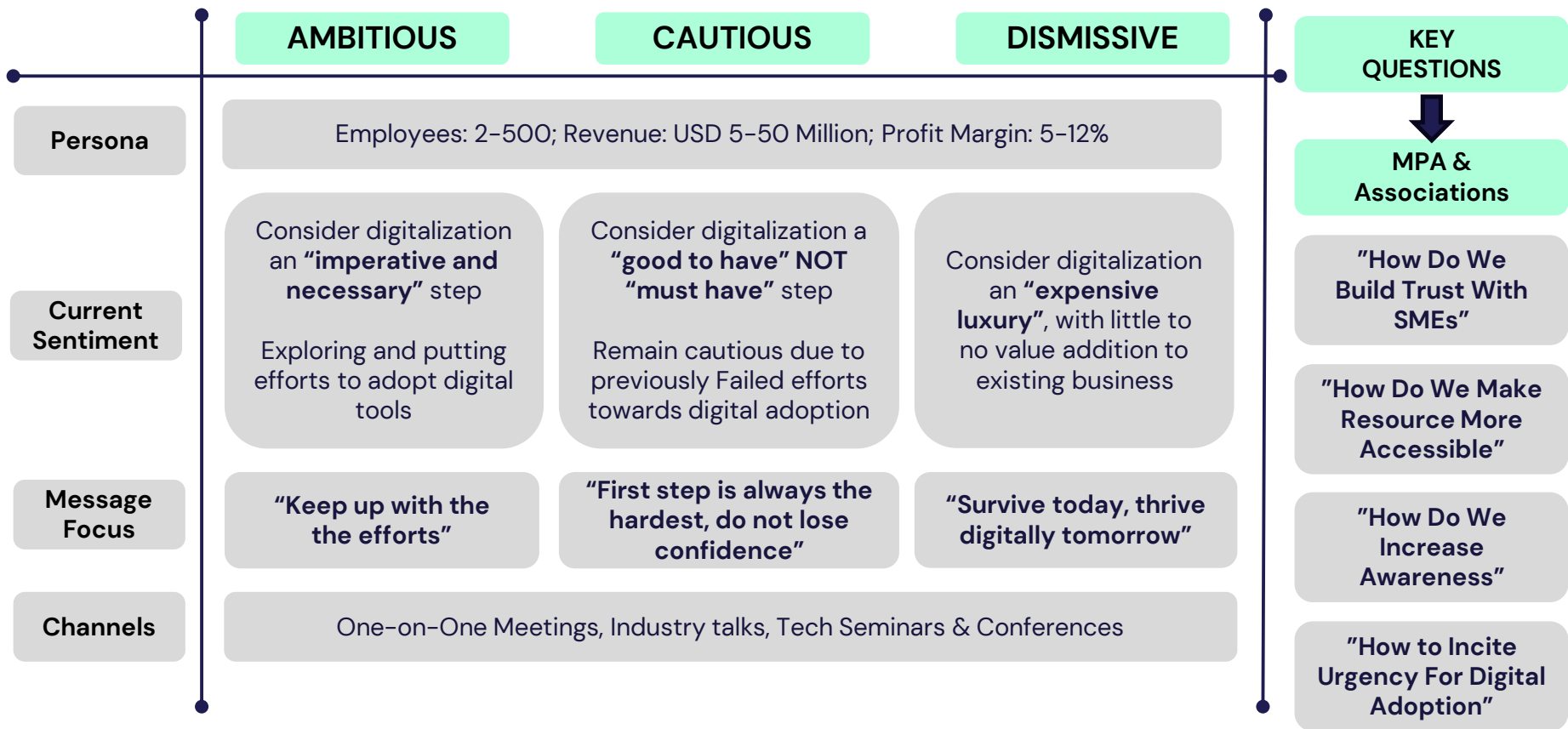
- "Don't fix what's not broken" and "waiting to see" mindset hinders change
- Marginal gains are seen as insufficient for process changes
- Stuck to legacy processes such as usage of WhatsApp and Email and unwilling to change.

## DIGITAL AWARENESS



- Not aware of how to execute on MPA's digital plan
- Lack of understanding of MPA's objectives among management in SME's due to technical capabilities.
- Solutions not customized to business requirements. Lack of understanding on IT Business Strategies

# PERSONA BASED COMMUNICATION – SME





# 03 OVERVIEW OF SOLUTION





# UNIFIED MARITIME PORTAL – DIGITAL WORKPLACE





# PRE-IMPLEMENTATION

## OUR VISION & MISSION



*"To be an integrated maritime hub, through state-of-the-art innovation, while ensuring a sustainable future-ready ecosystem."*



*"To enhance Singapore's position as a leading global maritime hub, and secure Singapore's strategic maritime goals through digital transformation and integration."*

## CASE FOR DIGITALIZATION – COMMUNICATING THE URGENCY

### CASE STUDY BASED FACTS

**Maritime Industry:** \$5–10 cost saving per document for electronic bill of lading, reduce fuel consumption by 10–20% due to route optimization

**Case Study of an organization in the maritime industry:** Following the implementation of new digital initiatives, the organization achieved a **15% reduction** in operational costs and a **20% increase in customer satisfaction**

**Air Cargo Industry:**

- **Cargo Communication Systems:** Connecting stakeholders in the air cargo industry on a common platform. Expected to unlock a value of at least over **\$9Bn annually** and save around **120,000 trees** a year
- **Emagic Software:** Read different types of content including emails, text, and images and convert them into instant air cargo quotes. Customers witnessing **54% conversion rate** from this software.
- **IATA's "ONE RECORD" Initiative:** Seamless information flow, real-time visibility, and enhanced collaboration across the supply chain by creating a single record view of each shipment. **Deadline set for airlines to adopt ONE Record by 1 January 2026**

