



Future scenarios of maritime IT applications

An innovative approach of defining future research needs

Jean-Yves Pradillon



- Maritime IT activities today and in the future
- The Wondermar “Future Scenarios” : An overview
- Conclusion
- Open discussion



- Shipbuilding is facing a very strong international competition
- Hourly costs are varying within a large range
 - \geq €10 in Western countries
 - \approx €5 in Eastern countries
 - \approx €0.4 in China (more in other Far East countries)
- European shipyards must face this situation with quality and productiveness with help of IT technology
 - Design: Ultimate software technologies
 - Supply and logistics: Inter-operability
 - Production: Automation
- => **Stick to fast changing technologies!**



■ Design

- Integrating the design phases (ED, BD, DD)
- Reducing design times
- Improving quality (reliability, environment, safety on board)
- Focusing on high added-value ships

■ Production

- Integration with design
- Robotics (Japan is an example)
- Production chain optimisation

■ Supply and logistics

- Maximise the benefits of ultimate IT supported techniques
 - ▶ LANs (incl. Intranets) and WANs (incl. Internet)
 - ▶ Virtual enterprises, e-business

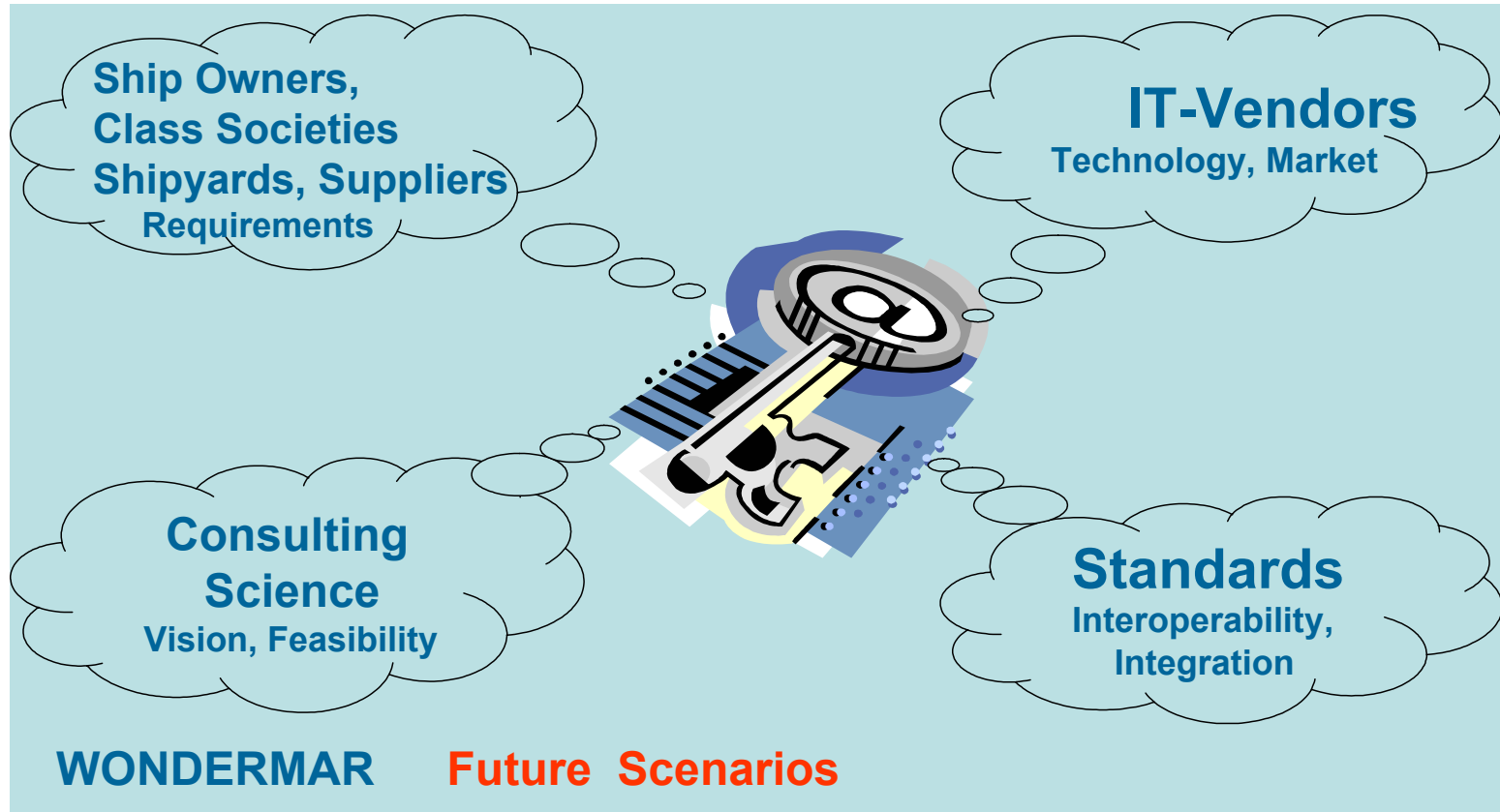


The Need for Standards

- Like human beings, computers need a common language to communicate
 - Protocols at the data transport level (TCP/IP, FTP, HTTP)
 - Data representation standards at software level (STEP, XML)
- Integration of IT tools by using standards would allow
 - Reducing times and errors (preventing re-typing)
 - Facilitating engineering & trading
 - Improving data recording (PDM)
 - Improving survey, maintenance and repair (life cycle)



The way forward



- Wondermar is a Thematic Network
 - Must provide industry and EC with a comprehensive overview
 - IT use within shipbuilding industry (Design, Supply, Production)
- Wondermar results offer
 - A state of the art of technologies (research and design centres)
 - A comprehensive review of actual situation in shipyards
 - ▶ Questionnaires based study
 - ▶ Identification of IT gaps
 - ▶ Identification of trends
 - Tentative views of mid or long-term situation
 - ▶ The Wondermar scenarios



