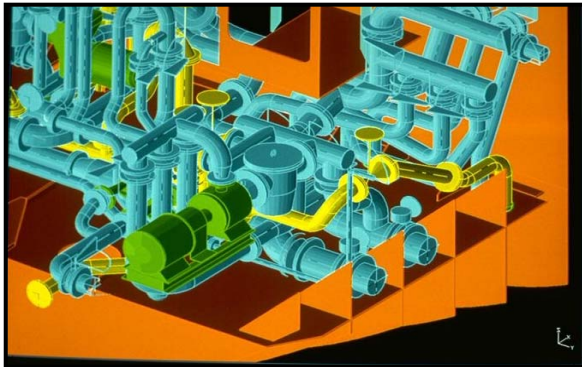


# Trends in the Maritime Industry



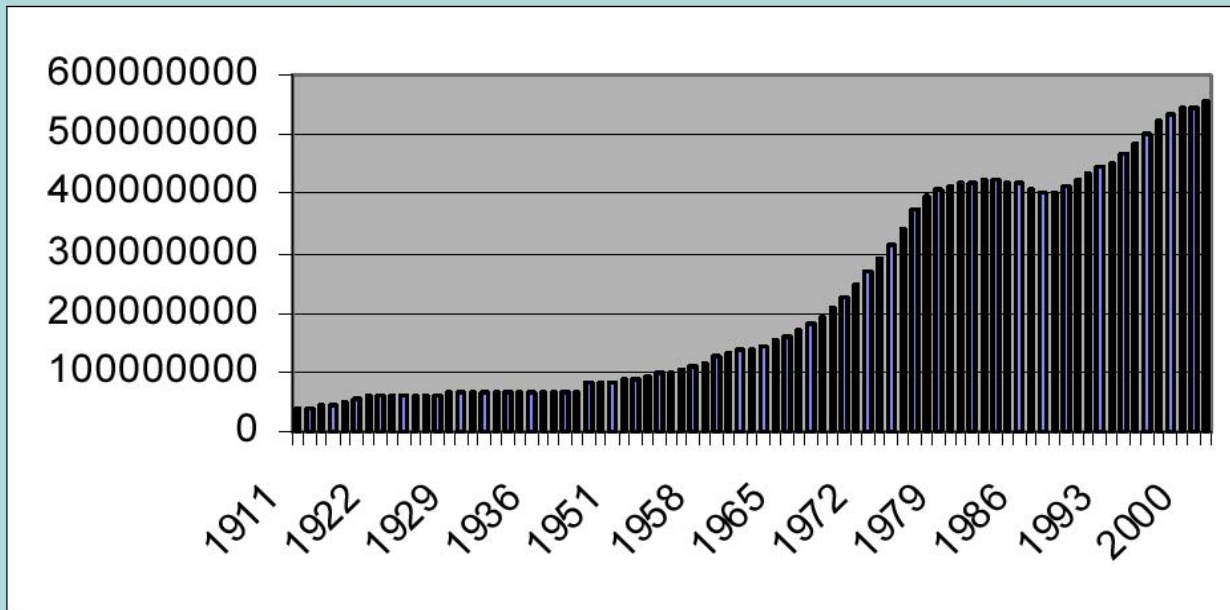
**WONDERMAR**  
**February 20, 2003**  
**Prof. Dr. Ir. Ubald Nienhuis MBA**

# Cont(r)ends.....

- Trends in the market
- Trends in the business
- Trends in the technology
- Meanwhile in the Netherlands

