



# Compiling an Inventory of Hazardous Materials (IHM)

*- sharing some experiences -*

# ***Content***

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1. Sampling on board ships
  2. HazMat Experts – training & qualifications
  3. State of play of HazMat Experts
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# Content

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## 1. Sampling on board ships

- How to prepare IHMs for ships
  - Legislation
  - Preparation and conduction of IHM projects
    - IHMs for new ships
    - IHMs for existing ships

# Legislation



- “International Convention for the Safe and Environmentally Sound Recycling of Ships “Hong Kong Convention” of IMO
- “Regulation of the European Parliament and of the Council on ship recycling ...” of EU

Scope	Impacting
All merchant EU-flagged ships* and all non-EU ships calling at EU ports > 500GT	Suppliers Shipyards Shipowners Ship Recycling Facilities Administrations

"ship" means a vessel of any type whatsoever operating or having operated in the marine environment, and includes submersibles, floating craft, floating platforms, self-elevating platforms, Floating Storage Units (FSUs), and Floating Production Storage and Offloading Units (FPSOs), as well as a vessel stripped of equipment or being towed

# Legislation: IHM-Guidelines

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## Guideline for the Development of Inventory of Hazardous Materials

- **Old:**
  - A.962(23) – Green Passport
  - Res.MEPC.179(59) – IHM-Guideline
  - Res.MEPC.197(62) – IHM-Guideline
  
- **New:**
  - 2015 Guidelines for the Development of IHM of IMO (Res. MEPC.269(68))
  - EU - IHM-Guideline (under final discussion)





# Legislation: IHM for Ships

Asbestos

PCBs

Ozone Depleting Substances

Organotin Compounds (AFS)

EU: + PFOS

us

Building &  
Operation

Prior to Recycling

Part I  
Structure &  
Equipment

Part II  
Hazardous  
Wastes

Part III  
Stores

**Table A Materials**

Mandatory for all ships & installations



**Table B Materials**

Mandatory for new ships & installations,  
voluntary for existing ships



**Table C Materials**

Hazardous Items

Heavy Metals

Radioactive Substances

.....

EU: + HBCDD

**Table D**

Regular consumer (household) products

Excluded  
items



# IHM-Responsibilities



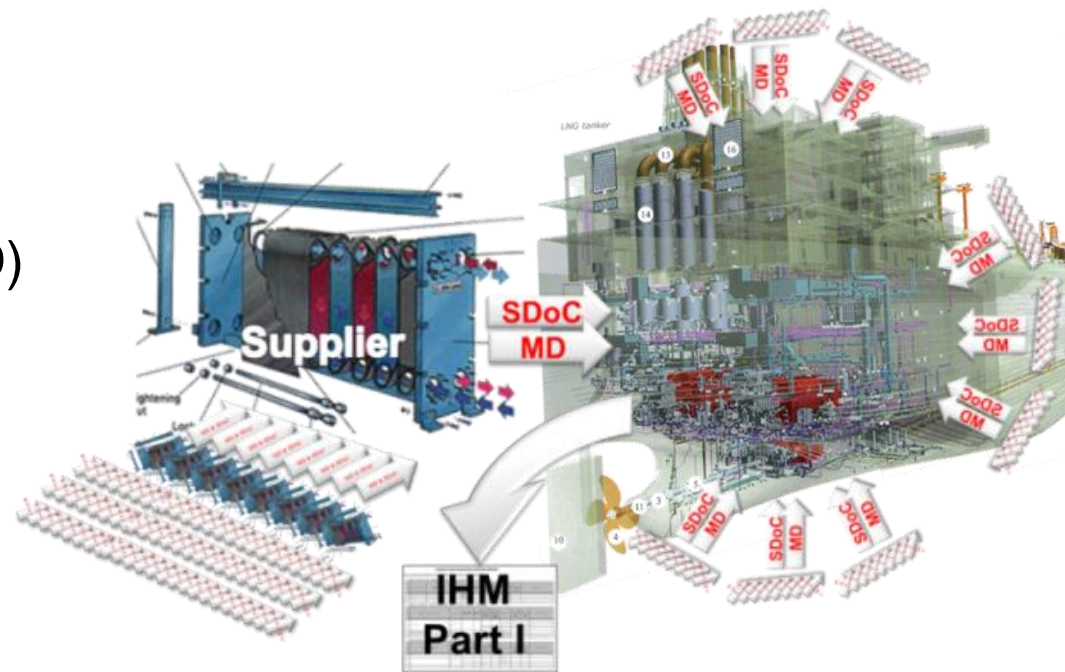
	New Ships	Existing Ships
<b>Definition</b>	On or after EiF / application: (a) building contract is placed; or (b) keel is laid six months later; or (c) delivery thirty months later.	“not a new ship”
<b>Responsibility</b>	Shipyard	Shipowner
<b>Scope</b>	Table A & B	Table A
<b>Method</b>	information from suppliers (SDoC & MD)	Inspection & sampling
<b>EU</b>	+ PFOS & HBCDD	+ PFOS
<b>IHM-Deadlines</b>	HKC: after EiF (contract...) EU: 30.12.2015 / 2018	HKC: 5 years after EiF EU: 7 years / 30.12.2020 (Rec. Ships: 30.12.2016 )

