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Port Authority of
Trinidad and Tobago

Building Port Resilience: Strategies for Risk Management and Emergency Response

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Agenda

- Introduction to the Port Authority of Trinidad and Tobago
- Port Resilience
- Key Elements of Port Resilience
- Risk Management
- Risk Identification
- Risk Analysis
- Risk Control
- Monitoring, Audit & Review
- Hierarchy of Control
- Emergency Response Planning



The Port Authority of Trinidad and Tobago

Established by the Port Authority Act 51:01 in 1961. The Port Authority, has direct responsibility for the Ports of Port of Spain and Scarborough, which are divided into **three Strategic Business Units (SBU)**:

- ✓ **Port of Port of Spain (PPOS) Cargo & Container Handling**
Facilitating international trade with efficient logistics.
- ✓ **Trinidad and Tobago Inter-Island Transportation Company (TTIT) Passenger & Ferry Services** – Connecting Trinidad and Tobago via inter-island ferry transport.
- ✓ **Port of Spain Infrastructure Company (POSINCO) Infrastructure Development** – Modernizing port facilities to enhance efficiency.



What is Port Resilience?

The ability of Port systems to Resist, Respond to, and Recover from any disruptive events efficiently.

Why Is it Important:

- ✓ Global trade dependency
- ✓ Economic impact of delays
- ✓ Safety of personnel and environment



Key Elements of Port Resilience

- ✓ Risk Assessment & Mitigation
- ✓ Redundancy and Flexibility
- ✓ Strong Governance & Communication
- ✓ Training and Capacity Building
- ✓ Emergency Response / Business Continuity Planning
- ✓ Legal Compliance



Risk Management Framework for the Port Authority of Trinidad and Tobago

Risk Management Framework



1

Risk Identification

- Document the risk and related events

2

Risk Analysis

- Assess and measure risk using set criteria that includes Impact and Likelihood. Risks are Prioritized.

3

Risk Controls

- Controls are implemented to Eliminate or Mitigate identified risks.

4

Monitoring & Review

Port Hazards and Risks



Natural Hazards

Storm surges, hurricanes, earthquakes

Man-made Risks

Fires, oil spills, terrorism, cyber-attacks

Operational Risks

Equipment failure, human error, labor disputes

Risk Analysis

$$R = C \times L$$

$$R = C \times (T \times V)$$

LIKELIHOOD/FREQUENCY

CONSEQUENCE/SEVERITY

	1 LOW	2 MEDIUM	3 SERIOUS	4 MAJOR	5 CATASTROPH IC
5 FREQUENT	5	10	15	20	25
4 PROBABLE	4	8	12	16	20
3 OCCASSIONAL	3	6	9	12	15
2 REMOTE	2	4	6	8	10
1 IMPROBABLE	1	2	3	4	5

Risk Rating	Action to be taken
Extreme (20 -25)	Stop work. Improve control measures. Conducting work at this level of risk is to be reported up the Line Management / Command chain.
High (10-19)	Review control measures and improve if reasonably practicable to do so, consider alternative ways of working.
Medium (4-9)	Maintain control measures and review if there are any changes.
Low (1-3)	No action necessary

Risk Criteria

Consequence

	Safety / Health On-Site / Off-Site		Environmental	Loss / Disruption
5 Catastrophic	Multiple on-site fatalities Multiple life-altering injuries or illness	Single fatality Single life-altering injury or illness Multiple lost time injuries Shelter in place more than 10,000 people	Major release with irreversible ecosystem off-site impact	100M \$
4 Major	Single on-site fatality Single life altering injury or illness Multiple lost time injuries	Single lost time injury Multiple recordable injuries Shelter in place up to 10,000 people	Major release with irreversible ecosystem on-site impact Major release with extensive off-site impact requiring outside (third party or regulatory) agency mitigation	10M \$ < X < 100M \$
3 Serious	Single lost time injury Multiple recordable injuries	Single recordable injury Multiple minor injuries (First aids) Shelter in place up to 1,000 people	Release not contained on-site above the reportable quantity Release with serious extensive and difficult-to-reverse on-site impact Release with serious reversible off-site impact	1M \$ < X < 10M \$
2 Medium	Single recordable injury Multiple minor injuries (First aid)	Single minor injury (First aid)	The release contained on-site above the reportable quantity or requiring external release notification Operating permit non-compliance incident with regulatory notification Release with minimal off-site impact	250K \$ < X < 1M \$
1 Low	Single minor injury (First aid)	No off-site impact	The release contained on-site below reportable quantity or not requiring external release notification	< 250K \$

