QinetiQ GRC

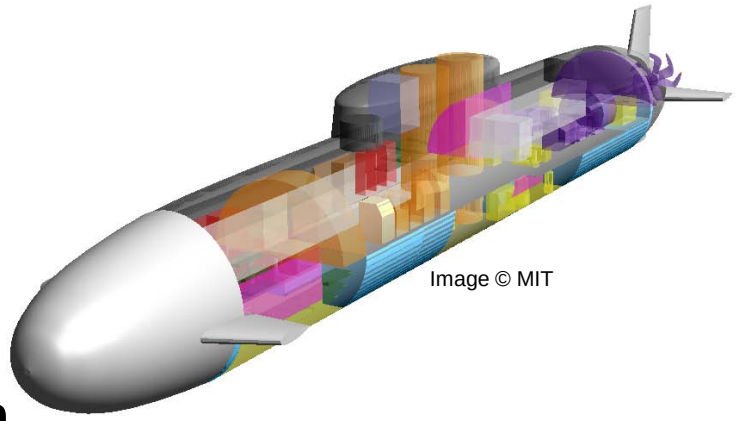
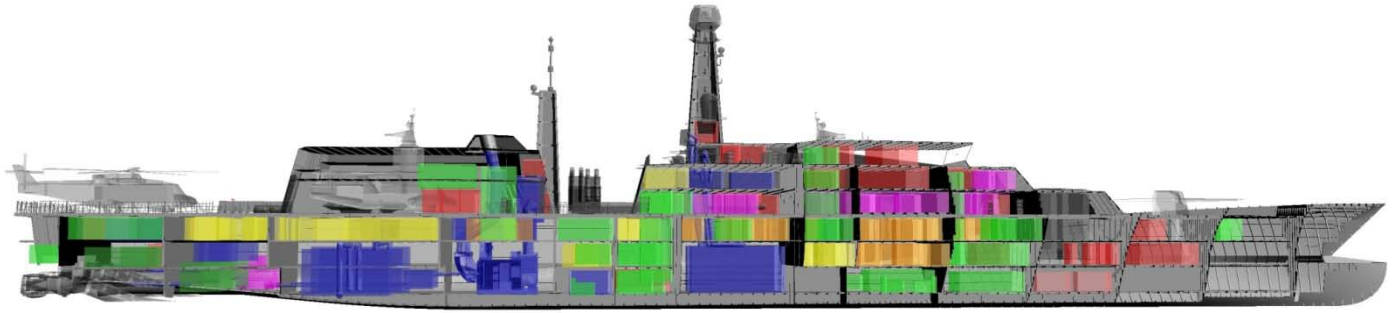


