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Simulators – a tool for practical training and specialization courses

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- Schiffer-Berufskolleg RHEIN [**SBKR**]-

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01-2013

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Central Commission for the Navigation of the Rhine

30th of January, 2013 – Round Table: Simulators in Inland Navigation



Simulators – a tool for practical training and specialization courses

A simulator - WHY?

Aviation:

- countless hours before first flight
- annual assessment



Seafaring:

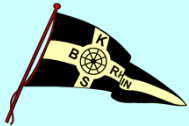
- detailed simulator training
- biennial assessment



Inland Waterway Transport:

- only practical training –
depending on the boatmaster (!)
- no further assessment





Simulators – a tool for practical training and specialization courses

A simulator - WHY?

- structured situations
- combination of different aspects
- situations are reproducible
and therefore in examinations comparable
- possibility of making mistakes
and learning from them
- trial and error – act differently in the same situation
- recording and playback function
- individual grades of difficulty



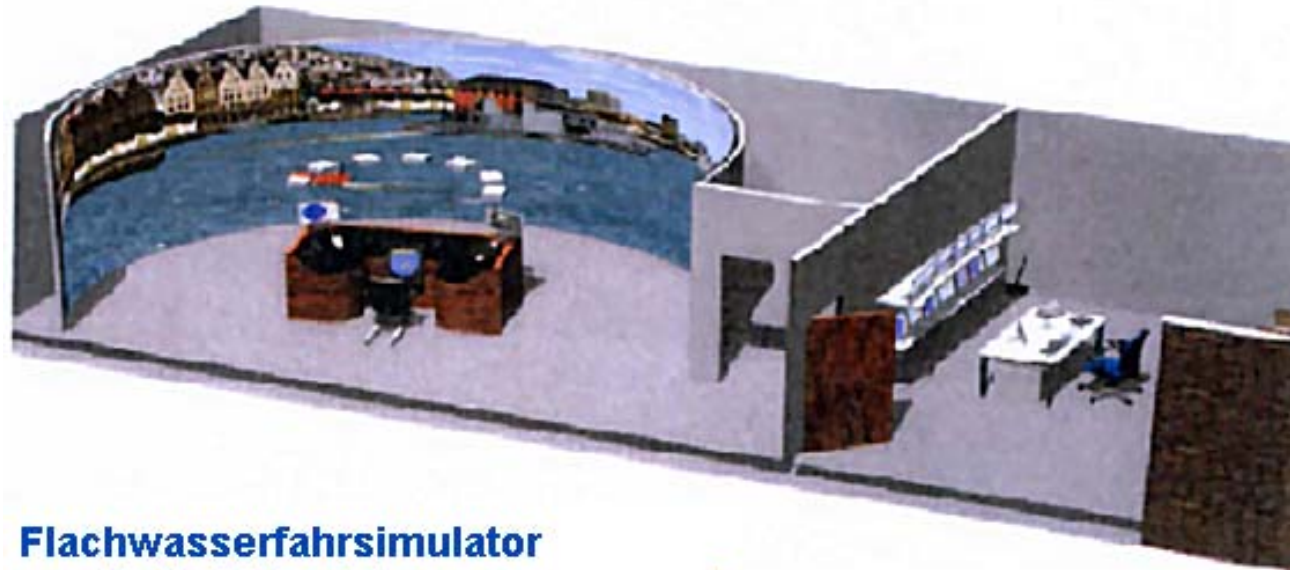


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Simulators – a tool for practical training and specialization courses



since 2008 ...



Flachwasserfahrtsimulator

SANDRA

Simulator for Advanced Navigation Duisburg
Research and Application



DST



Operator: DST - Development Centre for Ship Technology
and Transport Systems e.V., Duisburg



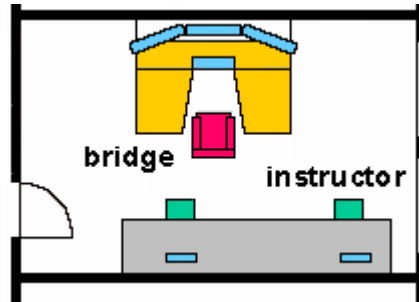
Simulators – a tool for practical training and specialization courses

Flachwasserfahrtsimulator

SANDRA

Simulator for Advanced Navigation Duisburg
Research and Application

Location: DST - Duisburg



Independent development Station with a test console.

Diapositive 5

Pau1

hier wurde das Sandra-Logo verändert. Bitte das Original verwenden. Danke!