Risk Criteria

Likelihood of Occurrence

5 Frequent	Likely to occur frequently in the life of the facility (Up to or greater than once per year or a probability of 10^{-1})
4 Probable	Can occur several times during the life of the facility (Once in 10 years or a probability of $\leq 10^{-1}$ and $> 10^{-2}$)
3 Possible	Possible to occur in the life of the facility(once in 100 years or a probability of $\leq 10^{-2}$ and $> 10^{-3}$)
2 Remote	Unlikely to occur in the life of the facility(up to once in a 1000 years or a probability of $\leq 10^{-3}$ and $> 10^{-4}$)
1 Improbable	Highly unlikely to occur in the life of the facility (up to once in 10,000 years or a probability of 10^{-4} and 10^{-5})

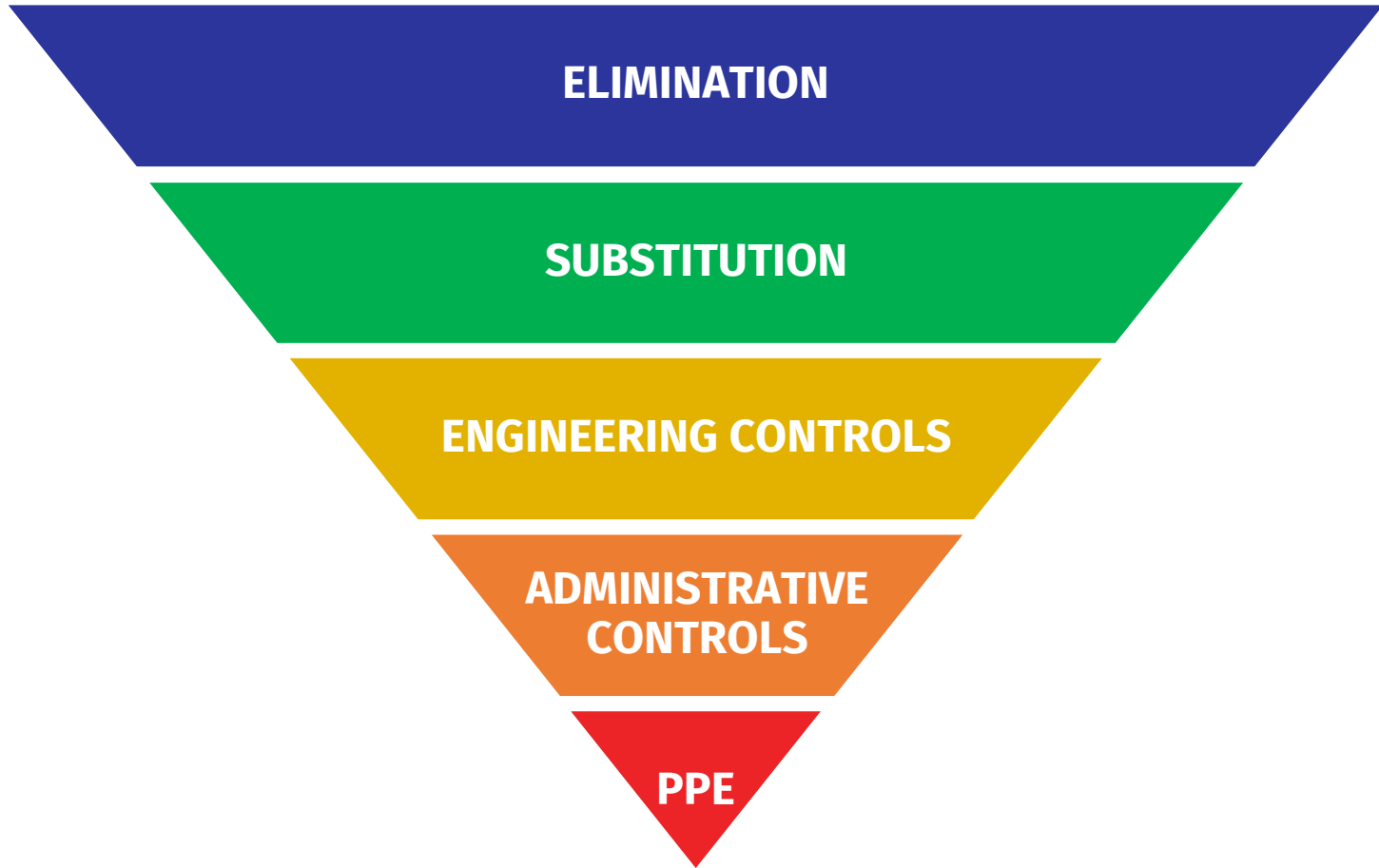
Risk Control

Hierarchy of Control

MOST EFFECTIVE



LEAST EFFECTIVE



Physically remove the hazard



Replace the hazard



Isolate people for the hazard



Change the way people work



Protect the worker with Personal Protective Equipment

Monitor Audit Review

Continuous improvement can be viewed as a formal practice or an informal set of guidelines. Many companies have shifted focus to more formal approaches to project and process management such as Lean / Agile methodologies (Kanban, Kaizen, Scrum, XP)



