

# **BCSEA Project Training on IMO Code and EU Directive on Accident Investigation Evidence Collection**

Kiev, 9-10 April 2019

Stephane Floch / Enrico Gironella  
B.2.3 Marine Accident Investigation  
Ship Safety





## Content:

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

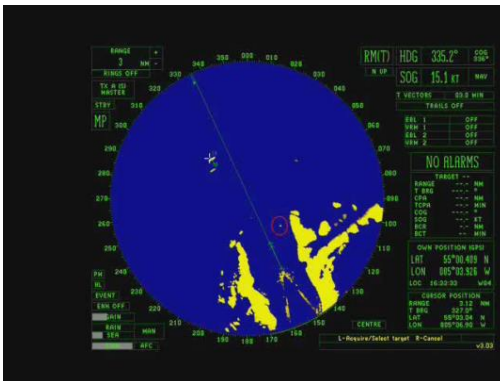


## Initial stages of investigation, gathering evidence to determine

- 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!**



- 
- An illustration of a business meeting. Three people are seated around a large, light-brown wooden conference table. On the left, a man in a grey suit and tie is gesturing with his hands while speaking. In the center, a woman with short dark hair and glasses, wearing a grey blazer over a pink top, is looking at him. On the right, a man in a brown suit is seen from the back, holding a white document. The background is a solid light green. The style is flat and modern.



# Case Study: Evidence gathering (30 min)



## Look at summary of accident provided

Plan your actions, concerning:

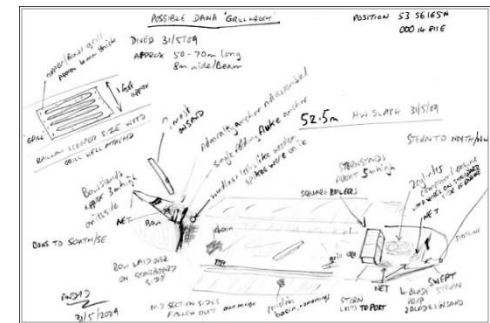
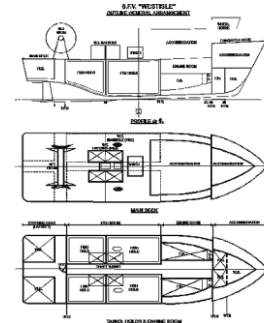
- What evidence needs to be collected to support your investigation?
- Sequence of your actions for evidence collection.
- What precautions and constraints there might be?



