



**Commercial Diving Association (Singapore)**

# **Safety Diving Seminar**

## **19<sup>th</sup> August 2022**

**Emergency Response Plan (ERP)**

**“What really happens from a ground up approach”**

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Subsea International Training Associates

# Introduction

**Emergency Response Plan Drill  
Challenges and Lessons Learnt  
Scenarios 1 and 2**





# Commercial Diving Association (Singapore)



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## EMERGENCY RESPONSE PLAN DRILL CHALLENGES AND LESSON LEARNT SCENARIO 1

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# Questions and Answers

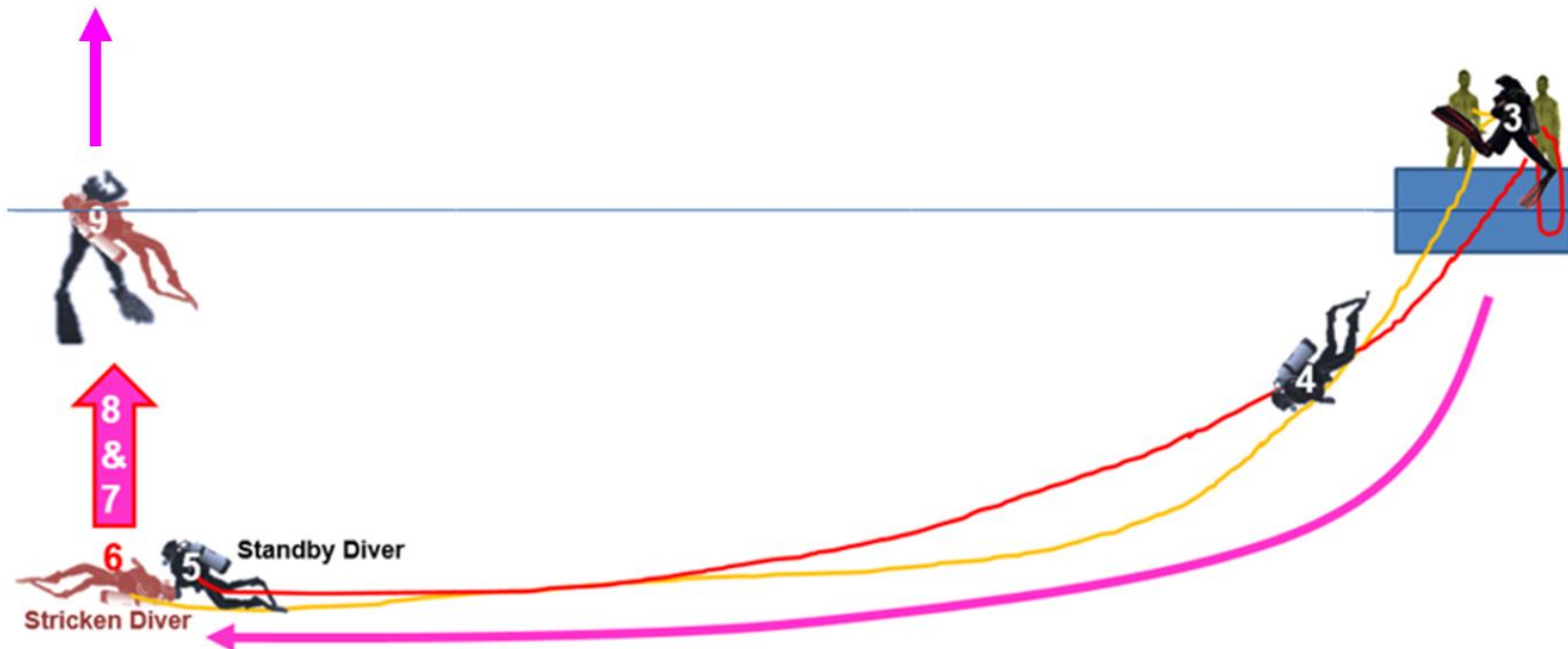
**Emergency Response Plan Drill  
Challenges and Lessons Learnt  
Scenarios 1 and 2**

slido



## What are the challenges?

① Start presenting to display the poll results on this slide.





