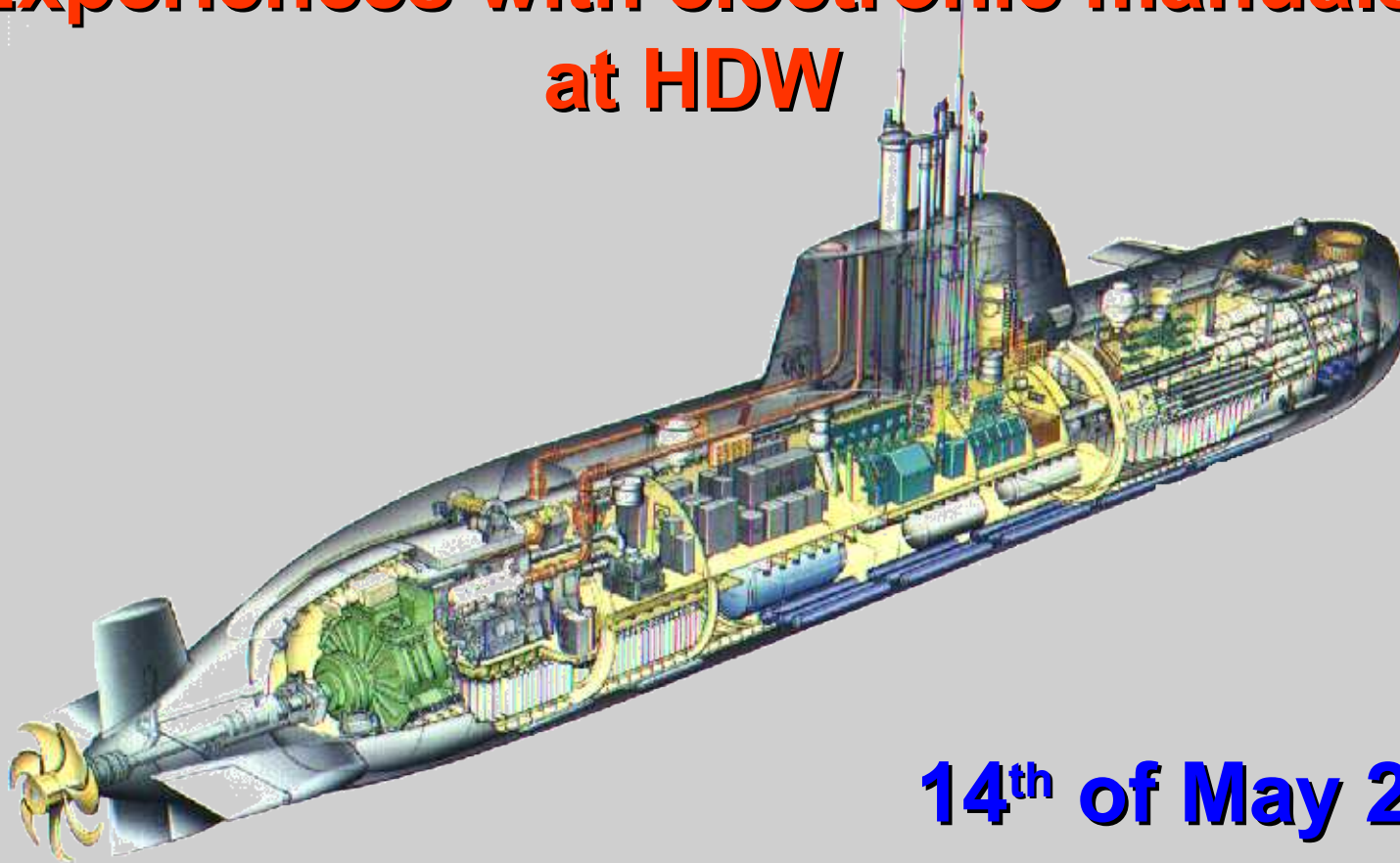


# Experiences with electronic manuals at HDW

## Experiences with electronic manuals at HDW



14<sup>th</sup> of May 2008



# Experiences with electronic manuals at HDW

**Kay-Michael Goertz**

**Head of Logistic Procedures & IT**

**Diploma in information science (University Dresden)**

**6 years at debis (Professional)**

**6 years at HDW**



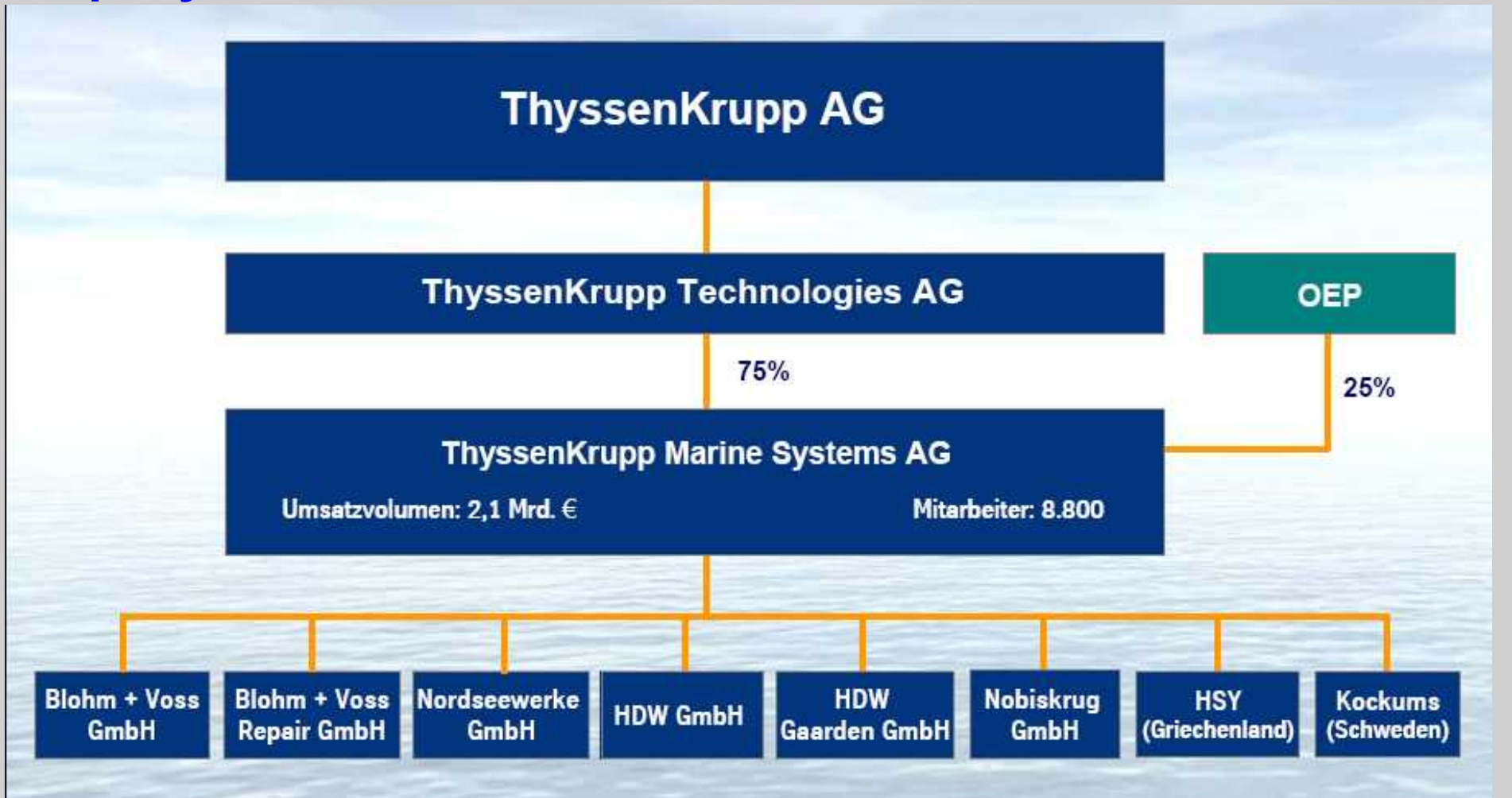
# Experiences with electronic manuals at HDW

- **HDW - a member of ThyssenKrupp Marine Systems**
- **Printed documentation**
- **Interactive Electronic Technical Documentation (IETD)**
- **Creating IETD as main contractor**
- **Ship Logistic Information System™ (SLIS)**
- **Experiences**



# Experiences with electronic manuals at HDW

## Company



# Experiences with electronic manuals at HDW

## Products

- **Submarines**
  - **U212A – German / Italian Navy**
  - **U214 – export**
  - **U209 – export**
- **World leader for non-nuclear submarines**
- **65% of free contract in more than 30 years**