### SINGAPORE'S GLOBAL POSITION

**Singapore's Position in the Global Market**

- World's top maritime centre according to ISCD index for 10<sup>th</sup> consecutive year
- Fully digitalized and automated port, Tuas Port by 2040.
- Digitalization is key to achieve industry goal of net-zero carbon emissions by 2050
- Market value estimated at \$6Bn SGD with estimated annual growth rate of 5%
- In the current global scene, **Digitalization is key to maintain competitiveness and accelerate growth**

### THE CASE FOR REGULATORY COMPLIANCE

*"PROPOSED DEADLINE TO ONBOARD  
ONTO DIGITAL WORKPLACE BY 2030"*

# FORMING COALITION AND ENGAGEMENT STRATEGIES



**MPA**



**MARITIME ASSOCIATIONS**

Singapore Shipping Association

Singapore Association Of Ship suppliers and Services

Singapore Shipping Chandlers Association



**KEY INDUSTRY LEADERS**



**MARITIME SME SERVICE PROVIDERS**

Ship Agencies

Ship Suppliers

Other SME Service Providers

**ENGAGEMENT CHANNELS**

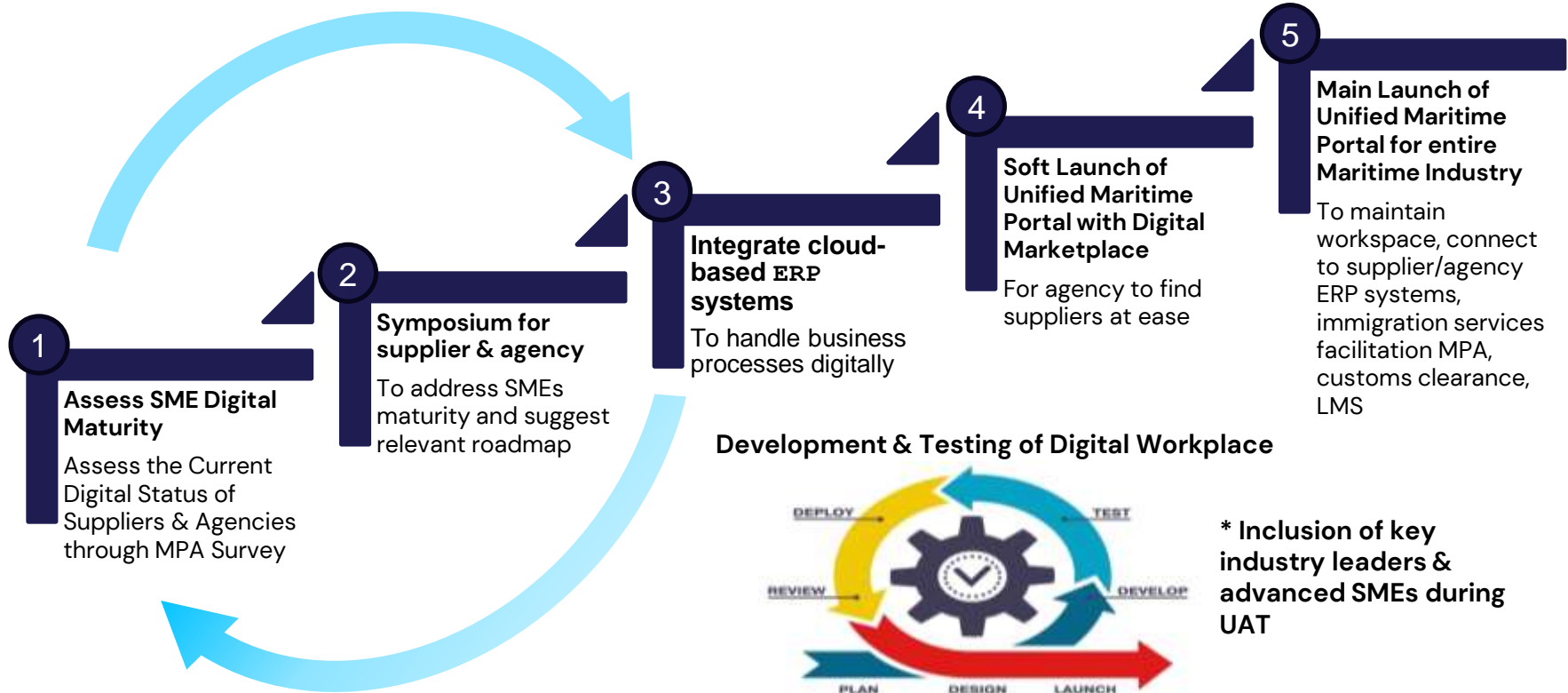