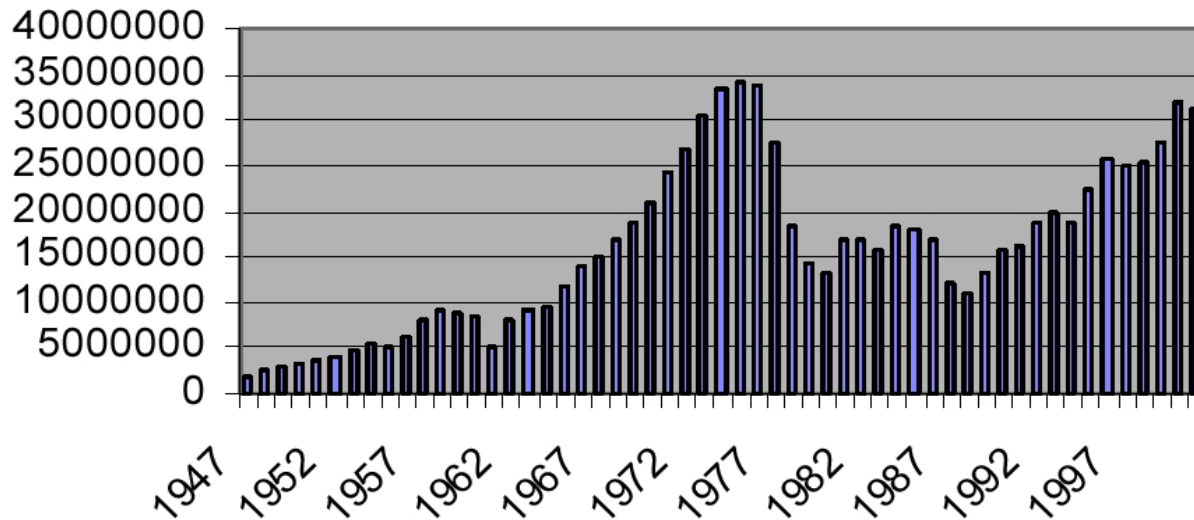
# Global Shipping Market

World fleet 1911-2001  
gross tonnage in 2001: 558 million



# Global Shipbuilding Market

World shipbuilding output 1947-2001  
gross tonnage 1961-2001: total 803 million



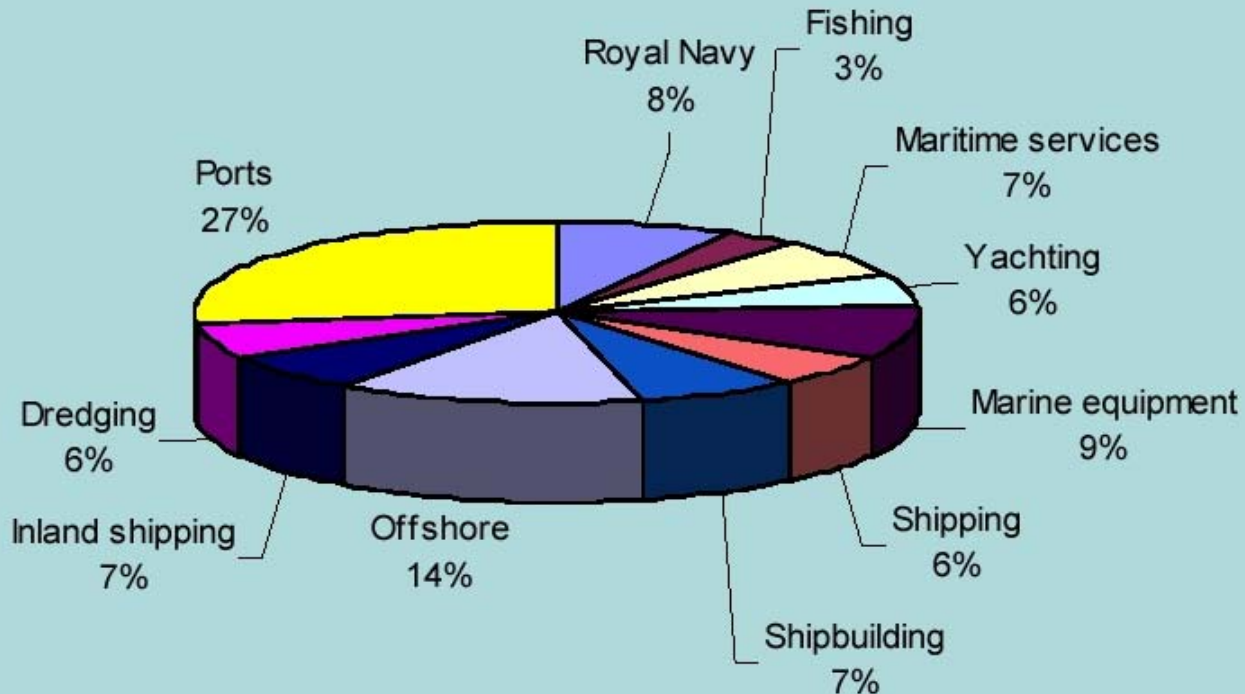
# EU-Maritime Market

Maritime market 1997	Direct	Indirect*	Total
Turnover (bn EUR)	159		
Value added (bn EUR)	70	41	111
Employment (*1000 persons)	1545	847	2392

\* Sum of the indirect effects of the separate clusters minus the estimated inter-cluster relations

© Policy Research Corporation NV & ISL

# NL-Maritime Market



Value added per sector; Total 10.5 bn Euro (1997); Labor cost + depreciation + profit

# Shipbuilding Mega Trends

- Korean onslaught continues
- Chinese dawn
- Japanese crunch
- EU-enlargement...
- Consolidation, scale, co-operation
- Niches under pressure

# Ship Owner Strategies

- Full service provider
- Functionality specification/Smart buyer
- Source globally
- Smart maintainer
- Full service requirement
- Total cost of ownership
- Design for service



# Shipbuilding Competition

- Competitive position is dominated by:
  - Wage cost per hour
  - Productivity per hour
  - Product value

Order = f(P, Time, Value, Relation, Law)

$P = ER * (C_{ship} + C_{ifs} + \text{Margin} - \text{Subsidies})$

$C_{ship} = C_{mat} + HRS * (C_{cap} + C_{lab}) + O$

Hrs = f(Size, Complexity, Repeats, Efficiency)

- More competition with size and series

# Shipbuilding Business Strategies

Factor	Strategy	But...?
Law	Relocate to the US	Local peculiarities...
Wages	Move to Romania, China, Poland, Ukraine,...	Educate, educate, educate; management cost; future?
Efficiency	Automation, ICT	Higher C <sub>cap</sub> & C <sub>lab</sub> (?)
Efficiency	Outsourcing	Profits outsourced as well
Complexity	Standardize, modularize	Attractiveness to client
Subsidies	Level playing field	Will you live to see it...
Value	ICT, knowledge, innovate	Does the client pay...

