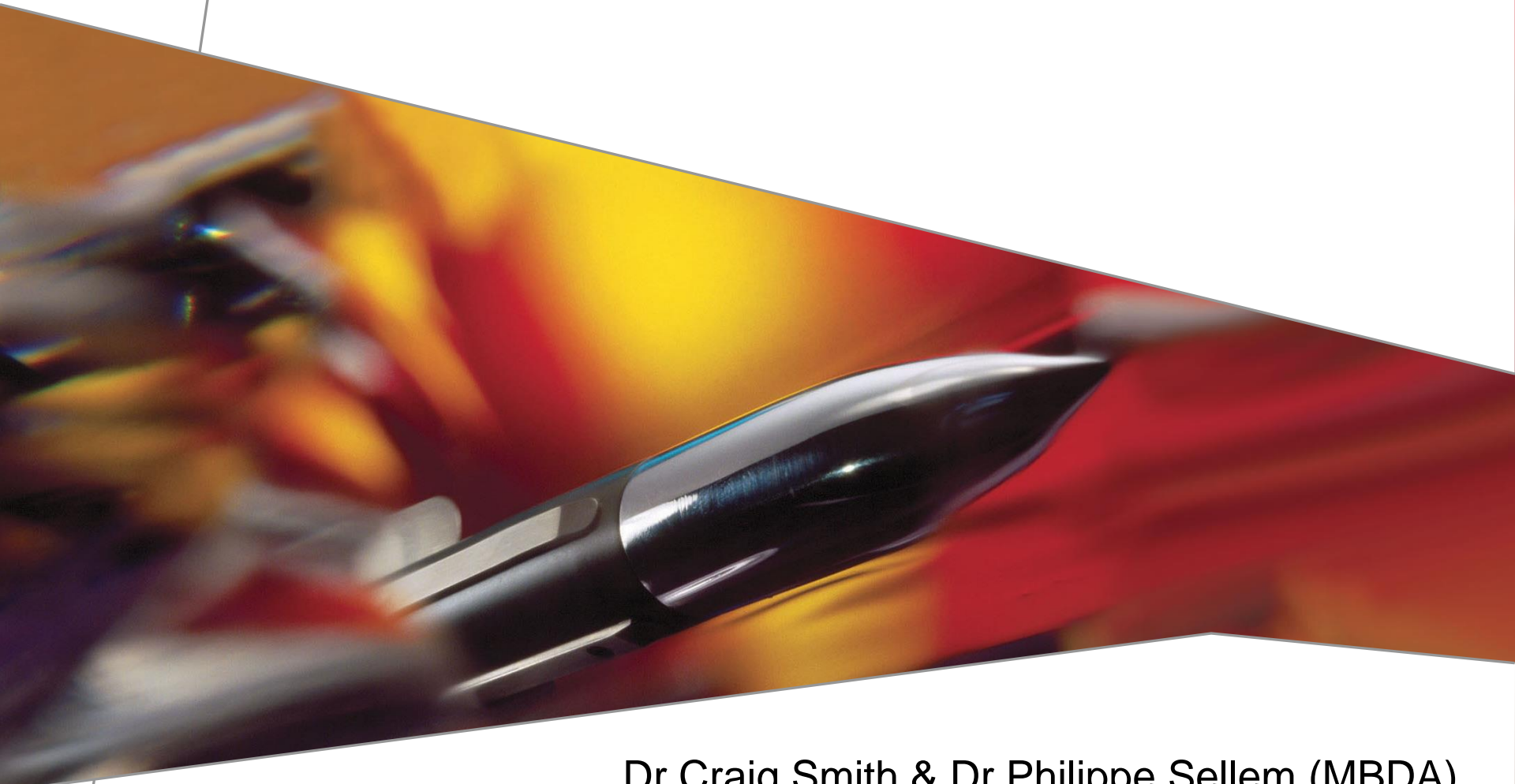


Anglo-French Portfolio Analysis



Dr Craig Smith & Dr Philippe Sellem (MBDA)
ISMOR 2013

MBDA
MISSILE SYSTEMS

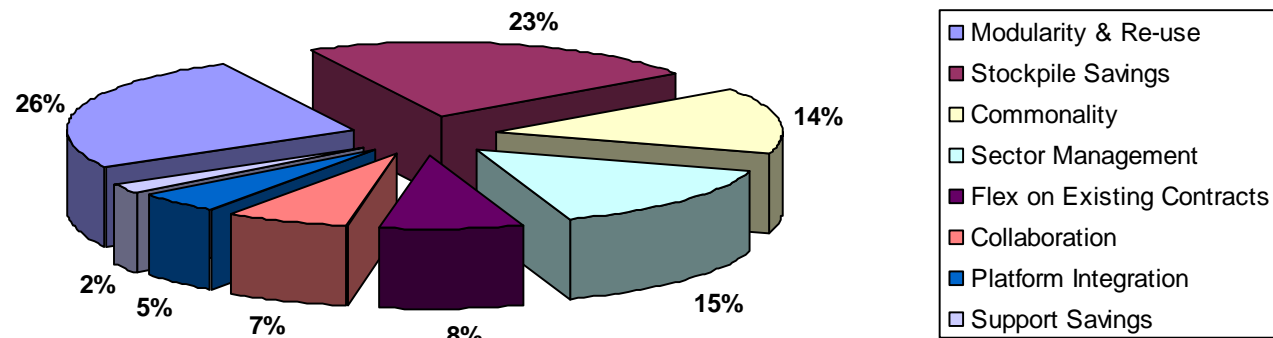


Scope of the presentation

- The Context for the Analysis
 - The Team CW background
 - Additional Challenges for Anglo-French Collaboration
- The Analysis Process
 - Requirements Exploration
 - Concept Generation
 - Concept Refinement and Analysis
 - Portfolio Generation and Analysis
- Key Highlights from the Analysis
- Lessons Learnt
- Summary

Team CW - Sector Transformation

- Portfolio Management Agreement - between MoD and MBDA covering portfolio of Complex Weapons (missile systems)
 - Maximum Sovereignty from portfolio c.£600M pa
 - 100% Flexible within the Pipeline
 - Incentivisation towards Joint Benefits
- Successful operation for 3 years
 - Libya and SDSR / PR12
- MoD-MBDA Bilateral represents the best Value for Money option - c. £1.2Bn efficiencies



Filière Missile and Anglo-French cooperation

- Filière Missile – portfolio of capabilities provided by MBDA to the French MoD
 - The French CW pipeline
 - Different arrangements compared to Team CW, suited to the different MoD – industry environment
 - Compatible with FR industrial policy
- One Complex Weapons sector - Feb 2012
 - Working towards 10 year strategic plan
 - Potential efficiency savings of up to 30%
 - Not just ad hoc collaboration!





Objectives & Scope

- Objectives:
 - Conduct comparative analysis between “collaborative” versus “national” procurement options
 - Identify key issues
- Scope
 - Consider the entire CW pipelines in UK and FR
 - Consider capability, budget and industrial issues, including export
 - Exploratory analysis to consider consequences at a strategic level, not to make capability decisions
 - Consider a thirty year window (2012 – 2042), recognising that opportunities for joint projects grow with time
 - Most of the first decade is committed

Overview of Process

To provide a high level characterisation of the military problem space suitable for joint UK-FR analysis

Vignette Generation

Requirements Capture → Vignettes

Concept Generation

Concept Generation Workshop

To generate a set of (Complex) Weapon Concept Classes which will meet military requirements in the 2020 – 2040+ timeframe

To select champions and characterise them in cost and capability terms sets of Concepts to be input to the Portfolio analysis