## Discussion to follow afterwards

# 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.)

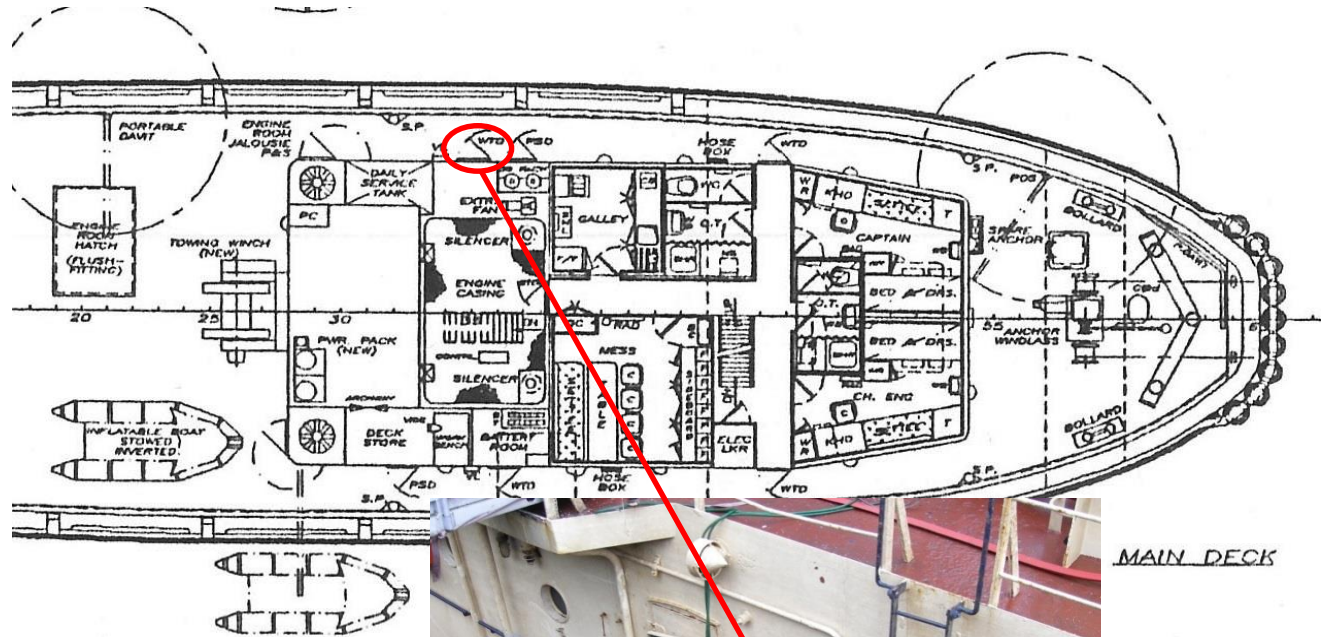


- ## Evidence Log

[illegible]



# Documenting and sketching



Plotting and sketching

Document what is found



# Inspecting physical evidence (1)



## Following initial mapping, systematic inspection:

- **Plan** the inspection (usually you will be escorted)
- A **walkthrough** with key crew members may assist
- A **checklist** of complex equipment components to help ensure a thorough survey
- Make sure that critical areas are not **accessed** by people outside investigation.



# Inspecting physical evidence (2)



## 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** any equipment or parts prior to examination or testing
- Prepare **checklist** for complex equipment to be examined
  - Record such observations.



# 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.





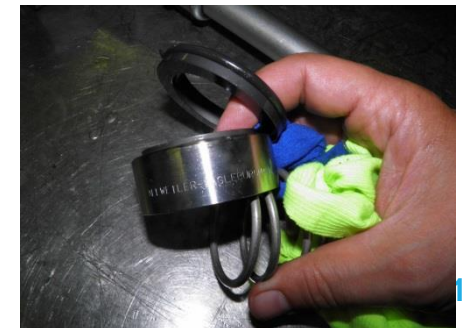
# Physical evidence collection

## Examples:

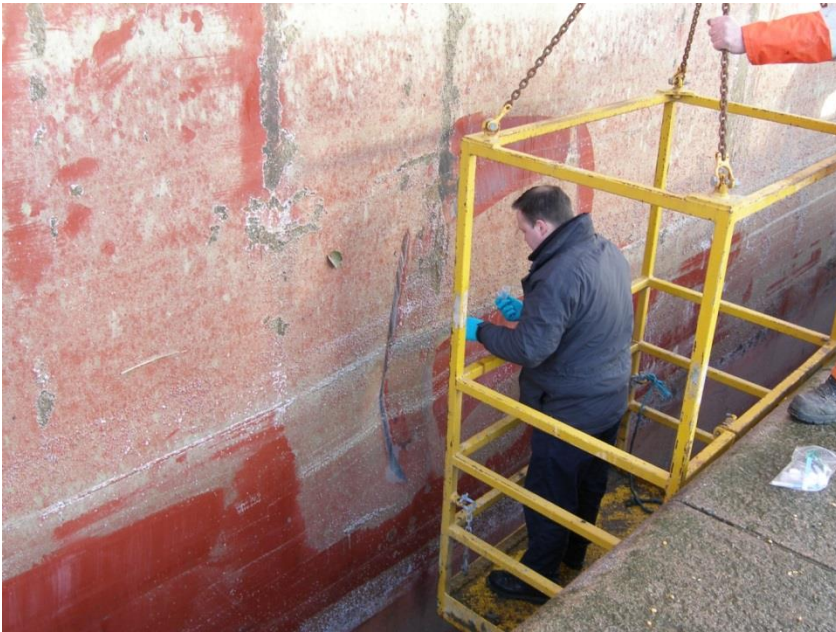
- Equipment
- Tools
- Scatter debris
- Pattern, parts and properties of physical items