# Experiences with electronic manuals at HDW

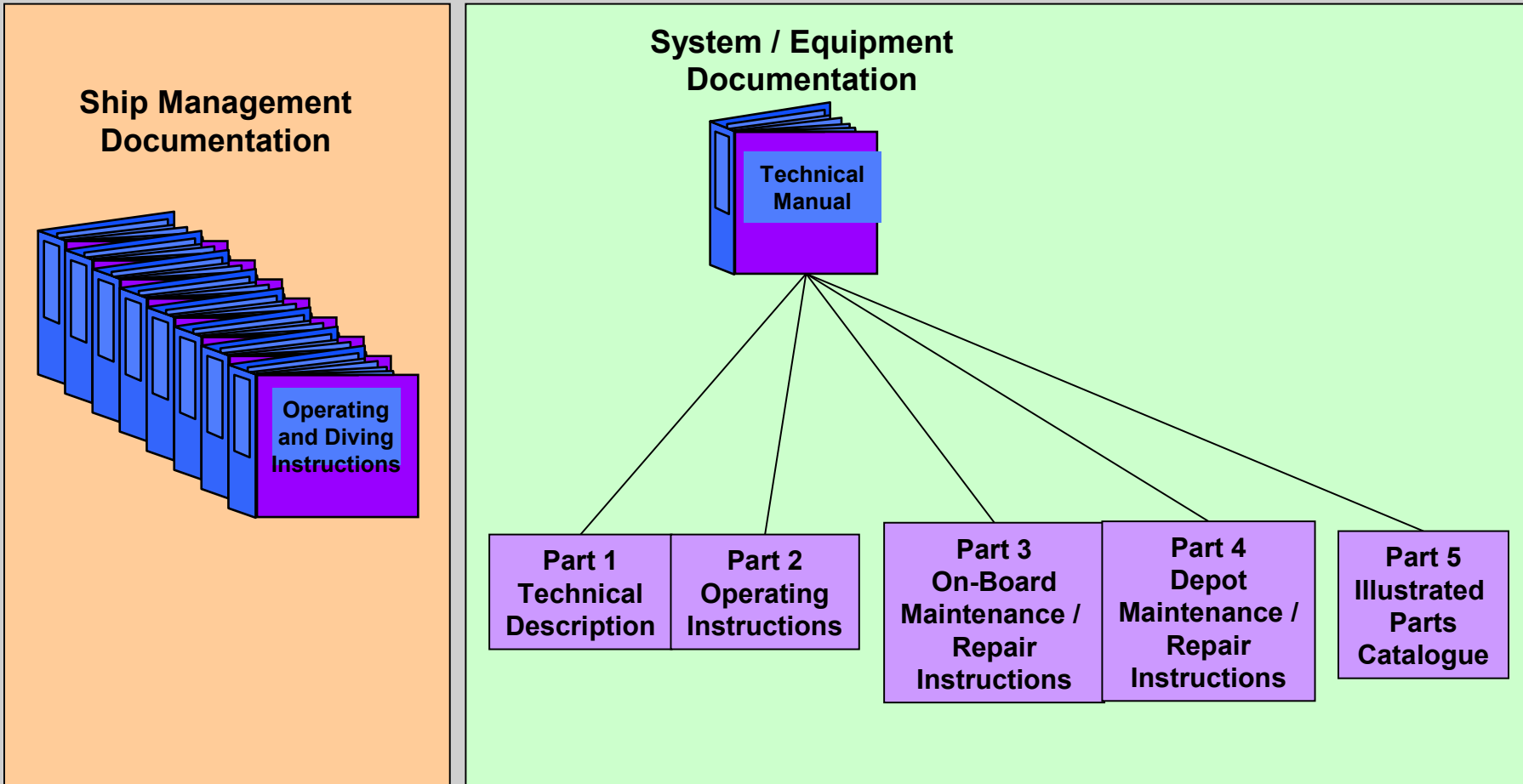
## Printed documentation

- More than 100 technical manuals
- More than 200 folders
- More than 15 meters in a shelf
- More than 1 m<sup>3</sup> space – on a submarine !!!
- History:  
Submarine could only take parts of manuals!