**ONE-ON-ONE MEETINGS**

**TECH SEMINARS & CONFERENCES**

**INDUSTRY LEADER TALKS**

# PROPOSED DIGITAL TRANSFORMATION ROADMAP



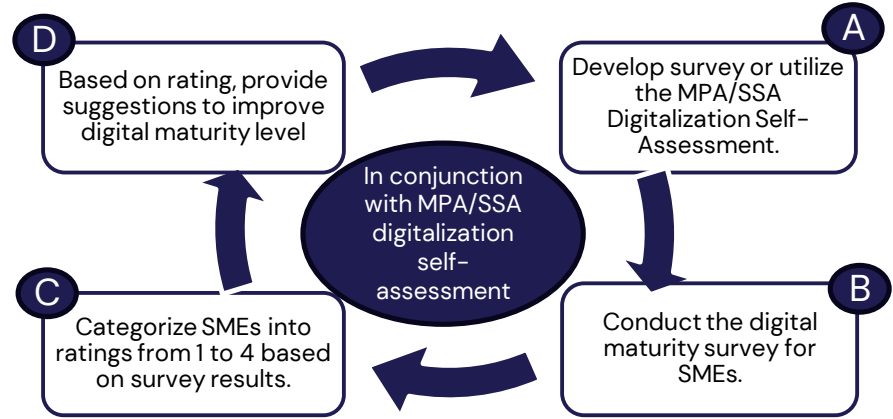
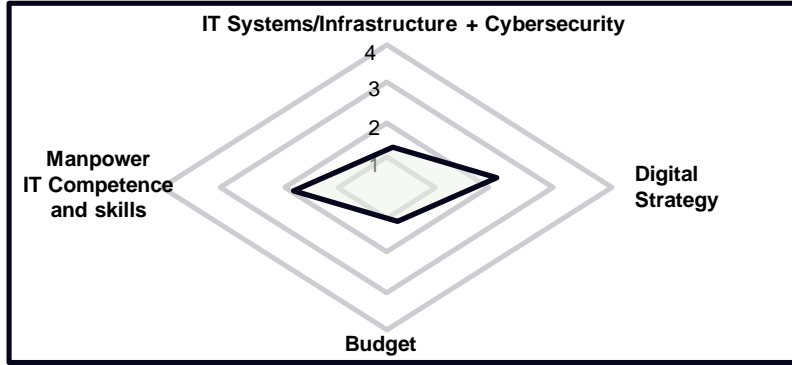
2025 - 2027

2028

2030

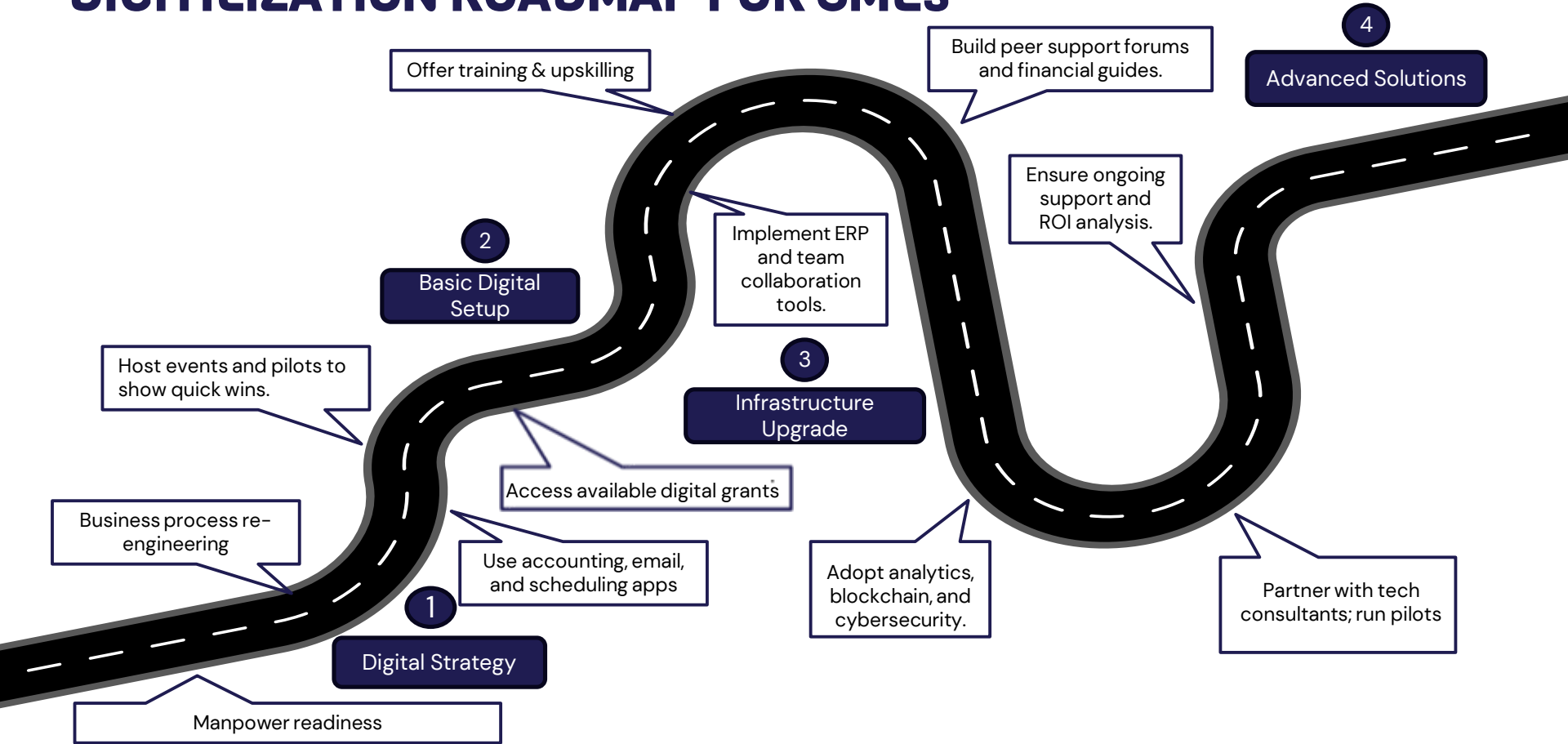
# ASSESSING SMEs DIGITAL MATURITY LEVEL

Sample Digital Adoption Maturity Rating



Rating	Internal IT team	Information Systems	Budget	Cybersecurity	Digital Mindset
1 – Digital Beginner	No inhouse IT team	Manual work Eg: using hardcopies	Very low	Initial	Not digitally aware/pessimistic
2 – Digital Novice	Management team with IT skills	Basic information system Eg: email, excel	Low	Managed	Digitally aware with basic tools & technologies
3 – Digital Native	Vendor IT team	Business process enabled with standalone applications	Medium	Defined	Digitally enabled with basic tools & technologies Digitalized
4 – Digital Expert	Inhouse IT team	Business process enabled with ERP systems	Sufficient	Proactive	Digitalized

