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Dialogue on Design Future Scenario

Jean-Yves Bozec – CMN
Jean-Yves Pradillon - PMA

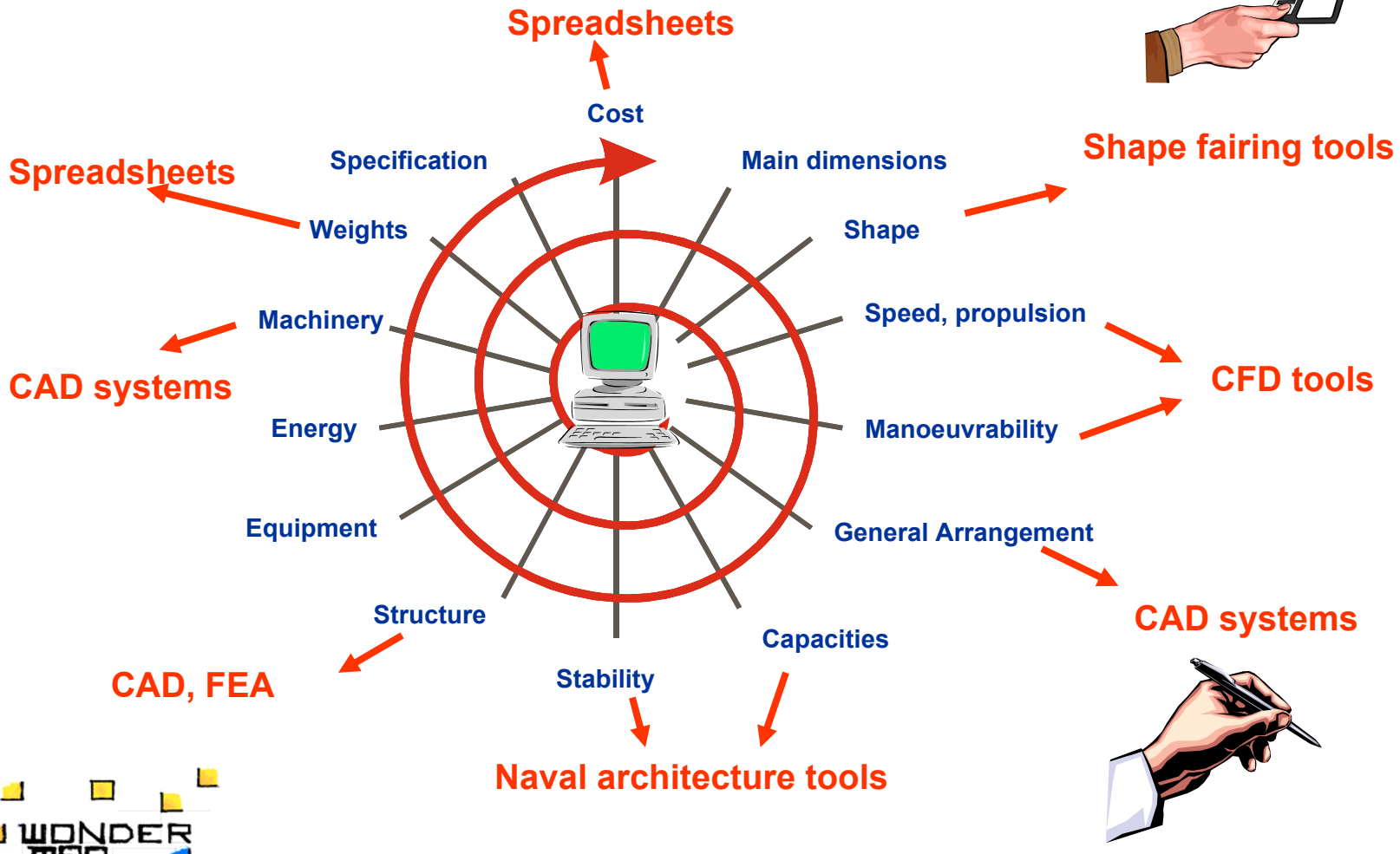
Facts

- Ship remains one of the largest industrial products
  - Related to many technical and business data
- All modern products have to be considered for the whole life-cycle
  - Design taking maintenance and repair into account
- Pressure from the market requires yards to be more reactive in
  - Increasing quality
  - Shortening design time
  - Improving co-ordination and planning
  - Preventing from wasted time in retyping or error fixing