# IHMs for New Ships



## Shipyard responsible

- Preparation based on information from suppliers of equipment and materials for ships' structure:
  - Suppliers Declaration of Conformity (SDoC)
  - Material Declaration (MD)
  - **EU: + PFOS + HBCDD**



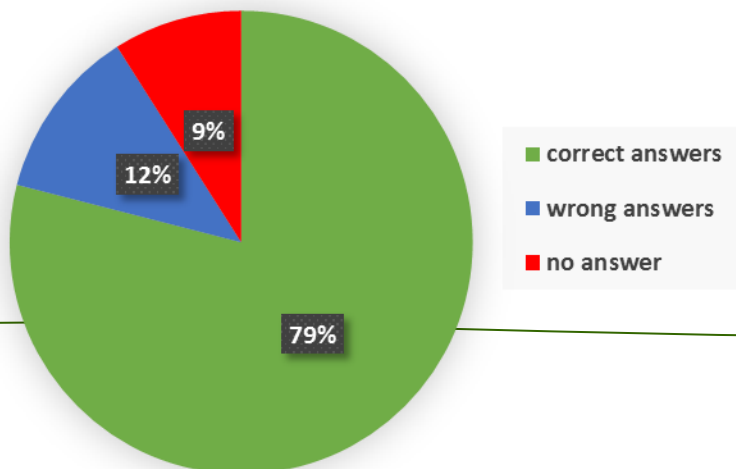


# IHMs for New Ships

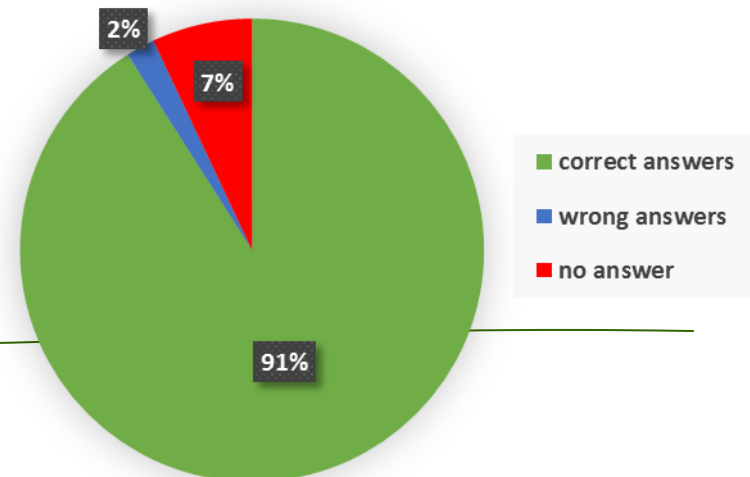


- Experience: IHM for a cruise vessel
  - ~1.800 suppliers in total
  - ~1.400 IHM-relevant
  - Duration = 10 months, support for suppliers provided
  - Cost: ~102.000,- € (without random sampling)
    - As existing ship: ~24.000,-€