## FIRST AID EQUIPMENT

- This will depend on the type of diving



## How much 100% Oxygen available and adequate for ERP?

PART #	SERVICE PRESSURE		WATER CAPACITY		DIAMETER		LENGTH		CYLINDER WEIGHT		OXYGEN	
	psi	bar	lbs	liters	in	mm	in	mm	lbs	kgs	cu ft	liters
M74	3000	207	22.0	10.0	7.25	184.2	23.8	605	28.4	12.9	77	2167
M32	3000	207	9.1	4.1	4.38	111.3	25.5	648	10.8	4.9	32	906
M20	3000	207	5.7	2.6	4.38	111.3	16.8	427	7.3	3.3	20	566
M12	3000	207	3.4	1.5	4.38	111.3	10.9	277	5.1	2.3	12	340
M7.8	3000	207	2.1	1.0	4.38	111.3	7.8	198	3.9	1.8	7.8	221
M7.5	3000	207	2.1	1.0	3.21	81.5	11.8	300	2.9	1.3	7.5	212
M265	2216	153	102.2	46.4	9.80	248.9	51.7	1313	84.7	38.4	265	7503
M150	2015	139	63.7	28.9	8.00	203.2	47.2	1198	49.2	22.3	150	4248
M122	2216	153	47.1	21.4	8.00	203.2	36.2	919	40.3	17.9	122	3455
M90	2216	153	34.7	15.7	7.25	184.2	32.7	830	30.4	13.7	90	2549
M60	2216	153	23.2	10.5	7.25	184.2	23.1	587	22.3	10.1	60	1699
ME	2015	139	10.2	4.6	4.38	111.3	25.4	645	7.8	3.5	24	680
M22	2216	153	8.5	3.9	5.25	133.4	16.3	414	8.2	3.7	22	623
MD	2015	139	6.4	2.9	4.38	111.3	16.7	424	5.4	2.5	15	425
M9	2015	139	3.8	1.7	4.38	111.3	10.9	277	3.8	1.7	9.0	255
M7	2015	139	3.0	1.4	4.38	111.3	9.1	231	3.2	1.5	7.0	198
ML6	2015	139	2.5	1.2	4.38	111.3	7.9	200	2.9	1.3	6.0	170
M6	2216	153	2.3	1.0	3.21	81.5	11.8	300	2.3	1	6.0	170
M4	2216	153	1.5	0.7	3.21	81.5	8.7	221	1.7	0.8	4.0	113
M2	2216	153	0.6	0.3	2.50	63.5	5.9	149	0.75	0.34	1.6	45

Capacity = Working Pressure (Bar) x Water Capacity (VOL)  
 = 139 x 2.9  
 = 403 Litres of O<sub>2</sub> available

Duration = Available O<sub>2</sub> ÷ Flow Rate  
 = 403 ÷ 15 L/Min  
 = 26 minutes

PSI x 0.0689 = Bar  
 2015 x 0.0689 = 138.8 bar

Check AED & O <sub>2</sub> Kit for READY TO USE		
WP x WC (VOL)	Capacity	Duration @15 L/min
139 x 2.9	403 L	403 / 15 = 26 mins

Demand / Manually Triggered Ventilator (MTV)



Tru-Fit Mask



Pocket Mask c/w O<sub>2</sub> Nipple

Non-Rebreather Mask (NRM)





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## Annex E: Decompression Illness (DCI)

WSH Guidelines Inland/Inshore Commercial Diving 2021 pages 107 -120

### Decompression Illness (DCI) Barotrauma

### Nitrogen Bubbles

### AIR Bubbles

#### Pulmonary Barotrauma

#### Air Cavities in the Body Barotrauma

#### Decompression Sickness (DCS)

#### Pneumothorax

#### Dental

#### Type 1: PAIN and Skin Rash likely

#### Mediastinal Emphysema

#### Sinus

#### Type 2: CNS

#### Subcutaneous Emphysema

#### Middle Ear

#### Arterial Gas Embolism (AGE)

#### Non-Life Threatening

#### Immediate Onset

#### Delayed Onset

Symptoms of DCS usually manifest within 24 hours of the dive


#### Administer 100% Oxygen

#### MEDIVAC

The diving supervisor shall be trained in the recognition and first aid management of diving related medical conditions, and in communicating the findings to medical practitioner.

**SS511: 2018 Clause 5.5.1 Diving supervisor Page 16**


**Clause 4.3.2 Page 13** When supervising diving operations, the diving supervisor shall be capable of recognizing symptoms of decompression sickness/illness, barotrauma, and supervising first aid, therapeutic treatment, and controlling compression chambers.