Image © MIT

Paramarine Design for Production
Cost estimation based on definitive design data

Dr Hamish Fowler CEng MIMechE

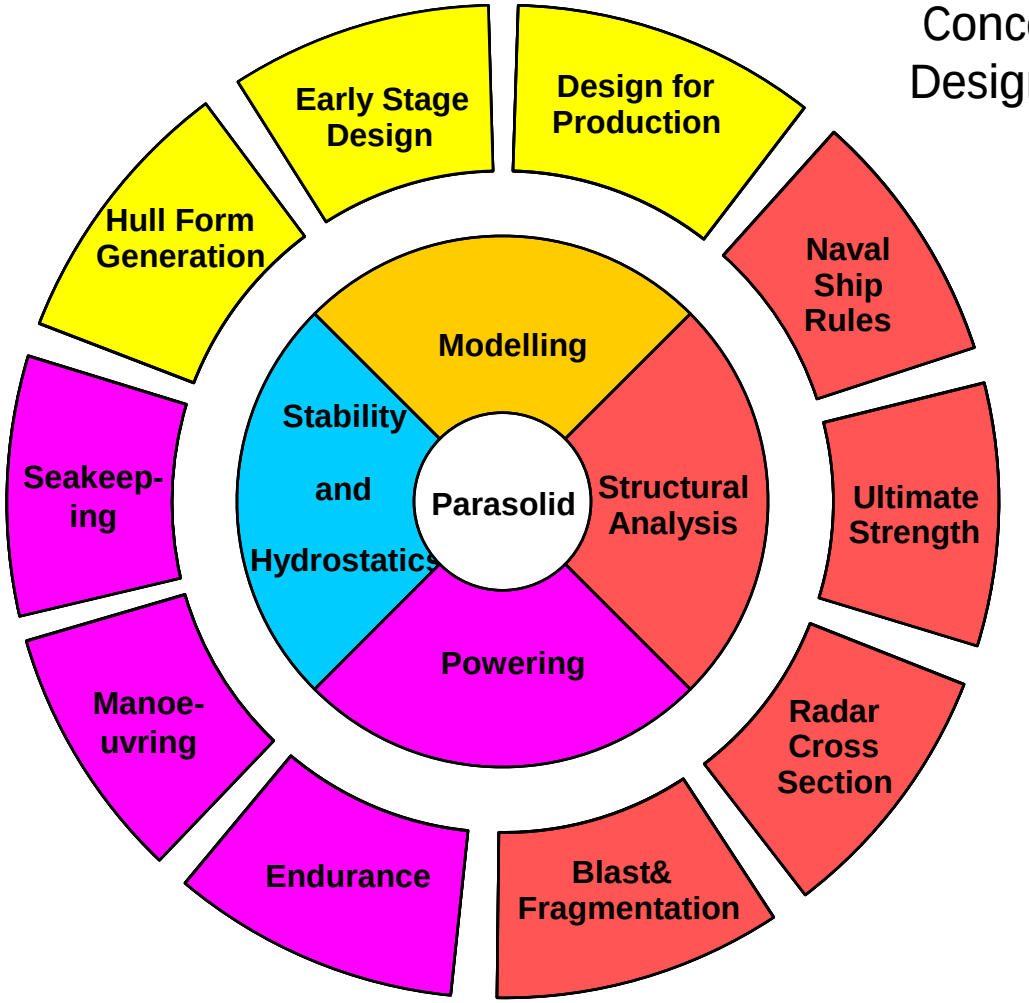
16th September 2009



1 Paramarine Modules

QinetiQ GRC

Concept Stage
Design Modules



1 Who uses Paramarine?

QinetiQ GRC

Shipbuilders

BAE SYSTEMS Submarines
Northrop Grumman Shipbuilding (Pascagoula)
BVT Surface Fleet
DCNS
Navantia
Kockums
Babcock Marine
Mitsui Engineering and Shipbuilding

Government Authorities

UK MOD (all Platform IPTs + Naval Authorities)
NAVSEA (CISD)
DSTO Australia,
DRD / DND Canada.
Co-operative Research Navies Group
South Korea ADD

Consultants

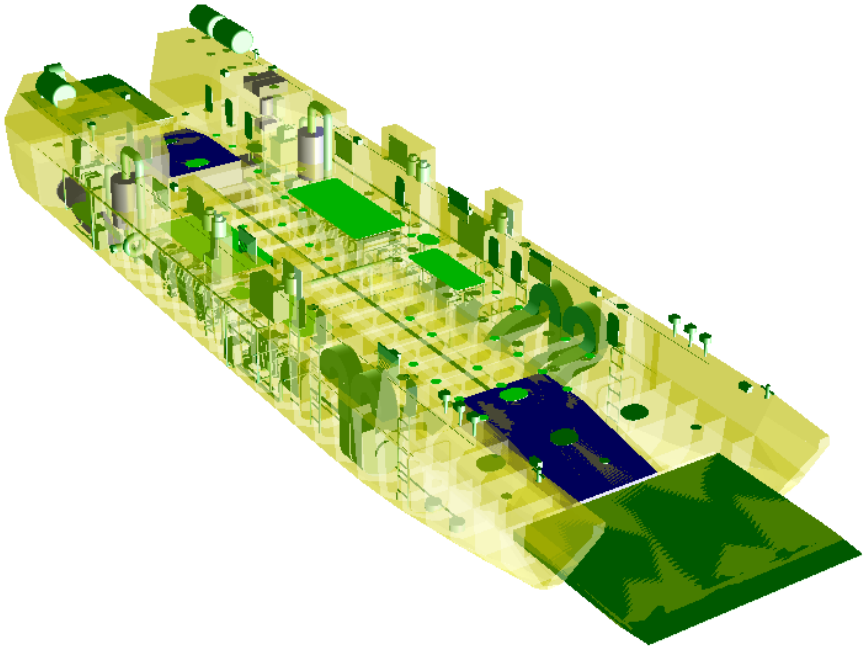
Alion Science and Technology
UK Naval Design Partnership,
Deep Blue Technology
BMT DSL
Thales Naval
MARIN
James Fisher Rumic Ltd