# DIGITILIZATION ROADMAP FOR SMEs



# MARITIME TECH SYMPOSIUM

Objective: to bring industry solutions, expert consultants, training and upskilling providers and grants and loans providers to the SMEs

MPA to Discuss SME  
Digital Readiness &  
The Need For  
Digitalization

A

Facilitate Digitalization  
Plan For SME' based  
on their Digital  
Readiness

B

Assist In Assessing &  
Finalising Digital Tool  
Vendors Based On the  
Roadmap Created

C

Gradual Deployment Of  
Digital Solutions Followed  
By Regular Review &  
Feedback

D



# SUGGESTIONS BASED ON DIGITAL RATINGS FOR SMEs

## RATING 1

**Create basic infra – Purpose (Getting Used to Basic Digital Tools)**

### TECH SOLUTIONS:

- Basic accounting software like Xero or Quick-books
- Basic Email Communication like Zoho
- Digital Scheduling like Google Calendar

### EDUCATION AWARENESS & CAMPAIGNS:

- One-On-One Meetings with key industry leaders
- Organize free and low- cost events highlighting the benefits of digital adoption
- Share examples of other industry players who have improved efficiency and profitability through digital tools.

### DEMONSTRATE QUICK WINS:

#### Pilot Programs:

- risk-free trials of basic digital tools to showcase immediate benefits.
- #### ROI Illustration:
- show potential cost savings and revenue gains.

### SUBSIDIES & GRANTS:

Inform them about government subsidies and grants

- Maritime cluster fund
- Enterprise Development Grant
- Productivity Solutions Grant

## RATING 2

**Improving infra + adopting ERP**

### TECH SOLUTIONS:

- Integrated ERP Systems : Solutions like Odoo, Microsoft 365 dynamics and Warehouse Management Solutions.
- Advanced Communication tools: Implement collaboration platforms like Microsoft Teams or Slack

### SKILL DEVELOPMENT:

- Training Programs: Provide targeted training to enhance digital literacy and technical skills
- E-Learning Platforms: access to online courses relevant to their industry needs

### PEER INFLUENCE:

- Leverage SSA: and other industry influencers or satisfied clients for digital adoption
- Community Building: Create forums or groups where SME's can share experiences and tips

### FINANCIAL PLANNING:

- Showcasing the cost benefit analysis to provide detailed analysis to justify investments
- Providing government grants like the Maritime Cluster fund and ESG grant

## RATING 3

**Advanced Digital Solutions**

### TECH SOLUTIONS:

Analytics and AI:

- Tools for demand forecasting and JIT planning – Windward
- Blockchain Technology For secure and transparent transactions – Tradelens, CargoX
- Cybersecurity Measures IDPS, MFA, BitLocker

### SKILL DEVELOPMENT:

- Training Programs: Provide targeted training to enhance digital literacy and technical skills
- E-Learning Platforms: access to online courses relevant to their industry needs.

### PARTNERSHIP WITH TECH PROVIDERS:

- Co-creation: Work with tech consultants willing to tailor solutions.
- Pilot Projects: Implement small-scale deployments to test effectiveness.

### RISK MITIGATION AND FINANCIAL PLANNING:

- Ensure ongoing technical support post-implementation
- Showcasing the cost benefit analysis to provide detailed analysis to justify investments

# DIGITAL MARKET PLACE - USECASE

An online platform designed for ship owners to easily connect with agencies and suppliers, providing access to essential services such as bunkering and pilot assistance etc. Users include ship owners, suppliers, and agents, with development managed by a third-party vendor under MPA supervision.

## SHIP OWNER

- New ship owners can register with a Certificate of Registry.
- Access a list of agencies and suppliers, including service details and costs.
- Post job requirements and choose a vendor.
- Use the payment gateway to pay agents and suppliers.
- Track order status updates.

## SHIP SUPPLIER

- Register using [required documentation or registration process].
- View job postings from ship owners and submit quotations.
- Connect with available agents for potential job opportunities.
- Track payments received from ship owners and agents in the payments profile.
- Access order status and provide order updates.

## Digital Market Place

## SHIP AGENCY

- Register using [relevant document or registration method, e.g., Agency Certification].
- View job postings from ship owners and submit quotations.
- Access list of suppliers with service details and costs.
- Use the payment gateway to pay suppliers.
- Payments profile to track payments received from ship owners.
- Access order status and provide order updates.



# DIGITAL WORKPLACE FOR MARITIME

A unified portal for the maritime industry with unique interfaces for ship owners, agents and suppliers which contains a collection of services that enable new ways of working.