1 month prior deadline



Final Result



# *IHMs for Existing Ships*



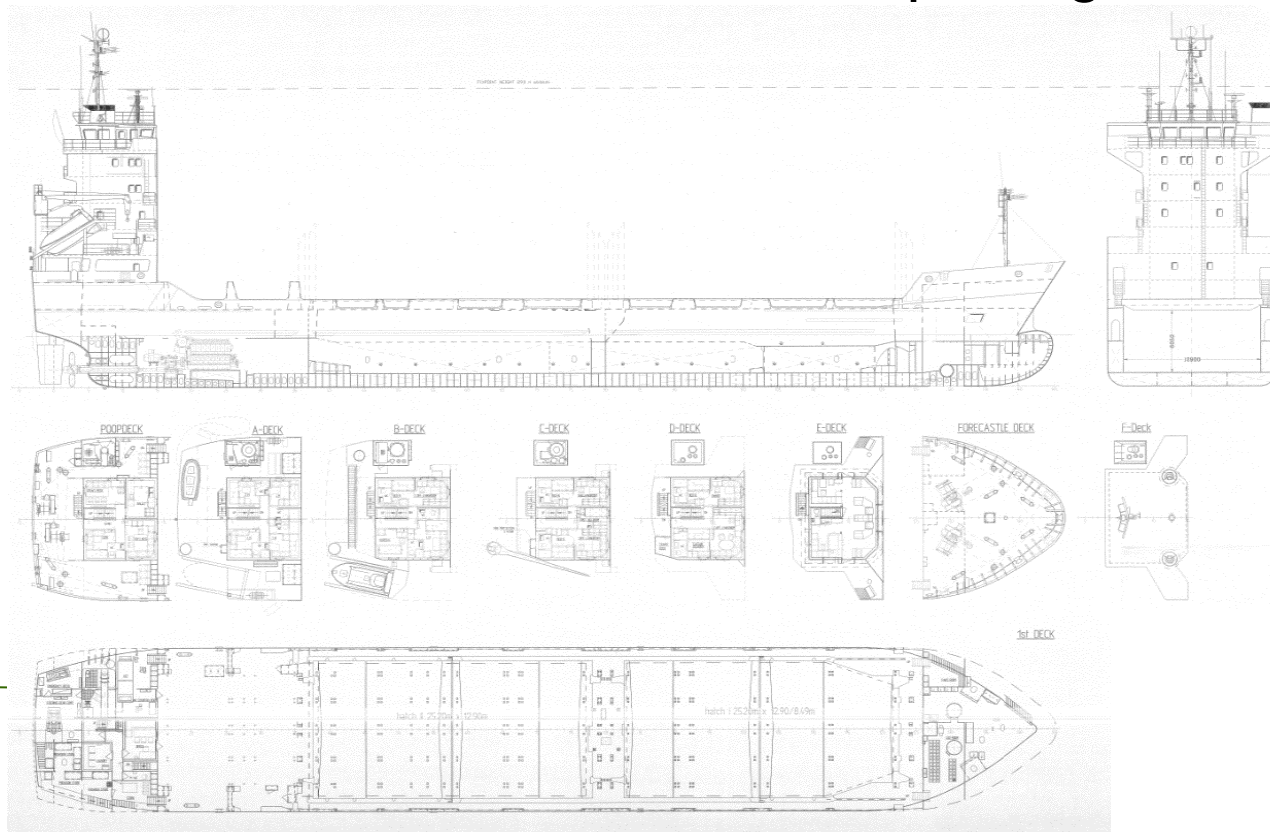
- Timing

Activity		Duration (appr.)
1	Review of documents and plans	~ 4 hrs
2	Preparation of VSCP	~ 8 hrs
3	Approval of VSCP by class	Depending on class
4	Sampling and Inspection <u>onboard</u>	> 8 hrs
5	Laboratory Analyses	~ 2 weeks
6	Finalization of IHM and Report	2 days
7	Certification of IHM by IACS-class	48 hours to 7 weeks

# ***IHM**s for Existing Ships*



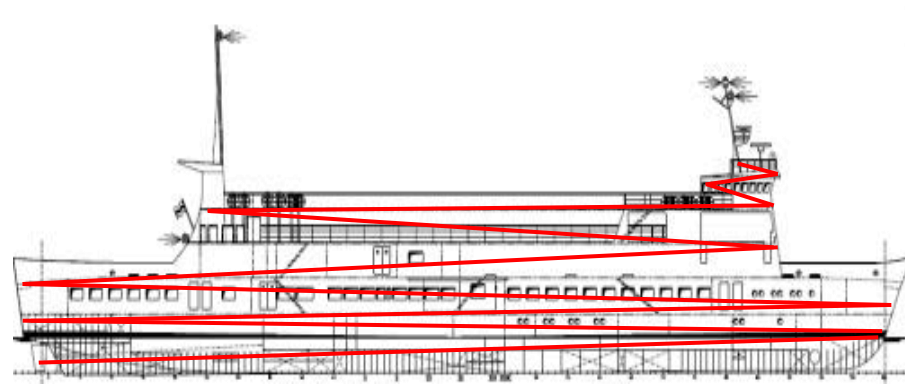
IHM-Preparation by **investigations**,  
sample takings, sample documentation, analysis and  
interpretation, calculations, detailed reporting