Concept Selection & Analysis

Concept Development

Portfolio Development

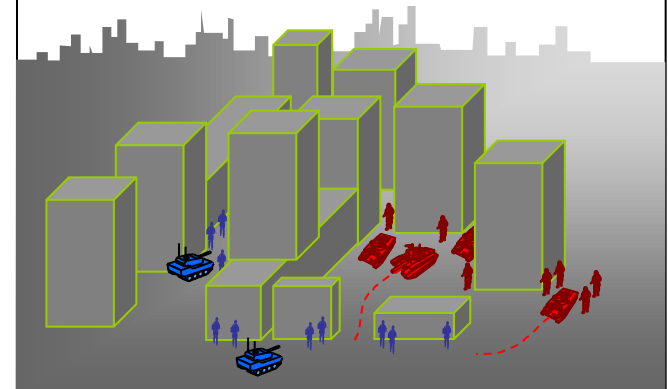
Portfolio Generation & Iteration

To generate a set of Complex Weapon Portfolios that explore the overall capability & affordability trade-offs in the 2020 – 2040+ timeframe

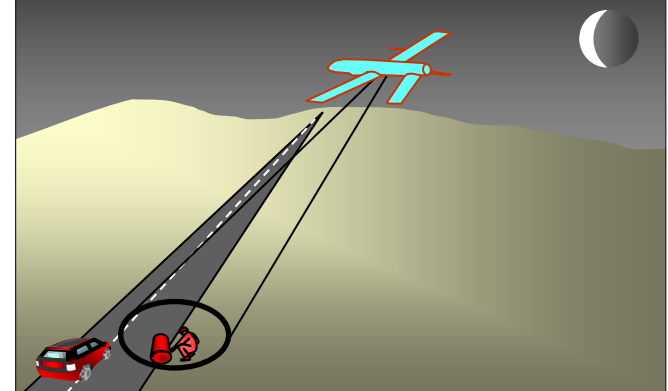
Exploring Requirements → Vignettes

- Vignettes used to explore underlying military need
 - Target plus context, including any targeting constraints
 - Avoids early numerical requirements (“range > x”)
- Set chosen to stimulate innovation
 - Sparse coverage of all domains and tasks (28 vignettes)
 - Representative conditions
 - Included some edge of envelope tasks – e.g. counter narcotics

Ground Forces Encounter Symmetric Threat in Urban



ISTAR identifies insurgent planting IED



Concept Generation

- Mixed FR-UK group from MBDA
 - Technical
 - Business Development
 - Export & Marketing

- 2 day workshop
 - Concepts generated against the vignettes
 - Rapid score to identify strengths and weaknesses
 - Prompted further ideas

