Reducing Weapon Costs through the Team Complex Weapons Portfolio Agreement

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• How savings are realised in Team Complex Weapons (TCW)
• How Atkins forecast those savings
Introduction
Introduction

• Pressure on Defence spending has driven innovation in cost reduction
• Team Complex Weapons (TCW) defines an approach to delivering the UK’s Complex Weapons requirements in an affordable manner
• TCW is based on linkages between weapons in a portfolio, which reduces overall costs
• Atkins provide the ‘IA’ side of the ‘COEIA’ for MoD’s Complex Weapon decisions - tasked by MoD through Dstl
• Atkins tasked to build a sector level cost model:
  – Used to investigate future scenarios
  – Ensure savings do not lead to unintended circumstances
### Background

<table>
<thead>
<tr>
<th>Target Set</th>
<th>Supersonic missiles</th>
<th>Subsonic missiles &amp; Unmanned Air Veh.s</th>
<th>Aircraft and helos</th>
<th>Small ships (FIACs)</th>
<th>Med. ships (FACs, Corv)</th>
<th>Mobile - hard armour</th>
<th>Mobile - light armour and soft skinned</th>
<th>Relocatable &lt;1hr</th>
<th>Relocatable &gt;1hr</th>
<th>Soft fixed</th>
<th>Semi-Hard fixed</th>
<th>Hard fixed</th>
<th>Very hard fixed</th>
<th>Large ships</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>Short Range Air Defence (3 variants)</td>
<td>Medium Range Air Defence (2 variants)</td>
<td>Short Range Surface Attack (6 or 7)</td>
<td>Medium Range Surface Attack (2-3 variants)</td>
<td>Long Range Surface Attack (1 or 2 variants)</td>
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**NOTE:** Between 14 and 17 Systems required, with modular sub-systems

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How savings are realised in Team Complex Weapons (TCW)
Savings - How?

Total benefit of Team CW approach forecast in 2010 of over £1Bn across 10 years

- Commonality, Modularity and Re-Use (CM&R)
- Sector Management
- Flexibility
- Stockpile Management
- Collaboration
- Support Savings
- Production Volume
Savings - How?

- Commonality, Modularity and Re-use is the key cost driver between systems
- Removing, or ‘off ramping’ a system with lots of CM&R linkages has great impact across the model

System B shares a rocket motor to system C and a seeker to System E

The effect of removing system B increases the cost of systems C and E
Savings - How?

- Two ways of realising savings: Keeping production lines open and reducing waste through obsolescence
- Longer lead time for traditional replenishment forces MoD to procure more up front

End result is a reduction in total stockpile quantity

- Through TCW MoD can afford to buy less units up front because they can recuperate faster if and when required. Waste through obsolescence is reduced.
Savings - How?

- Systems procured under TCW can have their support costs bundled together – producing economies of scale
- This is an easy benefit to model
Savings - How?

• There are cases when a project level COEIA may suggest the ‘off-ramp’ solution

• ‘off-ramp’ refers to procuring a system outside of TCW, i.e. a Military-Off-the-Shelf (MOTS) system

System D is not as embedded in the pipeline and will have less knock on effects should it prove cost effective to ‘off-ramp’
Savings - How?

- The long term savings/benefits can be modelled
- Compare the before and after costs of an ‘off-ramp’
- Possible to determine the overall benefit (or not) of this deviation

£M

‘Cost Growth’ from the erosion of later benefits

New pipeline cost profile

Initial cost saving by moving to an ‘off ramp’ solution

Time

Does the initial cost saving made outweigh the later cost growth?
Savings - How?
Example Whole Life Cost (WLC) Comparison

- Support savings with other TCW systems
- Reduced total stockpile quantity due to improved surge capability
- Commonality, Modularity and Re-use
- Single source assessment

NPV (£M)

TCW

Non-TCW

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How Atkins forecast TCW savings

Atkins Sector Level Model
Sector Level Approach

What is the cost of the TCW construct in relation to Open Competition?