# *IHMs for Existing Ships*



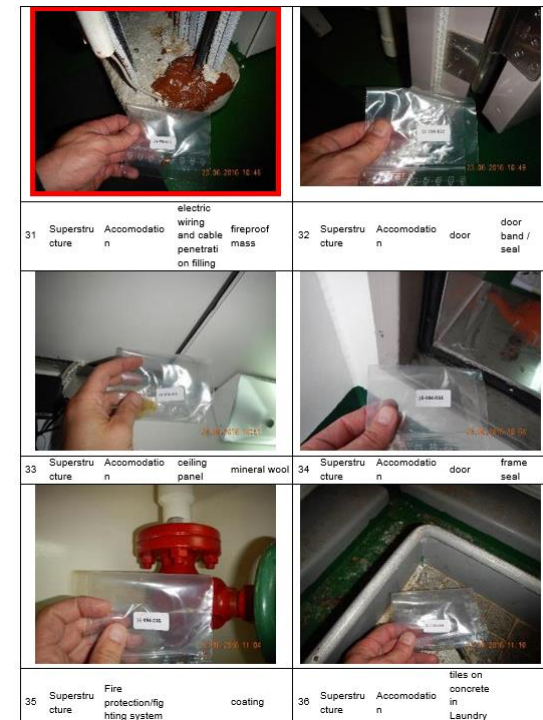
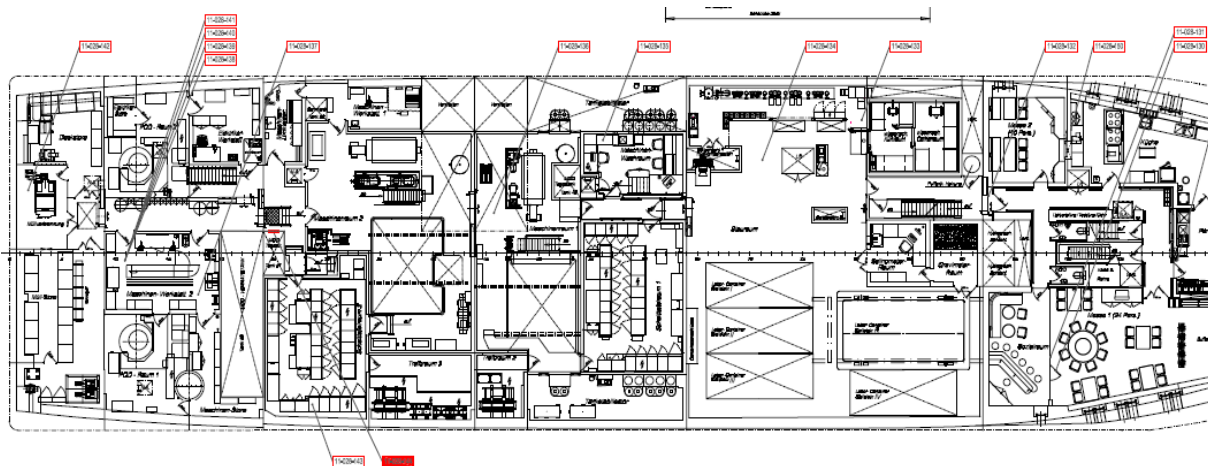
IHM-Preparation by investigations,  
**sample takings**, sample documentation, analysis and  
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# IHMs for Existing Ships



Preparation by an Expert by investigations, sample takings, **sample documentation**, analysis and interpretation, calculations, detailed reporting





I-1 Paints and coating systems containing materials listed in Table A and Table B of appendix 1 of the Guidelines

\*: = later estimation possible

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# IHMs for Existing Ships



Preparation by an Expert by investigations,  
sample takings, sample documentation, analysis and  
interpretation, **calculations**, detailed reporting

Probe 106, Beschichtung "XYZ" (Schätzung)						
	Breite (m)	Länge (m)	Höhe (m)	Fläche (m2)	Masse (Kg)	
Probe106 (7,33 g, kein Materialverlust)	0,1	0,1	0	0,01	0,00733	
Kettenkasten	3,4	1,7	3,8	50,32	36,88	
Ballastwassertank 1	4,13	7,62	2,2	114,6412	84,03	
Ballastwassertank 2 (Tankdeck)	2,07	5,2	2,96	64,5664	47,33	
Ballastwassertank 2 (Zwischendeck)	2,07	4,87	2,8	59,0258	43,27	
Ballastwassertank 3	7,21	1,94	6,1	139,6048	102,33	
Ballastwassertank 4	7,21	1,94	6,1	139,6048	102,33	
Ballastwassertank 5	7,21	5,25	3,35	159,187	116,68	
Ballastwassertank 6	7,21	5,25	3,35	159,187	116,68	
Ballastwassertank 10	3,6	6,31	2,8	100,928	73,98	
Ballastwassertank 11 (Kofferdammdeck)	3,6	6,31	2,8	100,928	73,98	
Ballastwassertank 11 (Stb-Erweiterung)	2,95	4,2	2,8	64,82	47,51	
Ballastwassertank 11 (Tankdeck)	2,85	4,2	2,63	61,023	44,73	
.	.	.	.	.	.	
.	.	.	.	.	.	
.	.	.	.	.	.	
Intering Tank 33 (Kofferdammdeck)	173		2,8	968,8	710,13	
				Gesamtmasse [Kg]	3375,40	