- Digital marketplace
- Digital bunkering
- DigiPORT@SG
- Trade-Net
- Port customs clearance
- Berthing arrangements
- Regulatory updates from MPA
- Immigration services

Ship owner interface



- Access to digital market-place.
- Ship tracking info app
- Integration of Learning Management System
- Regulatory updates from MPA
- ERP Integration

Agent interface



- Access to digital marketplace.
- Ship tracking info app
- Port customs clearance
- Trade-Net
- Integration of Learning Management System
- Regulatory updates from MPA
- ERP Integration

Supplier interface



Regulated by MPA

Developed and maintained by 3<sup>rd</sup> party vendor

## KEY POINTS



Outsource the development and maintenance of Unified portal to external vendor



Portal charges – only for advanced services on modular basis (no charge for basic services)



Unified portal can be accessed using SSO for all users



Cybersecurity team under MPA to regulate data privacy and data security

# DIGITAL WORKPLACE - BENEFITS



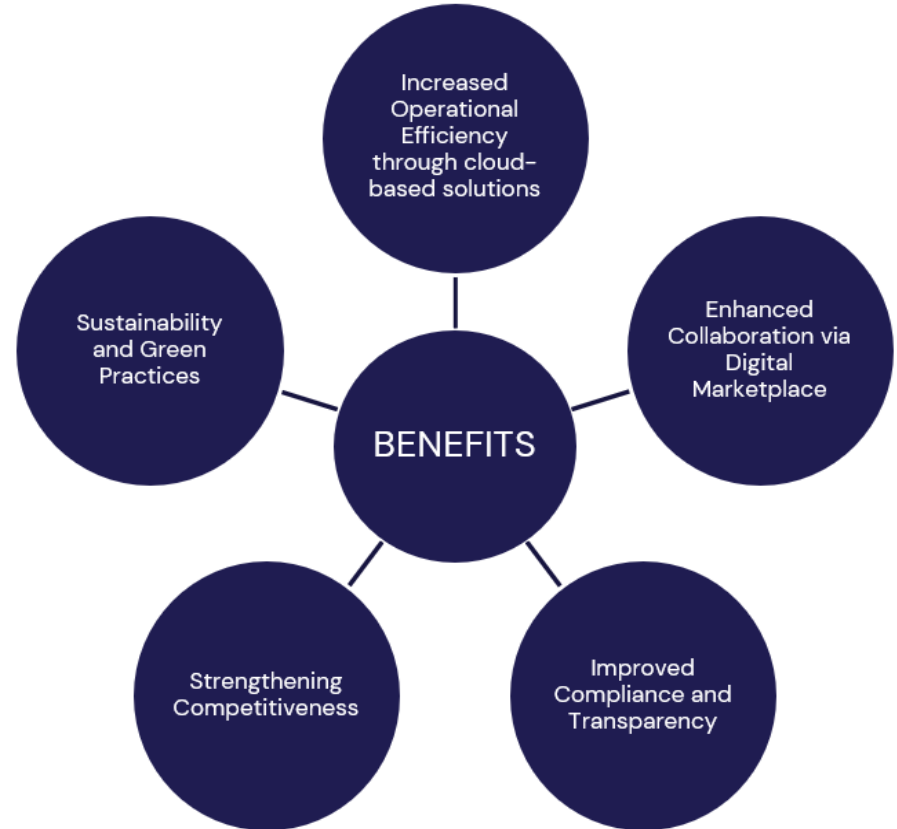
## SERVICES

Integrated ERP systems (operations, accountancy, scheduling, inventory, supply chain, crm)

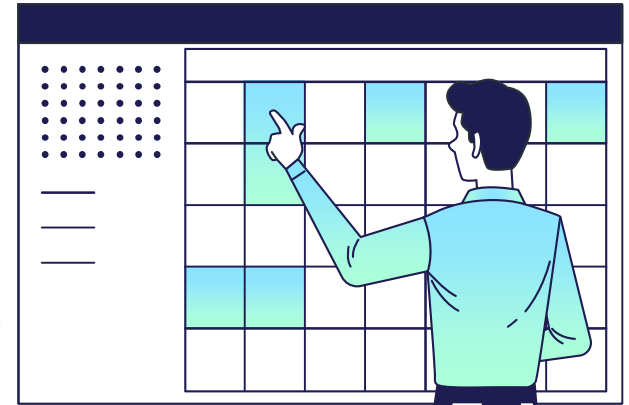
Digital Marketplace  
DigiPORT@SG

OCEANS-X (API marketplace)

Learning & Development



# 04 COST-BENEFIT ANALYSIS



# COST FORECASTING

Solutions	Particulars	Costs
Annual Tech Symposium (3 Day Event) (Gathering Size: 100 Companies) (Pax: 200 people)	<b>Venue Rentals:</b> (Suntec Convention Centre) – 3x Day X \$5000/Day	<b>\$15000</b>
	<b>Venue Décor &amp; Setup:</b> Technology & Equipment – \$2000/Day X 3 Days Maritime & Tech Themed Setup – \$1500/Day X 3 Days	<b>\$10,500</b>
	<b>Speakers &amp; Talent:</b> 3x Industry Leaders X \$5000/Speaker X 1 Day 2x Moderators X \$1000/Speaker X 3 Day 2x Tech Support/Persona X \$500/Person/Day X 3 Days	<b>\$21,000</b>
	<b>Marketing and Promotion: \$5000</b>	<b>\$5,000</b>
	<b>Food &amp; Beverages:</b> 200x People X \$40/Person/Day X 3 Days	<b>\$24,000</b>
	<b>Total Event Cost</b>	<b>\$75,500</b>
Unified Portal (12 Months Development)	<b>Initial Investment:</b> 1 x Project Manager for \$7,000/month 2 x Software Architect for \$5,000/month 2 x Data Engineer for \$5,000/month 2x Software Developer for \$5,000/month	 \$72,000 \$1,62,000 \$1,20,000 \$1,20,000
	<b>Total Initial Investment:</b>	<b>\$474,000</b>
	<b>Maintenance &amp; Cybersecurity (Annual)</b> 1x AWS Data Hosting Server for \$0.15/GB Data Protection & Encryption	 \$50,000
	Network Admin	\$18,000
	1x Software Developer	\$60,000
	<b>Total Maintenance Cost:</b>	<b>\$128,000</b>