## REPORTING WORK-RELATED ACCIDENTS


Under the Work Injury Compensation Act, an employer must notify work-related accidents to the Ministry of Manpower (MOM) when his employee:

Submit incident report online within 10 calendar days from:





**Dies in a work-related accident**

the date when the accident happened



**Contracts an occupational disease**


receiving a written diagnosis of the disease from a doctor

**Is injured in a work-related accident or has suffered a medical condition (e.g. stroke/heart attack) due to work**

the date when accident happened, if the employee is hospitalised for at least 24 hours; or

the 4th day of medical leave, if the employee is given medical leave for 4 or more calendar days (whether consecutive or not)



**Contracts a disease due to work-related exposure to biological/chemical agent**

the date when accident happened, if the employee is hospitalised for at least 24 hours; or

the 4th day of medical leave, if the employee is given medical leave for 4 or more calendar days (whether consecutive or not)

**1. HOW DO I REPORT?**

Submit incident report at [www.mom.gov.sg/Report](http://www.mom.gov.sg/Report)

**2. HOW TO ENSURE I REPORT WITHIN THE STATUTORY TIMELINE?**

Develop an internal reporting system so that you can be alerted of work accidents quickly.

**3. WHY MUST I BE ALERTED OF WORK ACCIDENTS BY MY EMPLOYEES?**

To facilitate prompt medical treatment to injured employee(s) and implement corrective actions to prevent similar recurrences.

**4. WHAT WILL HAPPEN IF I FAIL TO REPORT ON TIME?**

Any employer who fails to report a work-related accident within the statutory timeline may be convicted and fined up to \$5,000 for a first-time offence.

## Annex B: Definitions

The following definitions apply for terms used in this Guide:

<b>Incident</b>	Work-related event(s) in which an injury or ill-health (regardless of severity) or fatality or property damage or losses occurred, or could have occurred. [SS 506 : Part 3 : 2013]
<b>Accident</b>	An incident that has resulted in injury or ill-health or fatality. [SS 506 : Part 1 : 2009]
<b>Near miss</b>	An unplanned event that did not result in injury, illness or damage but had the potential to do so. [SS 506 : Part 3 : 2013]
<b>Hazard</b>	Source or situation or act with a potential for harm in terms of human injury or ill-health, damage to property, damage to the environment, or a combination of these. [SS 506 : Part 3 : 2013]
<b>Reportable injury</b>	Any injury or ill-health resulting in the following: <ol style="list-style-type: none"> <li>Hospitalisation more than 24 hours</li> <li>Medical leave more than 3 cumulative calendar days (for the same diagnosis)</li> <li>Diagnosed with occupational disease.</li> </ol>

<b>Major injury</b>	Non-fatal injuries which are more severe in nature, defined using a combination of factors, including the nature of injury, part of the body injured, incident type and duration of medical leave. These include: <ul style="list-style-type: none"> <li>amputation;</li> <li>blindness;</li> <li>deafness;</li> <li>paralysis;</li> <li>crushing, fractures and dislocations: head, back, chest and abdomen, neck, hip and pelvis;</li> <li>exposure to electric current;</li> <li>acute illness requiring medical treatment or loss of consciousness from exposure to chemical and/or biological agents;</li> <li>asphyxia or drowning;</li> <li>hypothermia;</li> <li>burns with more than 20 days of medical leave; and</li> <li>concussion with more than 20 days of medical leave.</li> </ul>
<b>Minor injury</b>	All non-reportable injuries that did not result in death or major injuries.







# Commercial Diving Association (Singapore)

- **Specific issues when investigating diving related incidents**



Home » News » Making Waves – December 2021

## MAKING WAVES

Information and insight from the International Marine Contractors Association

### Competence and Safety

It is impossible to consider safety in the workplace, without considering competence.

The United Kingdom Health and Safety Executive (HSE) website, <https://hse.gov.uk/competence/what-is-competence.htm>, states:

*"Competence can be described as **the combination of training, skills, experience and knowledge that a person has and their ability to apply them to perform a task safely.** Other factors, such as attitude and physical ability, can also affect someone's competence.*

*As an employer, you should take account of the competence of relevant employees when you are conducting your **risk assessments.** This will help you decide what level of information, instruction, training, and supervision you need to provide. Competence in Health and safety should be seen as an important component of workplace activities, not an add-on or afterthought."*

All tasks, in every working environment, require a risk assessment to be carried out and sufficient mitigations to be in place to reduce risk and ensure workers and the workplace are as safe as is reasonably possible. Each type of working environment has its own unique challenges and, to adequately identify potential hazards and levels of risk, requires a person who is experienced and competent in that particular area of operations.

