

# Accident Investigation Course

## “Physical Evidence Collection” (on-line session)



## Content:

1. Physical evidence collection
2. Case Study: Evidence gathering.



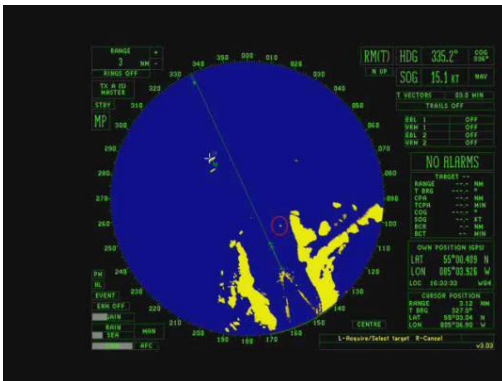
## Initial stages of investigation, gathering evidence to determine

- Who (key persons)?
  - What?
  - When?
  - How?
  - and crucially Why?
- 
- Evidence crucial to support findings
  - Beware of danger of reaching conclusions too early!
  - Beware of **your own safety!**



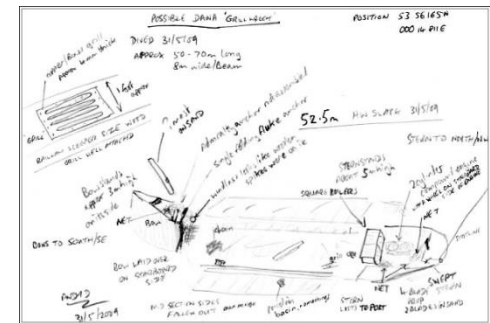
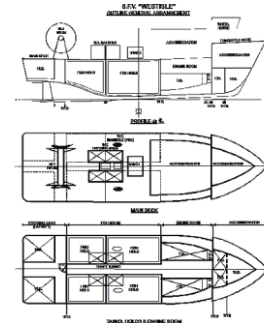
# Types of evidence?

- Human or testimonial evidence
- Physical evidence (equipment, parts, debris, hardware)
- Documentary evidence (reports, procedures, certificates)
- Electronic evidence (photos, videos, VDR, CCTV, VTS).



# Witness evidence

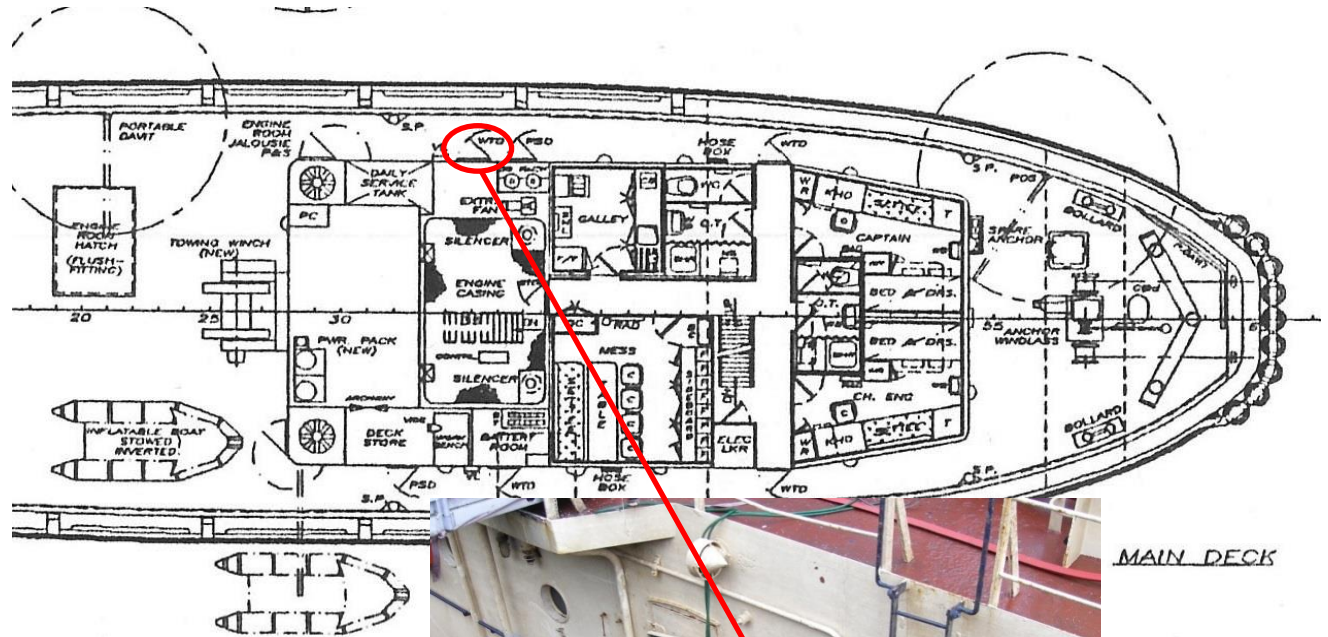
- Acquire the skills required (will be covered separately in the course)
- Try to request specific evidence from the right person
- Try to collect the same evidence from more than one witnesses if possible
- Try to link witness evidence with physical evidence
- Try to acquire any supporting evidence for witnesses' interviews (schemes or sketches, photos, **audio-visual** recordings, etc.)