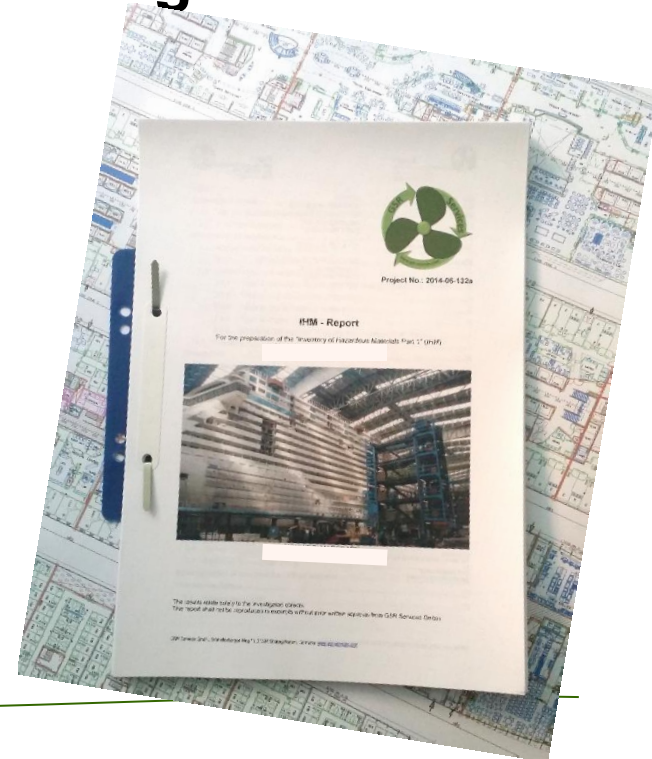
# *IHMs for Existing Ships*



Preparation by an Expert by investigations, sample takings, sample documentation, analysis and interpretation, calculations, **detailed reporting**

- Ship Plans, documents, and certificates used
- Scope (Table A = minimum)
- Documentation of sampling
  - Finalized VSCP\*
  - Photos
  - Markings in ship plan
- Lab results & accreditations
- Calculations
- Certificates of HazMat Expert(s)

IHM = technical file: Precise documentation required!





# Content

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## 2. HazMat Experts – training & qualifications

- What is an HazMat Expert?
  - Quality of IHMs
- Who trains, approves or certifies HazMat Experts?

# ***What is an HazMat Expert?***

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- Expert has to know about:
    - Ship technology & occurrence of HazMats
    - Indicative lists
      - Asbestos = 125
      - Polychlorinated Biphenyls (PCBs) = 27
      - ODS = 7
      - Organotin = 3
      - PFOS = not available yet
      - Table B-Materials = 46
    - Safe sample taking and equipment
    - Legislations (national, flag state, point of sampling...)
    - Documentation, etc.
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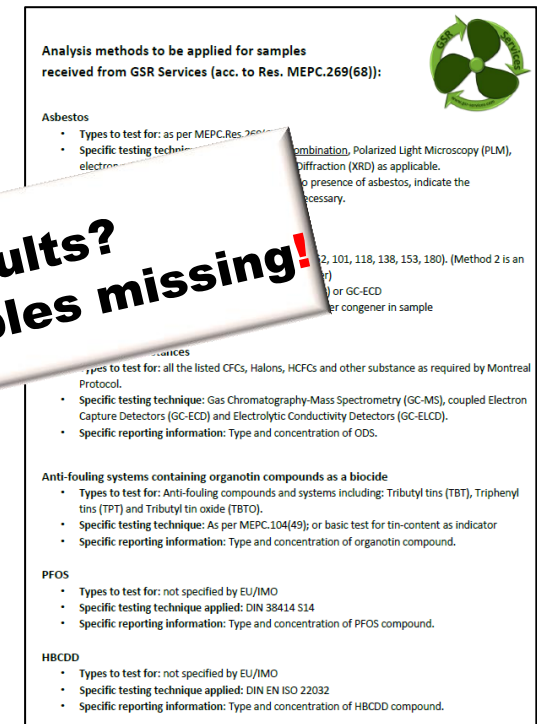


# What is an HazMat Expert?



- Using an accredited laboratory
  - **Asbestos:** two methods out of 3 required!
    - Polarized Light Microscopy (PLM),
    - Electron microscope techniques and/or
    - X-Ray Diffraction (XRD).
  - **Polychlorinated Biphenyls (PCB)**
    - Method 1: ICES
  - **Organotin compounds:** MEPC.104(49);  
or basic test for tin-content as indicator
  - **PFOS (own approach):** DIN 38414 S14 (?)