# Shipbuilding ICT-Consequences

Strategy	ICT-tools
Low-wage countries	Adapted UI's, web ERP/PDM-services
Automate	Superior algorithms & UI's, CAx
Outsourcing	Web services, PDM, multi-site, multi-user, inter-enterprise ERP
Standardize, modularize	PDM, ERP, Trade-off algorithms
Higher value product	Knowledge engineering, virtual prototyping, PDM, specialised software
Shorter time-to-market	Concurrent, collaborative process & tools
Improve own process	CAx, ERP, Virtual manufacturing

# ICT – Dilemmas

Sharing knowledge

Enforcing standards

Long term partnership

Exclusive co-operation

Transparency

Generic low-cost

Me-too follower

◆ Limiting access

◆ Open architecture

◆ Market conformity

◆ Continuity

◆ Smoke & fire

◆ Tailormade hi-cost

◆ Exposed leader

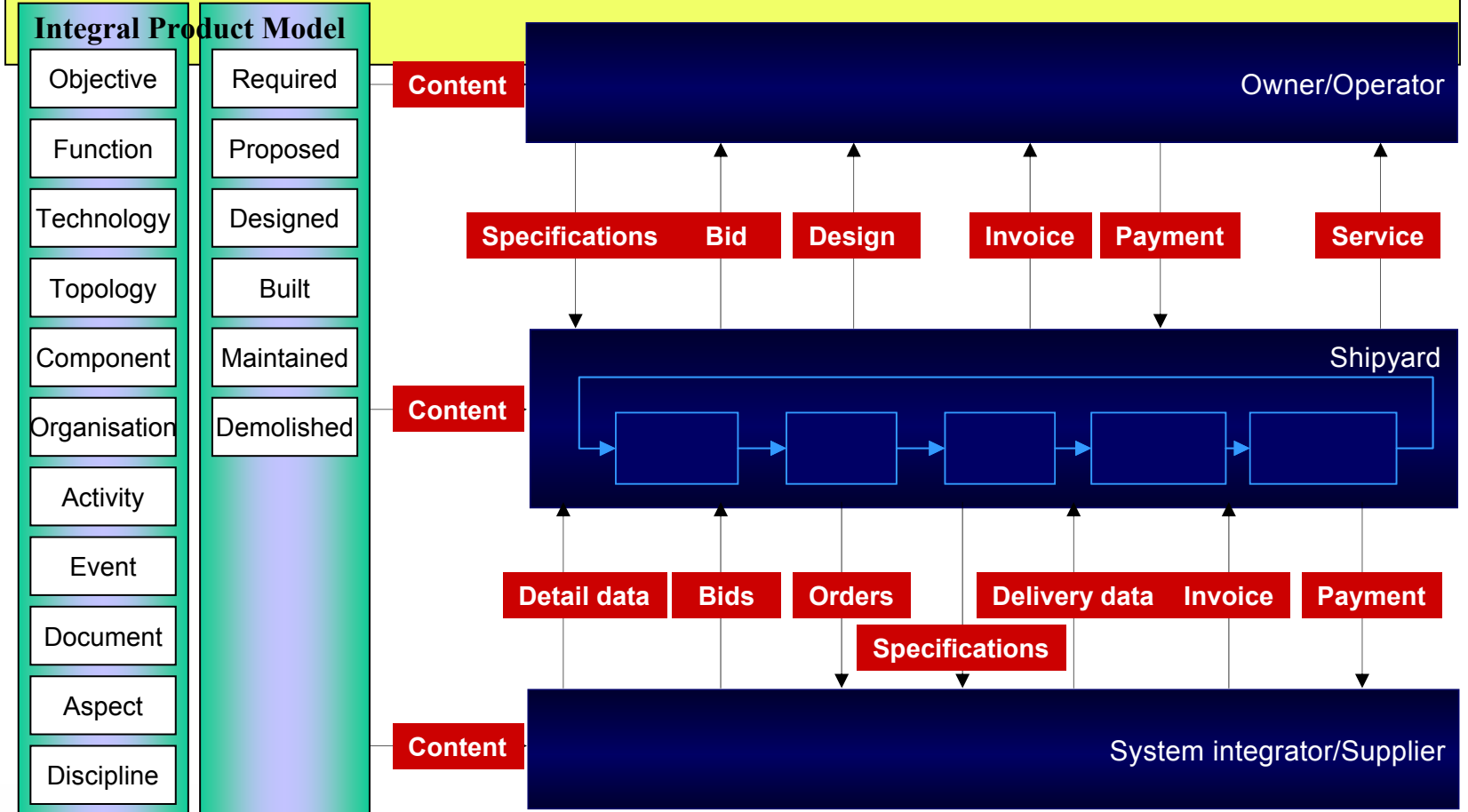
# ICT – Requirements

- NOK: one solution fits all
- NOK: proprietary standards
- NOK: generic software + consultants
- NOK: high threshold software
- NOK: ICT that needs re-organisation