## Less obvious example

- Liquid and gas samples



# Examples



# Photography

## Vital tool in evidence collection

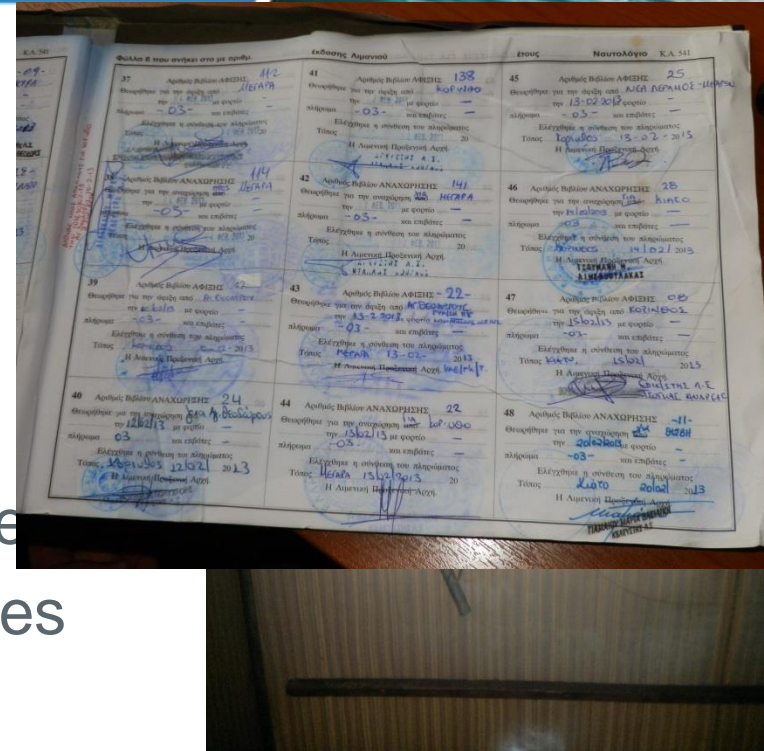
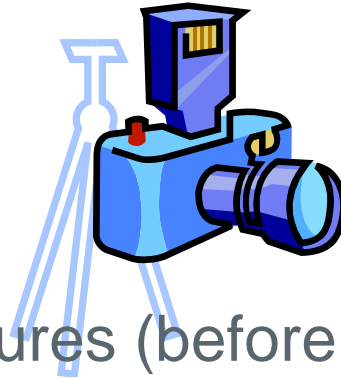
- assist with recall

## Areas to photograph

- general layouts
- damaged areas, fractures (before re
- 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!







Equipment



Controls



Failed components

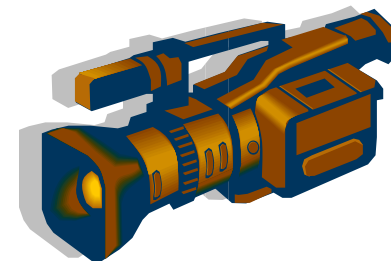


Hull



## Can greatly assist with

- recording layout
- reconstructions



**Ensure reference points are included**

**Commentary allows easier understanding later**

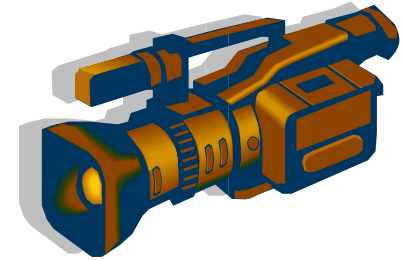
Sample Video (general view from bridge)

# Concerning visual evidence



## In general:

- Better use digital cameras
- Add clarity when included in investigation report
- Digital photography enables high quality / ability to take numerous photos
- Often video and still photography now combined
- **Practice to ensure familiarity with equipment**
- Look for other possible visual data sources (facility cameras, witnesses mobile phones, etc.).