Klaus Paulus; 22/01/2013



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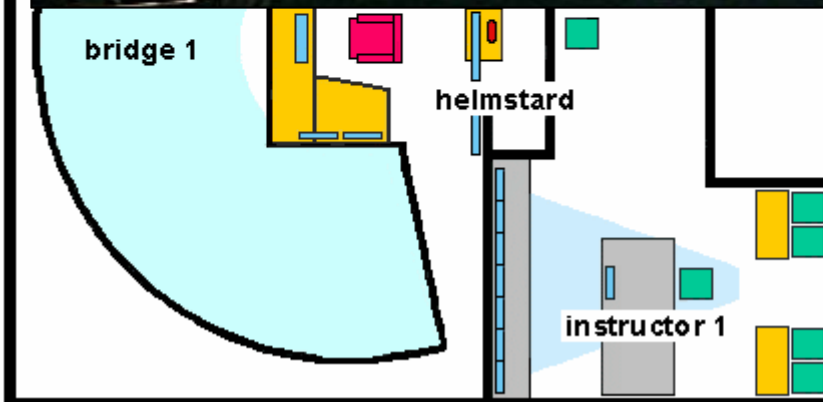
Flachwasserfahrtsimulator
SANDRA

Simulator for Advanced Navigation Duisburg
Research and Application

Location: Schiffer-BK-RHEIN



bridge 1



Fully equipped inland-vessel bridge with additional helmstand for coastal navigation. 7 projectors for 210° display and monitor screens for aft view.



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Flachwasserfahrtsimulator **SANDRA**

Simulator for Advanced Navigation Duisburg
Research and Application

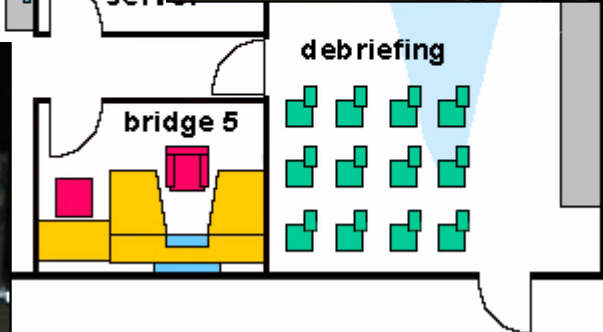
Location: Schiffer-BK-RHEIN



bridge 2

instructor 2

serv



bridges 2, 3, 4, 5

4 additional own-ship-operating consoles with single-monitor view.



Simulators – a tool for practical training and specialization courses

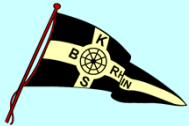
Flachwasserfahrtsimulator

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Simulator for Advanced Navigation Duisburg
Research and Application

More features:

- Specific design for inland navigation
- Computer cluster for online-simulation with 240 processors.
- One exercise comprises up to 5 manually operated vessels
- Up to 100 additional objects per exercise
- Specific inland navigation simulation software
- continuously modified and expanded by results of research and development projects



Simulators – a tool for practical training and specialization courses

Flachwasserfahrtsimulator

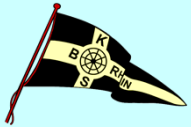
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Simulator for Advanced Navigation Duisburg
Research and Application

Application range

Examples for possible variations:

- type of vessel including associated components as propulsion and control devices
- shipping area (waterways, ports, bridges, locks)
- traffic situation
- environmental conditions (time of day, current, weather, water depth, ...)
- malfunctions



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DST

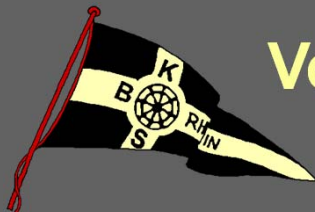


**Research and Development
DST**

Operator



**Training and Qualification
AdB**



**Vocational training [2./3. year]
SBKR**

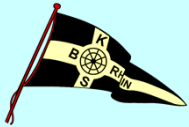


Vocational training - SBKR

- review existing skills and knowledge
- interdisciplinary activity-oriented situations
- improvement of skills and knowledge
- new content to expand professional skills
(e.g. RADAR, AIS, RIS, ...)

Time Scope:

2nd year: 1 lesson per week // 3rd year: two lessons per week



Training and Qualification - AdB

- Preparation for patent examinations
- RADAR-training
- company-specific training courses
- topography orientated navigation

Time Scope:

Depending on the content



Research and Development - DST

- modelling and test of vessels and waterways
- test of new types of vessels in different manoeuvres
- test of propulsion and control devices prior to the start of the construction works
- research and development of ports and waterways by navigability-studies
- ...