Today's practices

- Shipbuilding is an intensively collaborative activity
  - Design and production
    - Many departments, other shipyards
    - Class
    - Suppliers
    - Sub-contractors
  - Maintenance and repair
    - Everywhere around the world
- Data exchange is strongly linked to the process. But
  - Paper-based exchange still exists
  - Document-based exchanges are often "computer readable, but not computer sensible"

IT Tools for Ship Design



How IT specialists and software vendors may help

- Defining compatible Product Data Models
  - Unique or collaborative data storage
  - Simplified data translation between systems
- Allowing collaborative data for the whole life-cycle
  - New building: From early to detailed design and production
  - Operation: Simulations, monitoring, survey and repair
- Providing the designer with advanced design tools
  - CAD
  - CFD
  - FEA

How IT specialists and software vendors may help

- Offering tailor-made and flexible systems
- Adopting standards
  - Data exchange
    - File format
  - Data representation
    - Same meaning
    - Same structure
    - Compatible formulation
- Automating fastidious manual tasks
  - Time-consuming
  - Error-generating

Scenario 1 : "Collaborative design"

- Description
  - Co-operation of many yard departments, sub-contractors and suppliers within a ship design stage
- Requirements
  - Helping concurrent engineering work
  - Improving data exchange
  - Allowing to share data with different needs (data filtering)
- Benefits
  - Just in time design
  - Easy sharing of data
  - Zero paper

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
  - Better awareness of production constraints for designers
  - Design data made available within the workshops

Scenario 4 : "Rule-based / Rational-based designs"

- Description
  - To set up design methods that allow both rule-based designs and structural optimisation under realistic phenomena
- Requirements
  - Software tool for rule checks independent from Class tools
  - Facing innovative ships design
  - Providing designers with reliable simulation tools for extreme loading conditions
- Benefits
  - To automate and possibly compare checks from several rule sets
  - To link rule-based design to other tools (ex. FEA)
  - To validate rational-based design methods with Class Societies