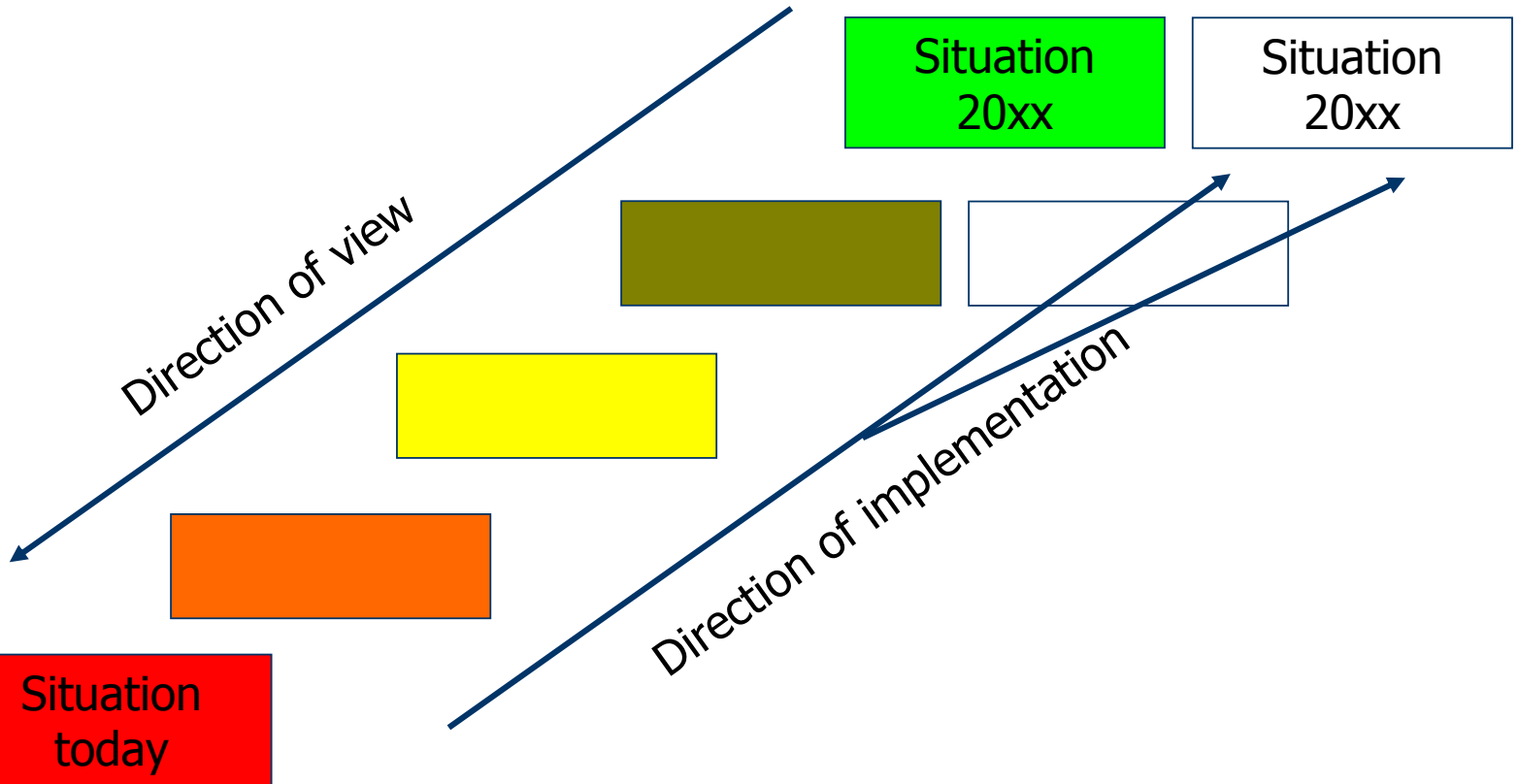
Please refer to www.wondermar.net

Ideas behind the future scenarios

- Address important problems in the maritime industry
- Define an ideal way of working to be reached within the medium and long term future
- Identify skills and functionalities needed to implement these scenarios
- Analyse today's state of the art as well as the way shipyards and suppliers work
- Find gaps in the IT support
- Define levels of implementation depending on different types of companies
- Predict costs and benefits of the implementation levels