Academia

University College London
Universities of Glasgow, Strathclyde, and Newcastle
MIT
VA Tech
Michigan
GA Tech
Webb Institute
USNA
USN Postgraduate School Monterey

2

Design for Production



Benefits

Utilises the ship design model to develop a materials and labor cost estimate of production cost, at a level appropriate for the design stage you are in – including:

- structural components
- systems and equipments
- labour costs for each operation
- subcontract elements (eg bought in items)

Can identify cost drivers in the design – can populate the ‘cost v capability’ trade space – more later

Assess cost of design change – answering the ‘what if’ before its too late

Dynamic links to excel – easily links to existing costing information in spreadsheets – great for using simple algorithms in the early stages

Updates and refines as the design develops through life, reducing time to develop cost estimates.

2 Design for Production

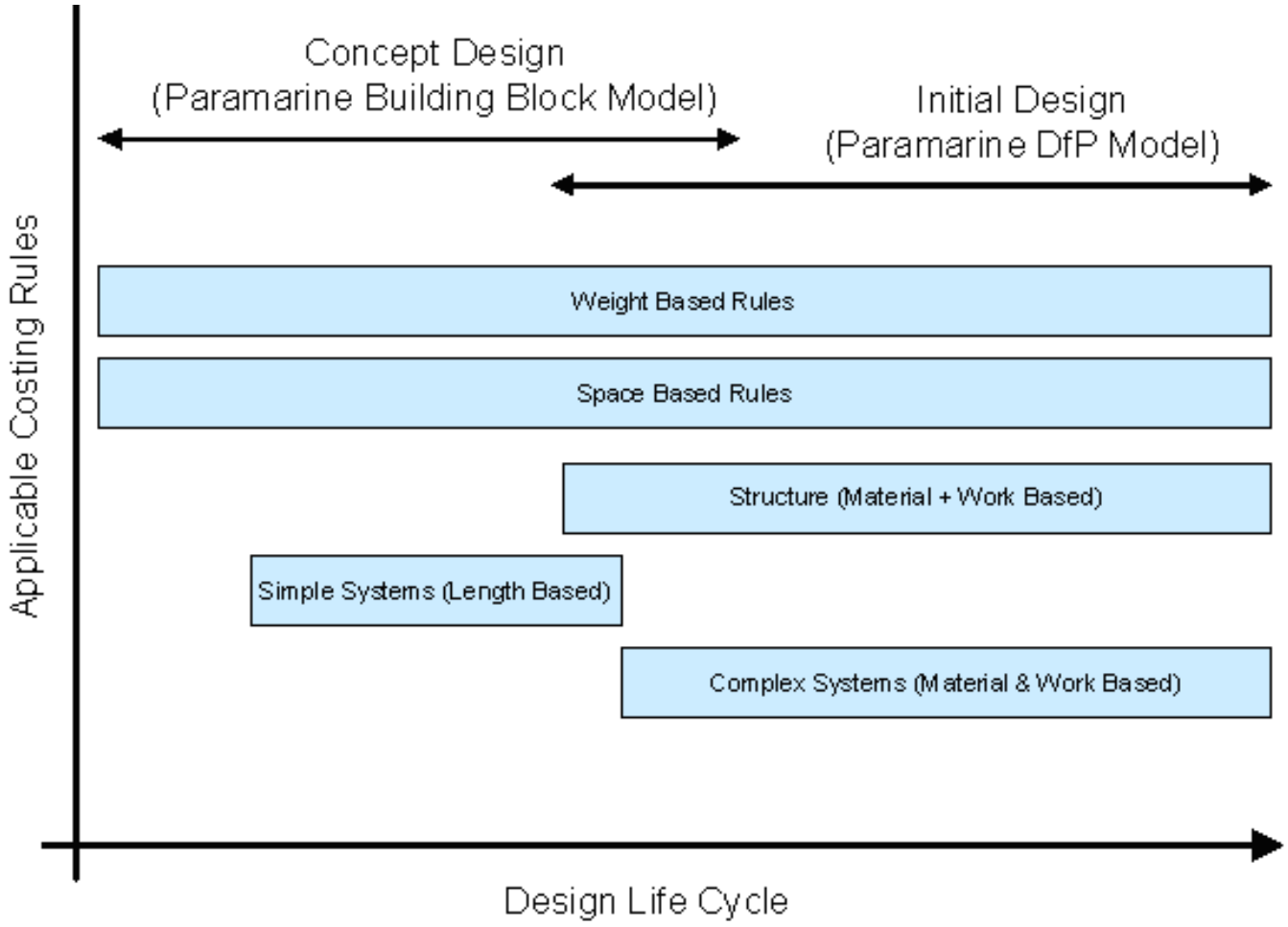
Design for Production utilises the concept design model developed by the design team to generate cost estimates for the design as it evolves