- Resulted in ~ 90 concepts for refinement

C8.1 Joint Development Man-Portable Anti-Tank

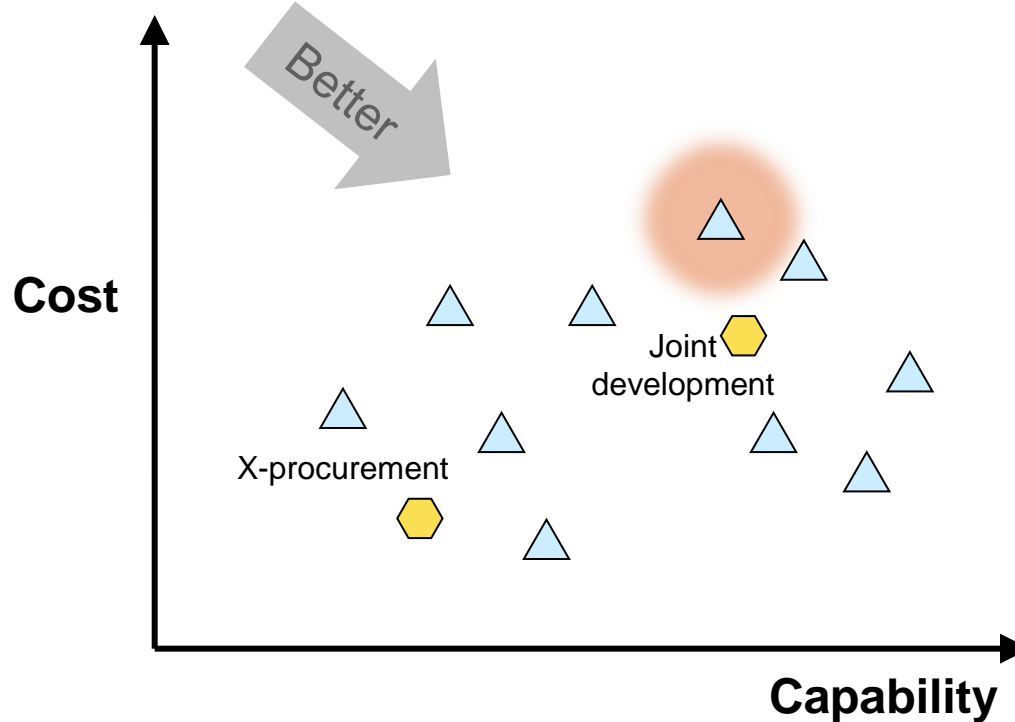


Description: A guided man-portable fire-and-forget missile to provide a top-attack anti-tank capability.

ISD:	2025	(20-year service, no re-life)	
Dimensions:	15 kg	1.2 m (L)	0.14 m (D)
Range:	4 km		
Integration:	Infantry		
Guidance & Nav:	Fibre optic wire with IR seeker		
Effector:	9 kg Tandem Shaped Charge		
Propulsion:	2.5 kg Solid rocket		
Stockpile:	FR: 2000 / UK: 2000 (50 / 50 reusable 4 kg launchers)		
Comments:	Low cost weapon with secure tactical targeting		

Characterising and Selecting Concepts

- Selected Concepts are “champions” for a region of trade space
 - Not about picking winners, project decisions lie in the future
- High uncertainty in cost & capability at this stage - ranking