Emergency Response Model for PATT

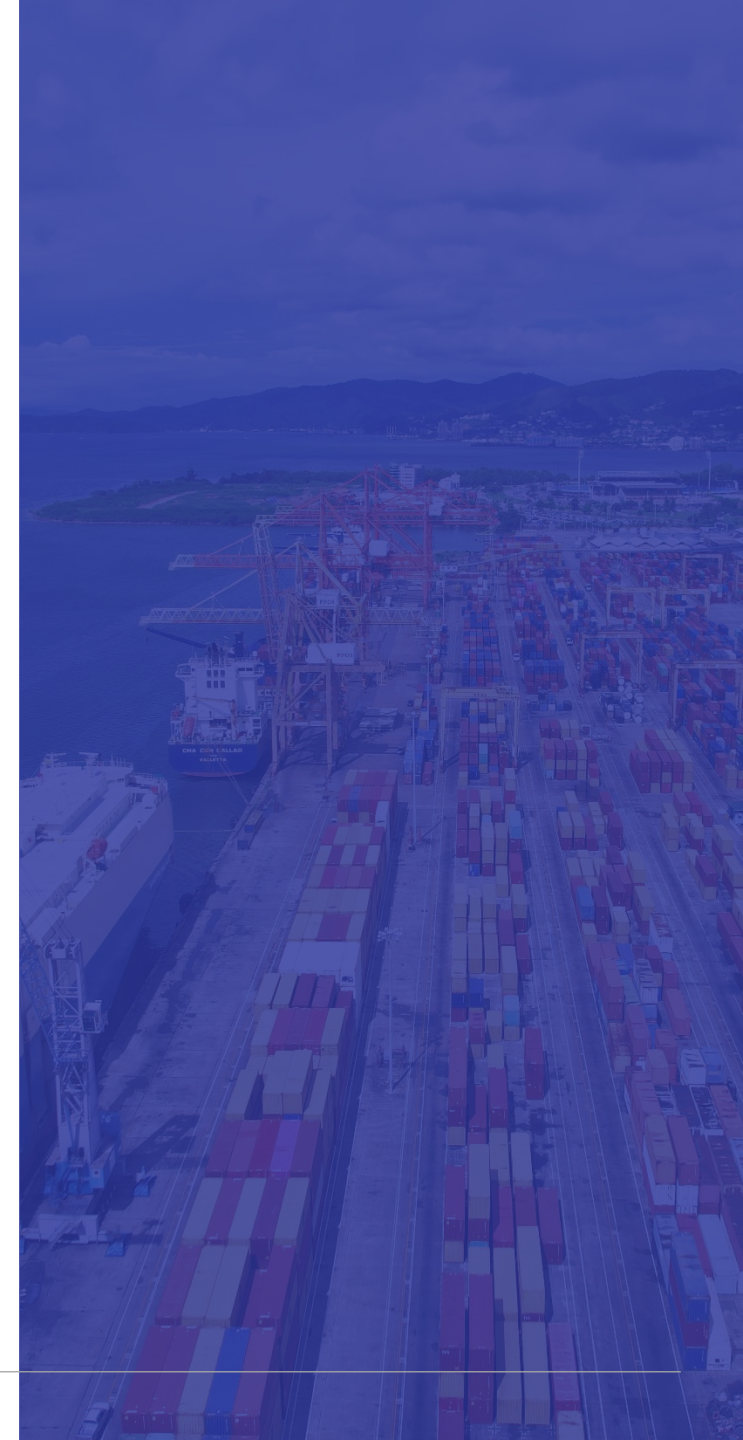