# Experiences with electronic manuals at HDW

## Printed documentation



# Experiences with electronic manuals at HDW

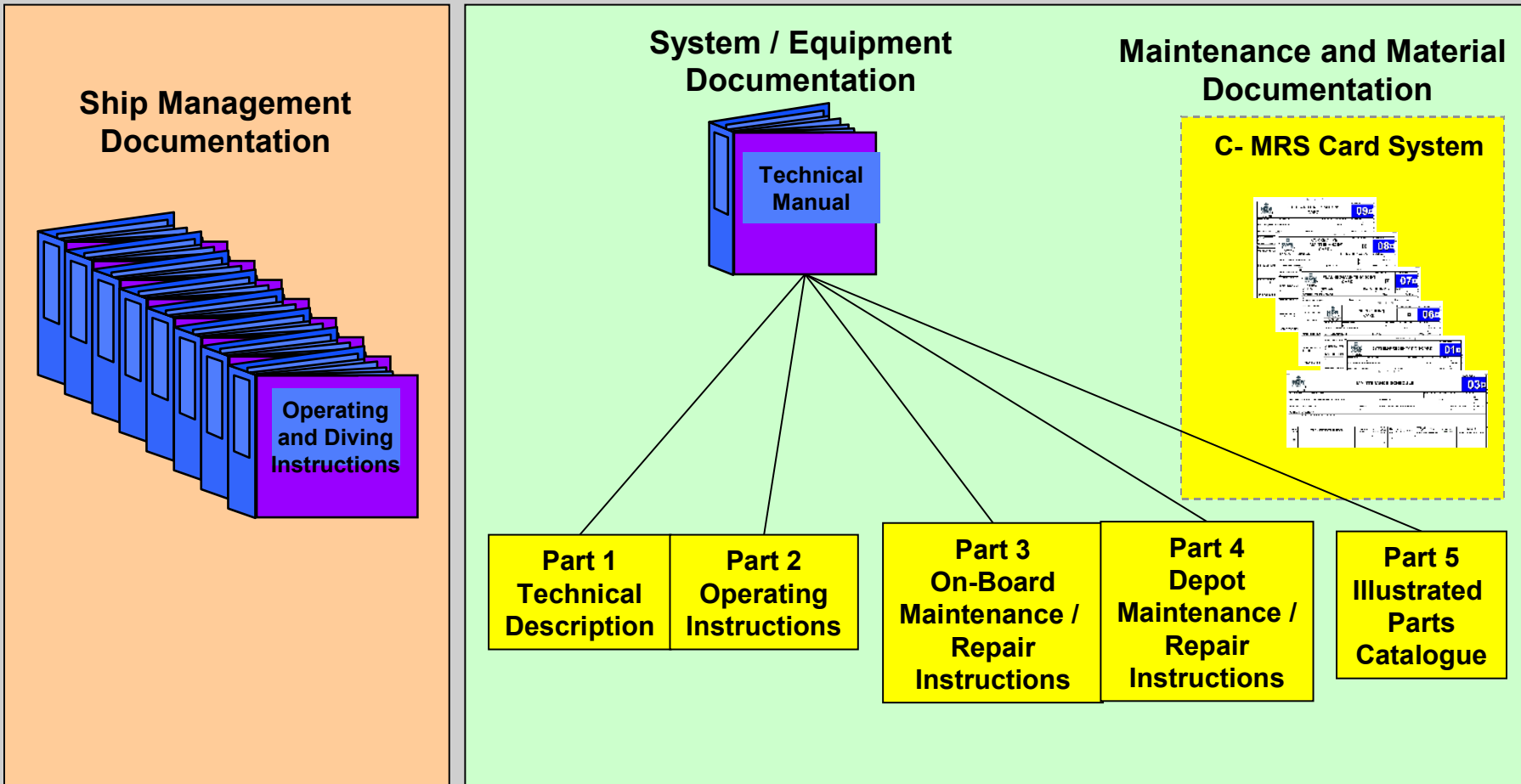
## IETD

- Restructured, still more than 100 technical manuals
- More than 15 GB for one submarine
- Modules each manuals
  - 500 or less – 20%
  - 2000 modules or more – 10%
  - biggest over 6000 modules
- Big amount of illustrations (inline, part 5, appendix)



# Experiences with electronic manuals at HDW

IETD





# Experiences with electronic manuals at HDW

IETD

Item No.	Structure No.	Description	1. MCode	NSN 1. Ref. No.	2. MCode	Uo/c MaRC	Variations	B	D	Remarks
1	C20000	FC COOLING SYSTEM	D1253	F1.2422-00-00.00-00		1 EA Z2	1			
2	C20000	..DISTILLATE COOL F.C.I.ON				1 EA	1			02-0090/1



# Experiences with electronic manuals at HDW

## CMRS Cards

- **Generation fully automated – no authoring of cards!**
- **Additional information stored in CSDB**
  - ships name, departments, ... (customer information)
  - equipment number, designation, ...
  - material data (spares, POL, S/C-TMT, ...)
- **Links between cards**
- **Links into the „normal“ IETD Teil 1-4**




# Experiences with electronic manuals at HDW

## CMRS Cards

- Key Plan Bilge Water De-Oiler System
View: Card Processing
Search:  Search in: All Books

Navigation Index

- SUB1
  - MI - Master Index
  - IL - Inspection List
  - Ship's Auxiliary Systems
    - TM4045 - De-Oiler System
      - 00 - Table of Contents
      - 01 - System Presentation Card
        - 4045-01-0001 - Overall
        - 4045-01-0002 - General
        - 4045-01-0003 - Purpose
        - 4045-01-0004 - Depend
        - 4045-01-0005 - Modes o
      - 02 - Special Safety Instructi
      - 03 - Maintenance Schedule
      - 04 - Cycle Schedule
      - 05 - Trouble Shooting Card
      - 06 - Inspection Card
      - 07 - Planned Maintenance C
      - 08 - Corrective Maintenance
      - 10 - Consolidated Equipment
      - 11 - Required Material Card
    - TM4020 - Steering Gear System
    - TM4080 - Galley Equipment
    - TM4110 - Chilled Water System
    - TM4010 - Depth Measuring Syste
    - TM4021 - Submarine Steering C
    - TM4061 - Fresh Water Generato
  - Ship with Outfit and Installations
  - Propulsion Systems
  - Electrical Systems
  - Communication, Navigation, Detecti
  - Command and Weapon Control Syste

 C-MRS	<b>SYSTEM PRESENTATION CARD</b>				<b>CARD CODE: 01</b>
<b>UNIT CODE:</b>	<b>SHIP'S NAME:</b> Submarine 1	<b>HULL NO:</b> SUB1	<b>DPT./DIV. CODE:</b> MECH	<b>CARD NO.:</b> 4045-01-0002	
<b>SYSTEM/EQUIPMENT DESIGNATION:</b> TM4045 - De-Oiler System			<b>NATO STOCK NO.:</b>	<b>TM NO.:</b> 4045	
<b>MANUFACTURER'S NAME:</b>		<b>PART NO.:</b>	<b>MFC:</b>	<b>QTY:</b>	
<b>SYS./EQUIP.NO.:</b>	<b>NAVAL - TECHNICAL DESIGNATION:</b>	<b>LOCATION CODE:</b>	<b>SECTION:</b>		
<b>REFERENCE DOCUMENTS:</b>					

**System Presentation**

By means of an eccentric helical rotor pump, located under the officers mess room, the oil/water mixture is pumped into the bilge water de-oiler where the de-oiling takes place.

An oil alarm unit monitors the maximum permissible residual oil content. In this way only water with a residual oil content well below 15 ppm (mg/l) is discharged.

