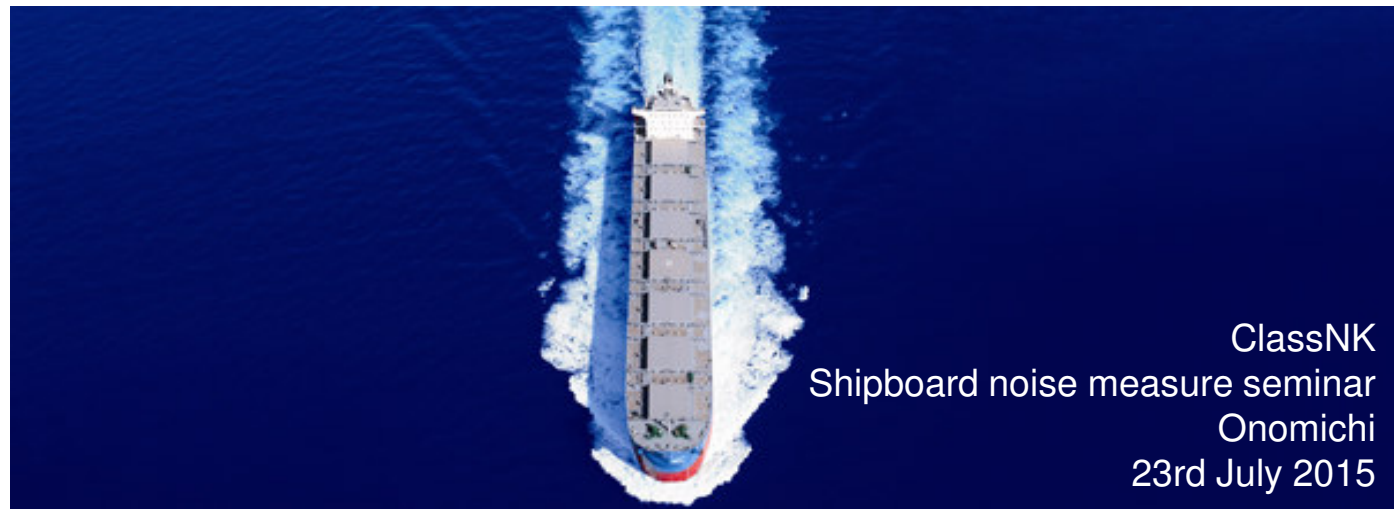
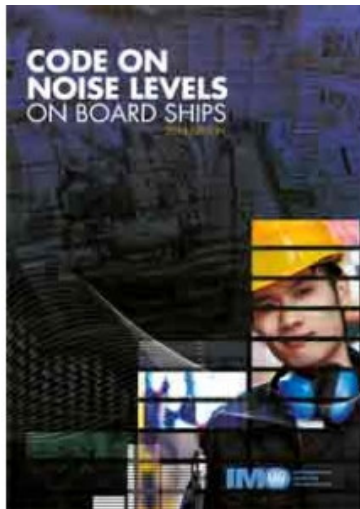




**Comprehensive noise control:**

**Designing quiet ships efficiently**



ClassNK  
Shipboard noise measure seminar  
Onomichi  
23rd July 2015

Ensuring acoustic quality



# Agenda

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1

Introduction to DW-ShipConsult

2

Key challenge: Noise control

3

Noise analysis: The DW-Compass method

4

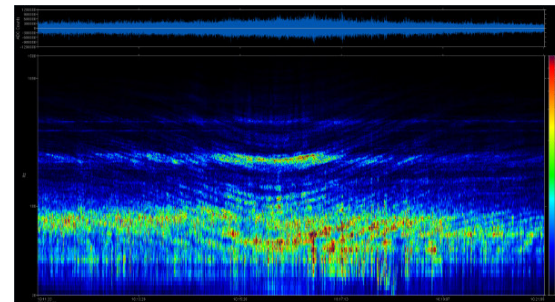
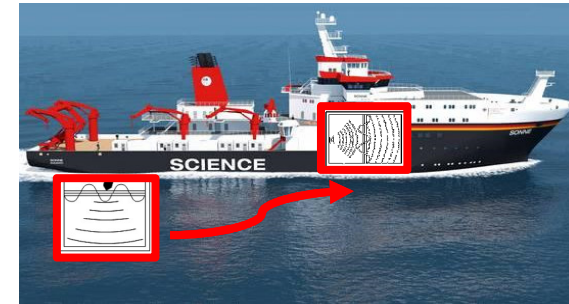
Service portfolio

# DW<sup>+</sup> SHIPCONSULT

Your Noise and Vibration Experts

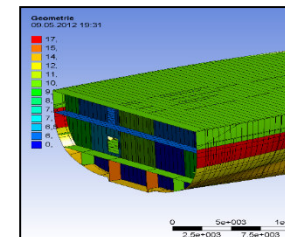


## Shipacoustics



## Hydroacoustics

## Engineering



## Hydrodynamics



# Human assets



CEO: Dr.-Ing.  
Dietrich Wittekind



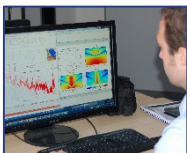
Germany's key expert on  
Ship Noise & Vibration