# ICT – Requirements

- OK: open architecture
- OK: non-proprietary standards
- OK: flexible complexity
- OK: scalable in functionality
- OK: loosely integrated
- OK: low barriers to adopt

# Situation

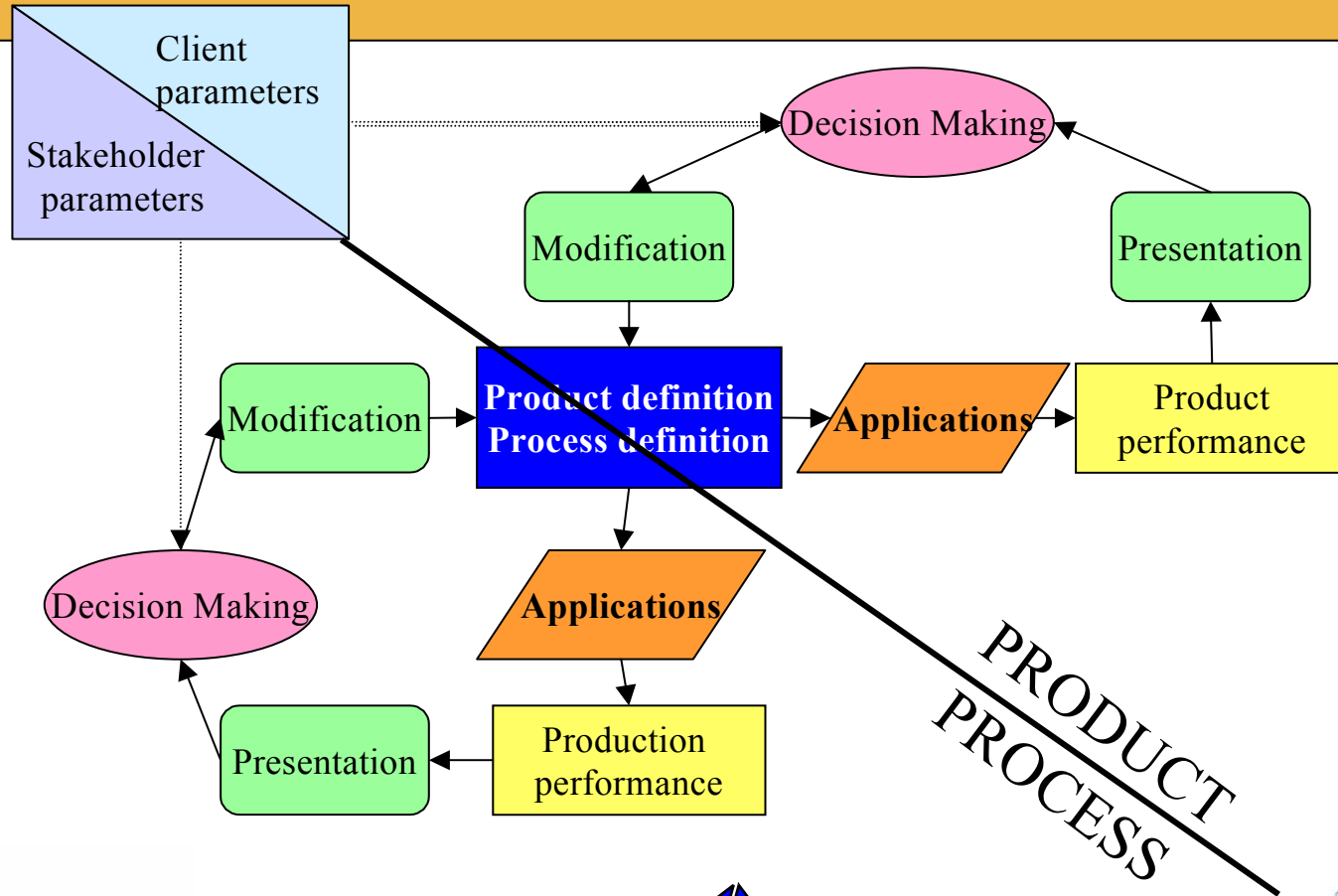


# Situation: Variability in ...

- Exchange standards (...STEP)
- Modeling philosophy (2D/3D)
- Applications (CAx/ERP/Specials)
- Company functional requirements
- Level of competence of employees
- Languages
- Project partners
- Ship types & ship systems
- Client constraints



# Technology Trends



# Technology Trends

- Latest ICCAS-conference:
  - > Data-centered papers 50%
  - > Design-centered papers 20%
  - > Operation centered papers 18%
  - > Process centered papers 12%
- What does this reflect?
  - Technology ready?
  - Market ready?
  - Highest potential?
  - Biggest hype?