A common switch board in the engine room which is fed from the auxiliary switchboard with 115 V 60 Hz 3 ph power supply, provides fully automatic operation of the bilge water de-oiler.

**The de-oiler system consists of the following main components:**

- One **helical rotor pump** (A-1/43150110) below the officers mess room, to suck the bilge water from the different compartments and force it to and through the bilge water de oiler.
- The **bilge water de-oiler** (A-1/43150100) in the engine room, to separate the oil from the water, including accessories for automatical oil drain to the contaminated oil tank.
- One **oil alarm transmitter (unit)** (A-1/43150300) in the engine room, which monitors

A-1 Key Plan Bilge Water De-Oiler System

# Experiences with electronic manuals at HDW

## CMRS Cards

The screenshot displays a software application window titled '- 4045-04-0006 - Cycle Schedule - 43150200'. The interface is divided into a navigation pane on the left and a main content area on the right.

**Navigation Index (Left Pane):**

- SUB1
  - MI - Master Index
  - IL - Inspection List
  - Ship's Auxiliary Systems
    - TM4045 - De-Oiler System
      - 00 - Table of Contents
      - 01 - System Presentation Card
      - 02 - Special Safety Instructions Card
      - 03 - Maintenance Schedule
      - 04 - Cycle Schedule
        - 4045-04-0001 - Cycle Schedule
        - 4045-04-0002 - Cycle Schedule - 4315
        - 4045-04-0003 - Cycle Schedule - 43150100
        - 4045-04-0004 - Cycle Schedule - 43150110
        - 4045-04-0005 - Cycle Schedule - 43150120
        - 4045-04-0006 - Cycle Schedule - 43150200**
        - 4045-04-0007 - Cycle Schedule - 43150300
        - 4045-04-0008 - Cycle Schedule - 1461
        - 4045-04-0009 - Cycle Schedule - 1499
        - 4045-04-0010 - Cycle Schedule - 1500
        - 4045-04-0011 - Cycle Schedule - 1501
        - 4045-04-0012 - Cycle Schedule - 1502
        - 4045-04-0013 - Cycle Schedule - 1503
        - 4045-04-0014 - Cycle Schedule - 1504
      - 05 - Trouble Shooting Card
      - 06 - Inspection Card
      - 07 - Planned Maintenance Card
      - 08 - Corrective Maintenance Card
      - 10 - Consolidated Equipment List
      - 11 - Required Material Card
    - TM4020 - Steering Gear System
    - TM4080 - Galley Equipment
    - TM4110 - Chilled Water System
    - TM4010 - Depth Measuring System
    - TM4021 - Submarine Steering Console 354
    - TM4061 - Fresh Water Generator
  - Ship with Outfit and Installations
  - Propulsion Systems
  - Electrical Systems
  - Communication, Navigation, Detection and Electronic Warfare
  - Command and Weapon Control Systems

**Main Content Area (Right Pane):**

**CYCLE SCHEDULE** (CARD CODE: 04)

UNIT CODE:	SHIP'S NAME:	HULL NO:	DPT./DIV. CODE:	CARD NO:
	Submarine 1	SUB1	MECH	4045-04-0006
SYSTEM/EQUIPMENT DESIGNATION:			NATO STOCK NO:	TM NO:
TM4045 - De-Oiler System				4045
MANUFACTURER'S NAME:		PART NO:	MFC:	QTY:
E+v Industrietechnik GmbH		OMD-2035	C6172	1
SYS./EQUIP.NO:	NAVAL - TECHNICAL DESIGNATION:		LOCATION CODE:	SECTION:
43150200	A_ALARM GENERATOR OIL IN BILGE		2L10	
REFERENCE DOCUMENTS:				
1 - TM4045 - De-Oiler System				

Period Code	Issue Date	Task Denomination	Ref. Doc.	Work Load WLC	MC MT	Req. Discipl.	Hours	Estimat. Job Duration	MTBF (h)	Reference Card No.	Remarks Maintenance Criteria
A003	14.2.2005	Change Desiccator			ME2 P	OM-Mech.Div	2	2		4045-07-A003	None
M005	9.2.2005	Clean and check Sample Cell Tube	1		ME1 P	OM-Mech.Div	5	5		4045-07-M005	None



# Experiences with electronic manuals at HDW

## CMRS Cards

The screenshot shows a software application window titled "- 4045-07-B001 - Change Fluid Grease of Gear". The interface is divided into a navigation index on the left and a main data area on the right.