It would be impractical to expect someone, who is experienced in office management, to carry out a risk assessment on a task being performed on the back deck of an offshore vessel for example. Clearly safety and specific task experience and competence are closely linked together, and it is imperative that

In many cases the root cause of an incident may well be attributed to a failure in the competence process, for example:

- A procedure not carried out correctly
- A misunderstanding or miscommunication of instructions
- A hazard or risk not correctly identified or mitigated against.
- A disregard of process due to time or cost savings
- Improper or inadequate training.

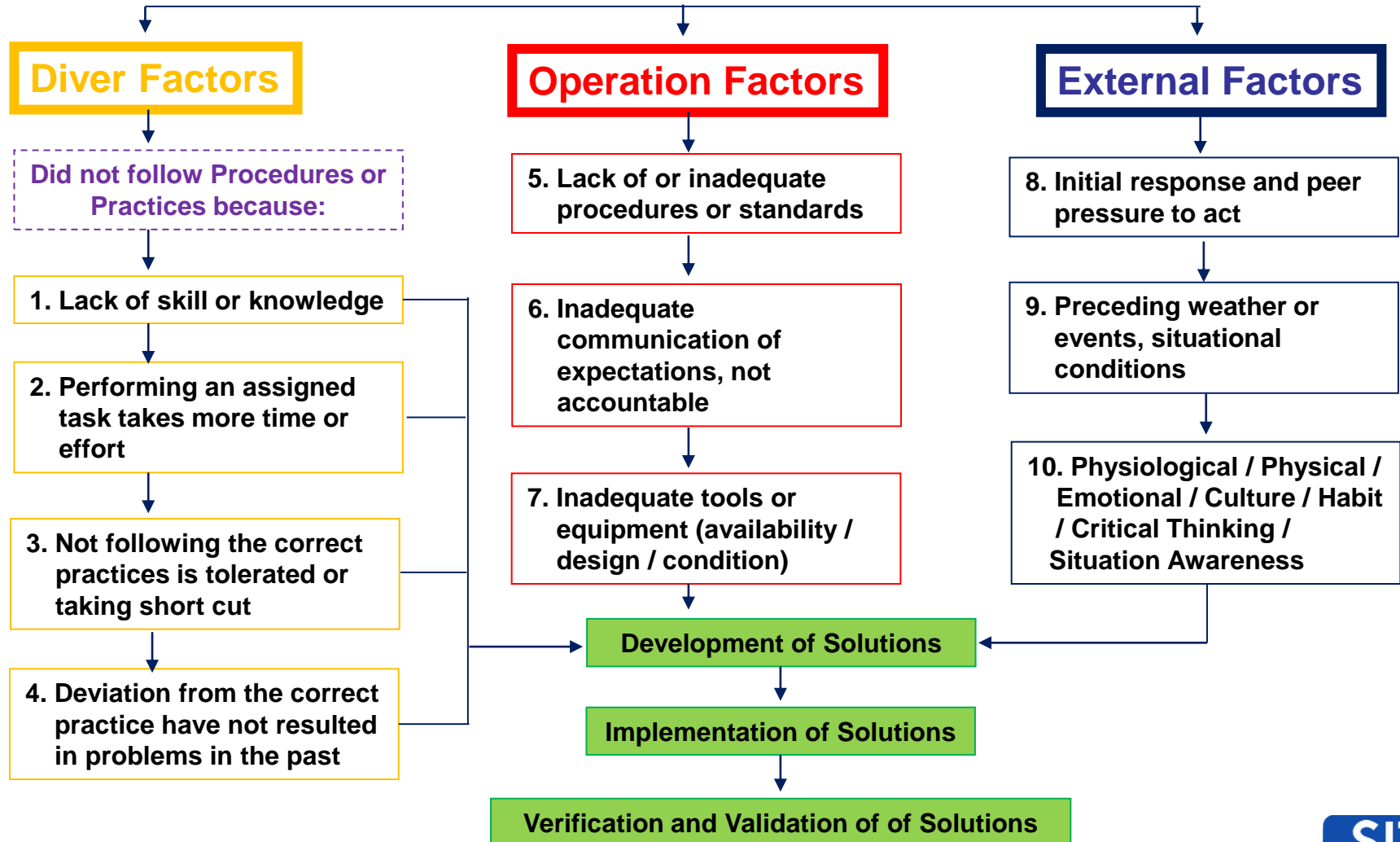
Even with equipment failure, competence is a consideration; was maintenance and inspection carried out correctly, were those completing the maintenance suitably competent?