Time Scope:
Depending on the project



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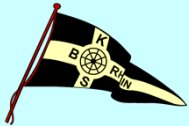
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Research and Application

Design of exercises on the simulator





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Selection of a vessel

Class		Type						
Name		Name	Length [m]	Beam [m]	Height [m]	Speed [kts]	Draught [m]	
<input type="checkbox"/> Ownship		GMS 38m bel	39	5	5	6	8	2
<input checked="" type="checkbox"/> 1Binnen		GMS 38m leer	39	5	5	6	9	1
<input type="checkbox"/> 2See		GMS 67m bel	67	8	8	6	10	3
<input type="checkbox"/> 3Test		GMS 67m leer	67	8	8	6	11	1
<input type="checkbox"/> 4A2666		GMS 80m bel	80	10	10	6	11	3
<input type="checkbox"/> 5Basel		GMS 80m leer	80	10	10	6	12	2
<input type="checkbox"/> 6Donau		KFz 05m Speedboot	5	2	2	5	50	1
<input checked="" type="checkbox"/> Traffic Ship		KFz 18m (WSP12)	18	5	5	5	21	1
<input type="checkbox"/> 1Binnen		KV 110m bel 2s1g	110	23	23	7	8	3
<input type="checkbox"/> 2See		KV 185m bel 1s2g	185	11	11	6	12	3
<input type="checkbox"/> 3Test		KV 185m bel C 1s2g	186	11	11	6	11	2
<input type="checkbox"/> 4Basel		KV 185m leer 1s2g	186	11	11	6	12	2
		Oscar Huber	75	8	8	11	8	2
		SB 35m (Herkules15)	35	15	15	11	8	2

Reload Database

Data		GMDSS Data		Picture	
Name:	Gemini	Callsign:	KVbC		
Hull Number:		MID:	1		
Visual Model:	KV_185m_b_C_1s2g /	MMSI Group:	1		
Object Group:	All Groups /	Cargo Type:	Cargo		
Controlled By:	BRIDGE1 /	Ant. Height:	<input type="text"/> m		

Ok Apply Cancel

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Variety of vessels



Instructor

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Environmental conditions

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Exercise Area: Duisburg

Exercise Date: 17-Jun-2008 Time: 12:22:14

Sun: Rise: 03:28:00 Set: 21:41:00 CIVIL

Fixed Lights: on

Seastate: SS 0 Dir: 000 deg Speed: 0.0 kts

Cloud: Cloud 0 Dir: 000 deg Speed: 0.0 kts

Wind Gusts : Static Wind Condition

Wind Dir.: 218 deg Speed: 34.0 kts

Current Dir.: 000 deg Speed: 3.5 kts Offset

Current Follows River

Tide/Depth: 3.0 m Offset Tide

LW time: 11:00 Duesseldorf

Water Temp.: 15.0 deg Change: 0.0 deg/day

Salinity: 0.0 % Change: 0.0 %/day

Target Drift: on

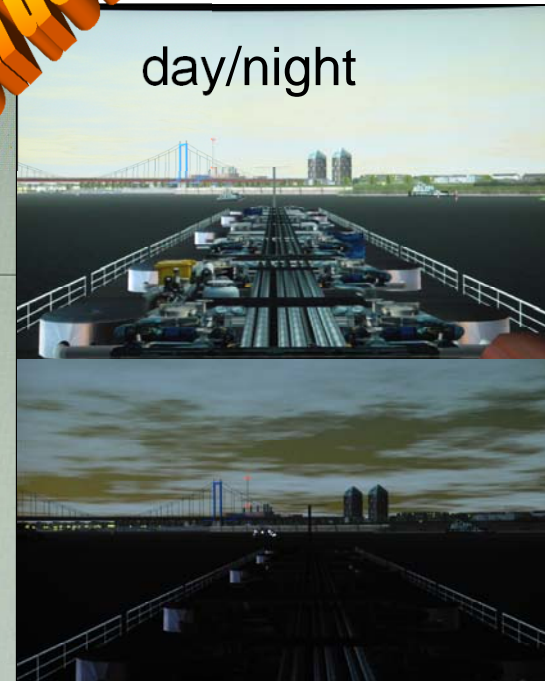
Weather: Diesig Visibility: 14.8 km

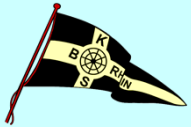
Air Temp.: 20.0 deg Change: 0.0 deg/day

Humidity: 65.0 % Change: 0.0 %/day Dew Point: 13.2 deg

Barometer (act): 1000 hPa

Barometer (cmd): 1000 hPa Change: 30 hPa/hour





Input of AIS-Data – RIS participation

Gain FTC STC
Aus
AIS Einstellen
Ziel Rotterdamm
Ankunft 30.01.13
14:00 Uhr
Status in Fahrt, Motor
Fracht Keine Zusatzin
Abladung 280
Einstellen
Navigation
Aus