- Builds upon the information contained within the model
- Uses a range of metrics or norms for
  - Manufacturing operation
  - Labour associated with each operation
  - Equipment costs
  - Materials
  - Coatings

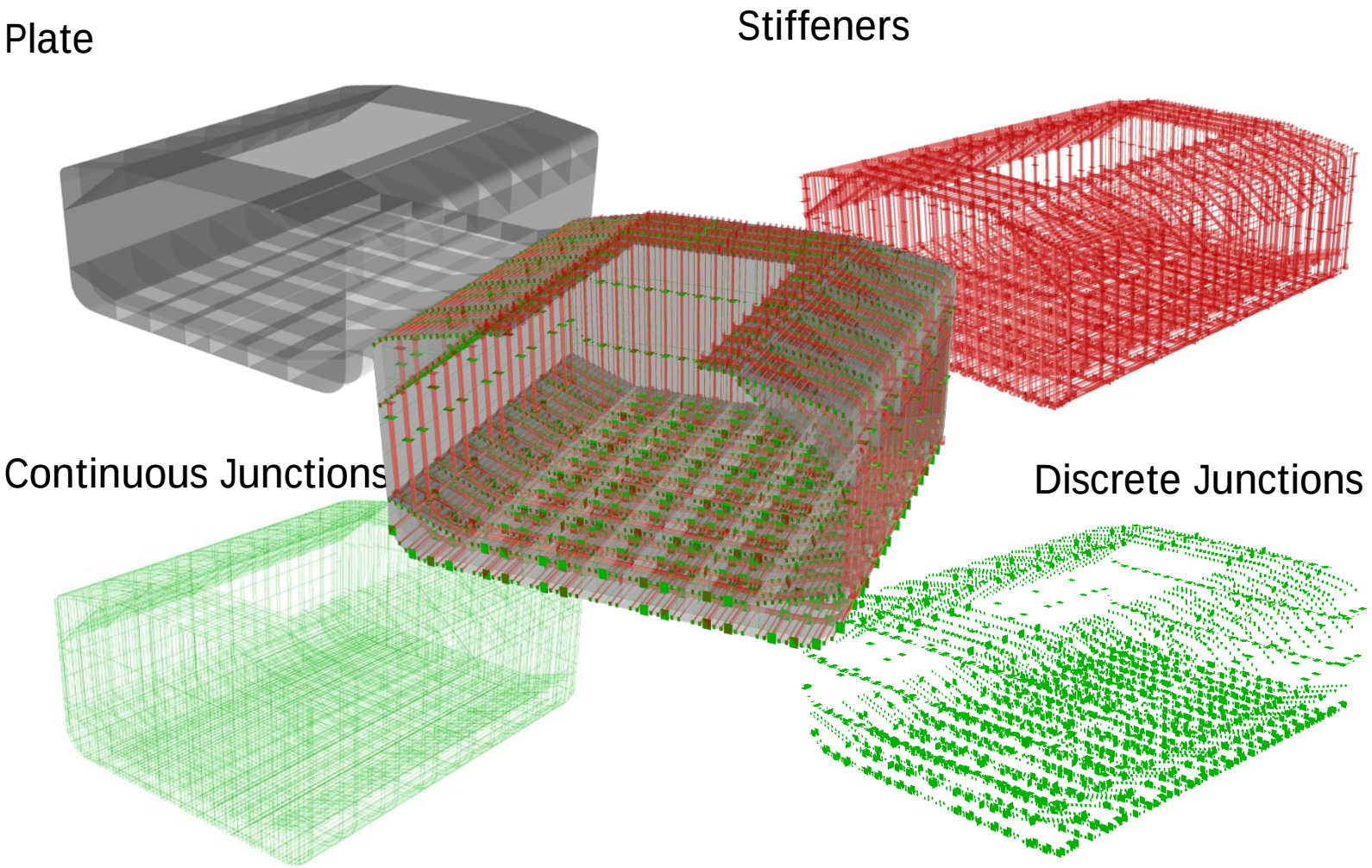
These metrics are provided **by the user**, either through direct entry or through a link to pre-existing data in excel spreadsheets