Staff:  
10 Employees



Dynamic team of young engineers



# Shipacoustics



## Service portfolio

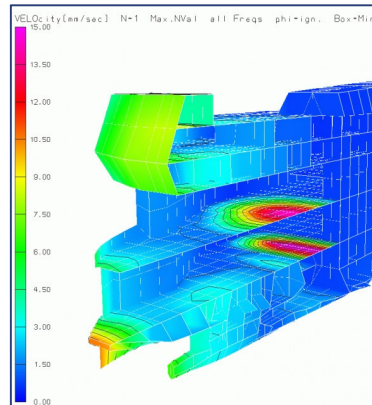
### Emperical noise prediction



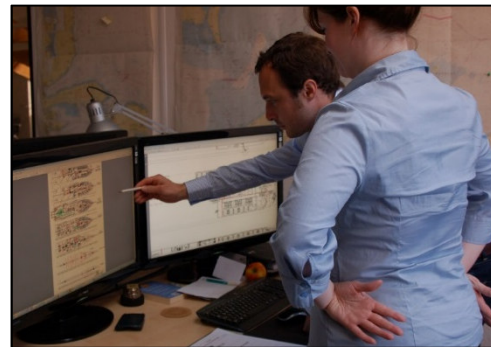
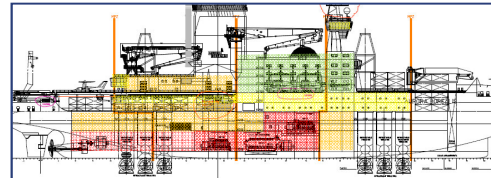
### Numerical-calculations



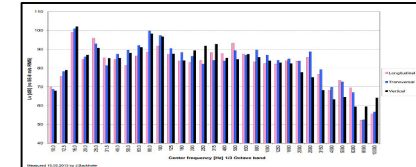
SEA  
FEA



### Design consultancy



### Trouble shooting



\*SEA = statistical energy analysis

FEA = finite element analysis

Ensuring acoustic quality



# Shipacoustics



Project types

Special Ships

Commercial Ships

Military



Yacht / Megayacht



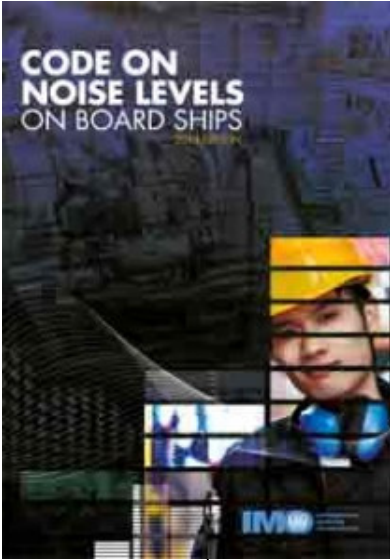
Research



Ensuring acoustic quality

# What's the challenge?

**MSC.337 (91)**



MSC 91/22/Add 1  
Annex 1, page 17

... noise levels greater than 85 dB(A) should be limited in those spaces (see chapter 5). The limit values that hearing protectors giving protection in chapter 7 are worn.

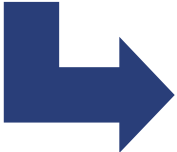
... sound pressure levels (see paragraphs 1.4.4 ...)

... various spaces as follows:

	Ship size	
	1,600 up to 10,000 GT	≥10,000 GT
...	110	110
...	75	75
...	85	85
...	85	85
...	65	65
...	70	70
...	60	60
...	65	65
...	60	55
...	65	60
...	65	60
...	75	75
...	65	60

