1 Supported as required by external project mgt/risk professionals from marine, offshore & other industries

- Master plan & key target milestones for each new naval project
- Target 'capital' budget (set and assured)
- Target cash profile - (pre & post contract)
- Ensure (accepted ) NSoS Governance recommendations are embedded within project

1 Mainly seconded from RN; DE&S lead yard specialists; key supply chain specialists; external project managers to enrich talent etc
- Deliver as per requirements of governance model (figure 2)
Governance applicable: all naval projects with estimated value £1 billion

1 Independent Chairman of Delivery Board involved prior to contract, as a non-executive member
2 The enterprise is end to end from requirements to ship delivery
**DESIGN CONCEPT**

- Options menu topside/defence system capability
- Standard hull and machinery and ship systems. Flexible choice electrical load
- Design for shorter life of 15 years - avoid costly refit - prepare to sell for export (earlier if necessary to support particular export sales)
- Launch of unmanned vehicles - GPFF as a platform for other capabilities
- All ships in series not fitted out to the same/desired specification
- Consideration might be given to first 2 ships with combat-spec fitted for but not with

**DESIGN CONSIDERATIONS**

- RN standards to be rigorously reviewed, costed and incorporated only when deemed essential
- Lloyds structural and commercial standards to apply generally to systems and materials
- Design to incorporate modules - engine room, cabins, Commercial Off The Shelf galley and laundry equipment
- Ease of combat and comms systems fit out to facilitate flexibility of choice
- Through life maintenance considerations including ease of maintenance and equipment withdrawal
- Key supply chain equipment to take account of strengthening supply chain export potential
- Incorporate commissioning engineers in design team to capture their experience early in the cycle
- Design for reliability

**DURING BUILD**

- Inspection processes to be streamlined to ensure no in-built delays
- Aim should be to halve construction time via VSB from conventional single yard build approach

**MARKETING**

- RN branded frigate with menu of option(s) choices will significantly increase appeal to overseas navies
- RN's involvement and lead support in marketing effort - will be crucial from intelligence to demonstration of capability

**OPERATIONAL COSTS**

- Critically examine speed/fuel consumption and optimise on cost
- Aim to reduce manpower
- Apply modern automation to high standards
- Machinery unmanned
- Fire Fighting: latest sensors, high fog auto release
- Laundry equipment

**CONSTRUCTION: OPTIMISE BLOCK BREAKDOWN TO SUIT VIRTUAL SHIPBUILD (VSB)**

**MENU OF CHOICE - DEFENSIVE CAPABILITY OPEN ARCHITECTURE**

**STANDARD PLATFORM**

**BLOCKS ALLOCATED TO COMPETING YARDS AND BUILT IN SERIES**

**FIGURE 3 - GENERAL PURPOSE FRIGATE INNOVATIVE EXPORT-FOCUSED DESIGN TO SATISFY RN REQUIREMENTS AND EXPORT MARKET**
FIGURE 4 - A VIRTUAL SHIP BUILDING (VSb) INDUSTRIAL STRATEGY TO BUILD A GENERAL PURPOSE FRIGATE COMPETITIVELY WITH REDUCED CYCLE TIME

Block series build: Capture learning curve benefits plus productivity gains from investment in Jigs, Robots, Specialised tooling etc.

• Each yard competing for block series to table their plans to invest to drive productivity gains and the capturing of learning curve benefits

• In particular a focus on modern advanced outfitting processes and modular build needs to be demonstrated linked to digital engineering and piece part/component logistics/bom

1 Companies with sufficient financial industrial capacity and capability to construct and to enter into the key sub-contracts
FIGURE 5 - EXPORT DRIVE

- Global scale of Naval ship (Offshore Patrol Vessels, Corvettes and Frigates) offers significant opportunities. Planned new ships worldwide 1:

<table>
<thead>
<tr>
<th>Vessels</th>
<th>OPV</th>
<th>Corvette</th>
<th>Frigate</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>In service</td>
<td>777</td>
<td>259</td>
<td>469</td>
<td>1505</td>
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<tr>
<td>On order</td>
<td>135</td>
<td>40</td>
<td>69</td>
<td>244</td>
</tr>
<tr>
<td>Being planned</td>
<td>276</td>
<td>67</td>
<td>158</td>
<td>501</td>
</tr>
</tbody>
</table>

- UK export effort should be nationally coordinated via Government and via Government to Government trade deals
- Support from RN contacts, other Navies and input from Naval Attaches and UK embassies
- Export value success will take many forms:

<table>
<thead>
<tr>
<th>Examples</th>
<th>Sale of design &amp; manufacturing information &amp; project management &amp; procurement from the supply chain</th>
<th>Sale of training &amp; support</th>
<th>UK build</th>
<th>Build 1st ship in UK, then overseas support</th>
<th>Sell from RN order book</th>
<th>Sell from Fleet mid-life</th>
<th>Sell from Fleet at design life</th>
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</tr>
</tbody>
</table>

Each has variable value to the UK

1 Source: UK Defence Solutions Centre 2016