Meeting capability goals through effective modelling and experimentation of C4ISTAR options

ICCRTS 16, June 2011
Paper 007

Bob Barton, MD Niteworks
Dick Whittington, CSO Salamander
Understanding the problem
Capability and Trade Spaces

Aspirations and budget

National Capability Trade Offs

Cross Capability Trade Offs

CMG Capability Trade Offs

DLoD Trade Offs

Reality and Cost

Defence Strategic Guidance

Capability Change Plan

Capability Management Plan

Through-Life Management Plan

* Defence Lines of Development
Trade Spaces or islands?

In practice the stages are not well connected
What does the model tell us?

• It emphasises the need for effective trades
• It shows how poor ‘left hand’ trades create work to the ‘right’
• Volume of work runs in reverse to size of original circles
  – Logjam
  – Repetition
  – Poor risk understanding
  – Uncontrolled expenditure

• Better collective use of resources can help
  – Consultation and collaboration -
The need for a better approach

- Current acquisition process lacks focus at front end
- ‘concepts to capability gap’
- Driving early to competition is not the answer
- Exploring risks and options, safely, will drive success
- ‘Value for Money’ vs ‘Affordability’ - subjective/objective?

“...we must rebalance our relationship with industry so that we achieve maximum value for money...”

UK Secretary of State for Defence
22 Feb 2011

Competition vs collaboration?
Balance means getting the best of both – Niteworks!
Informing the process

Niteworks provides an informed link between two key elements of the process
Our approach
Key Facts

12 industry partners drawn from the major defence providers

~80 associate members made up of small and medium sized enterprises (SMEs), specialists, academia and consulting companies
Where does Niteworks fit?

Divergence
[Exploring the question, testing the problem]

Convergence
[Examining what’s possible, shaping the requirement]

Divergence
[Exploring the supply side, choosing the partner]

Convergence
[Bringing the solution together, Delivering the integrated components]

[Ideally Capability across the DLoDs, through time]
Model-Centric Implementation

Decision Making & Governance Process

Balance – Trading / options – Visualisation

Operating Processes

Capability Planning

Capability Delivery (pan DLOD)

Capability Generation

Unifying Architecture

Common Language & Transparency

Common Technologies Tools & Methods

Sources of data

Systems

 endangered

Project Reporting
Risk Management

Sources of data

Systems

Project Planning
Cost Estimation
The defence enterprise – complex relationships

- Policy & Doctrine
- TTPs
- Operations
- Capability
- Systems & System of Systems
- Programmes & Projects
- Supply Network
- Enablers
- Wider Gov & Allies
- Industry provisional systems
- Capability RoadMap/requirements
- Information Exchange requirements
- Portfolio Level Management
- Requirements for US/UK Interoperability
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Cross-capability planning

1. Understand Capability Context
2. Understand Demand Changes
3. Analyse Capability
4. Update Capability Strategy and Plans
5. Adjust Programme Plans
0. Maintain Supply & Demand Baseline

Deliberate or unplanned Capability Planning activities
Continuous activities
Approach enables a number of aspects to be tested

- Operational concepts and military procedures
- Pan-DLOD needs and interdependencies
- Technology maturity and the ‘art of the possible’
- Capability goals, requirements and planning
- High level system of systems, and systems architectures
- Programme and project level requirements
- Integration and interoperability solutions
Apply the approach – some case studies

Case study: Army Equipment Development Plan

NB- ALL DATA IS ILLUSTRATIVE
Concept - taxonomy

Elements with definitions from doctrine

Tactical Functions
Concept - methodology

Judgement and analysis

Equipment needs and priorities

Tracking risks

Visualisation

Judgement and analysis

Defence credible evidence

Backed by data

Key decisions:
1.-----
2.-------
3.-----
4.-----

ASSUMPTIONS
LESSONS LEARNT
CAP AUDIT
HLOA
LLOA & studies
COST DATA

Cost modelling

Treat
Tolerate
Transfer
Terminate

MJPs
Scrubty & red team
Dstl review

ECAB paper

Equipment needs and priorities

Treat
Tolerate
Transfer
Terminate

ECAB paper

Judgement and analysis

Backed by data
Assumptions
1. Key assumptions which drive the results
2.
3.
4.
5.
6.
7.
8.

Deductions/Recommendations
1. The key ‘so what’s which form the basis of decisions taken to rectify the key issues identified
2.
3.
4.
5.
6.
7.