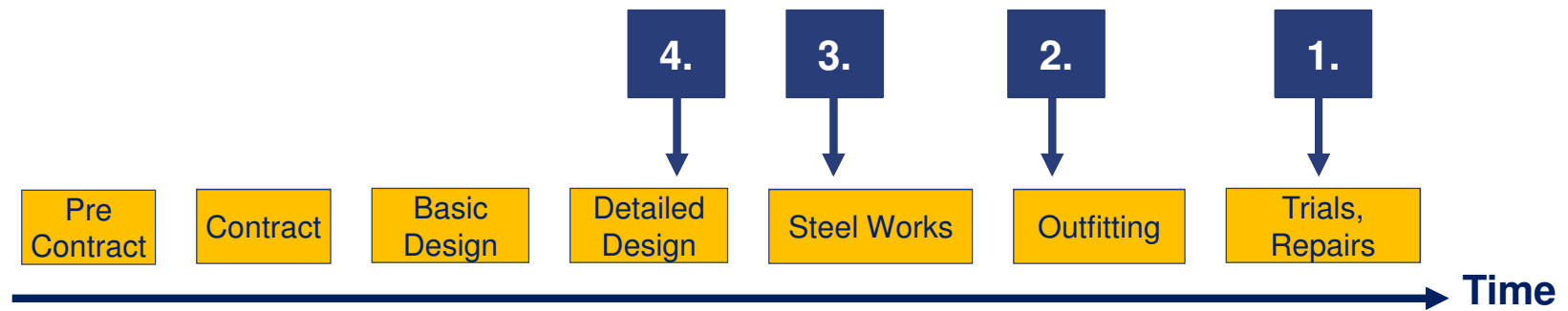
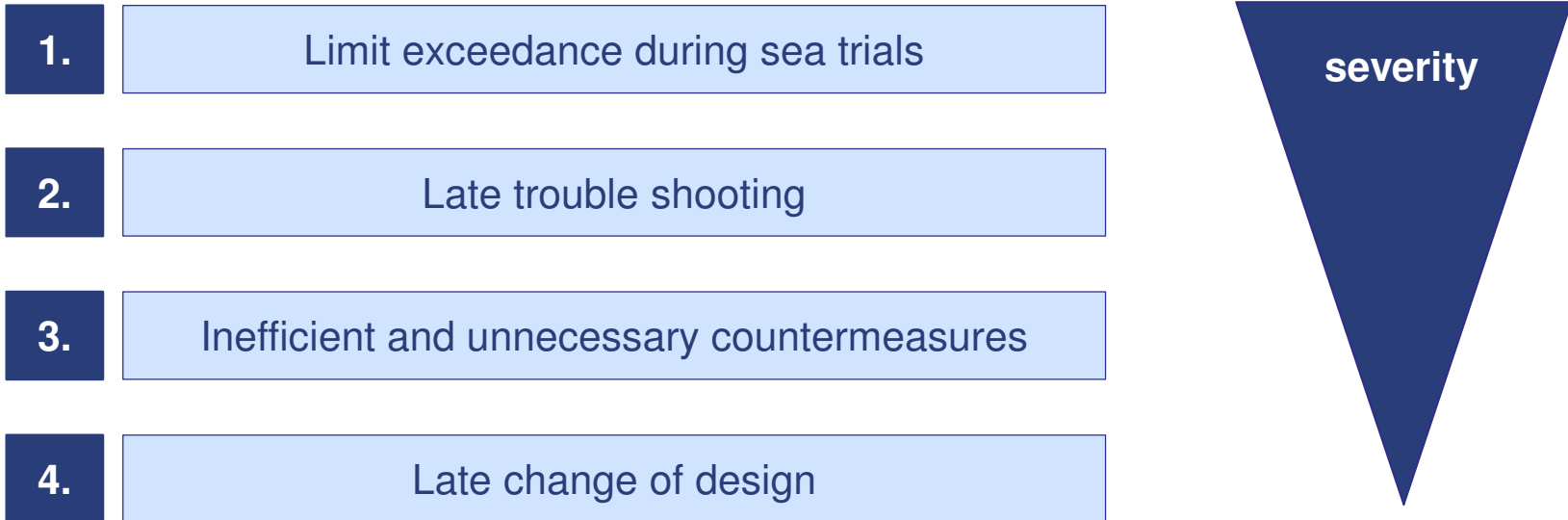