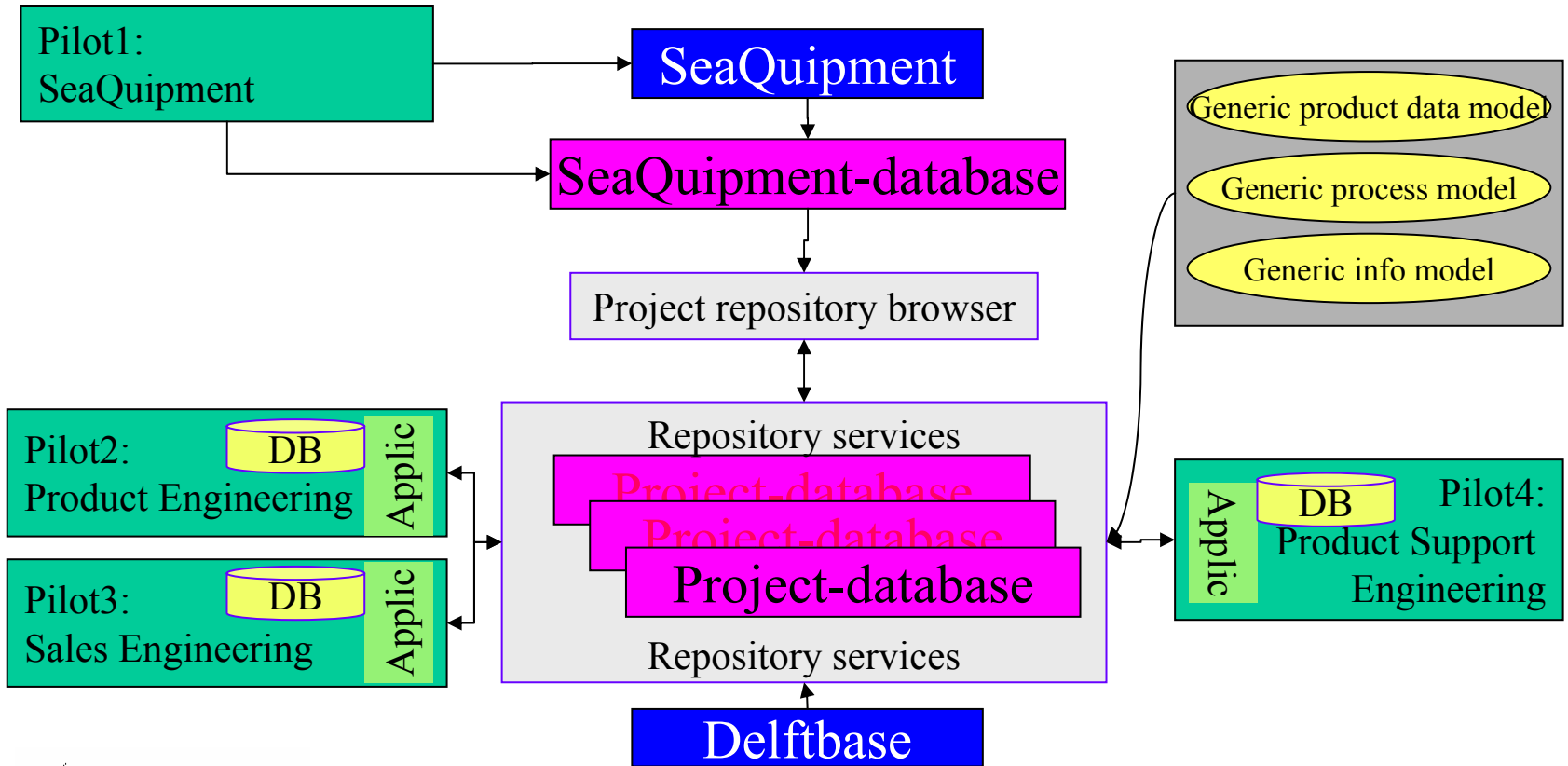
# In the Meantime in the Netherlands...

- Open Mind
- CE3P
- Quaestor
- Virtual manufacturing
- GES
- Maritime Knowledge Center
- NML-Task Force DigiShip

# Open Mind : VNSI

- 1st phase of Integral Design realization
- Builds on work of electro-tech industry
- Shipyards & consultants & academics
- Effective data exchange
- Generic model development
  - Product
  - Process
  - Information
- Pilots to demonstrate potential

# Open Mind



# CE3P : IHC & DUT

- Concurrent & collaborative engineering
- 3 yards, 5 suppliers, MARIN, DUT
- 4-year R&D-program; abt 25 fte
- Better/cheaper/quicker/lower risk:
  - Simulate: control & optimise engineering process
  - Eliminate: obliterate engineering activities
  - Automate: automate engineering activities
  - Rationalise: knowledge (re-)use in engineering

# Knowledge-based



# Design & Analysis

- Management & application of databases, formulas, spreadsheet, computer programs
- Goal-dependent application and re-use of tools & data, concept variation
- (Cost) effective use of scarce resources
- Improving the (understanding of) design and analysis methods & processes
- Fully traceable results
- Uniform work method (models & knowledge)