# COST BENEFIT ANALYSIS OF SME (SMALL)

Assumptions:							
Annual Revenue	<\$5 Million	Grants Provided		50%			
Employee Size	15-20 People						
Average Order Value	\$35,000						
Average Vessel Calls Handled Per Year	100						
%age of more vessel calls handled in 1st Year	5%						
%age of Enhancement in Order Value in 1st Year	15%						
REVENUE METRICS							
		Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
New Orders Serviced		0	5	6	7	9	11
Growth Rate				5%	10%	15%	20%
Enhancement in Average Order Value		\$0	\$5,250	\$5,775	\$6,353	\$7,306	\$8,768
Growth Rate				10%	10%	15%	20%
TOTAL REVENUE ENHANCEMENT		\$0	\$26,250	\$34,650	\$44,471	\$65,754	\$96,448
COST METRICS							
Operational Expenditure (%age of revenue)	90%	\$0	\$23,625	\$31,185	\$40,024	\$59,179	\$86,803
Initial Investment		\$0	\$0	\$0	\$0	\$0	\$0
Software Costs (Annually)		\$1,000	\$3,500	\$7,000	\$8,750	\$11,813	\$15,948
Growth Rate			250%	100%	25%	35%	35%
Grants Provided:		\$500	\$1,750	\$3,500	\$4,375	\$5,907	\$7,974
Subsidised Software Cost		\$500	\$1,750	\$3,500	\$4,375	\$5,907	\$7,974
Consulting & Training Cost:							
Training Cost (As a % of Total Cost)	20%	\$200	\$700	\$1,400	\$1,750	\$2,363	\$3,190
Annual Maintenance		\$0	\$0	\$0	\$0	\$0	\$0
Cost optimisation (%age of opex) due to:	5%	0%	0%	5.0%	5.8%	7.2%	9.7%
(i) reduced manual errors							
(ii) better decision making							
(ii) standardised back-end processes							
(ii) Quicker Inventory Turnover							
Growth Rate				10%	15%	25%	35%
Reduction in costs		\$0	\$0	\$1,559	\$2,301	\$4,253	\$8,423
TOTAL COST		\$700	\$26,075	\$34,526	\$43,848	\$63,194	\$89,544
TOTAL CASH FLOW							
WACC	7%	-\$700	\$175	\$124	\$623	\$2,560	\$6,904
NPV	\$6,501.10						
IRR	89%						
IRR IS GRRATER THAN WACC							



# 05 RISK MITIGATION

# RISK MITIGATION

## Fear of New Technology and Resistance to Change

### Risk

- SMEs may resist adopting new digital tools due to concerns over complexity and disruption

### Mitigation

- Offer simple, modular tools that allow incremental adoption. Run training and change management programs that emphasize the long-term benefits of digital adoption

## Cybersecurity Risks

### Risk

- Increasing digitization opens the industry to cybersecurity vulnerabilities

### Mitigation

- Implement industry-wide cybersecurity standards and offer cybersecurity training to all users of the digital workplace. Leverage partnerships with AWS for secure cloud solutions

## Unemployment and Displacement of Jobs

### Risk

- The transition to digital could lead to job losses, particularly among workers in ship agencies and smaller maritime SMEs

### Mitigation

- Provide reskilling programs for workers displaced by automation and create new job roles around the digital workplace, such as data analysts and digital engineers

## Fragmentation and Unequal Adoption

### Risk

- Different adoption rates across SMEs could create fragmentation, leaving some businesses behind

### Mitigation

- Implement a phased approach with clear industry-wide benchmarks and government-led incentives to ensure all players are on board



# 06 SUPPLY

# SUPPLY

## TECHNICAL EXPERTISE

### ERP Solutions

- SMEs should train select team members in basic technical skills.
- Trained members will facilitate communication with ERP solution vendors.
- Ensures smoother collaboration and implementation of ERP systems.

## NON-TECHNICAL EXPERTISE

### Symposium

Event and management team under MPA to engage SMEs on the unified portal and digital transformation roadmap.

### Maturity Assessment

Management consultants under MPA to develop and conduct SME maturity assessments.

**Maturity Categorization** Business analysts to categorize SMEs by rating and provide improvement suggestions.

### Regulatory Body

MPA team with data governance expertise to oversee the vendor-developed workplace.

## OUTSOURCING

### Digital Marketplace

Need a vendor with expertise in digital marketplace development to develop and maintain the marketplace.

### Digital Workplace

Need a vendor with expertise in digital workplace to integrate the various services under one application.

**Thank you**



# REFERENCES & APPENDIX

# REFERENCES

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# PERSONA BASED CLASSIFICATION

## AMBITIOUS

## CAUTIOUS

## DISMISSIVE

### CURRENT SENTIMENT

- Developed tailor made operational software & implemented an industry recognized software for accounting department
- Experimentation of other operational software like email filtering system
- Consider technology as a **“must-have”** thing to remain competitive

- Failed implementation of digital solutions like accounting software. Therefore, remain cautious to experiment something new
- Self-awareness about their lack of expertise and resources to access latest technologies in the market
- Consider digital tools as a **“good-to-have, not a must-have thing”**

- Mostly manual-based business process with no urgency to adopt digital solutions

### KEY CONCERNS

- Pre-approved solutions provided by MPA do not fit their business requirements
- SMEs not involved in the process of creating the pre-approved solutions
- Current workforce already multi-tasking and do not have the bandwidth to experiment new solutions

- Do not have a digitalization roadmap and are not aware of how to proceed with the process of digitalization
- Do not have the funds to allocate on an in-house IT team

- Consider it as a “luxury” option to adopt digital solutions as they are very expensive
- It would cause extreme disruption to their existing business, for which they believe will not have a significant enhancement

# SWOT ANALYSIS

S  
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## Ambitious

- Have basic IT solutions (eg accounting software – Xero)
- Real time experience of how digital transformation can influence business.