**All Ships > 1,600 GT**



**To comply with MSC.337(91) and stay competitive**

# Main risks with new regulation

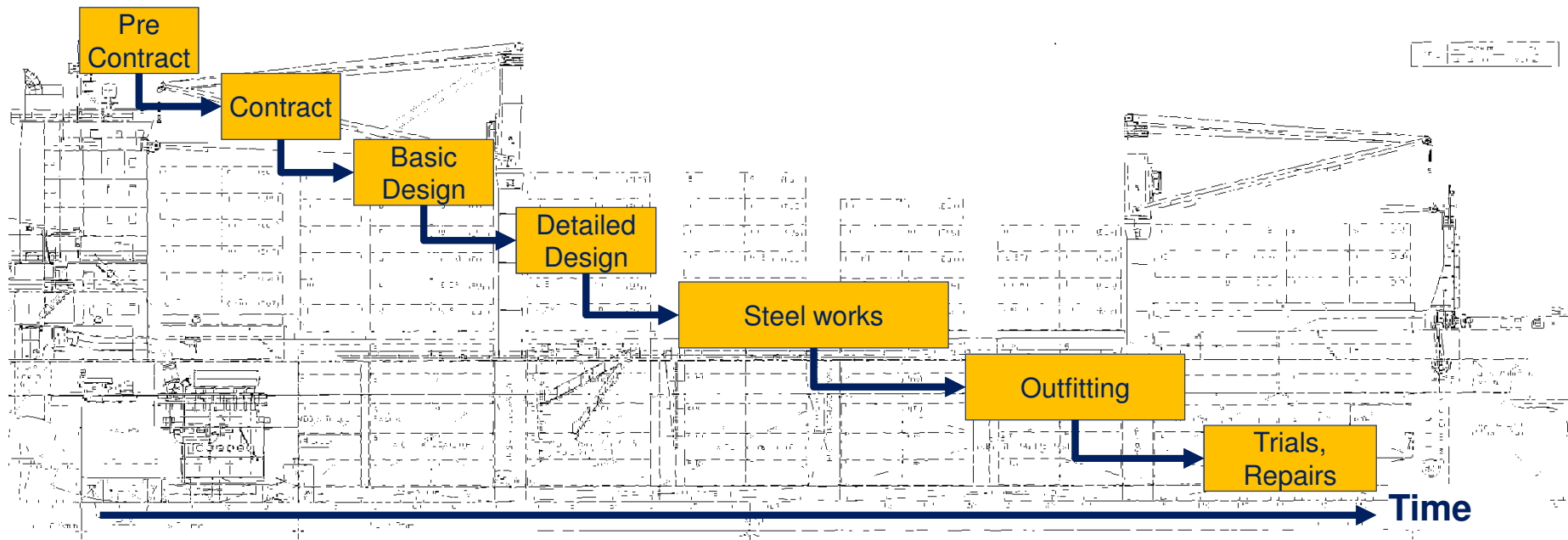


Ensuring acoustic quality

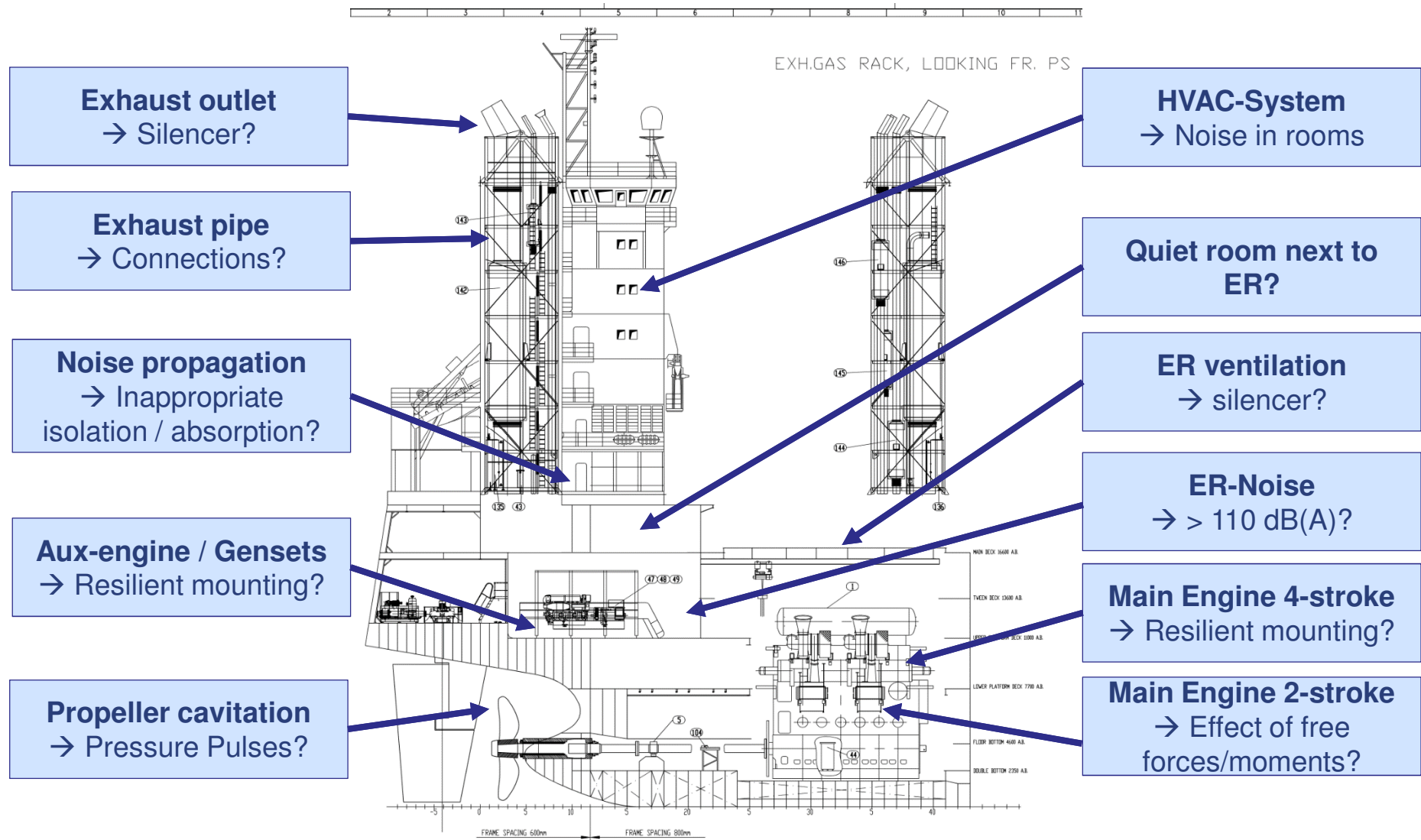