# Examples of visual evidence



# Collecting documentary evidence

**Have a template list of all available documents-certificates to choose from**

## **Examples of documentary evidence:**

- Logbooks
- Equipment readouts
- Equipment manuals
- Licenses
- Certificates
- Photos
- Procedural documents
- Check lists



**Sometimes available in electronic form**

**Ensure photocopies are truly representative.**



# Example of template document list

**List of Certificates and other Documents for IHBAN**

Certificates	Books and Manuals	Notes
Cert. of Registry	Vessel's Particulars	
International Tonnage Cert.	Bridge Log Book	
International Load Line Doc.	Engine Log Book	
Minimum Safe Manning Doc.	Engine Bell Book	
Class Cert.	Radio Log Book	
Cargo Ship Safety Construction Cert.	Previous PSC Reports	
Cargo Ship Safety Equipment Cert.	Compass error Book	
Cargo Ship Safety Radio Cert.	Compass Deviation Table	
Cargo Ship Safety Certificate	Log Book Entries with respect to records of tests - drills - inspections and maintenance of lifesaving appliances and arrangements	
High speed Craft Safety Cert.	Safety Management Manual	With regard to:
Permit to Operate High Speed Craft	Work/Rest Hours Records	For Crew members:
Passenger Ship Safety Cert.	Familiarization Records	For Crew members:
Special Trade Passenger Ship-Space Cert.	Master's Standing Orders	With regard to:
List of Operational Limitations (if any) (For Passenger Ship)	Master's night orders	With regard to:
Safety Management Cert.	C/E Standing Orders	
International Ship Security Cert.	Ship Security Plan and Associated Records	
International Oil Pollution Prevention Cert.	Stability information	
International Air Pollution Prevention Cert. (IAPP)	Damage Control Plans and Booklets	
Engine International Air Pollution Prevention Cert. (EIAAPP)	Damage Control Booklets for Passengers (574-I/C II-1/2 23)	
Noxious Liquid Substances Cert. (NLS)	Instruction for on-board Maintenance (PMS)	
Cert. of Fitness for Carriage of Dangerous Goods	Ship-specific Plans and procedures for recovery of persons from water (expected to enter into force 1/7/2014)	
Cert. of Fitness for Carriage of Special Requirements	Muster List	
Cert. of Fitness for Carriage of Liquefied Gases	Fire Control Plan	
Document of Cargo	Fire Safety Training Manual	
Cert. of Fitness for Carriage of Dangerous Goods	Fire Safety Operational Booklet	
International Sewage Pollution Prevention Cert.	Maneuvering Booklet and Information	
International Anti-Fouling System Cert.	Fuel Oil Changeover Procedure and Log Book	
International AIS	Oil Record Book Part I	
Declaration of AIS	Oil Record Book Part II	
Record of AIS	Cargo Record Book	
CLC 92 Cert.	Material Safety Data Sheet (MSDS)	
Bunker CLC Cert.	Procedures and Arrangements Manual (P&A Manual)	
Exemption Certificates (if any)	VOC Management Plan	
Maritime Labor Cert. (P&A)	STS Operation Plan and records	
Certificates of Compliance	Capacity Plan	
Medical Certificates	SOPEP - SMPEP	
Unattended Machinery Space Cert. of Entry	SOPEP - SMPEP Drill Records	
P&A Cert. of Entry	Garbage Record Book	
Continuous Discharge Permit	Garbage Management Plan	
VDR Type Approval	Cargo Securing Manual	
VDR Approval	SAR Co-Operation Manual for Passenger Ships trading on the high seas	
	AIS Annual Test Report	
	Decision Support System for Masters	
	Information on the A/A -max Ratio for Ro-Ro Passenger Ships	
	15/CI-I/RB-1)	
	Dangerous Goods Manifest or Stowage Plan	
	Grain Loading Stability Booklet	
	Document of Authorization for the carriage of Grain	
	Enhanced Survey Report File	