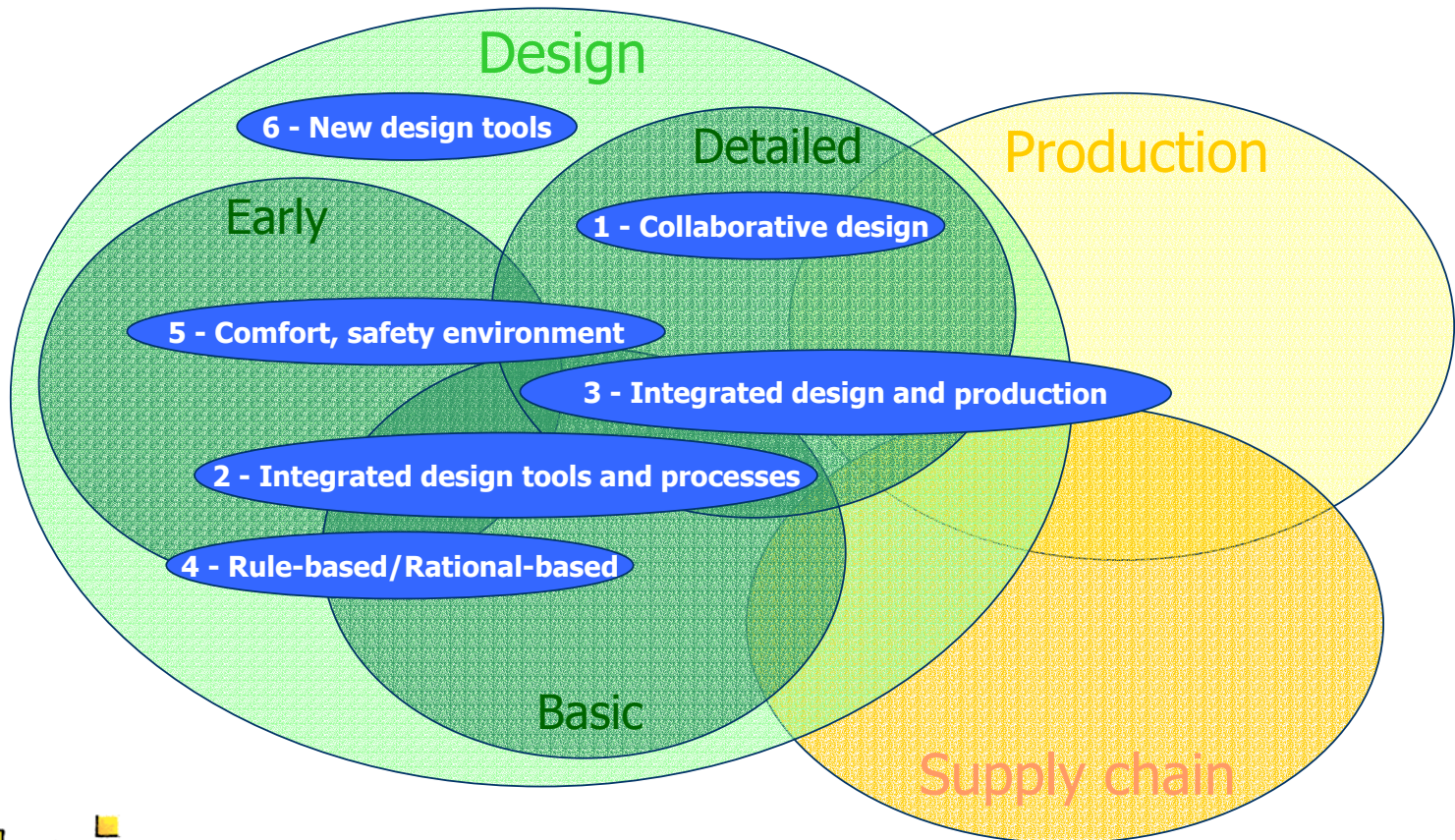
The way towards the future



Standard format for scenarios

- Must cover common topics
 - Problem
 - Existing solutions
 - Requirements
 - Needed skills (for development and for use)
 - Possible implementation levels
 - Expected improvements
- May address a transversal reference database
 - Tools
 - Methods
 - Standards





Scenario 2 : "Integrated design tools & processes"

■ Description

- From the design loop to detailed design the data must be kept and inherited from one stage to the subsequent ones

■ Requirements

- Avoiding to "break the pipe"
- Inputting common data only once
- Ensuring the overall consistency

■ Benefits

- To store the design alternatives history (revision control)
- To make shared data updated and available to any involved department
- To allow experts to concentrate on their own area without minding about details



Scenario 3 : "Integrated design & production"

■ Description

- To better include production aspects within the design stage

■ Requirements

- To achieve production costs-driven designs
- To include strategic integrated planning from design stage
- To share data between design and production

■ Benefits

- Automating the feedback of production data within design systems
- Better awareness of production constraints for designers
- Design data made available within the workshops



- Scenario 1 : "Collaborative design"
 - Co-operation of many yard departments, sub-contractors and suppliers within a ship design stage
- Scenario 4 : "Rule-based / Rational-based designs"
 - To set up design methods that allow both rule-based designs and structural optimisation under realistic phenomena
- Scenario 5 : "Comfort, safety and environment friendly design tools"
 - To provide tools allowing designs oriented to comfort, safety and environment friendliness
- Scenario 6 : "New design tools"
 - To bring new IT technologies within the ship design process