# Key points to achieve competitiveness

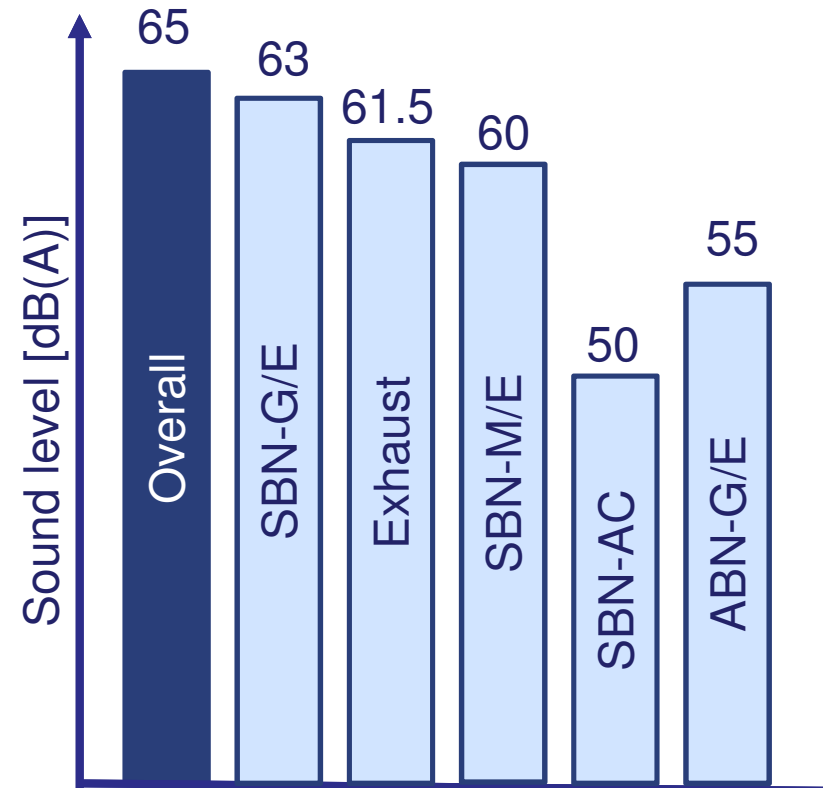
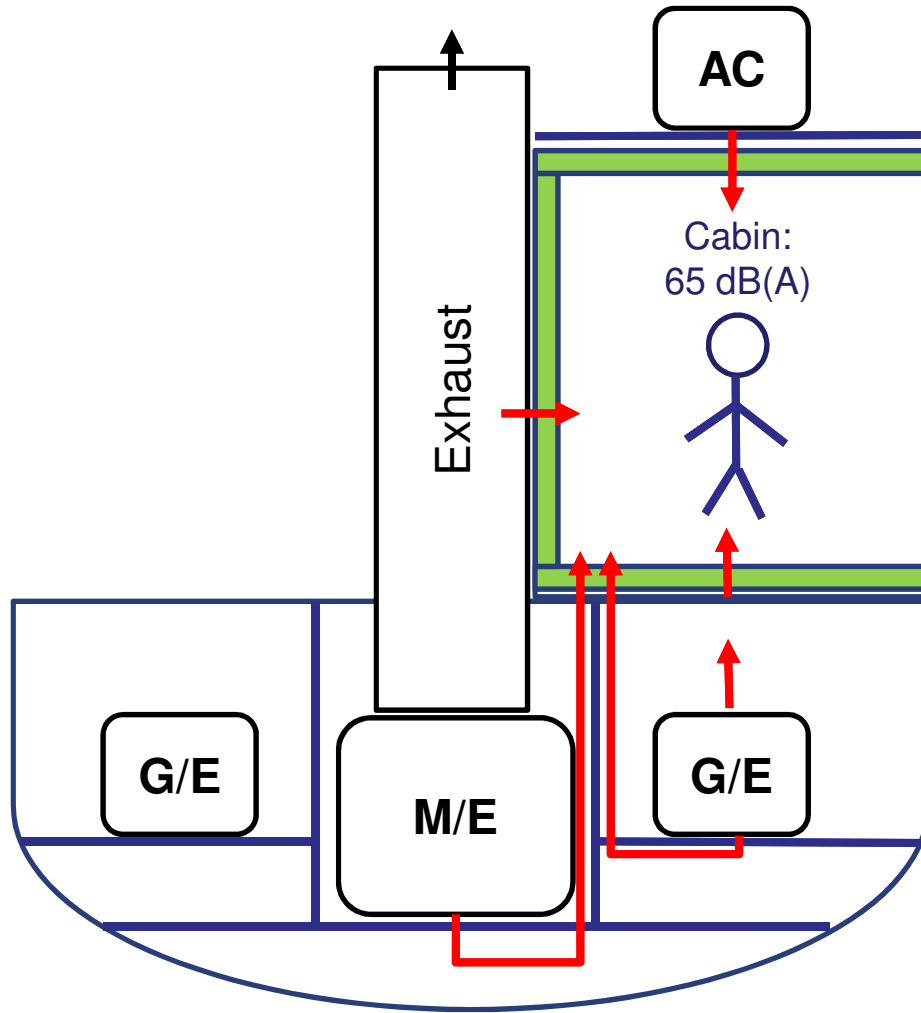
1. Know your noise levels
  2. Improve design at the right spots
- As soon as possible