**Navigation Index:**

- SUB1
  - MI - Master Index
  - IL - Inspection List
  - Ship's Auxiliary Systems
    - TM4045 - De-Oiler System
      - C0 - Table of Contents
      - C1 - System Presentation Card
      - C2 - Special Safety Instructions Card
      - C3 - Maintenance Schedule
      - C4 - Cycle Schedule
      - C5 - Trouble Shooting Card
      - C6 - Inspection Card
      - C7 - Planned Maintenance Card
        - 4045-07-M001 - Clean Bilge Water De-Oiler exte
        - 4045-07-A001 - Clean Bilge Water De-Oiler inter
        - 4045-07-B001 - Change Fluid Grease of Gear
        - 4045-07-Q001 - Clean Coarse Filters (1461, 1499
        - 4045-07-M002 - Check Dry Run Protection (4315
        - 4045-07-A002 - Perform Insulation Test of Elect
        - 4045-07-Q002 - Clean Bilges and Suction Socke
        - 4045-07-M003 - Flush and check Suction Lines
        - 4045-07-A003 - Change Desiccator
        - 4045-07-M004 - Flush De-Oiler System
        - 4045-07-A004 - Clean and check De-Oiler Switch
        - 4045-07-M005 - Clean and check Sample Cell Tub
      - C8 - Corrective Maintenance Card
      - 10 - Consolidated Equipment List
      - 11 - Required Material Card
        - 4045-11-0001 - Change Fluid Grease of Gear
        - 4045-11-0002 - Replace Stuffing Box Packing
        - 4045-11-0003 - Clean Coarse Filters (1461, 1499
        - 4045-11-0004 - Change Desiccator
        - 4045-11-0005 - Replace Sample Cell Tube
    - TM4020 - Steering Gear System
    - TM4080 - Galley Equipment
    - TM4110 - Chilled Water System
    - TM4010 - Depth Measuring System
    - TM4021 - Submarine Steering Console S54
    - TM4061 - Fresh Water Generator
  - Ship with Outfit and Installations
    - Propulsion Systems
    - Electrical Systems
    - Communication, Navigation, Detection and Electronic Warfar
    - Command and Weapon Control Systems

**Main Data Area:**

C-MRS		<b>PLANNED MAINTENANCE CARD</b>		PERIOD CODE: <b>B</b>	CARD CODE: <b>07</b>
UNIT CODE:	SHIP'S NAME: Submarine 1	HULL NO: SUE1	DPT./DIV. CODE: MECH	CARD NO: 4045-07-B001	
SYSTEM/EQUIPMENT DESIGNATION: TM4045 - De-Oiler System			NATO STOCK NO:	TM NO: 4045	
MANUFACTURER'S NAME:		PART NO:	MFC:	QTY:	
SYS./EQUIP. NO:	NAVAL - TECHNICAL DESIGNATION:		LOCATION CODE:	SECTION:	
JOB DUR.: 10	RELATED JOBS:		WORK LOAD: 10000	WLC: H	
MAINTENANCE CRITERIA: None		MAINTENANCE SYSTEM CONDITION: System out of operation			
TASK DENOMINATION: Change Fluid Grease of Gear					
REFERENCE DOCUMENTS: TM4045 - De-Oiler System					
REFERENCE CARD NO.: 4045-11-0001 - Change Fluid Grease of Gear					

Man	Person	Category	Skill Level	Tradecode	Estimated Time
A		Mechanic	On-board Maintainer	Mechanical Division	10
Total Working Hours (in Tenths of an Hour):					10

**Job Description**

- 1 Remove 4045-11-0001 (A-6/21) and 4045-11-0001 (A-6/20) and drain fluid grease into a can for contaminated oil
- 2 Replace the screw plug if necessary.
- 3 Replace sealing ring.
- 4 Remove 4045-11-0001 (A-6/8) and 4045-11-0001 (A-6/7).



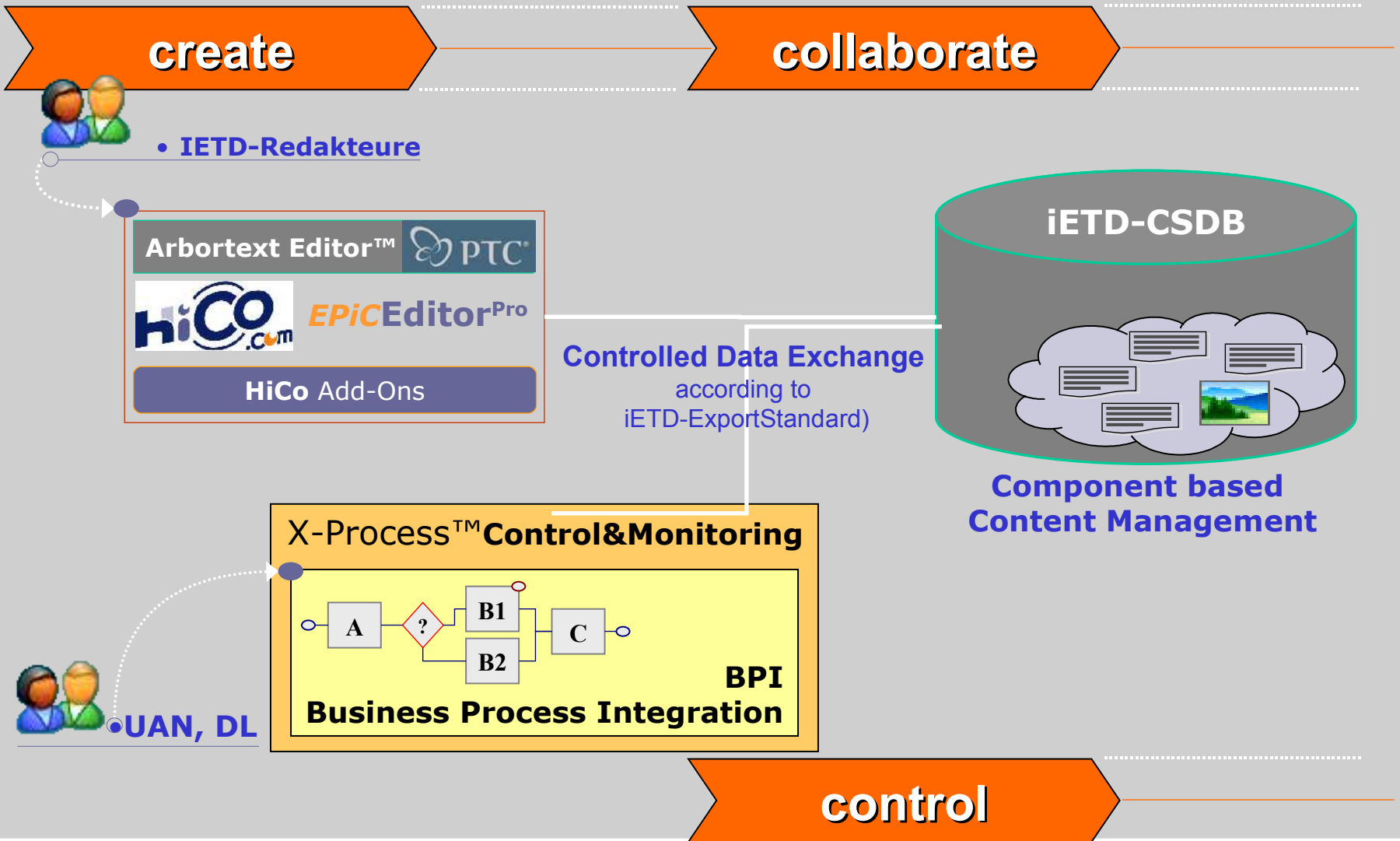
# Experiences with electronic manuals at HDW