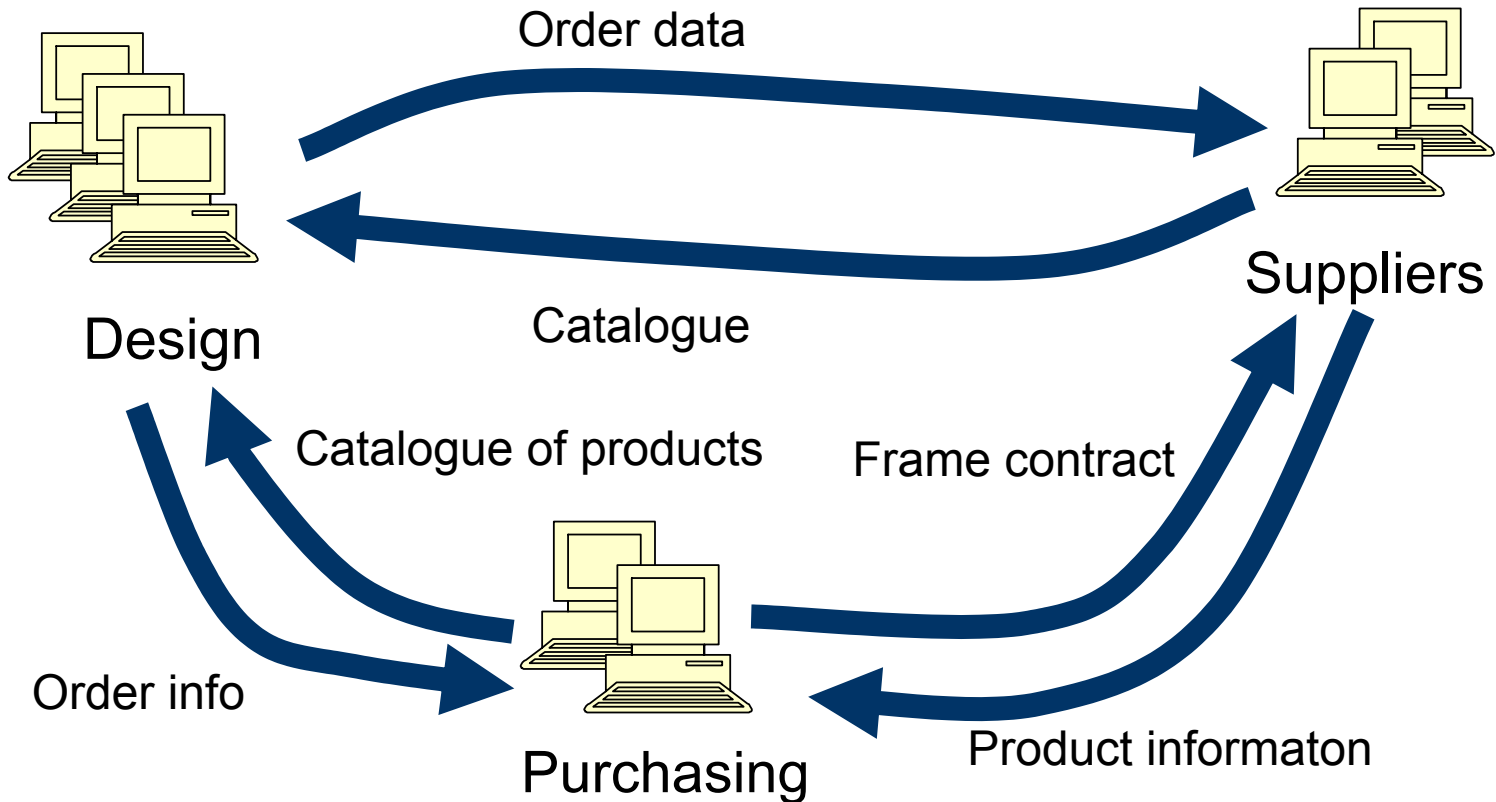


■ Ordering in the design phase

- During design a large number of standard components is used
 - ▶ Could be ordered directly without involving the purchase department
 - ▶ A lot of communication between purchase and engineering departments may be avoided, especially on large yards
- Outcome
 - ▶ Order process could be initiated earlier, leading to better planning and availability of components
 - ▶ Purchasers could concentrate on the ordering framework
 - ▶ Shorter and faster process chain
 - ▶ Scenario might also be used for the quotation process for larger components