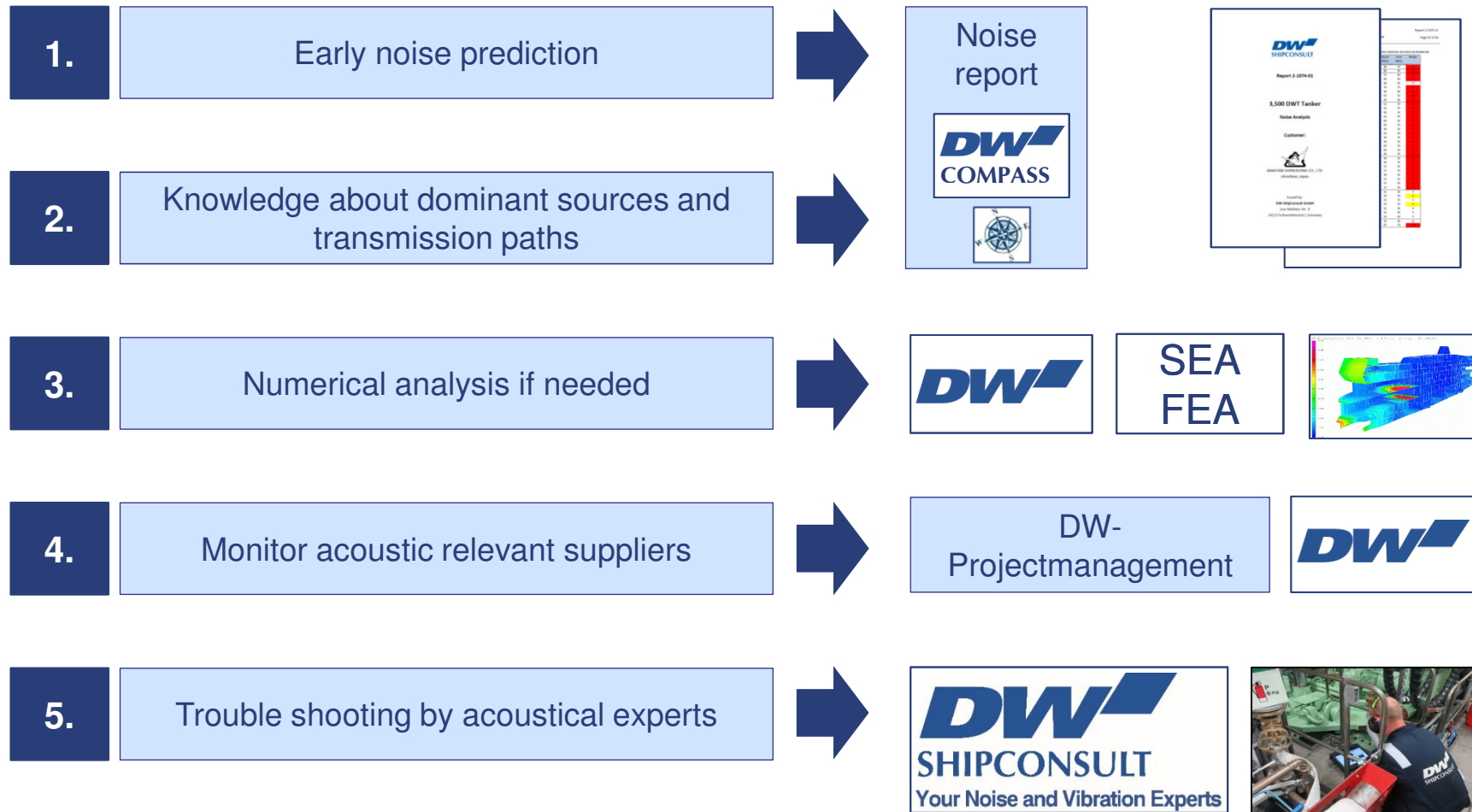
# Some typical acoustical hot spots on commercial vessels



## Example: Contents of overall noise level



# DW-ShipConsult services for smart noise control



# Noise and Vibration calculation

## The **DW** -COMPASS method

**COMP**rehensive  
Transmission and  
Impact  
**ASS**essment



**AIM: to get reasonable prediction with the little information available at early project stages**

# DW-COMPASS method

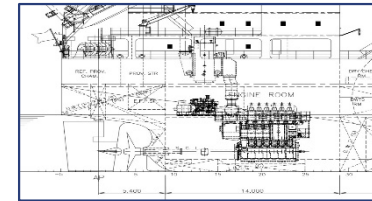
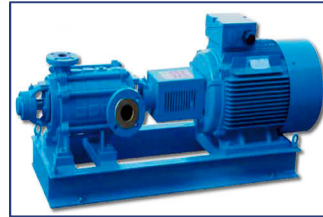
**Noise and  
Vibration  
sources**