# Witness evidence



# Documenting and sketching



MAIN DECK

## Plotting and sketching

## Document what is found

# Inspecting physical evidence



## Following initial mapping, systematic inspection:

- Note the **position or indication** of switches, valves, mechanisms, etc.
- Look for indication that component parts were **missing or out of place before** the accident
- Note the **absence or removal** of any parts **after** the accident
- **Identify** and take note of any equipment or parts prior to examination or testing.



# Removing physical evidence

**NOT** until witnesses have been interviewed

**NOT** until position/status has been recorded

Locations of removed parts should be marked

Care during extraction/collection of items

Agreement with other interested parties **BEFORE** extraction takes place.



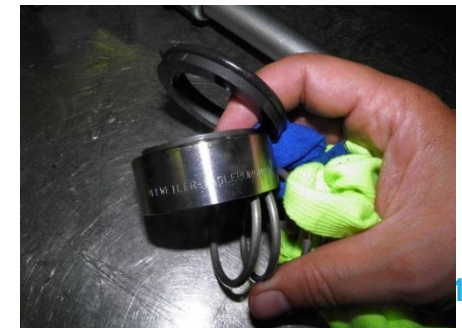
# Physical evidence collection

## Examples:

- Equipment
- Tools
- Scatter debris
- Pattern, parts and properties of physical items

## Less obvious example

- Liquid and gas samples



# Photography

## Vital tool in evidence collection

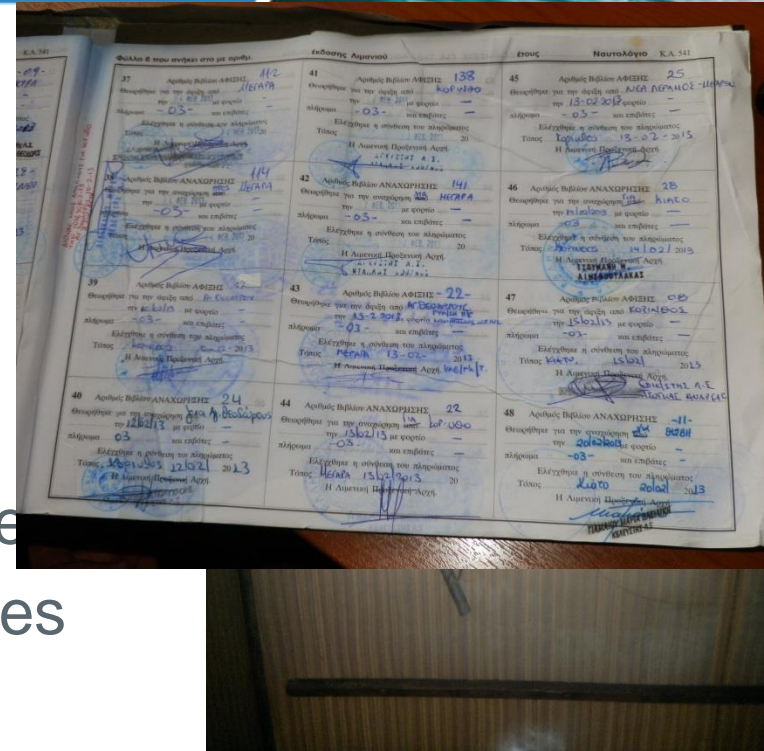
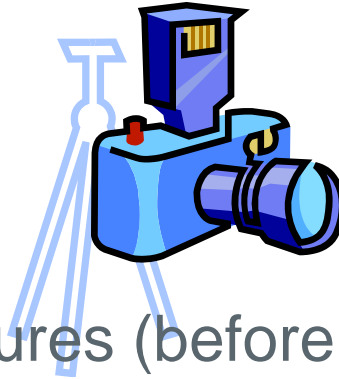
- assist with recall

## Areas to photograph

- general layouts
- damaged areas, fractures (before repair)
- views from positions of key witnesses
- instrument and control settings
- **documents** if photocopying is unavailable

## Some spots need careful access

Always take more photos than you think you need!