Gain FTC STC
Aus
AIS Einstellen Binn
Verbandstyp
Schiff
Gütermotorschiff
Tankmotorschiff
Tankmotorschiff, Flüssigfra
Blaue Kegel 1 Kegel
Ladung Beladen
Einstellen

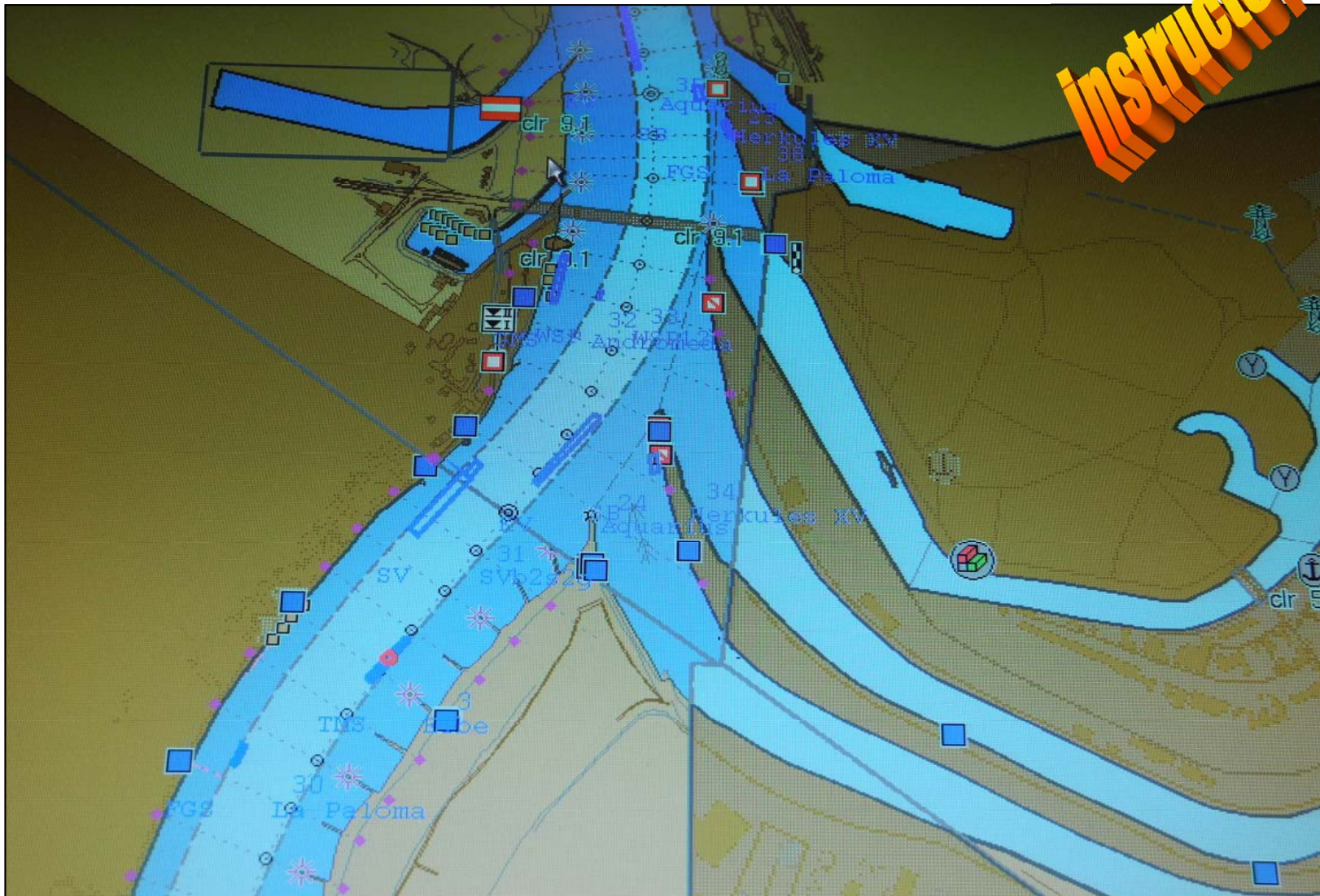
Aus
AIS Personenzahl
Personenzahl
Gesamt 0005
Besatzung 0005
Passagiere 0000
Schiffspersonal 0000
Senden Einstellen