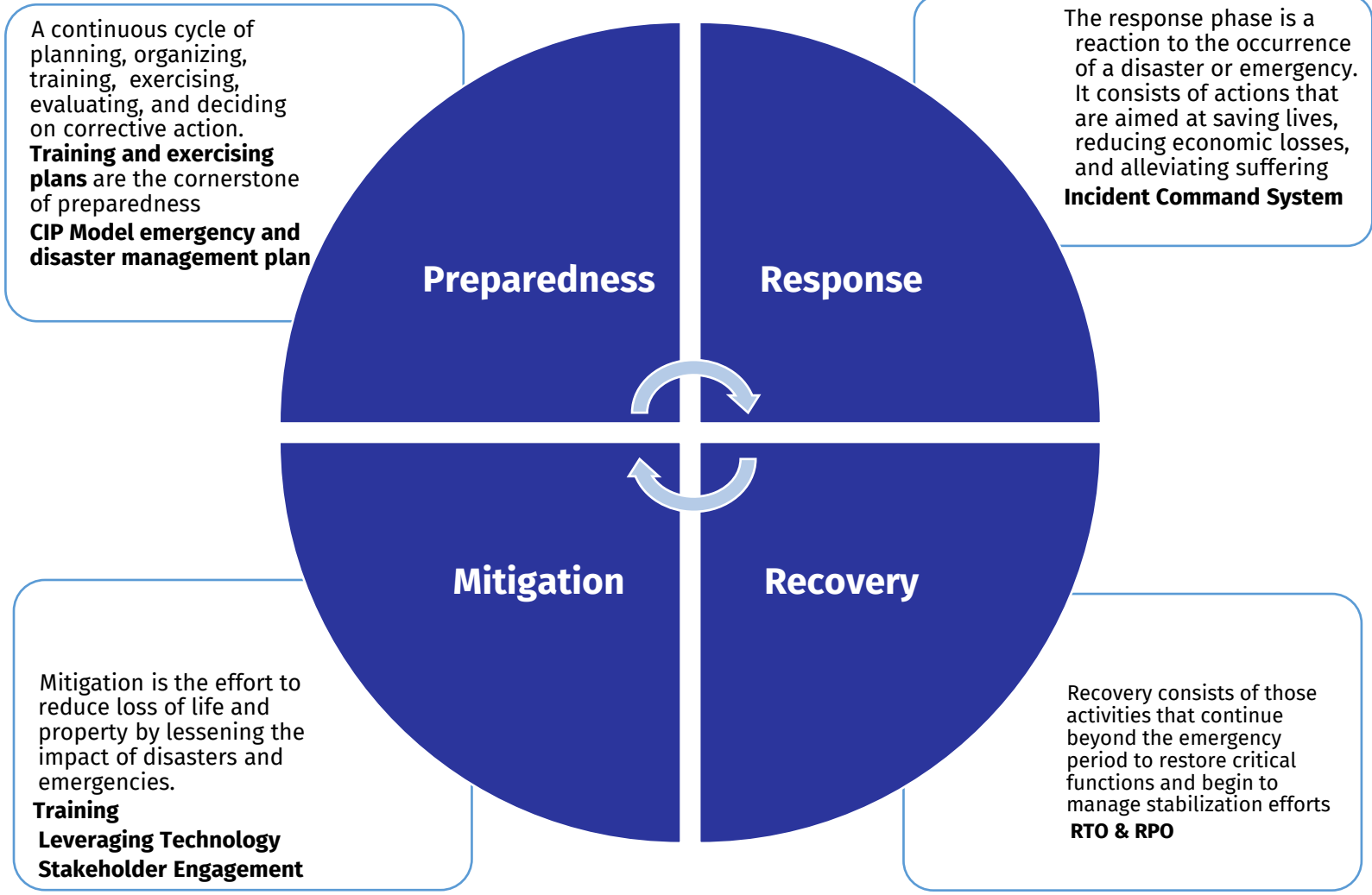
Emergency Response Plan

Importance of an ERP?