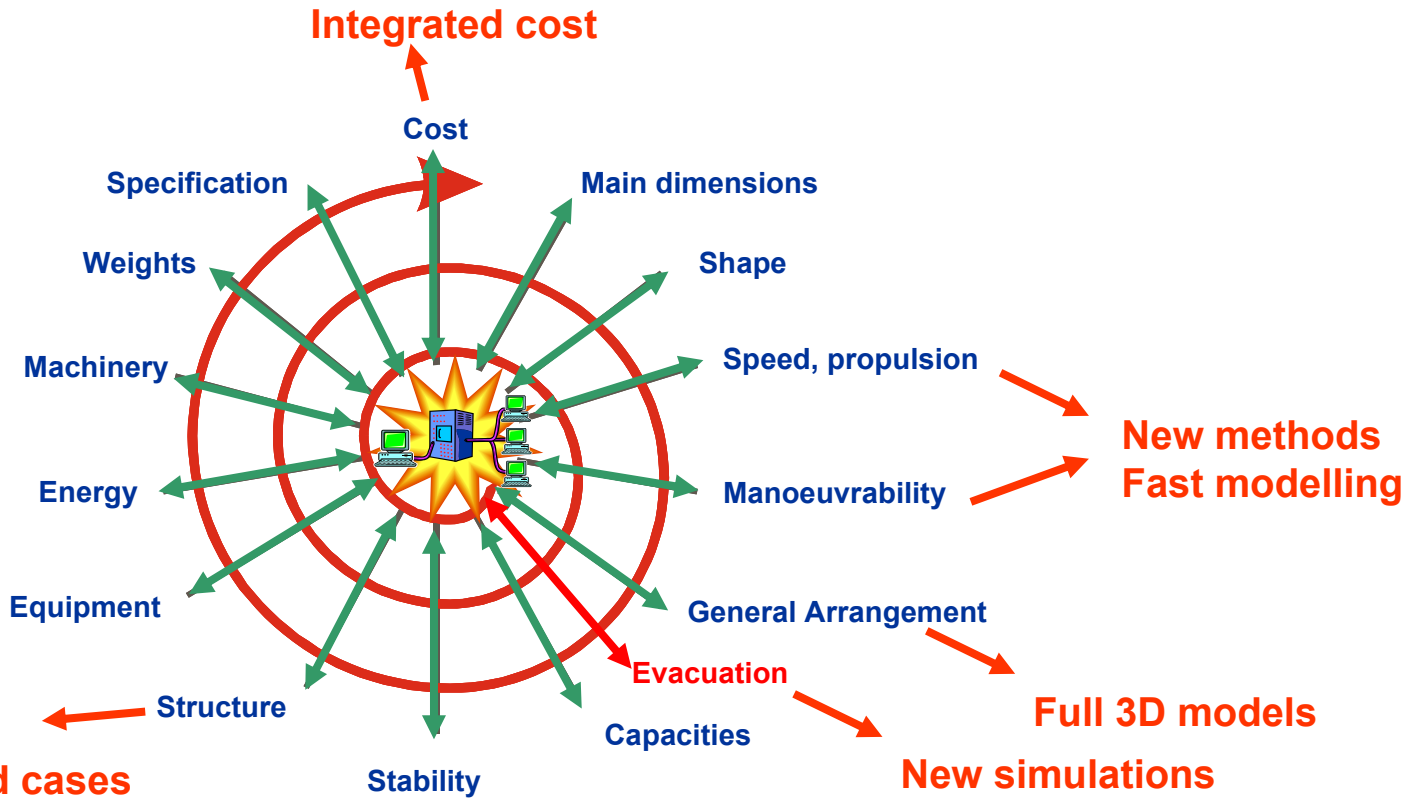
Scenario 5 : "Comfort, safety and environment friendly design tools"

- Description
  - To provide tools allowing designs oriented to comfort, safety and environment friendliness
- Requirements
  - To estimate comfort class of the ship (ex. vibration levels)
  - To ensure safety (ex. crash worthiness analyses)
  - To reduce environmental impacts (for overall ship lifecycle)
- Benefits
  - To make analysis techniques available
    - To any size of shipyard
    - For any kind of ship