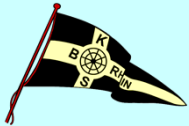
INSTRUCTOR



Simulators – a tool for practical training and specialization courses

Inland-ECDIS





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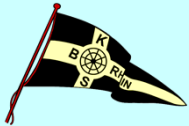
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View from the bridge

bridge





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Relevant data for the helmsman

Schiffsstatus

Kurs		Geschwindigkeit	
Gyro	040.0 °	< 0.0	km/h
Mag	041.7 °	ü.G.	19.4 km/h
Wendegeschwindigkeit		< 0.1	km/h
> 0.4 °/min		Weg	16 m <input type="button" value="Reset"/>
Ruderlage		Echolot	
> 0.0 °		Bug	5.6 m
Rel. Wind		Heck	5.6 m
Richtung	360 °	Uhrzeit	
Geschw.	10.4 km/h	12:00:03	

Control Panels:

- Port [X] / Stbd [X]:** Sliders for port and starboard engine power.
- Engine Modes:** Cruise, Full, Half, Slow, D.Slow, Stop, D.Slow, Slow, Half, Full.
- RPM [cmd]:** 267
- Pitch [%]:** 100
- Rudder:** Rudder Midships
- Whistle:** FOLLOW UP 040 deg
- Speeds:** Bow < 0.0 kts, BT 10.4 kts, Stern < 0.0 kts
- Sp/Crs Display:** Bottom Track
- Buttons:** Prop, Env, Env, Ctrl, Aux, Dat
- Function Buttons:** Anchors, Lights, Whistle, Search L, unuseit, Shapes, unuseit, unuseit, Line Stat., Flags, Alarms, unuseit

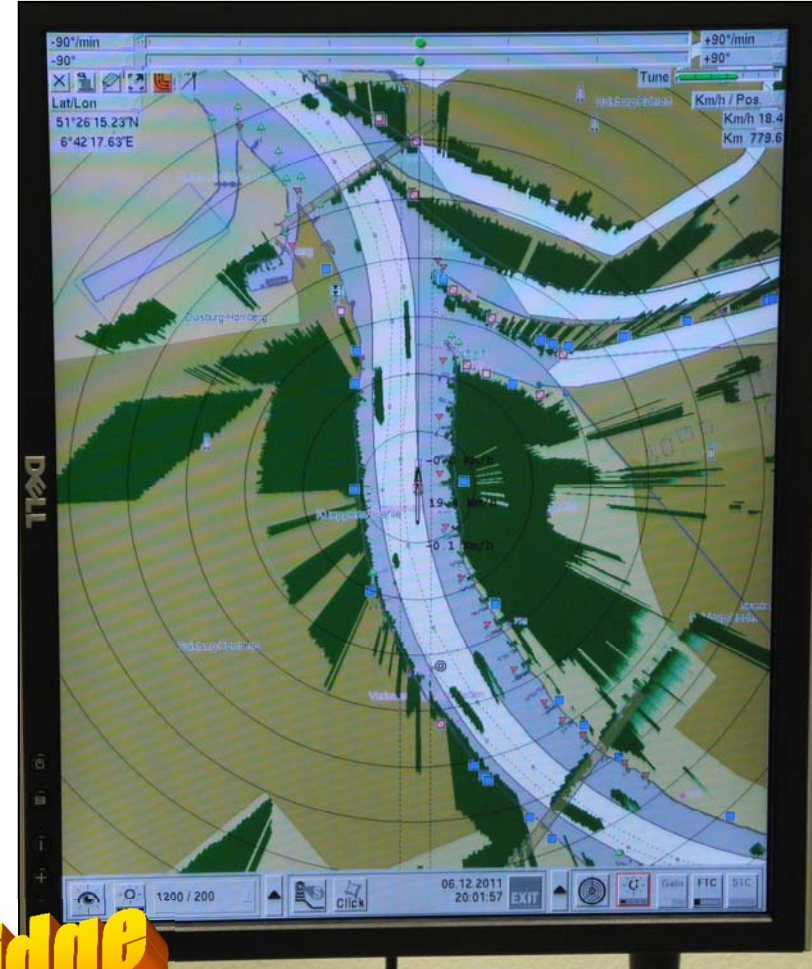
Bottom Panel:

- Name:** Elbe
- Call:** TMS
- BT Speed:** 10.4 kts
- Gyro 1:** 30 35 40 45 50
- Position:** 51:26.871 N 006:42.996 E
- Ex Time:** 12:00:03
- Rudder:** -60 -50 -40 -30 -20 -10 10 20 30 40 50 60