## Creating IETD as main contractor

- 20% of Technical Manuals – done by submarine div.
- 80% of Technical Manuals - Subcontractor
- Subcontractor delivers regarding requirements – 15%
- 65% - conversion to IETD by external companies
- **TASK**  
Management of the process

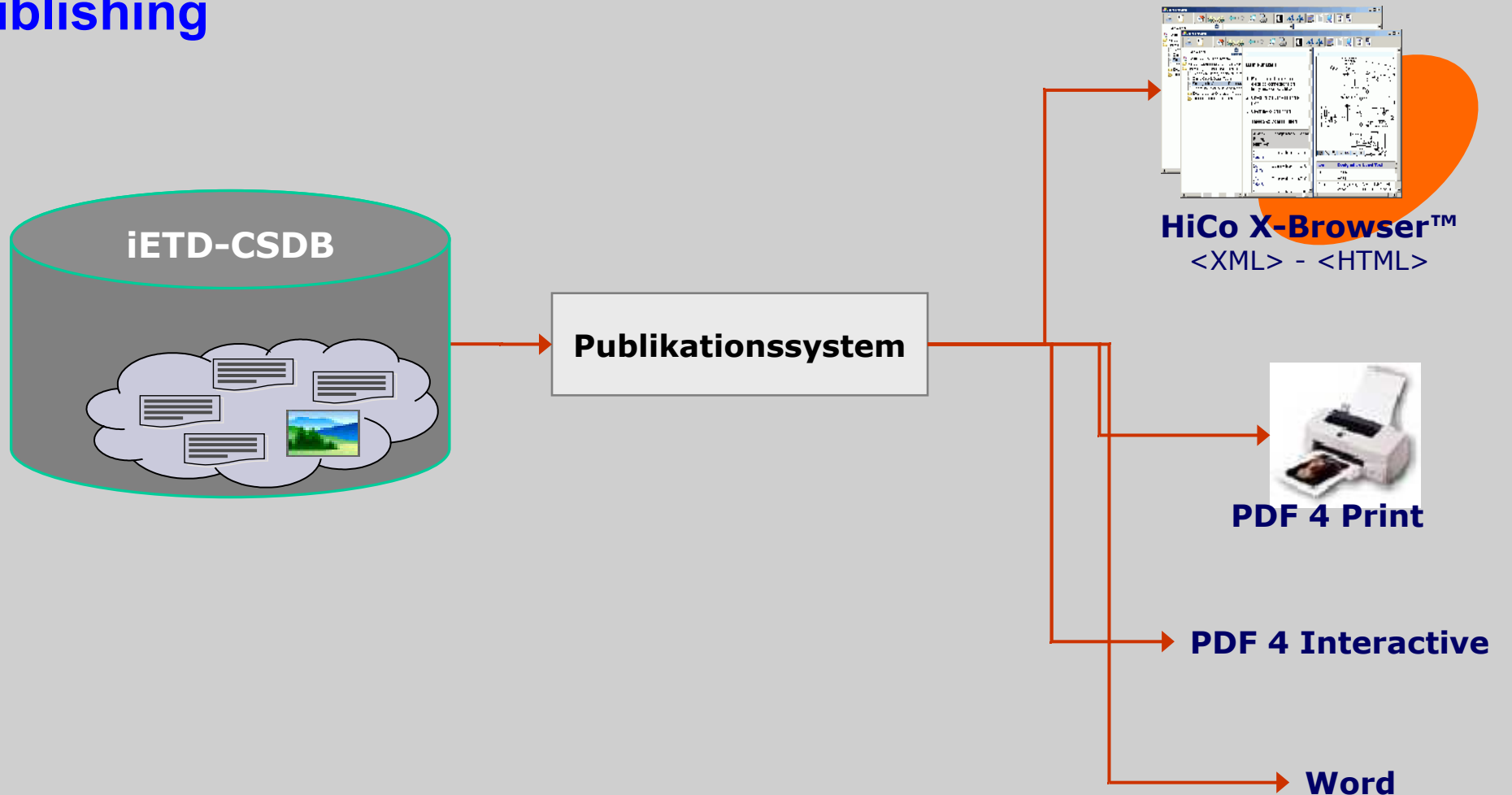


# Experiences with electronic manuals at HDW



# Experiences with electronic manuals at HDW

## Publishing



# Experiences with electronic manuals at HDW

## Test processes

- Check of structure of manual (SPSL – better DMSL) (Excel)
- Check of delivery
  - structure and modules
  - links
  - illustration entities
  - validity, completeness
  - illustration (layer, format,...)



# Experiences with electronic manuals at HDW

## Import process

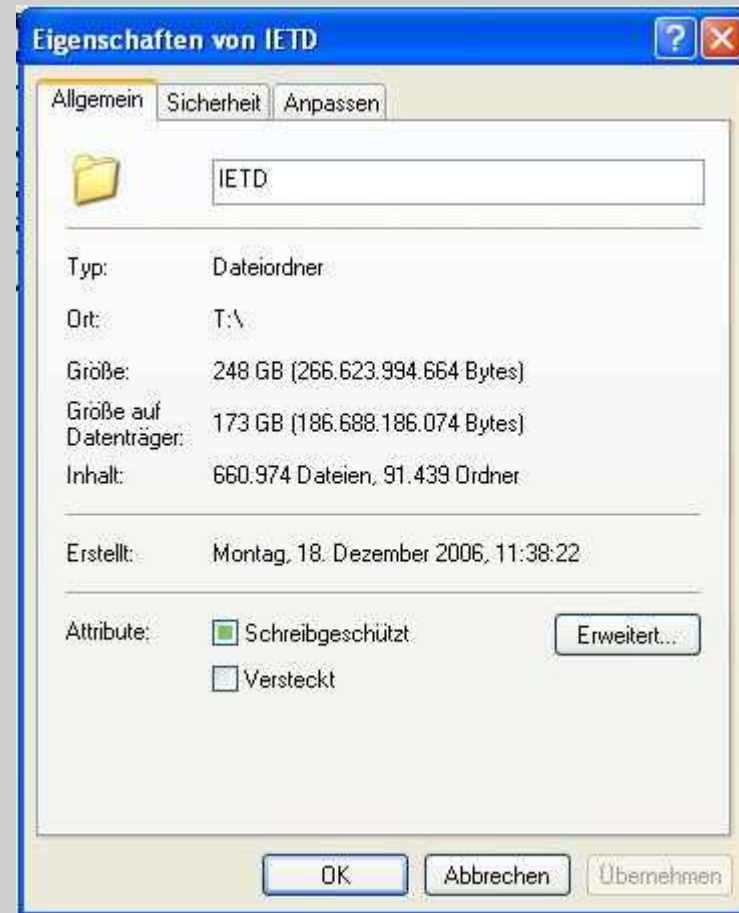
- only after successful check
- import of structure --> generation of modules
- import of a complete delivery
  - import of structure
  - import of modules
  - import of illustrations including legends