Furthermore, human factors, at least in part, can impact competence such as:

- A momentary lapse of concentration
- A sudden distraction
- A pressing personal issue causing more prolonged distraction
- Pressure to achieve a deadline or completion of a task
- A wrong decision
- Advice not being heeded

# Root Cause Analysis Flowchart

**Incident, Near Miss, Accident, Fatality**





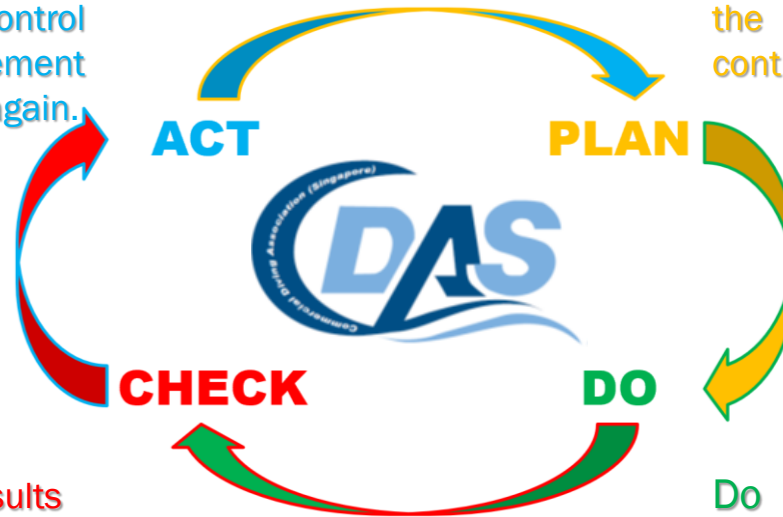


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## • Plan Do Check Act (PDCA) cycles

**Act** – Document the results, inform members about process changes, and make recommendations for the future PDCA cycles. If the control measures was successful, implement it. If not, repeat the PDCA cycle again.

**Plan** – Identify the problem, collect relevant data, and understand the Hazards/Risks, develop safe work procedures about what the Hazards/Risks, and plan additional control measures.



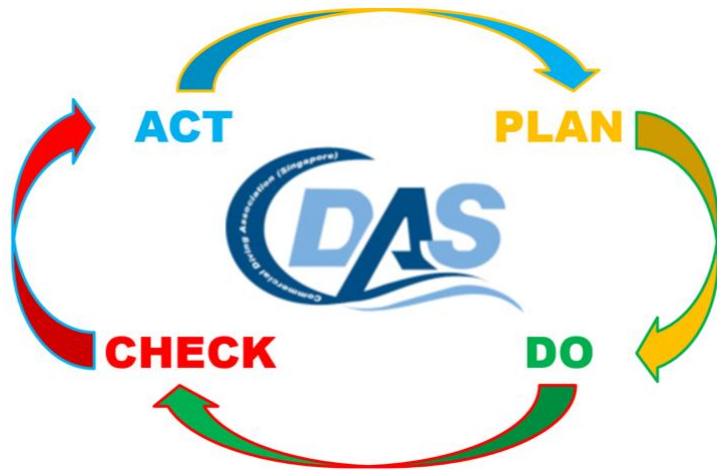
**Check** – Confirm the results through before-and-after control measures. Study the result, measure effectiveness, and decide whether the ALARP control measures is supported or not?

**Do** – Develop and implement risk assessments control measures; gauge its effectiveness and measure the results.



# Commercial Diving Association (Singapore)

## • Plan Do Check Act (PDCA) cycles



Plan – Identify the problem, collect relevant data, and understand the Hazards/Risks, develop safe work procedures about what the Hazards/Risks, and plan additional control measures.

### LOOK. THINK. DO.

Look out for danger. Think of how you can protect yourself. Do your work safely.