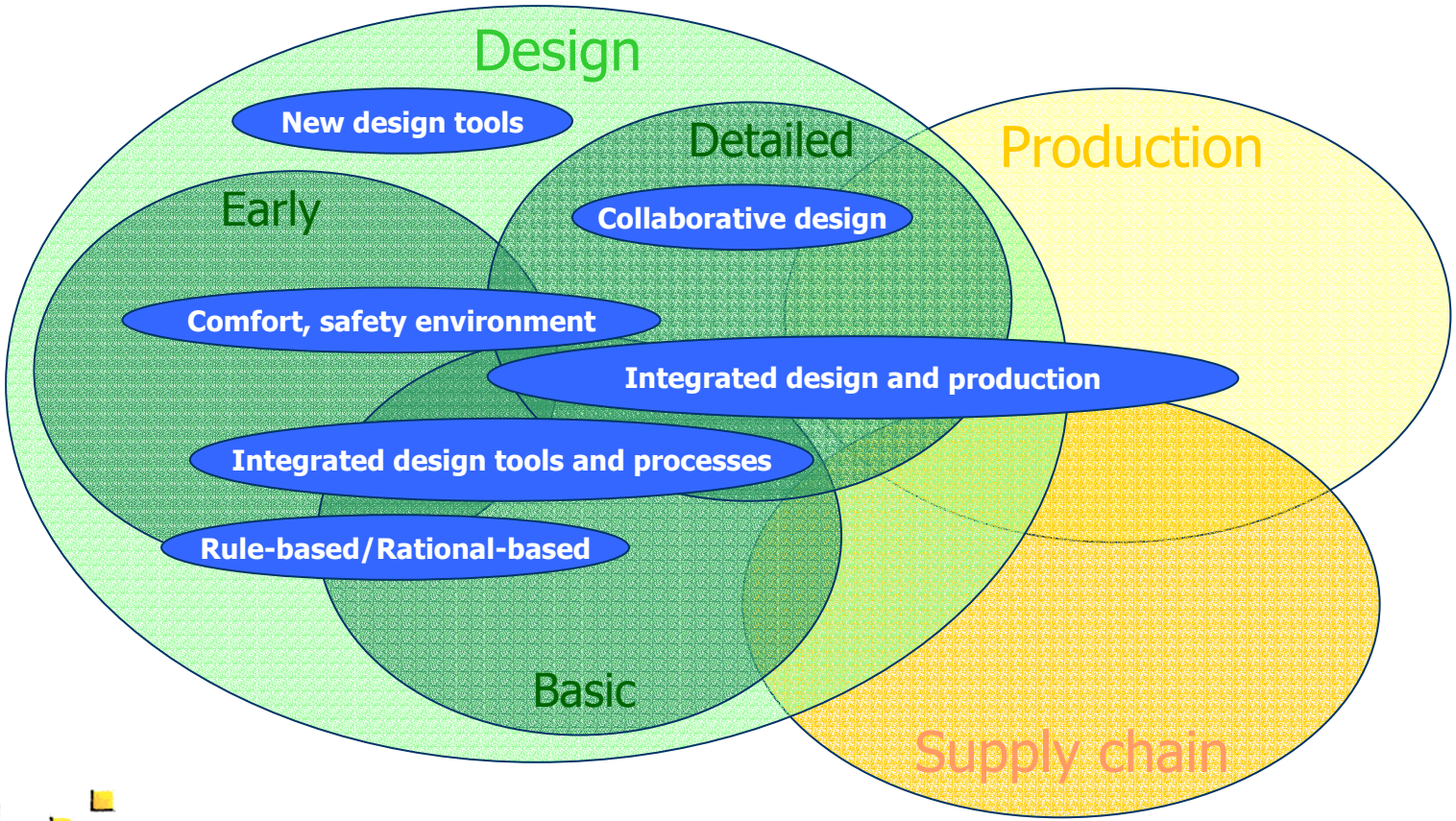
Scenario 6 : "New design tools"

- Description
  - To bring new IT technologies within the ship design process
- Requirements
  - Adding new functions to the design loop (ex. passengers evacuation)
  - To benefit new IT standards
    - Faster computers
    - Networks
- Benefits
  - To offer new services to owners using new simulation tools for both manufacturing and operation
  - To improve the process using new techniques (ex. Virtual Reality)
  - To benefit IT enhancements (ex. next generation CAD, new CFD tools)

IT Tools Improvements



Where scenarios are lying within the process



Statements

- A multi-vendor software tools environment is unavoidable
- One only CAD system can be used from early design to detailed design and then for lifecycle management
- Almost automatic meshing techniques for FEA will be available in a rather close future

Please provide us with your advice on the board

Open discussion from the floor

- Proposed topics
  - Central vs. distributed databases
  - Need for neutral PDM
  - Use of ISO/industrial standards
  - Need for revision control
  - Required CFD simulations
  - Vision of the future structural analyses
  - Versatile and flexible systems to face innovative projects
  - Optimisation as a design tool