# UAESTOR : MARIN

Quaestor - [Mvr.14962] - MARIN.Knowledge

File Edit Knowledge Workbase Graph View Tools Window

Frame Viewer  
Reference Data  
PROPELLERS (No value) Obj  
Propeller data  
Telitab Value of PROPELLERS  
@DOCUMENT\_OWATXML\$ 1  
19  
Text of: PROGRAM  
Propeller data

Slots & Properties  
VR, OUT, OBJECT  
Alphabetic Categorized  
(Cell width) 9  
(Contents) PROPELLERS  
(Data type) @Object  
(Decimal places) 2  
(Dimension) Obj  
(Error)  
(Fixed KB value)  
(Format) FF: Fixed  
(Initial value) 1  
(Maximum value) Undefined  
(Minimum value) Undefined  
(Output to) OUT: Report + Screen

Knowledge Browser Access to: Mvr.as Domain Expert  
Parameters of the selected CLASS  
Frame  
D... Reference  
Block coefficient  
Midship section coefficient  
L... configurations  
Prismatic coefficient  
Plane area coefficient  
Displacement would be in salt w...  
Centre of buoyance aft of FP  
Combined hydrostatic informati...  
Enter for YES, 0 for NO  
LPP fwd of LPP/2  
Star Loading condition

Knowledge base:  
Relations  
Constraints  
Parameters  
Properties  
Telitabs  
Fixed values  
Satellite interfaces

Model Assembler  
Solver  
Interpreter

Parameter	Value	Dimension
%MCR Service #1	0	%
%MCR Service #2	0	%
%MCR Trials #1	90	%
%MCR Trials #2	0	%
%MCR Trials Serv	90	%
C.AddKt	1.000	-
C.Kg	1.000	-
C.Kt	1.000	-

Project phase

Test Number (Test descriptio	586 (PROPULSION TEST CONF. IV BALLAST	662 (PROPULSION TEST CONF. V DE
PROPELLERS [Obj]	(No value)	
PropStock/Design [Str]	(No value)	
PROPOL [Obj]	#1) Prop_No I/P/D = 4802 (1.082	
Prop_No [Str]	#2) Prop_No I/P/D = 6719 (0.890	
Ps ITTC-78 [kW]	0	0
PULS [Obj]	Puls DataSetID = 5233	Puls DataSetID = 5234
Puls DataSetID [ID]	5233	5234
Report AnnConf [Str]	with truster tunnels 1 ? Sterns III and 2 Pudda collapse 1 ? Sterns III and 2 Pudders III (middle	

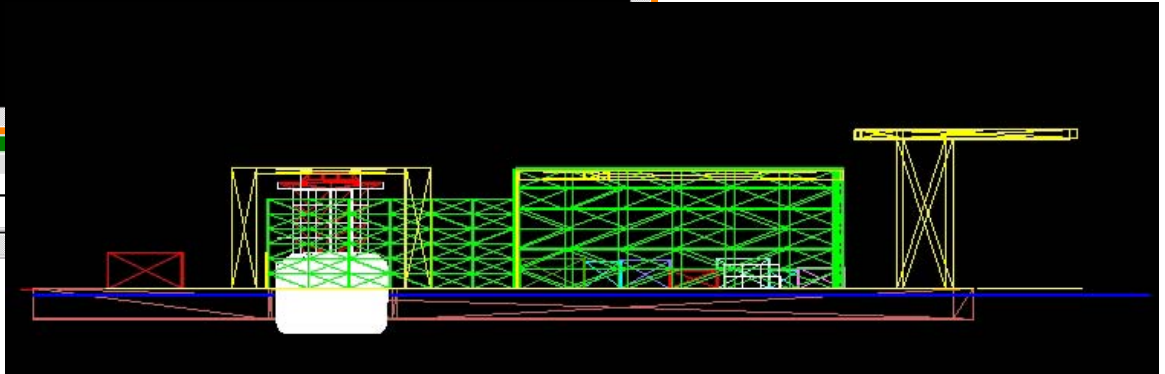
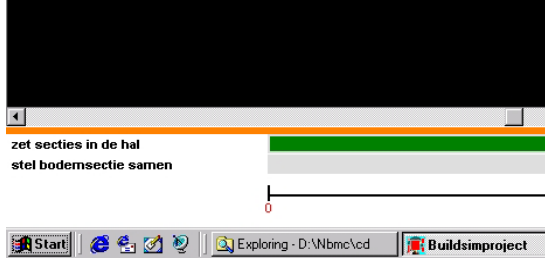
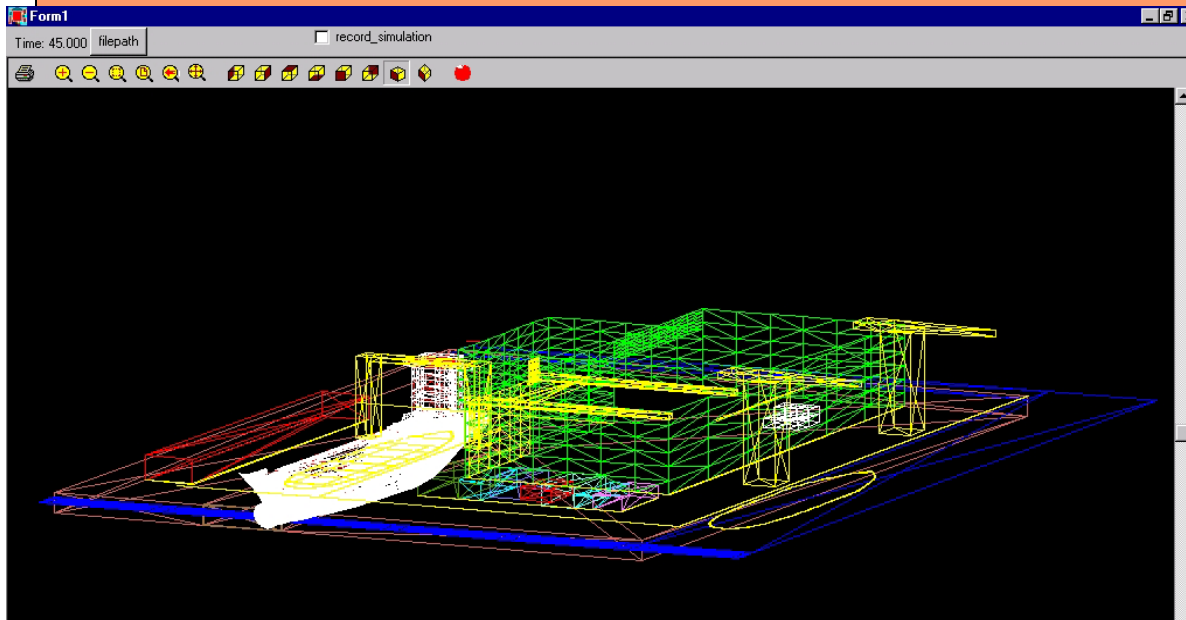
Workbase  
Dataset  
Solutions