**Why incorrect analyses results?  
Standards for preparation of samples missing!**



- 1: Gas Chromatography - Mass Spectrometry  
2: Gas Chromatography - Coupled Electron Capture Detectors  
3: Gas Chromatography- Electrolytic Conductivity Detectors

# ***What is an HazMat Expert?***



Some of our competitors say they can identify asbestos by “looking at it”:



# Quality of IHM



- Number of samples taken
  - What has / has not been sampled
  - How many assumptions were made
  - How many samples were taken
- Laboratorys' expertise
- Interpretation of laboratory results
- Certifier / Classification Society
  - From *zero to hundrets* of assumptions and/or samples
  - Business vs quality is a critical issue

Location	Equipment	Expected HazMat	Component	Remarks	Document analysis result	Check procedure	Quantity	Check result	Sample number
Dock 6 office chief plongeur	coating insulation	Asbestos	material wall	door to the east	n.a.	sample g check	n.a.	no asbestos detected	1
Dock 6 office chief plongeur	coating insulation	Asbestos	insulated insulation		n.a.	sample g check	n.a.	no asbestos detected	2
Dock 6 office chief plongeur	coating panel	Asbestos	acoustic material & wood		n.a.	sample g check	n.a.	no asbestos detected	3
Dock 6 office chief plongeur	coating panel	Asbestos	panel frame construction board		n.a.	sample g check	n.a.	no asbestos detected	4
Dock 6 office chief plongeur	window sealing	Asbestos	black rubber sealing	window from the inside	n.a.	sample g check	n.a.	no asbestos detected	5
Dock 6 office chief plongeur	window sealing	Asbestos	sealing material	yellow, hard, door to the outside	n.a.	sample g check	n.a.	no asbestos detected	6
Dock 6 office chief plongeur	door panel	Asbestos	panel material	down door to the outside	n.a.	sample g check	n.a.	no asbestos detected	7
Dock 6 office chief plongeur	door sealing	Asbestos	black rubber sealing	door to the outside	n.a.	sample g check	n.a.	no asbestos detected	8
Dock 6 office chief plongeur	door sealing	Asbestos	door frame sealing	door from the outside	n.a.	sample g check	n.a.	no asbestos detected	9
Dock 6 Superstructure	wall material	Asbestos	wall coating		n.a.	sample g check	n.a.	no asbestos detected	10
Dock 6 Superstructure	wall material	Polychlorinated Biphenyls (PCBs)	wall coating		n.a.	sample g check	n.a.	PCB level 20.5 mg/kg	10
Dock 6 Superstructure	wall material	Asbestos	wall coating		n.a.	sample g check	n.a.	<0.01 mg/kg	10
Dock 6 Superstructure	wall material	Asbestos	wall coating		n.a.	sample g check	n.a.	no asbestos detected	11
Dock 6 Superstructure	cable line (Kabelkanal)	Asbestos	floor glass		n.a.	sample g check	n.a.	no asbestos detected	12
Dock 6 Superstructure	cable duct	Asbestos	cable duct tiling		n.a.	sample g check	n.a.	no asbestos detected	13
Dock 6 Superstructure	window sealing	Asbestos	window sealing	window from the outside (sample no. 13)	n.a.	sample g check	n.a.	no asbestos detected	14
Dock 6 Superstructure	window sealing	Polychlorinated Biphenyls (PCBs)	window sealing	window from the outside (sample no. 13)	n.a.	sample g check	n.a.	PCB level 211 mg/kg	14

# Who trains or approves HazMat Experts?

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- Classification Societies
  - HazMat Expert Training
    - Few offer trainings
    - Knowledge & approach different
    - Training  $\neq$  experience
  - HazMat Expert Approval
    - ABS
    - Class NK
    - DNVGL
    - LR
    - Others = ?



# Content

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## 3. State of play as regards HazMat Experts

- Competition & pricing
- IHM orderbook and outlook

# Competition & pricing

## Preparation vs. certification

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- Example: General Cargo Vessel

- 158m LoA, Built: 1994 / Germany

- IHM Preparation:

- 88 samples
    - Laboratory costs: 4.616,- €
    - 5,5 working days: 5.280,-€
    - Sum: **9.900,- €**

- IHM Certification:

- “class 1” = 1.900,- €
    - “class 2” = 11.500,- €

Asbestos	73
PCBs	3
(ODS)	4
Organotin (AFS-Certificate)	0
PFOS	3

**Total for owner: 12 – 21k USD**

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# IHM orderbook and outlook



- Affected ships: ~30.000 ships
- Very few IHMs prepared so far
- Timely compliance possible?