- Unable to catchup with MPA Objectives.

- Can handle more customers when IT solutions are implemented successfully.
- Become market leader since the processes are optimized.
- Can make business decision based on data analytics.

- Might lose capital if digital solutions doesn't work.
- Cybersecurity threats for their data since they might not have an cybersecurity team.

## Cautious

- Have an idea how digital transformation can transform business and can learn from ambitious persona.
- Have access to latest IT solutions in the market.

- Failure in implementing IT solutions.
- Unable to catch up with MPA Objectives.
- Unable to attract talent for digital transformation.
- Cannot pay upfront cost for digital solutions.

- Successfully implementing digital solutions can attract new businesses.
- Can increase customer experience through real-time tracking and updates.

- Might face significant financial losses if digital transformation are unsuccessful.
- Short-term productivity decline during the digital transformation transition phase.

## Dismissive

- Have a solid customer network without use of technology

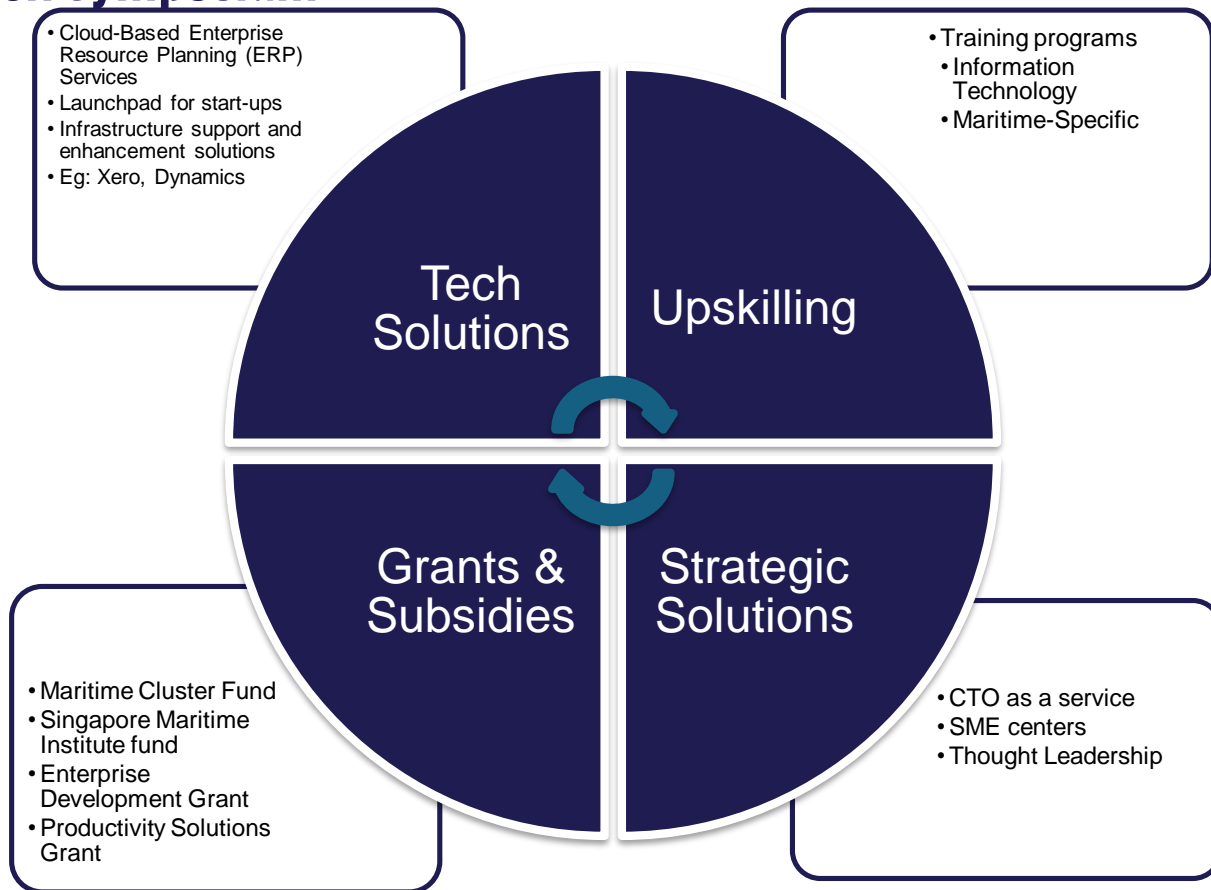
- Not aware how digital solutions can influence business.
- Lack of confidence in implementing digital solutions.
- Lack of Funds and lack of transition time.

- Can reduce operational expenses by implementing basic digital solutions.
- Can attract new customers who opt for digitally enabled service providers.

- Might face bankruptcy when digital solutions not implemented successfully due to high cost involved in basic infrastructure setup.
- Might lose business to competitors if they don't implement digital solutions.