Future scenario „Ordering in the design phase“



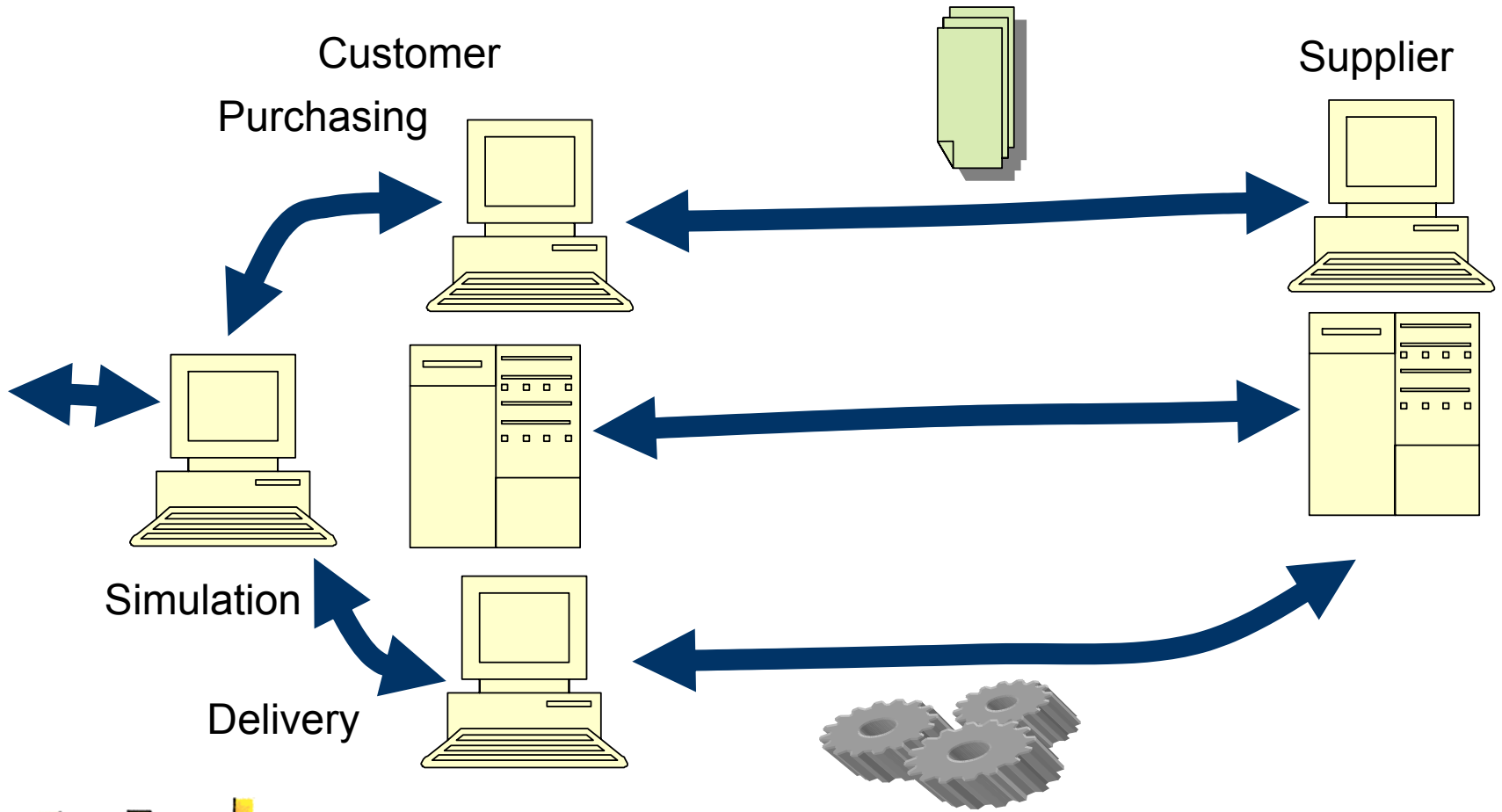
Supply and logistics scenarios

■ Virtual purchasing

- Purchasing requires communication between different departments and with external companies
 - ▶ Large amounts of data have to be exchanged
 - ▶ Different media are in use (Paper, Proprietary files, Online connections)
 - ▶ No integration between the software tools in use
 - ▶ Data conversion causes loss of information
 - ▶ Difficulties to get the required information
- Outcome
 - ▶ Shorter lead times
 - ▶ Less misunderstandings
 - ▶ Direct import of order information into delivery and storage systems
 - ▶ No media breaks in data transfer
 - ▶ Full integration of business, product and logistic data
 - ▶ Show consequences of component selection by means of simulation



Future scenario „Virtual purchasing”



Other supply and logistics scenarios

- Full digital certificate handling
 - Material certificates are generated digitally and exchanged online between class society, supplier and yard
- Virtual marketing
 - Provides information about material and components for the maritime industry online, supports online requests for quote



- Material handling planning
 - Simulation Modelling
 - ▶ Predict bottlenecks
 - ▶ Monitor various handling factors
 - ▶ Review options
 - ▶ Analyse cost impact
 - Today
 - ▶ Simulation not always used
 - ▶ Poor visualisation (2D)
 - Future
 - ▶ Visualisation
 - ▶ Cost Estimation
 - ▶ Optimisation / Automatic Planning
 - ▶ JIT
 - ▶ Modularisation of ships