## 6 Basic Workplace Safety and Health (WSH) Rules

Moving machine parts can cause death or serious injuries such as crushed limbs and amputations. **Every year, 2 workers die and 1,000 workers are injured while working with machines.** Do your risk assessment before starting work.

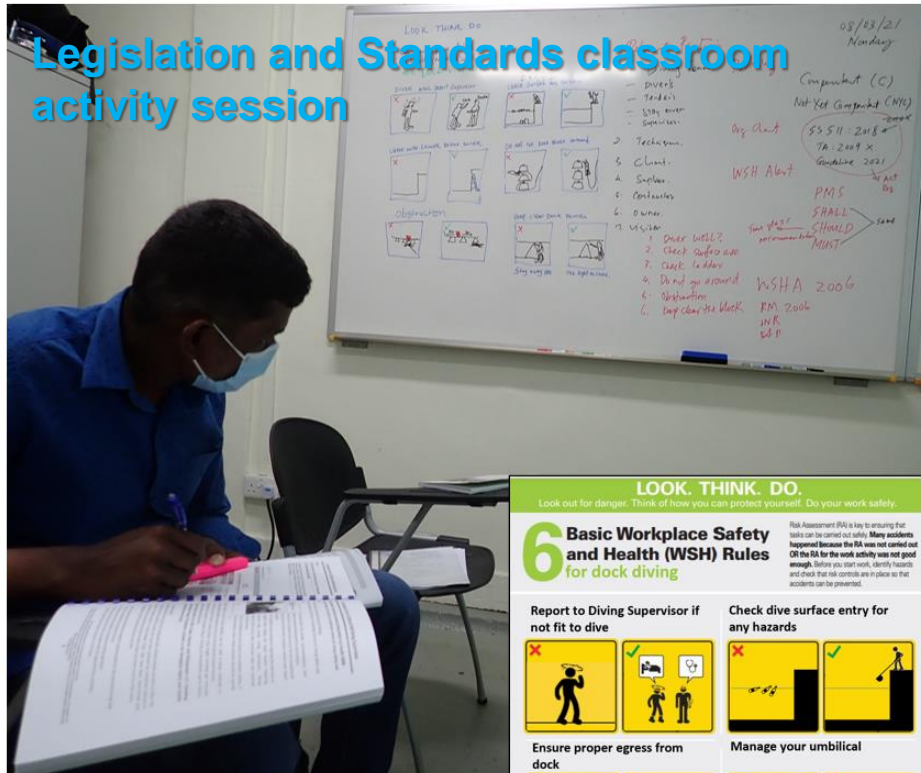
### Posters

- Lifting Operations
- Loading on Vehicles
- Traffic Management
- Use of Electrical Equipment
- Working at Height
- Working on Roofs
- Working with Machines





## Legislation and Standards classroom activity session



At SITA we incorporated the WSHC 2016 campaign of “LOOK, THINK, DO” approach into our courses.

**LOOK. THINK. DO.**  
Look out for danger. Think of how you can protect yourself. Do your work safely.

### 6 Basic Workplace Safety and Health (WSH) Rules for dock diving

Risk Assessment (RA) is key to ensuring that tasks can be carried out safely. Many accidents happened because the RA was not carried out OR the RA for the work activity was not good enough. Before you start work, identify hazards and check that risk controls are in place so that accidents can be prevented.

<b>Report to Diving Supervisor if not fit to dive</b> 	<b>Check dive surface entry for any hazards</b> 
<b>Ensure proper egress from dock</b> 	<b>Manage your umbilical</b> 
<b>Keep safe distance of 5m from sea chest intake</b> 	<b>Caution during measurement of vessel clearance</b> 

**LOOK. THINK. DO.**  
Look out for danger. Think of how you can protect yourself. Do your work safely.

### 6 Basic Workplace Safety and Health (WSH) Rules for U/W Sea Chest Visual Inspection

Risk Assessment (RA) is key to ensuring that tasks can be carried out safely. Many accidents happened because the RA was not carried out OR the RA for the work activity was not good enough. Before you start work, identify hazards and check that risk controls are in place so that accidents can be prevented.

<b>Report to Diving Supervisor if not fit to dive</b> 	<b>Select appropriate diving equipment</b> 
<b>Appropriate mask for the task</b> 	<b>Diver's flag hoisted, LOTO administered and documented</b> 
<b>Ensure the right sea chest location</b> 	<b>Manage lifeline and communication</b> 

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