PERSONA	AMBITIOUS	CAUTIOUS	DISMISSIVE
What's in it for me? (WIIFM)	<ul style="list-style-type: none"> <li>- Clarity on better process optimization</li> <li>- Exploration into new and better solutions to replace or complement what has already been adopted</li> <li>- First-hand experience with latest IT solutions in the market or by upcoming start-ups</li> <li>- Training and upskilling support to continue improving operations</li> <li>- Monetary support in terms of grants from MPA, IMDA, ESG, etc.</li> </ul>	<ul style="list-style-type: none"> <li>- Process optimization solutions that are catered well for their business</li> <li>- Training and upskilling support in IT and relevant fields that are necessary to better understand the importance and impact that digitalization offers to the industry.</li> <li>- First-hand experience with latest IT solutions in the market or by upcoming start-ups</li> <li>- Monetary support in terms of grants from MPA, IMDA, ESG, etc.</li> </ul>	<ul style="list-style-type: none"> <li>- Insights and strategies to aid in building and improving on current IT infrastructure.</li> <li>- First-hand experience with industry-recognized ERP solutions that can optimize and bring better value to business operations</li> <li>- Basic upskilling in IT and relevant fields</li> <li>- Monetary support in terms of grants from MPA, IMDA, ESG, etc.</li> </ul>
Benefits & Outcomes	<ul style="list-style-type: none"> <li>- Improved decision-making on available solutions and what will work best for the business</li> <li>- Recognition as industry leaders in terms of current business processes and the opportunity to play a leading role towards digitalization in the maritime industry</li> <li>- Better streamlined processes with increased efficiency and better resource allocation, resulting in reduced operational costs and higher productivity</li> <li>- Opportunities for innovation to create their own solutions and to work with tech firms/start-ups to bring these solutions to life for the industry</li> <li>- Attainment of sustainability goals</li> </ul>	<ul style="list-style-type: none"> <li>- Implementation of solutions that are best fit to the business which will streamline processes, increase operational efficiency and provide better resource allocation</li> <li>- Optimization and Improvement of current business processes to adapt to the evolving industry</li> <li>- Recognition as upcoming and "best-improved" in the industry and can be seen as an example to follow</li> <li>- Upskilling for workers to continue to stay relevant within the industry and the current evolving IT scene</li> <li>- Assurance that they will not be left behind while the industry shifts towards digitalization</li> </ul>	<ul style="list-style-type: none"> <li>- Implementation of basic IT infrastructure and accounting/ERP solutions to kick-start their digital/IT journey and to start reaping the benefits of these solutions.</li> <li>- Improved operational efficiency, lead times, optimization of business processes, reduced operational costs</li> <li>- Setting-up the foundation for continuous improvement and adaptation to the ever-evolving industry</li> <li>- Assurance that they will not be left behind while the industry shifts towards digitalization</li> <li>- Upskilling for workers to continue to stay relevant within the industry and the current evolving IT scene</li> </ul>

# Maritime Tech Symposium





## CONSULTS & WORKSHOPS

Global Innovation Alliance Co-Innovation Programmes

## CTO-as-a-Service at a glance



### SME Centres

## Thought Leadership Talks

Healthcare financing generally, 2005 Summary, regular/supplemental financing, government/non-government sources and expenditure, The 2005 government spending profile, government health expenditure, indicators, and the new capital source discussion.

## GRANTS

## Productivity Solutions Grant

- H** Funds individual projects intended to improve productivity. Limited to a 440-appointment list of vendors.

### Maritime Cluster Fund (MCF)

Introduced by the Maritime and Port Authority of Singapore (MPA), the Maritime Cluster Fund (MCF) facilitates the growth of Singapore's maritime cluster by supporting the industry's manpower and business development efforts as well as its drive for productivity improvements. There are three key components under MCF:

## SkillsFuture Enterprise Credit

Reduce out-of-pocket expenditures for enterprise and workforce transformation

## Enterprise Development Grant

- For Singapore companies starting new projects to upgrade their business, explore new growth, or expand overseas
- Funds individual projects tailored to your business

## LEARNING & DEVELOPMENT

[illegible]

Career Conversion Programme (CCP)

Die folgenden Aussagen sind richtig (R) oder falsch (F). Bezeichnen Sie die Aussagen mit R oder F. (1 Punkt pro Aussage)

Die folgenden Aussagen sind richtig (R) oder falsch (F). Bezeichnen Sie die Aussagen mit R oder F. (1 Punkt pro Aussage)



## SkillsFuture for Digital Workplace

[illegible]

### Equipping Singaporean adults with digital literacy skills for the digital economy



The information for digital resources listed below is available on the Internet at <http://www.elsevier.com/locate/locate/locate>. For more information, please contact the Elsevier Customer Service Department at [elsevier@elsevier.com](mailto:elsevier@elsevier.com).

It was in 1999, 10 years after the earthquake and 10 years after the tsunami, that the first tsunami warning system was established in the Pacific. The system was first tested in 2001 and 2002, and it was then that the first tsunami warning system was established in the Pacific.

ESL may also present other but neglected opportunities for parents to develop important learning opportunities for the children – actually *with* children.



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odoo

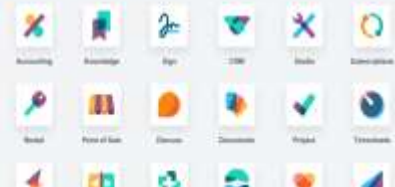
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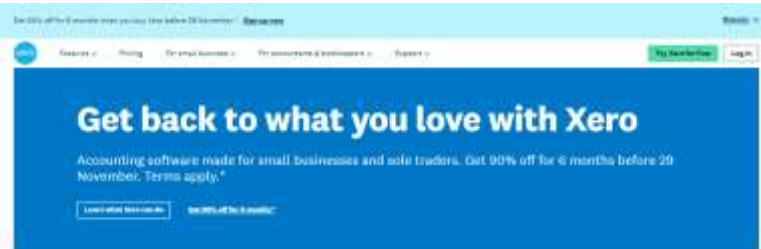
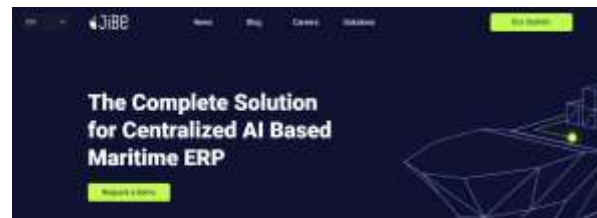
Navigating Challenges: MariApps' Vision for Empowering the Shipping Industry with Maritime ERP



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