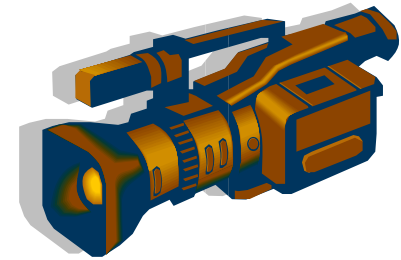


# Video recording



## Can greatly assist with

- recording layout
- reconstructions



Ensure reference points are included

Commentary allows easier understanding later

**Practice to ensure familiarity with equipment!**

# Video recording





## ‘Black Box’ of the seas (VDR & Simplified-VDR)

### Can provide:

- Date & time
- Position
- Speed
- Heading
- Bridge audio
- Comms audio
- Radar (or AIS)

Items below not required for S-VDR

- Echo sounder
- Wind speed and direction
- Accelerations & hull stresses
- WT and fire door status
- Engine order and response
- Hull openings
- Rudder order and response
- Main alarms

**Data storage - minimum of 12 hrs of data**

# Voyage Data Recorder carriage



## For ships on international voyages

- **VDR required on**
  - All passenger ships
  - Other ships >3,000GT constructed on/after 1/7/2002
- **S-VDR (simplified VDR) or VDR**
  - All Cargo ships >20,000GT
  - Cargo ships >3,000GT <20,000GT (by 1/7/2010)

**From July 2010 all ships >3,000GT on international voyages must have a VDR or S-VDR!**

**Make sure VDR data has been saved!**



# VDR equipment



VDR cabinet

SAVE  
button  
panel



VDR capsule



Removable drive



## Other data sources:

- Electronic Chart Display and Information Systems (ECDIS)
- Integrated Bridge Systems (IBS)  
(generally will need to consult manuals/manufacturers)
- AIS data from coastal States
- VTS radar and VHF recordings
- CCTV footage/web cams
- Mobile phones.





## May include:

- Fire protection systems
- Communications systems
- Security cameras
- Electronic log books
- Alarms' logs
- Engine management systems
- Safety management systems.



View 1: 03:11:00 to 03:16:00

# KEY

■ Sequence of activation of stateroom heat detectors

■ Ventilation system smoke detectors shown to illustrate probable external smoke path

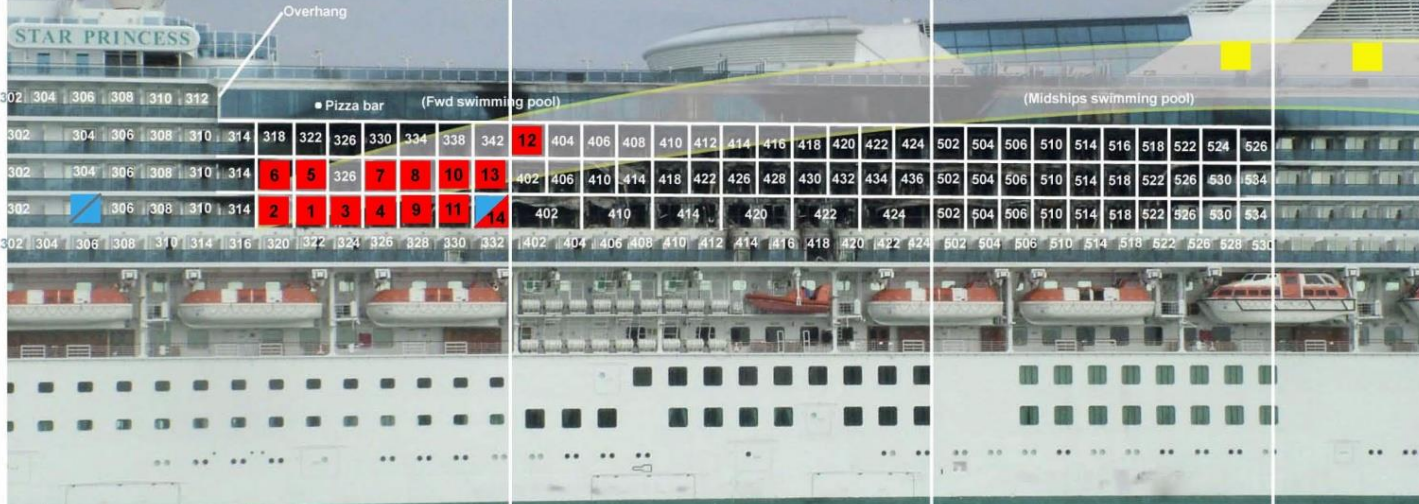
■ Initial activations of manual call points

Zone 2 Zone 3

Zone 3 Zone 4

Zone 4 Zone 5

Zone 5 Zone 6



	GPS Time	Detector	Deck	Zone	Cabin location
	03:09:20		11	2	By B258
	03:10:46		15	6	Fan room frame 105 port side
	03:10:55		15	5	AC stn frame 110 port side
	03:11:02		10	3	By C334
1	03:11:05	Det-44.011	10	3	C318
2	03:11:22	Det-44.010	10	3	C316
3	03:11:40	Det-44.013	11	3	C320
	03:11:50		10	3	By C304
	03:12:21		10	3	By C303
4	03:12:43	Det-44.014	10	3	C322