- ✓ Preservation of Life
- ✓ Rule of Law - OSH Act 2004 - Section 8(2)(b).
- ✓ Protection of the environment.
- ✓ Business Continuity.
- ✓ Economic Security.- Critical for a S.I.D.S



Emergency Management Cycle



Emergency Response Planning

Define Critical Success Factors

Defined ERP/ BC objectives, define its value & protection instructions for each SBU.



IDENTIFY & ANALYZE

Identified all significant roles of risks, resources & all critical processes.



DEVELOP STRATEGIES

Determined the strategies for mitigation (testing scenarios).



CONTINGENCY PLANS

Developed redundancies which included role allocation & responsibilities in the event of an Emergency



Drills and Exercise

Testing helps to create awareness for execution in the event of any disaster or risk.

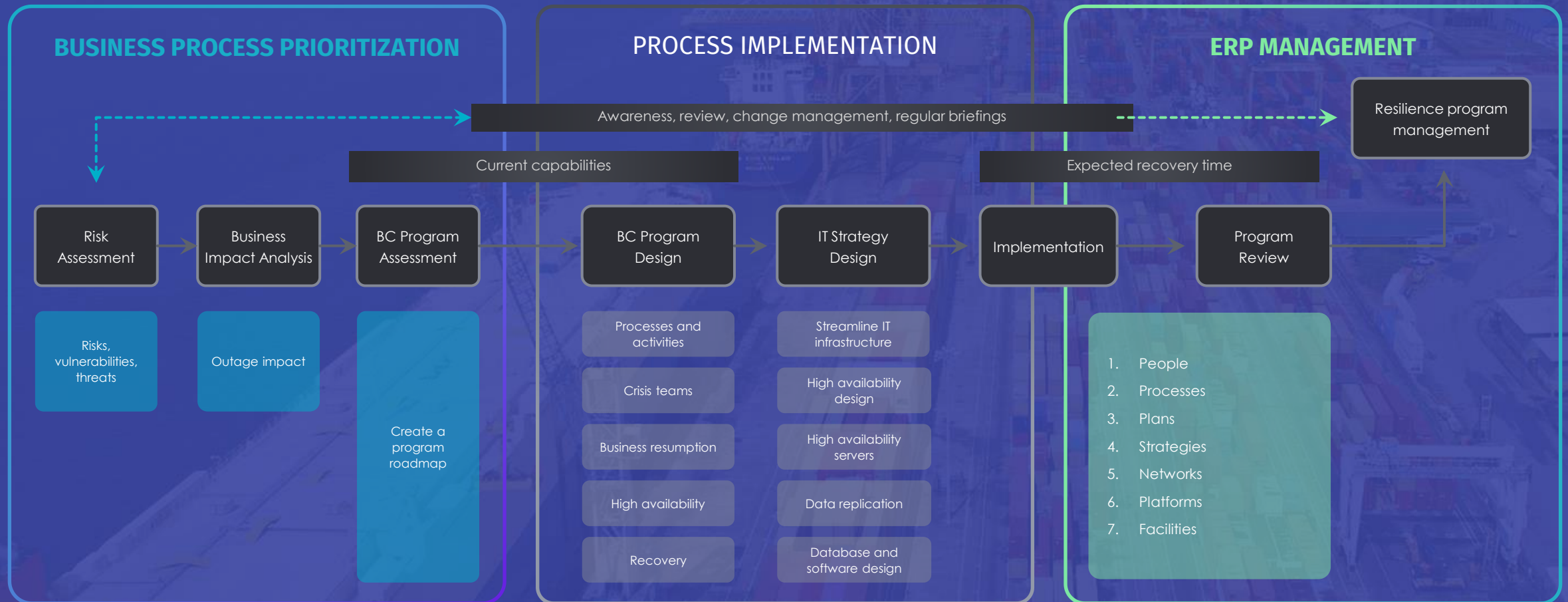


ERP/ BC Comms

create awareness among managers, employees and Stakeholders.