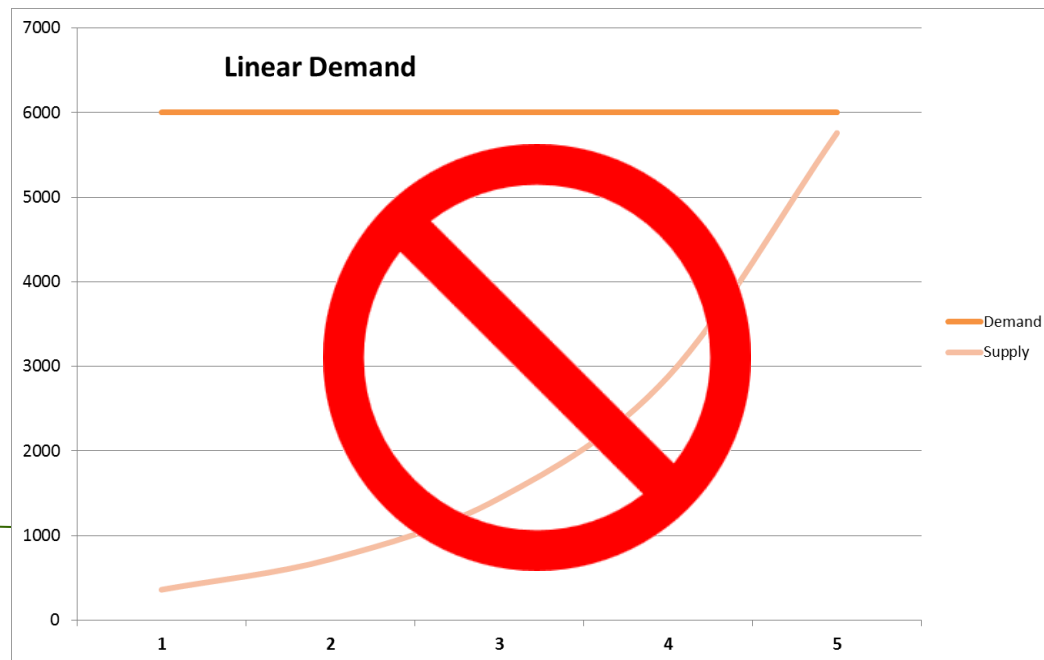
IHM Supply & Demand		2016	2017	2018	2019	2020
Linear	Demand	6000	6000	6000	6000	6000
	Supply	360	720	1440	2880	5760
	Price	12.000 €	13.440 €	16.320 €	22.080 €	33.600 €
Gradual	Demand	3000	4100	6200	7700	9000
	Supply	360	852	2140	4799	5609
	Price	12.000 €	14.494 €	16.143 €	19.478 €	31.256 €
Progressive	Demand	200	600	1800	5400	22000
	Supply	360	500	900	2700	5000
	Price	12.000 €	22.000 €	33.000 €	49.500 €	60.750 €

# Linear increase



- Demand constant
- Supply doubles each year

	Avg.	Sum	Delta
Demand	6.000	30.000	<b>- 18.840</b>
Supply	2.232	11.160	
Price	19.488	584.640.000	