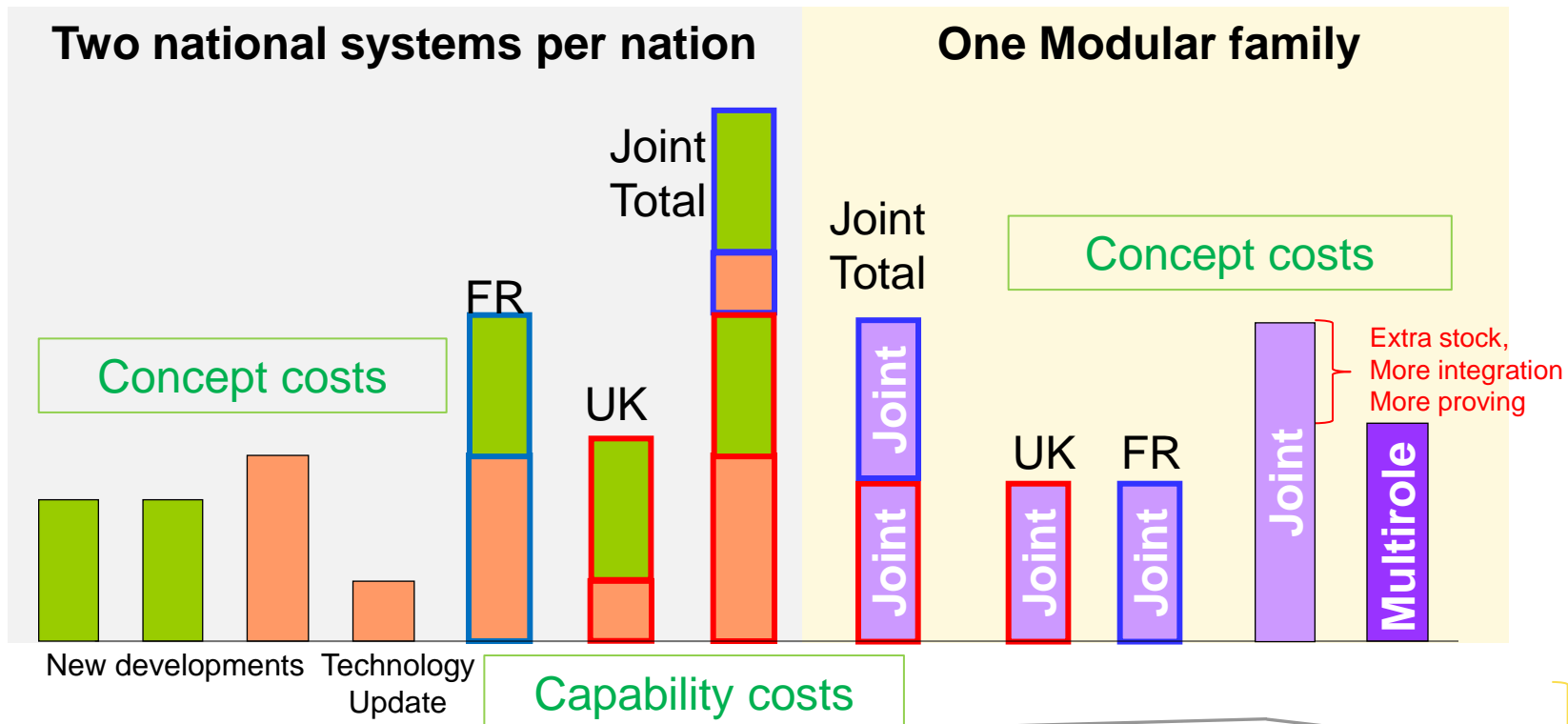
Variants - Trade-offs

Seeker type
Propulsion
Warhead
Airframe
etc.

- △ Concept
- Variants around a concept
- ⬡ Option for portfolio analysis

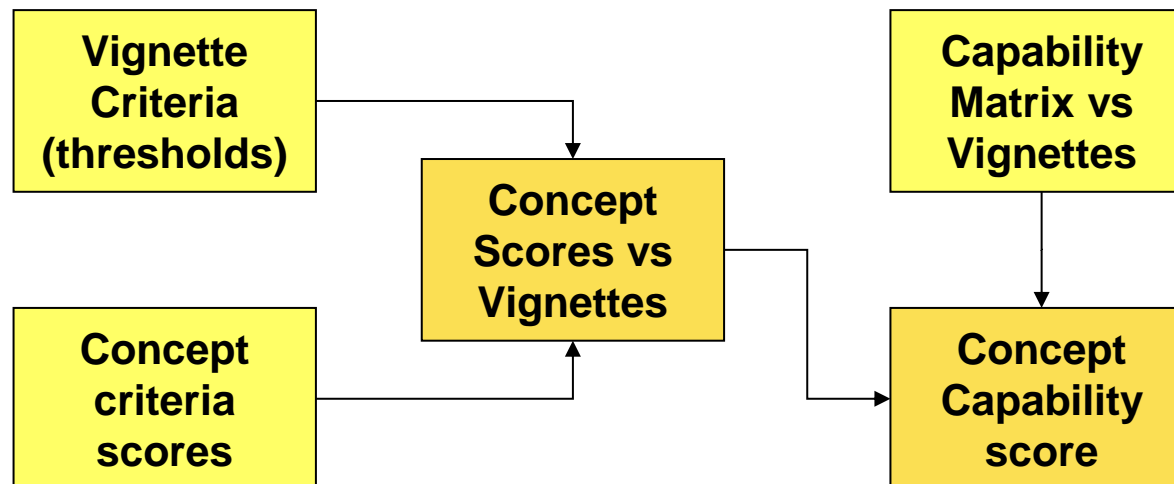
Cost Analysis Example

- Parametric estimated Whole Life Cost, including integration
- Very Rough Order of Magnitude
 - Correct ranking of Concepts, more uncertain for radical options