Emergency Response Process Flow



Incident Command System

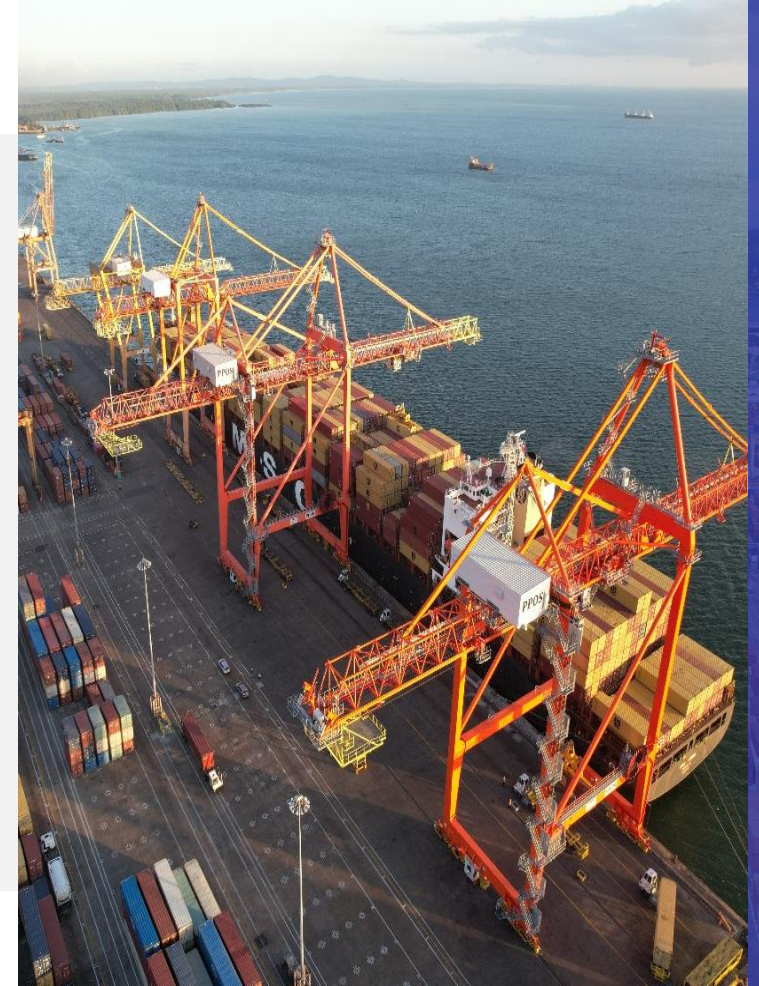


Document Management System

	YES	NO
01 Plans and resources for alternative locations	<input checked="" type="checkbox"/>	<input type="checkbox"/>
02 Emergency Operations Centers (EOC)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
03 Documentation (CIP Model, Copies of critical business data)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
04 Contact list (Employees & Stakeholder)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
05 Business impact and risk analysis	<input type="checkbox"/>	<input checked="" type="checkbox"/>
06 Recovery task list and office recovery plans and recovery priorities	<input checked="" type="checkbox"/>	<input type="checkbox"/>
07 Supplier list and contact	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Leveraging Technology in Emergency Response

- ✓ Use of AI, Drones
- ✓ IoT for real-time Emergency notification & monitoring
- ✓ Geographic Information Systems (GIS) for damage assessment
- ✓ Digital simulation tools for training and planning
- ✓ Cybersecurity Infrastructure
- ✓ Various Digital Tools for tracking and analyzing HSSE metrics
- ✓ GPS for Equipment Operations, and Maintenance
- ✓ Climate Monitoring



Resilience Culture

“The Human Element”

- ✓ **Leadership** commitment and policy support
- ✓ **Continuous training** and scenario-based drills
- ✓ Collaboration with government, private sector, and communities
- ✓ Performance review and lessons learned from past emergencies



Lessons Learned

“If I see further...”

- ✓ Invest in infrastructure and technology
- ✓ Establish robust and adaptive ERPs
- ✓ **Foster multi-agency and stakeholder collaboration (1=0)**
- ✓ Continuous improvement through **training** and feedback



PATT ERP Resilience Framework

GAPS

Organizational flexibility, responsiveness & awareness in daily operations

Predetermined response, identified roles, process optimization

Confused & frustrated, lacking appropriate system

Unable to access critical information, miscommunication & Human Errors

Resilient

Working Plan

Responds quickly & effectively

Starting to Plan

Delayed response & access to information

No Plans

Unprepared

CRITICAL SUCCESS FACTORS

ACT

M.A.R. & improve the plan after an event

CHECK

Test the plan in a Drill or exercise

DO

Structure and implement the plan

PLAN

Find a template & get started



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THANK YOU



Port Authority of
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