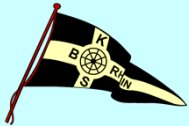




Radar-Pilot 720°: Inland-ECDIS + Radar-Overlay



bridge



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Malefunctions

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Object Id: 3

Propulsion

Engines False Start
 1 2 3 4

Engines Reduced Power By
 1 % 2 0 % 3 0 % 4 %

Steering

Rudder Lost
 3 1 2 4

Rudder Jamming At
 3 > 0 deg 1 > 0 deg 2 > 0 deg 4 > 0 deg

Rudder Jamming
 3 1 2 4

Pump 1 Damaged
 3 1 2 4

Pump 2 Damaged
 3 1 2 4

Bow Thrusters Reduced Power By
 1 0 % 2 % 3 %

Stern Thrusters Reduced Power By
 1 % 2 % 3 %

Sensors

Autopilot Breakdown
 Echo Sounder Breakdown
 Echo Sounder Offset Error 0 m
 RDF Breakdown

Further Sensor Settings :
 Radar ... Gyro ... DoLog ...
 GPS ... Loran C ...

Procedure Alarms

General (Ship Alert)
 Abandon Ship
 General Fire
 Person Over Board
 Procedure Alarms ...



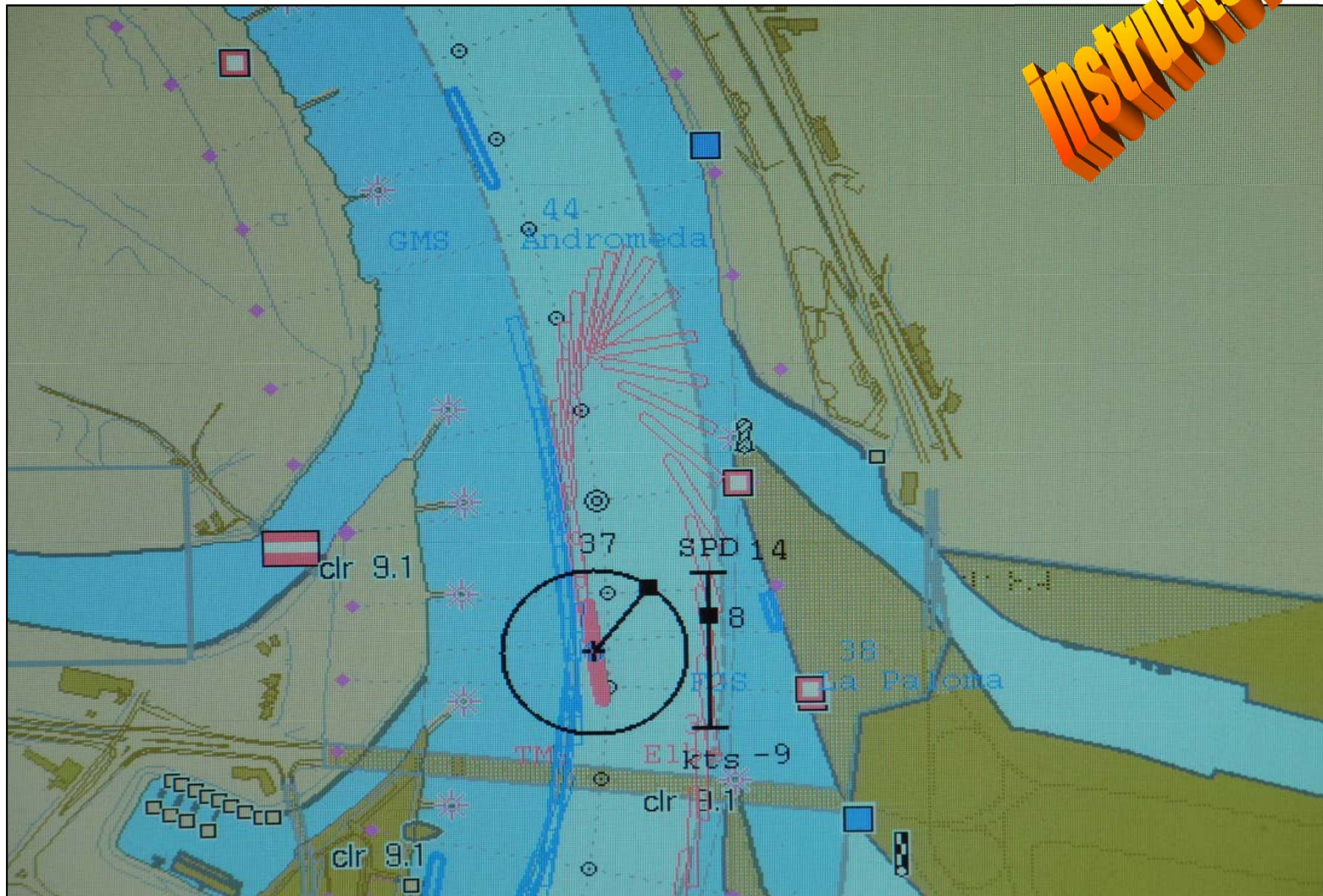
<input type="checkbox"/>	Schmieroeldruck Hptm.	<input type="checkbox"/>	Niv. Maschinen-raumbilge max.
<input type="checkbox"/>	Kühlw. Temp. max. Hptm.	<input type="checkbox"/>	E-Motor Ruderanl. Überlast
<input type="checkbox"/>	Ausfall Ruderanlage	<input type="checkbox"/>	24V Steuersp. Ruderanl. min.
<input type="checkbox"/>	Luftdruck Umsteuerung min.	<input type="checkbox"/>	Niv. Hydr. Tank Ruderanl. min.
<input type="checkbox"/>	Abgassammelleitung Temp. max.	<input type="checkbox"/>	
<input type="checkbox"/>		<input type="checkbox"/>	
<input type="checkbox"/>		<input type="checkbox"/>	
<input type="checkbox"/>		<input type="checkbox"/>	
<input type="checkbox"/>	Test	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	Betrieb	<input type="checkbox"/>	