# Experiences with electronic manuals at HDW

## Amount of Data

- for 3 contracts in work
  - Folder: 91,439
  - Files: 660,974
  - Space: 248 GB



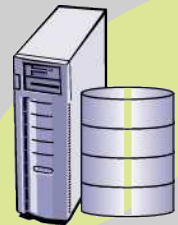
# Experiences with electronic manuals at HDW

SLIS

Ship Logistic Information System

C-MRS

Computerised Maintenance, Repair  
and Supply Support System  
C-MRS Application and Data

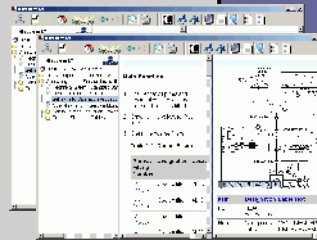


AMOS  
SpecTec

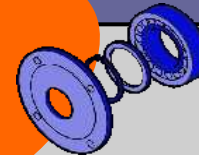
fully integrated maintenance  
information system

IETD

Interactive Electronic Technical  
Documentation  
TM's & CMRS-Cards



iETM - Browser  
HiCo X-Browser™  
XML> - <HTML>



# Experiences with electronic manuals at HDW

## Experiences

- IETD is the future, higher usability
- Electronic data – different scenarios of use
- Newer version of ASD S1000D – suitable
- Write once – use often
- Production of IETD – cheaper (but initial investment)



# Experiences with electronic manuals at HDW

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