Organisation Profile:

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Key Equipment Profile

Predicted Defence Cost Profile
Timeframe 1 Scenario 1

Assumptions and constraints

A number of assumptions and constraints which define this scenario and timeframe. Particularly:

1) The policy environment which defines the requirement.
2) The level of forces in the scenario.
3) The amount and type of equipment that the forces have available.
4) The threat level.
5) Assumptions about concurrency and endurance.
The Army Equipment Development Plan (AEDP)

AEDP is a decision support visualisation and information environment based on comprehensive military judgement of Defence validated evidence sources.
Case study: Talon Strike Multi-National Experiment
Talon Strike - the Problem

Distributed

Experimental Sequence

Ex OF 08 ➔ CWID 09 ➔ Ex OF 09 ➔ Ex TS

People - Using UK and US operational Staffs – 10 Mtn Div/12 Bde
Processes - Tackling procedures and processes in digital age
Rapid Spiral Development for CIS Capability Area
Benefits of experiment

Provided insights into the issues of track management

Provided British Army with a better understanding of the technical challenges of C2 integration and interoperability

Allowed distributed training to be conducted by exploiting past investment

Provided insights into the utility of specific existing C2 environments

Exposed shortcomings in some theatre applications & other capability gaps for achieving Shared Situational Awareness (Some are now Urgent Operational Requirement actions)

Exposed the need for a Strategic authority on Coalition Network Standards

Exposed the complexity of achieving Shared Situational Awareness in a two-nation coalition WAN environment

Helped de-risk future requirements by assessing the use of OneSAF as a core simulation for Divisional level hybrid operations

Exposed the lack of standards for digital symbols and where in existence the disparate ways of interpreting them.

Confirmed the continued requirement to deploy digitally empowered LOs and the need to improve Information Management & Exploitation skills overall.
Case study: Future Maritime Fires (FMF)
Providing decision support, trade space analysis, for a fires capability

- Future Maritime Fires (FMF) is being delivered by International Guns, Missiles and Rockets (IGMR) Project Team and supported by Niteworks.

- Niteworks is modelling requirements, capability & solution effectiveness and cost, enabling trades to be made as part of the acquisition process.

- The FMF capability is to “engage and destroy land threats which have the capability to deny own forces the ability to control the Above Water Battlespace in the Littoral.”

- The mix is expected to include:
  - **Maritime Indirect Fire System (MIFS):** which is expected to be predominantly met by the MCG.
  - **Maritime Indirect Fire Precision Attack (MIFPA):** which is expected to be predominantly met by missiles.

- The Concept Phase will determine the appropriate mix of capability to deliver the FMF requirement.
Helping the customer answer the key questions about the Maritime Fires capability

1. Why do we need a gun?

2. How capable are the MCG weapon systems at engaging targets?

3. How effective is the MCG compared with other Maritime Fires effectors?

4. Does the MCG offer additional capability over and above other platforms?

5. What are the priority targets?

6. How much does the weapon system cost, through life?

7. On which platform should the weapon system be installed?
Modelling supports both capability definition and decision support

### Capability definition

- **Definition**
  - Concept
  - Capability Requirements (Effects)
  - User Requirements
  - System Requirements

- **Validation**

### Decision-support

- **Assessment**
  - Operational performance through time
  - Capability performance
  - Solution performance against user requirement
  - Solution performance against SRD

- **Validation**

### Option definition

- **Solutions**
  - 5 MCGs
  - 20 Munitions
  - 3 Platforms

### Solution differentiator

- **Cost model**

### Performance models

- **URD score**

### Key

- Requirement definition
- Option definition
- Operational analysis
- Capability modelling
- Cost modelling
Capability Modelling provides a holistic view of Capability, Cost and Risk

- Flexible model
- Enable trading of Performance, Cost and Time
- Present Outputs as Visualisations as required by the Customer

FMF Cost Modelling

Cost Model

FMF Requirements

FMF Capability Modelling

- Visualisations
- Decision Support Model
- Performance Model
- Assessments of soft factors/ DLoDs
- Assessment against full list of URD criteria
- War game and analysis
- Through time view of capability

URD

CRD
The capability modelling visualisations support decision-making
Benefits from FMF analysis

- All stakeholders actively involved before key decisions
- Solid basis of evidence, robust analysis
- A model, refined and tested, for future use
- A model which permits trades between:
  - System of systems and concept of operations
  - Cost and performance
  - OA, Capability and user needs

.......handed over to MOD........

- Subsequent trades to be performed by MOD staff
Summary and Conclusions
Getting the requirement right
- Not exhaustive, but test the “art of possible”

Being prepared for change
- Stuff happens – the more you experiment the lower the risk

Managing Integration begins on day one
- It’s not something you do at the end

Knowing where your degrees of freedom are
- And be realistic about using them

Collaboration up front pays dividends
- It explores the unthinkable, the ‘un-thought-about’
- Prepares the supply base
- Exposes the performance ‘knees’ which drive cost
Headline benefits being delivered

- Shaping affordable requirements
- Informing Industry-informing MOD where no other mechanism can
- Developing methods which deliver coherence
- Confronting and solving the risks and “difficult issues”
- Providing an alternative to costly and unnecessary competition

Niteworks – the collaborative model

- A unique capability
- Constructive challenge
- Honesty replacing conspiracy

Better decisions, reduced operational risk, lower costs
....and finally.....

“....and there’s a trade-off between the gold-plated solution – often admired but rarely competitive even when it does at last hit the market – and what we can get quickly and at better value for money......

....that’s why I’m a supporter of the Niteworks Partnership which helps to improve requirements, reduce risk, and enhance value for money. Niteworks is one of our best kept secrets and deserves to be much better known.......”

Peter Luff
UK Defence Minister
February 2011