• Atkins created a Sector Level (Portfolio) cost model

• CAAS and Scrutiny engaged throughout the process, including a Red Team review of Sector Savings/Benefits

• We began by determining the possible future scenarios
Sector Level Approach

Futures Tree

- A decision made at each system ‘block’ will result in a different branch being followed, which will lead to different costs and interdependencies.
- Each ‘future’ represents a portfolio of weapons spanning ~30 years into the future.
- Each future represents a unique aggregation of savings.
Sector Level Approach

Futures Tree

• Each weapon was benchmarked against alternative means of acquisition in an Open Competition world;

  ➢ ‘Stovepipe’ - Traditional UK customer-supplier procurement
  ➢ MOTS (Military Off The Shelf). MOTS comparator determined as the nearest ‘analogue’

• By comparing the traditional (Open Competition) future to the TCW future, savings could be determined

• Atkins derived WLC estimates for MOTS systems
MOTS Costing Approach

Whole Life Costs (WLCs)

- CADMID used as a framework to assess WLCs
- Cost estimating techniques include:
  - Parametric analysis of historical data (e.g. NAO, MoD)
  - Read across from TCW option
  - Weapons Integration UK (WIUK) Model
  - All Sources Aggregated Estimate (ASAE) for Unit Production Price (UPP) estimate
MOTS Costing Approach

ASAE

- UPP is a significant cost driver. ASAE includes:
  - Bill of Materials
  - FACET
  - MERA
  - Open Sources (E.g. US budget data, Government Audit Office (GAO), Foreign Military Sales)
- Bottom-up, top-down, analogous estimating methods are combined
MOTS Costing Approach

Bill of Materials

• MBDA supplied Atkins with generic templates of sub-system cost breakdowns for different classes of guided weapons (e.g. 50kg, 100kg, 1000kg)
• Atkins SMEs assess the complexity of each component of a MOTS system against the generic guided weapon to produce sub system cost estimates
• Input from Dstl SMEs where available

Example Sub-Systems

<table>
<thead>
<tr>
<th>Seeker IIR</th>
<th>Seeker RF</th>
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</thead>
<tbody>
<tr>
<td>Propulsion Solid</td>
<td>Propulsion Turbo</td>
</tr>
<tr>
<td>Datalink</td>
<td>Fuze</td>
</tr>
<tr>
<td>Lethal Package</td>
<td>Actuation</td>
</tr>
<tr>
<td>Navigation</td>
<td>Weapon Controller</td>
</tr>
<tr>
<td>Airframe &amp; Structure</td>
<td>AIT inc Production Support &amp; Management</td>
</tr>
</tbody>
</table>
MOTS Costing Approach

UPP Triangulation

- BOM
- FACET
- MERA
- OS1
- OS2
- OS3
- Combined

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MOTS Costing Approach

WLC Results

UPP * missile quantity is the main component of the M Phase
Sector Level Approach

Futures Tree

• With MOTS and Stovepipe costs attained..
• For each weapon block an open competition ‘baseline’ was determined
Sector Level Approach
Project WLC Comparison

Lowest cost of the two typically selected as the Open Competition option

E.g. Weapon 4a
Sector Level Approach

Weapons Tree

- Open Competition future determined
- Model Open Competition and TCW future against one another, for each future scenario
Sector Level Approach

Aggregated Comparison

- Monte Carlo simulation used to determine most likely TCW and O/C costs
- Considers inflation, currency, risks, cost assumptions, correlations
- Present each future scenario to Defence Scrutiny

E.g. ‘Future A’
Summary

- Atkins Sector Model used to inform MoD on weapon cost saving potential for different future scenarios
- Analysis provides vital evidence to support decisions on establishing and continuing the TCW arrangement
- Atkins continue to support MoD at both a project and a sector level (a similar approach is adopted at a project level)
Questions?

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