2 Design for Production

QinetiQ GRC



2 Design for Production – simple example



2 Early Stage Design Exploration Process

QinetiQ GRC

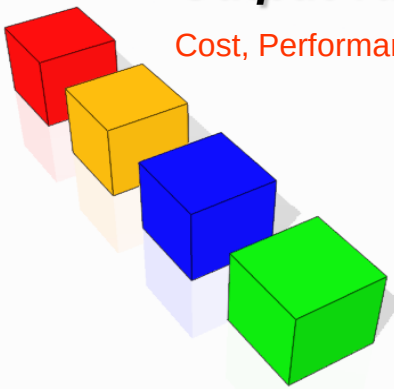
modeFRONTIER
multi-objective optimization and design environment

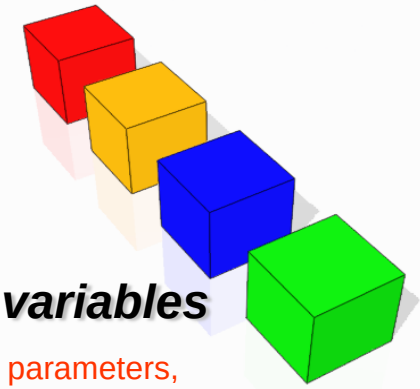
Genetic algorithms

eg reduce cost, maximise endurance

Output variables

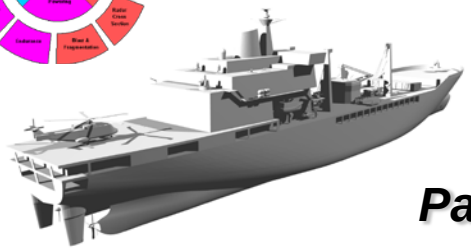
Cost, Performance, etc





Input variables

Hull form parameters, susceptibility level, range, speed etc