	GPS Time	Detector	Deck	Zone	Cabin location
5	03:12:50	Det-44.130	11	3	B322
6	03:13:20	Det-44.131	11	3	B318
7	03:13:21	Det-44.126	11	3	B330
8	03:13:56	Det-44.127	11	3	B334
9	03:14:06	Det-44.015	10	3	C326
10	03:14:44	Det-44.126	11	3	B338
11	03:14:54	Det-44.016	10	3	C330
12	03:14:58	Det-43.139	12	4	A402
13	03:15:21	Det-44.125	11	3	B342
14	03:15:30	Det-44.017	10	3	C334

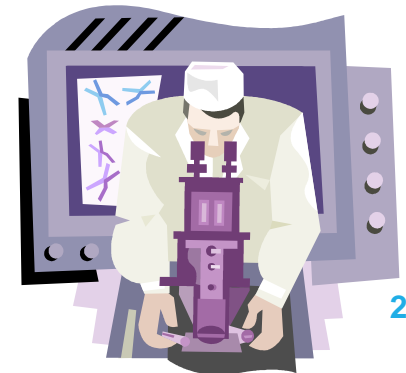


**Investigators cannot be experts in everything!**

**Early assessment of the need for specialist services essential to:**

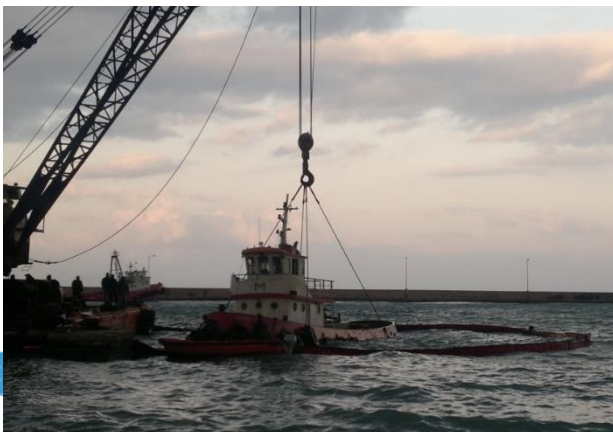
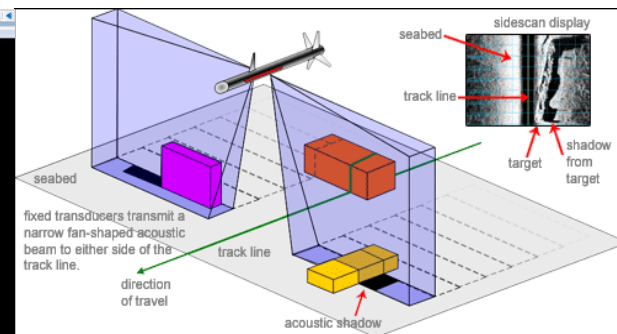
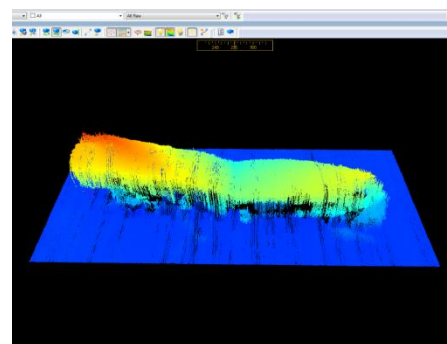
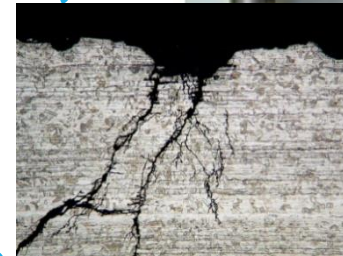
- look for State specialists
- find appropriate contractors
- determine what preservation steps are needed
- list of specialist services (pre-planned action!)

**Ideally having some specialist contacts and/or mechanism to enable contracts.**



# Other sources of evidence

- Material testing (e.g. tensile testing, microscopic examination, fatigue testing... )
- Forensic exams
- Underwater surveys (e.g. divers, ROVs)
- Salvage ops.



# Case Study: Evidence gathering (20 min)



## Look at summary of accident provided

Plan your actions, concerning:

- What evidence needs to be collected to support your investigation?
- Sequence of your actions for evidence collection.
- What precautions and constraints there might be?



## Class discussion to follow afterwards



 [twitter.com/emsa\\_lisbon](https://twitter.com/emsa_lisbon)  
 [facebook.com/emsa.lisbon](https://facebook.com/emsa.lisbon)

 **EMSA**  
European Maritime Safety Agency