Diagrams - Schemes	Notes
General Arrangement	
Ballast Arrangement	
Engine & Stowage Piping	
Fire Fighting System	
Shed Expansion Plan	
Mid ship's Section	
Mooring/Anchor Gear Arrangements	

Other Documents	Notes
Master's report to the company with regard to the accident	
Safety Committee meeting records	
Risk Assessment records	
Safety Investigation records	
Near Miss accidents reporting record	
Internal audit report	

To the Master of \_\_\_\_\_  
 For the purpose of the safety investigation please provide copies of the  
 above marked Certificates and Documents.  
 For the Investigation Team (see Annexes)

Received by the \_\_\_\_\_ of the \_\_\_\_\_  
 Date, Signature and Vessel's Stamp



# Documentary evidence types



- **Shipboard and Shore management control documents**
- **Records of work activities**
- **Reports of:**
  - Results of special studies
  - Analyses
  - Audits
  - Appraisals
  - Inspections (deficiencies)
  - Inquiries
- **Previous occurrences**
- **Investigations related to work activities**
- **Follow-on documentation that describes actions taken.**



## ‘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



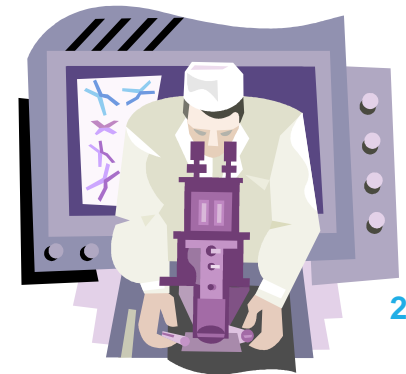


**Investigators cannot be experts in everything!**

**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.**

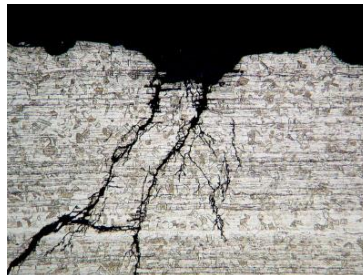




# Material testing

Tensile testing

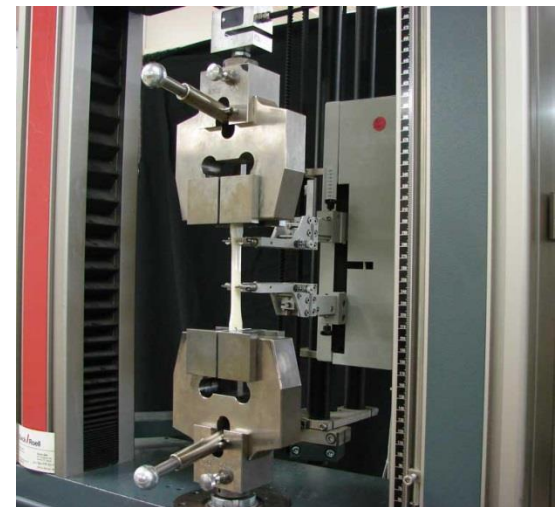
Shear testing



Microscopic examination

Failure mechanism,

Fatigue testing



# Cable and rope testing



Determining failure mechanism

Load to failure prediction

Rope/cable condition

Rope properties

Rope certificates



# Underwater Surveys- using divers



- Brief diver fully as to what is required
- Understand the limitations of the diver, e.g. dive time, visibility, current
- Give as much information on any known hazards
- Beware of client responsibilities
- Ideally head mounted camera feeding back to the surface, with communications to allow some direction of the diver
- Diver not to interfere with the wreck
- Interview diver







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

 **EMSA**  
European Maritime Safety Agency