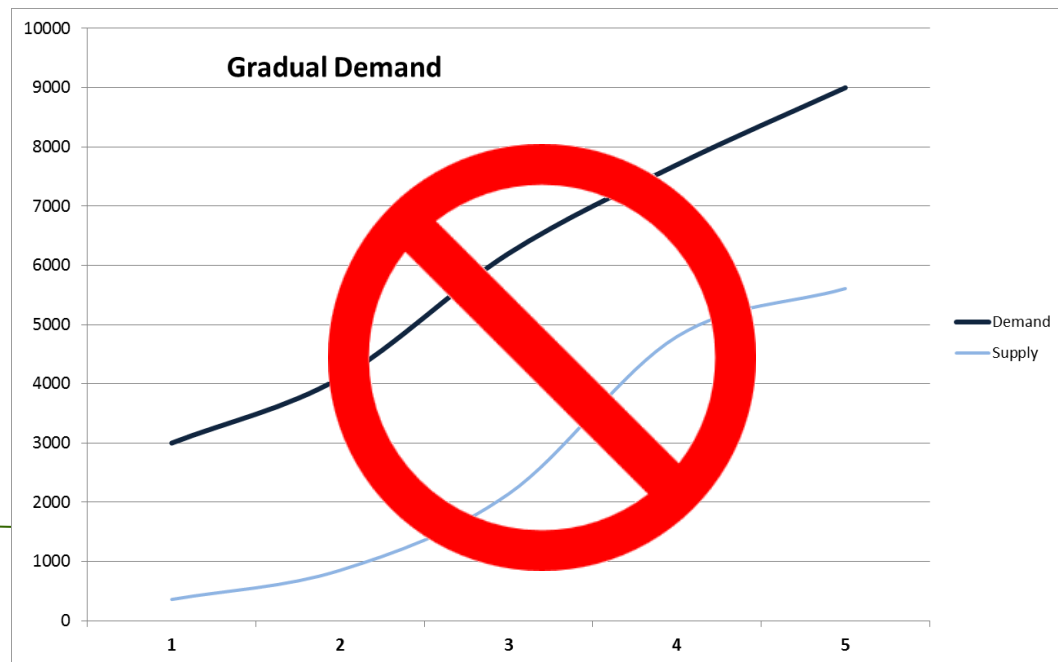


# Gradual increase



- Demand increasing
- Supply follows demand

	Avg.	Sum	Delta
Demand	6.000	30.000	- 16.240
Supply	2.752	13.760	
Price	18.674 €	560.221.571 €	

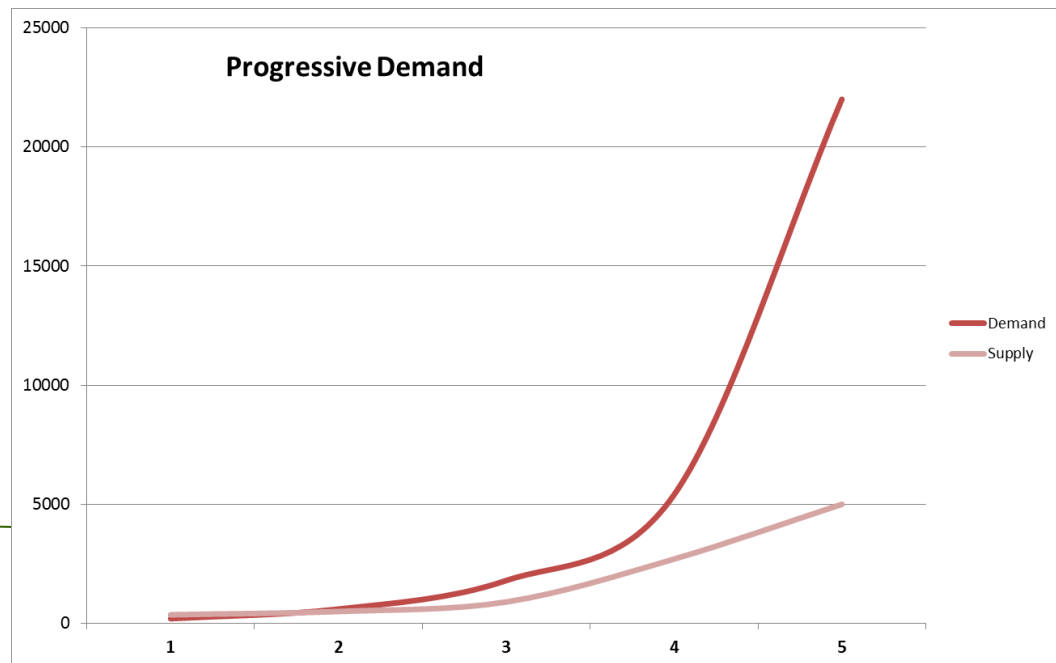


# Progressive increase



- Last minute rush
- Supply tries to follow demand

	Avg.	Sum	Delta
Demand	6.000	30.000	<b>- 20.540</b>
Supply	1.892	9.460	
Price	35.450 €	1.06 mio €	





# ***Conclusion***

# Conclusions

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- Practical IHM requirements needed
    - Preferable ONE standard (too late?)
    - Quality vs. “1000% secure”
  - IHM market
    - Nearly non-existent today
      - Shipping crisis plus new regulations (e.g. BWM)
    - Varying standards
    - Progressive demand most likely
  - Information & training campaign needed
- 





***Thank you for your attention!***

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# Presenter



## Henning Gramann

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### Current positions

- Managing owner GSR Services GmbH
- Chairman & Treasurer of [IHMA](#)
- Guest Professor at World Maritime University (WMU)
- Project Leader for ISO 30003 & 30005
- ...



### Experience

#### **Germanischer Lloyd - Global Head of Practice Ship Recycling (2005-2010)**

Development of all ship recycling related services, products, and trainings of Germanischer Lloyd

#### **AIDA Cruises - Environmental Officer (Senior Officer) aboard "AIDAblu" (ex. ArosaBlu), (2003 – 2004)**

Full implementation of Carnival Corporations' comprehensive „Environmental Compliance Plan“

#### **GAUSS gem.mbH - Project-Manager (2000 – 2003)**

Specialist in maritime environmental protection / waste management, legislation & technology