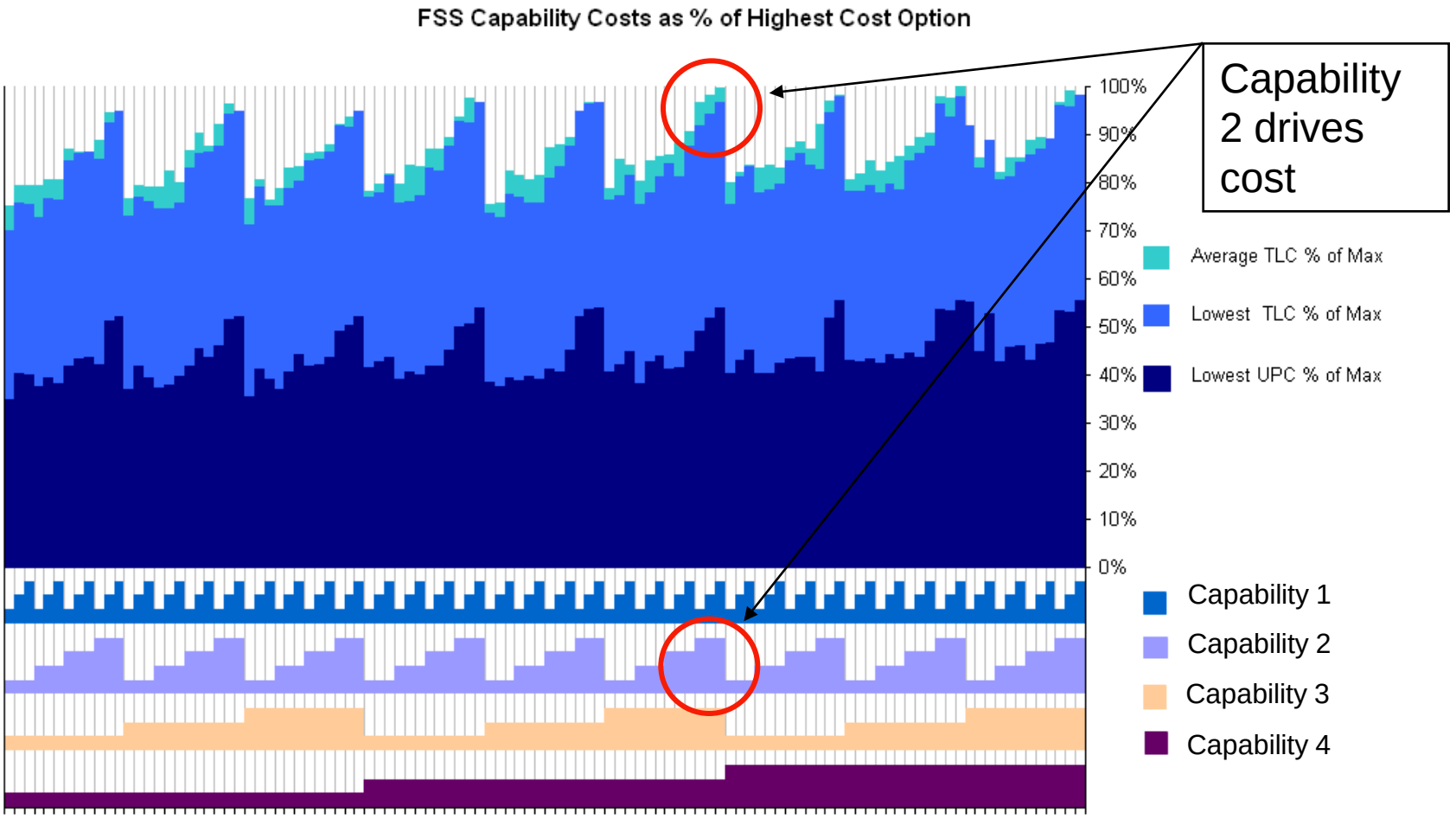


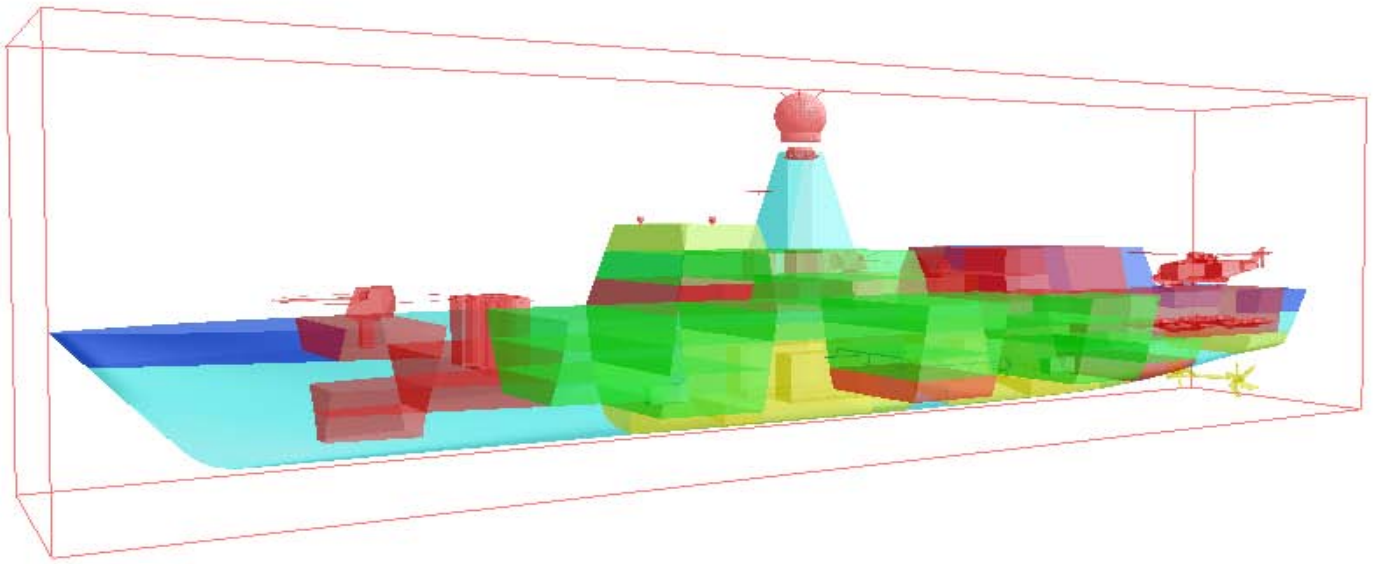
Paramarine Assessment

Stability, powering, etc

2 Cost v Capability Output

QinetiQ GRC





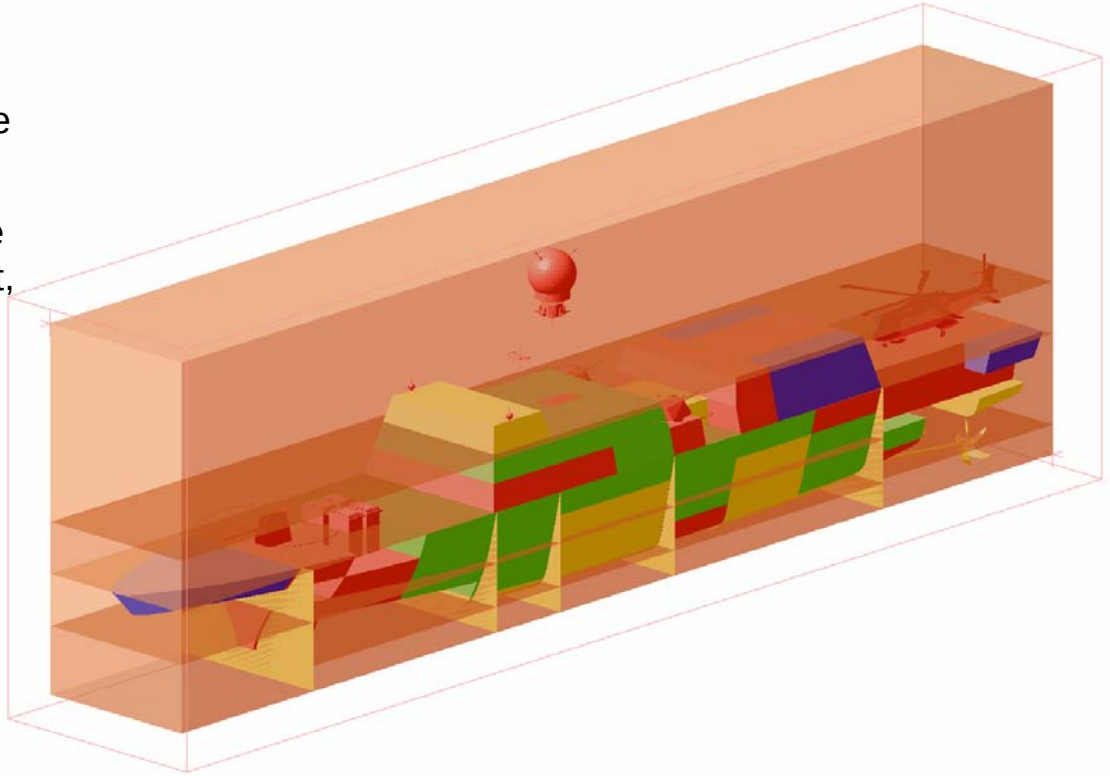
3

How is DfP Used?