# Virtual Manufacturing : DUT

- Quantitative risk analysis of building
- Planning & capacity optimisation
- Intelligent process monitoring & control
- Process optimisation evaluation
- Manufacturing considerations in design
- Tuning engineering & production
- If.... Then.... analyses

# Virtual Manufacturing



# GES : TNO

- Energy system design & evaluation
- All operational conditions
- All power plants
- All aspects:
  - Maintenance
  - Investment
  - Fuel consumption
  - Emissions,
  - Etc

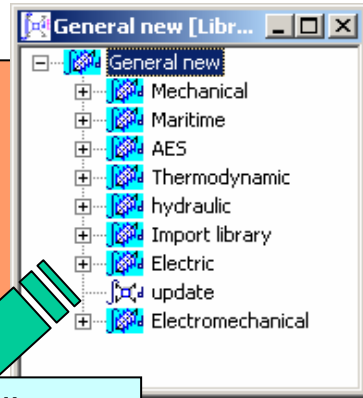


Hr. Ms. Rotterdam

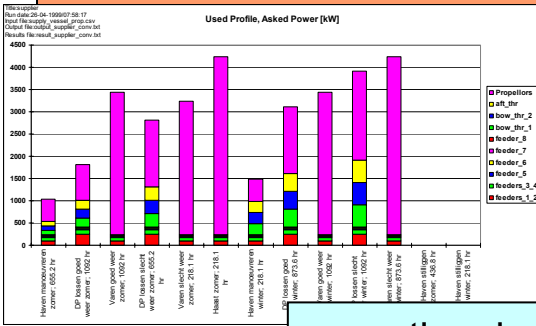
Royal Netherlands Navy  
Directorate Material