■ Monitoring & Tracking

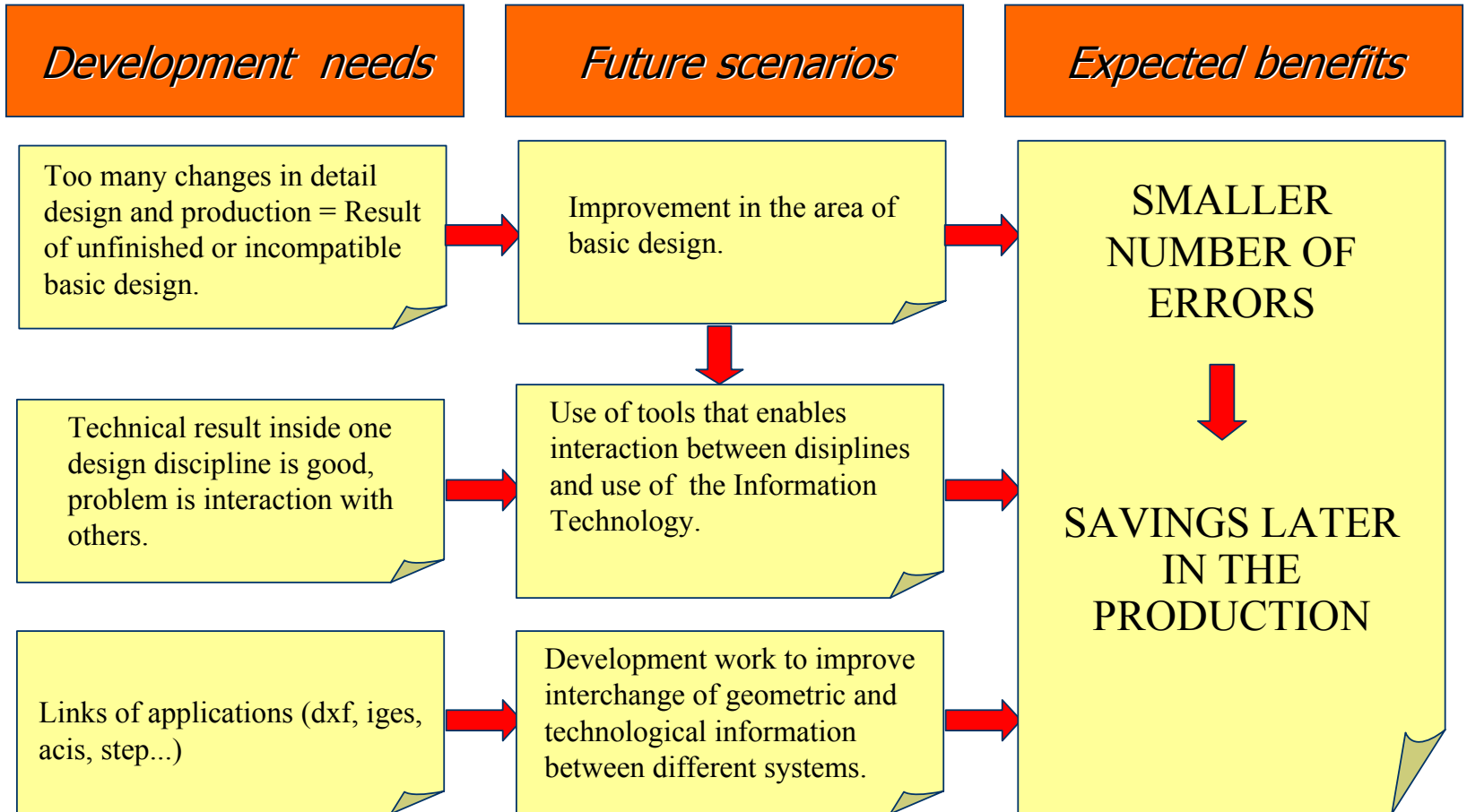
● Needs

- ▶ Cell control
- ▶ Transfer of production data
- ▶ Scheduling & execution of work tasks
- ▶ Automatic Data Acquisition
- ▶ Monitoring, including production reporting

● Solutions

- ▶ Internet
- ▶ Mobile Technology
- ▶ Materials Db linked to procurement
- ▶ Dealing with damaged materials
- ▶ Feedback of wrong place





Development needs

Future scenarios

Expected benefits

Optimizing the costs of material handling.

Simulation-based tools for logistic system design.

•COST EFFECTIVE PRODUCTION

Risk of missing information between production and design e.g. reporting of the changes in production.

Tools for controlling the interchange of the information between production and design.

•BETTER QUALITY

•SMALLER NUMBER OF ERRORS

The use of automation in production.

- machine vision
- measurement and inspection
- etc.



- Most of the functionality presented could be realised today
 - Technology available
 - ▶ Existing tools or academic research achieved
 - Different tools have to be combined

- Changes in the organisation required

- Major gaps
 - Simulation
 - Standards
 - Integration from users point of view



What do **YOU** think?



- Design: Simulation tools have enough functionalities - the problem is that yards do not use them, or do not use them properly
- Supply: For shipyards, virtual purchasing platforms only work for simple products, not for complex parts or systems
- Production: Automation in outfitting is too difficult and will never happen.