BRIDGE



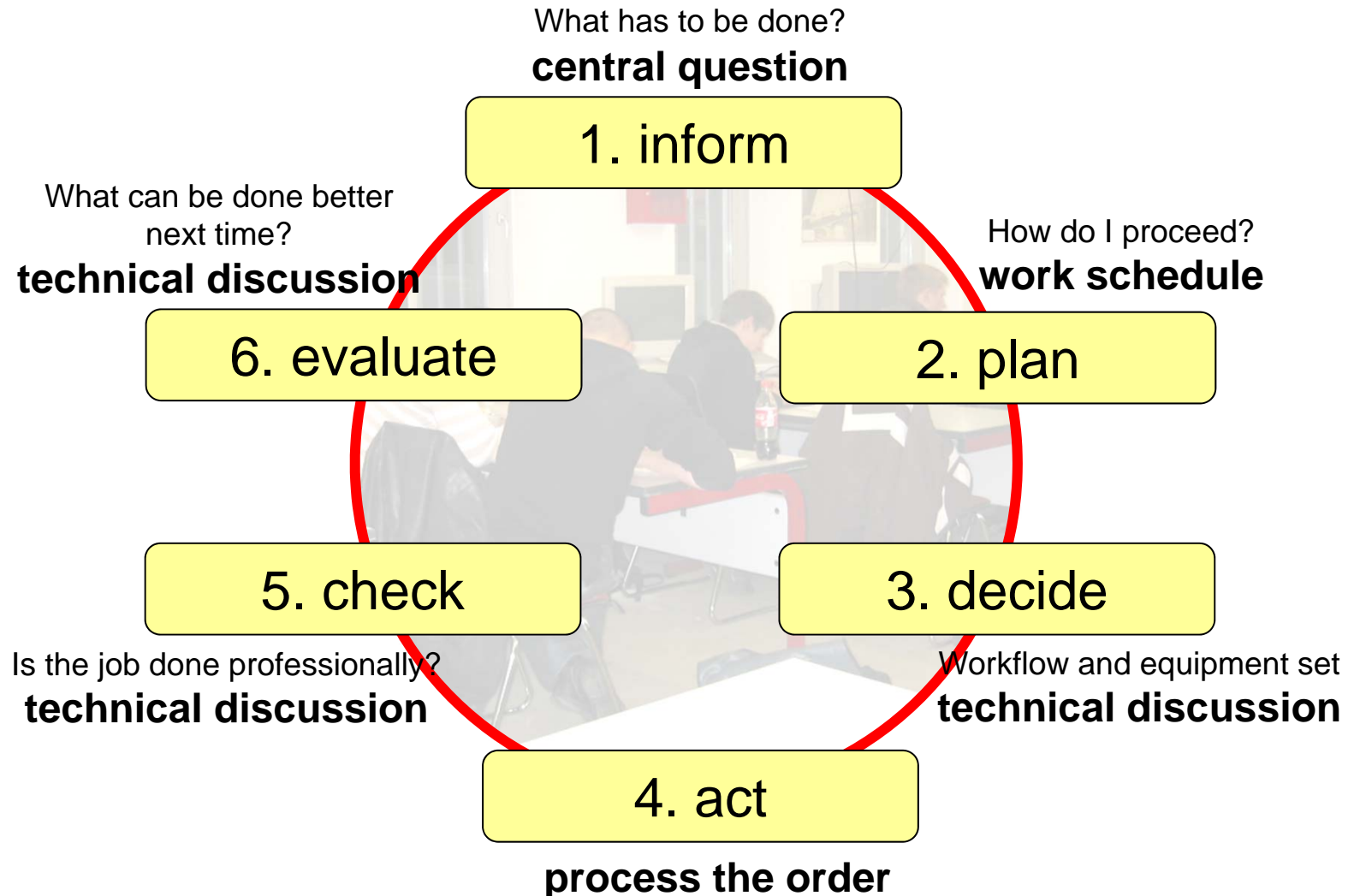
Recording

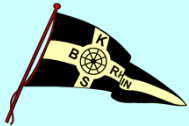
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Every exercise contains self-contained activities





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Example

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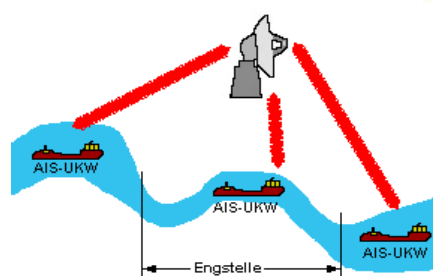
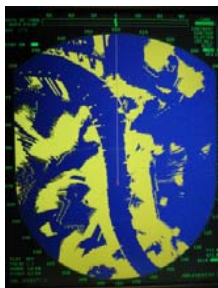
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Simulator for Advanced Navigation Duisburg
Research and Application

SBKR - Vocational training:

RADAR-Navigation under different weather situations

(RADAR-Image-Interpretation, assessing situations,
action according to the situation, radio communication)





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Example

Flachwasserfahr Simulator

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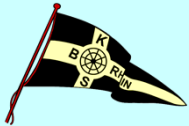
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Research and Application

ADB-course:

Passing and overtaking in heavy fog

(RADAR-Image-Interpretation, assessing situations,
action according to the situation, radio communication)





Simulators – a tool for practical training and specialization courses

Example

Flachwasserfahr Simulator

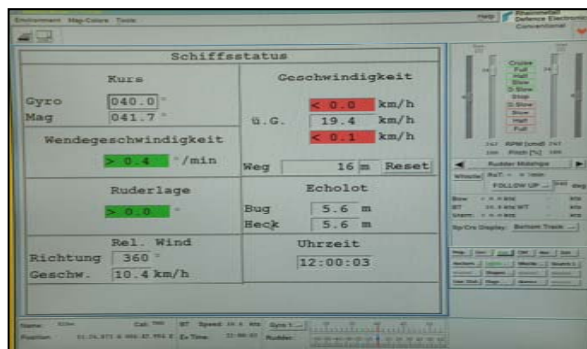
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ADB-course:

Navigation under extreme conditions – e.g. malfunction of rudder or engine while travelling downstream on the river Rhine

(radio communication, manoeuvring, anchoring)





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Example

Flachwasserfahr Simulator

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ADB-course:

Preparation for RADAR-patent

(crossing of fairways, navigate in and out of ports,
full stop at a given position, heading up, ...)

with a Motorvessel

**on different fairway-sections
and with alternating traffic density**





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Example

Flachwasserfahr Simulator

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ADB-course:

**Passing and overtaking on the middle Rhine
with a loaded/unloaded tanker
at alternating traffic density
and with different vessels**

(pusher unit 187m, container vessel 135 m, motor vessel 110 m)





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Example

Flachwasserfahrtsimulator

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ADB-special-course:

**Entrance into the port of Duisbug-Schwelgern
travelling upstream with different pusher units
with 4 or 6 loaded barges
at different water levels
and under different weather conditions**





Simulators – a tool for practical training and specialization courses

Simulators for Inland Waterway Transport

... are useful already in the vocational training

... support the aims of the vocational training

... the use of simulators

Conclusion



**Simulators are necessary tools
for advanced and continuous
vocational training and
qualification!**

... are a necessary part of the vocational training.

... can be used to gain experience.

... allow for the simulation of errors.

... are able to demonstrate complex situations.

...



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**Thank you
for your attention!**