3 How is DfP Used?

Design for Production is extremely adaptable and can be used for other purposes:

- System trade off studies – eg Astute Electrical Generation, Distribution and Propulsion System Options Studies (Future Business Group)
- Build strategy assessment – examining the benefits of different build strategies on cost, articulating the business case or otherwise for enhancing production facilities



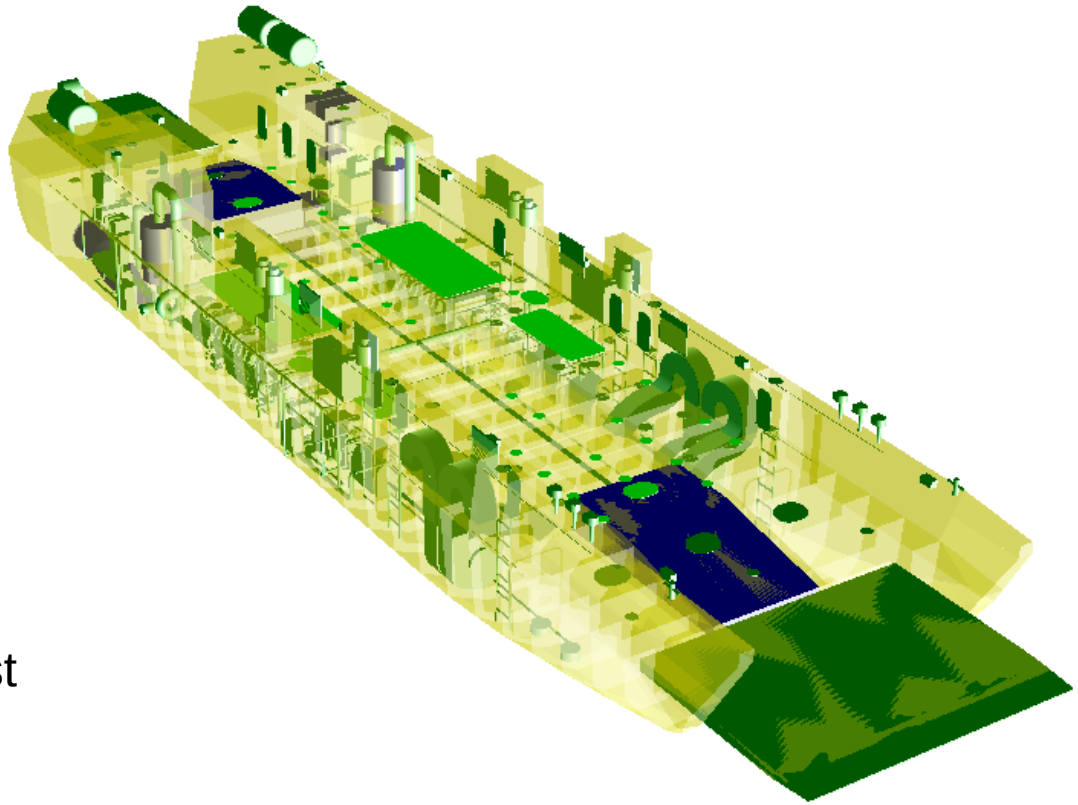
3 Platform Costing

PASCAT Fast Landing Craft Technology Demonstrator

Currently in final stages of construction in UK by QinetiQ – launch September 09

QinetiQ GRC determined the likely whole platform cost, to underwrite subcontractor build costs, including structure, systems and equipments

De-risked the prime contractor's cost and schedule aspects



www.QinetiQ.com