- Generators
- Main engine
- Propeller
- Gearbox

- Pumps
- HVAC
- Exhaust



**Shipstructure  
Isolation  
Absorption**

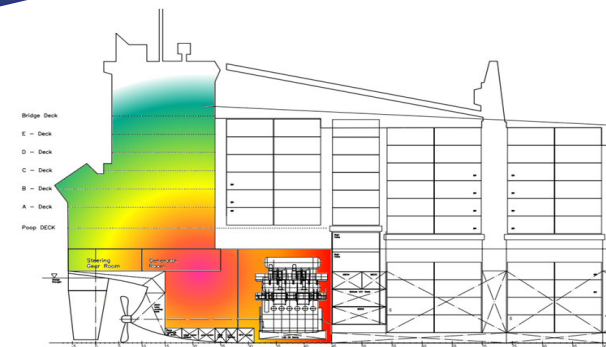


**DW**  
COMPASS



**DW**  
SHIPCONSULT

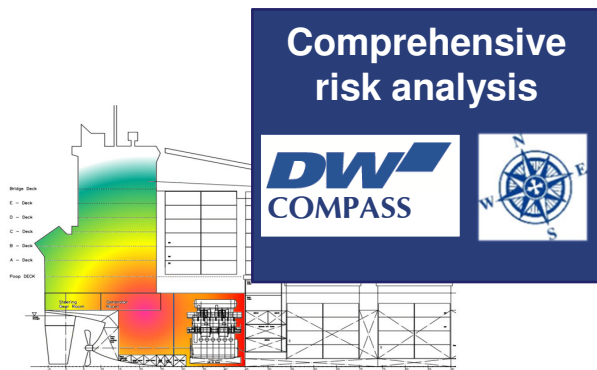
**Comprehensive  
risk analysis**



Ensuring acoustic quality

**DW**  
SHIPCONSULT

# Advantage of the DW-Compass method

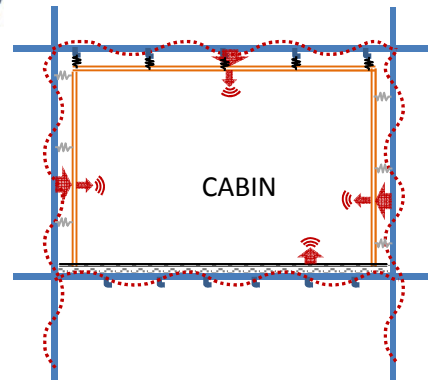
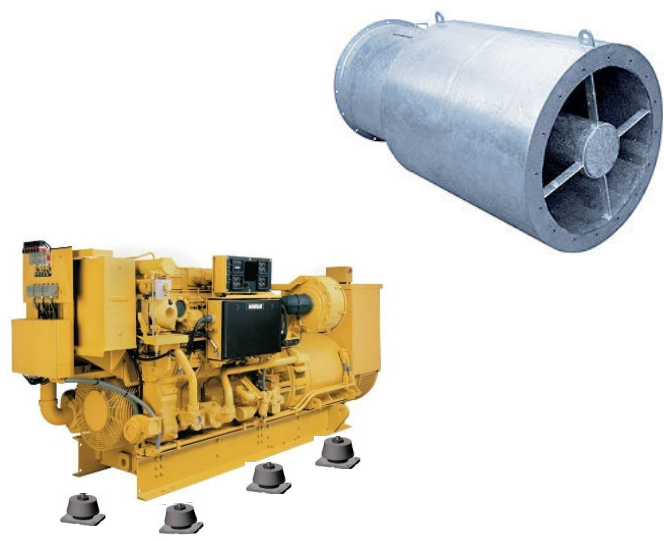