# GES

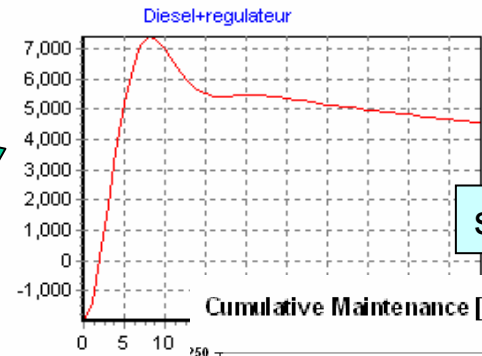


library



operational profile

analyse



Example Ship model

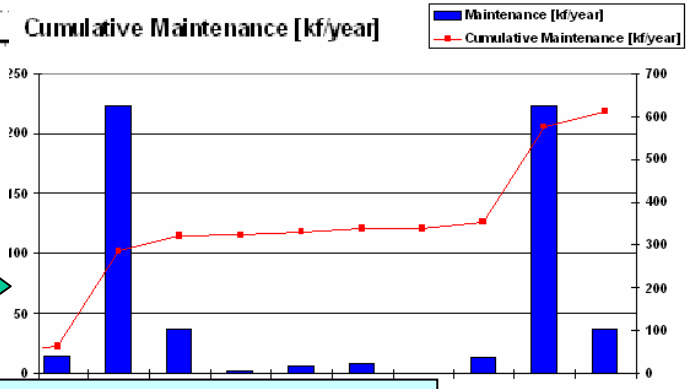
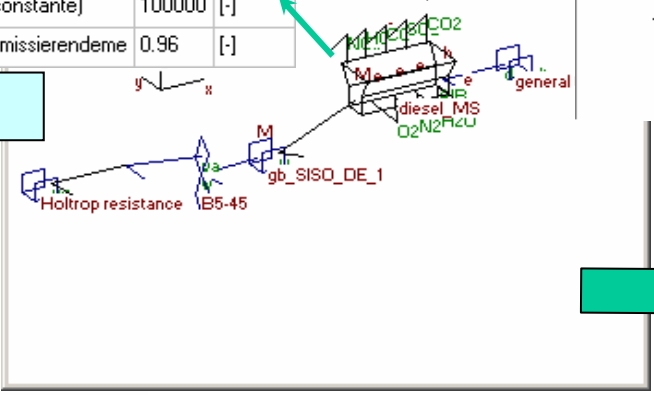
System behavior

- Accuracy
- Discontinuities
- Limits
- Applicability

system theory

Parameters - Diesel+regulateur			
Description	Value	Unit	
0 gearratio	7.5	[-]	
1 regulateurratio	1	[-]	
2 k (regulateur constante)	100000	[-]	
3 etatrans (transmissierendeme)	0.96	[-]	

modeling



functionality/performance



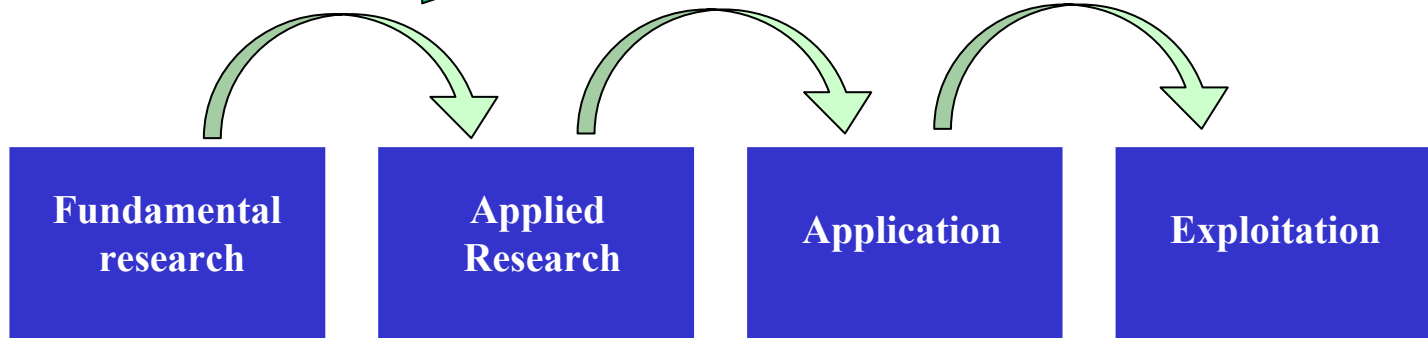
# Maritime Knowledge Center

Universities (TU Delft, KIM)

Research organisations (MARIN & TNO)

*Technology push*

Market



*Market pull*

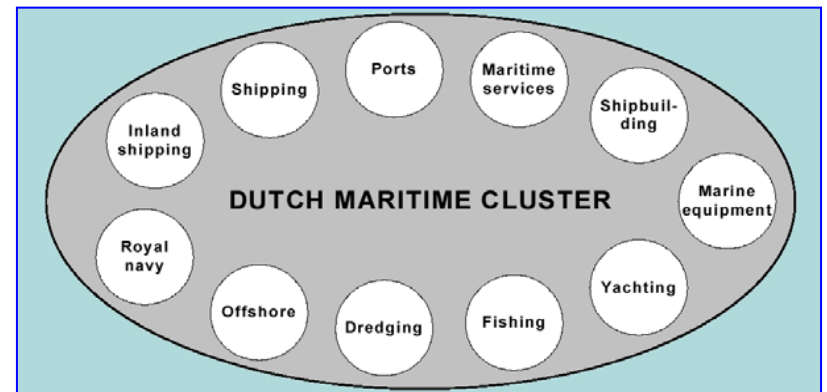
# Maritime Knowledge Center

- Partners invest substantially
- Period of 4 years
- Educational ambitions
- Programs:
  - > Integrated Ship Design
  - > Marine Safety & Environment
  - > Design for Service
  - > Intelligent Shipbuilding & Shipping Processes



# Dutch Maritime Network (NML)

- “Strength by co-operation”
- Network organisation
- Reinforcing cluster (Porter)
- Thematic approach
- Taskforce DigiShip:
  - > Stimulate innovation
  - > Intelligent shipbuilding
  - > Industry-driven



# Have a Trend-Setting Afternoon!