Dominant noise sources

Noisy areas / hot spots

Propagation paths

Acoustical weak points

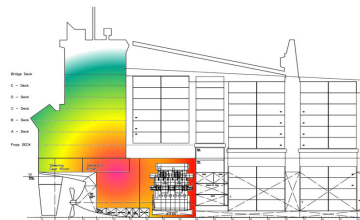


Design improvement recommendations

Find the most **suitable** and **economic** solution

# Sound propagation calculation

## Empirical analysis



## Advantages

Quick and transparent method

Design can still be influenced

Moderate costs



## DW-Product for:

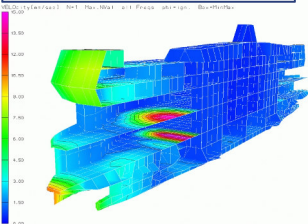
Commercial ships in all design phases

Special ships in early design

## Numerical analysis



SEA & FEA



## Advantages

Good resolution of details

Good visualization

Detailed optimization possible



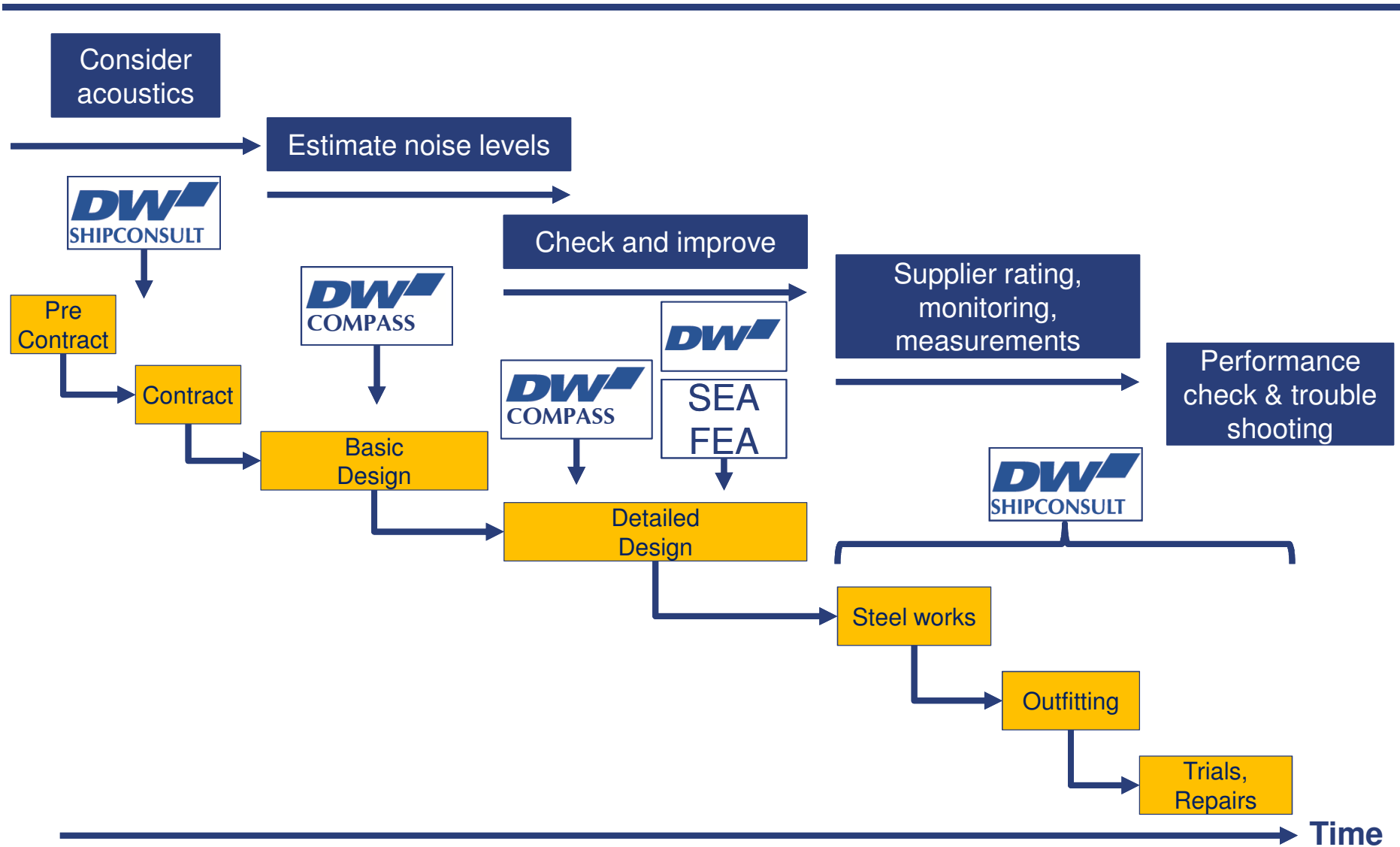
## DW-Product for:

Special ships in detailed design

Special and premium solutions



# DW-services during building process



Ensuring acoustic quality

# Summary

**DW**  
**SHIPCONSULT**  
Your Noise and Vibration Experts



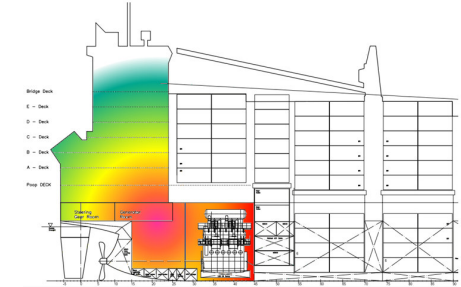
Consider shipnoise from the beginning



Have an early noise analysis



Act on it and implement the right countermeasures



Stay ahead of competition



## Contact

Managing Director:

Dr.-Ing. Wittekind: [wittekind@dw-sc.de](mailto:wittekind@dw-sc.de)

Deputy Director:

Dipl.-Ing. Schuster: [schuster@dw-sc.de](mailto:schuster@dw-sc.de)

Business Development:

Dipl.-Ing. Büchler: [buechler@dw-sc.de](mailto:buechler@dw-sc.de)

[www.dw-sc.de](http://www.dw-sc.de)

DW-ShipConsult GmbH • Lise-Meitner-Str. 9 • 24223 Schwentinal • Germany

Phone +49 4307 2769327 • Fax +49 4307 2769303 • [info@dw-sc.de](mailto:info@dw-sc.de)

Registered office: Schwentinal • Amtsgericht Kiel, HRB 11774 KI

VAT: DE271208264 • Managing Director: Dr. Dietrich Wittekind



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**DW**  
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