Capability Assessment

- Needs to be high level
 - Technical data relatively immature
 - Large number of concepts
- Focused on key attributes (see next slide)



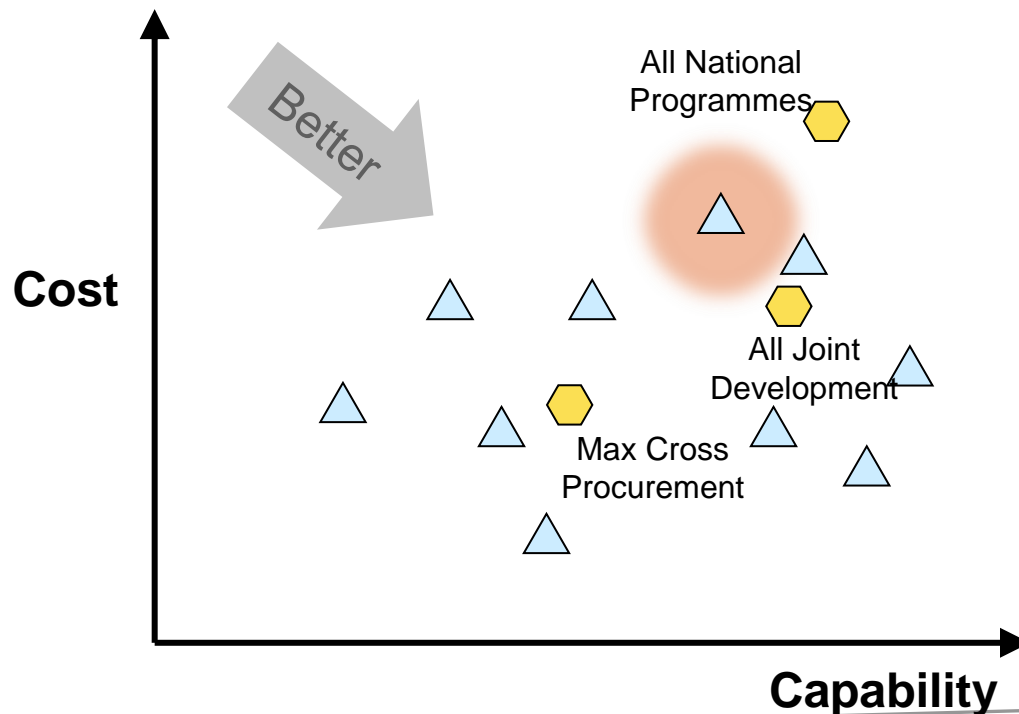


Concept and Capability Scoring

- Criteria – scored on 0-3 range
 - Effect vs target types (matrix)
 - Survivability
 - Range / reach (given launch platform)
 - Targeting/ discrimination
 - Persistence/ availability
 - Ability to attack moving / mobile targets
 - Responsiveness
 - Precision of attack
 - Countermeasures / False targets robustness
 - Collateral damage risk
- Each vignette is characterised with a minimum acceptable level for each criteria (can be zero if not a driver)
- Each concept has an aggregated score against each vignette (0-3 range)
 - 0 = no capability
 - 1 = limited capability
 - 2 = adequate capability
 - 3 = robust capability
- Each concept has a capability score (%), by summing the vignette scores for relevant vignettes

Portfolio Selection

- Similar issues to selecting concepts – champions
 - Many system choices for each capability → spread of data
- Use as the vehicle to tease out the high level issues
 - Capability, cost and timescale compromises, export, sustainment



Key variables
% of programmes
joint vs national
Cross procurement
Modularity & re-use
Sequencing
etc.



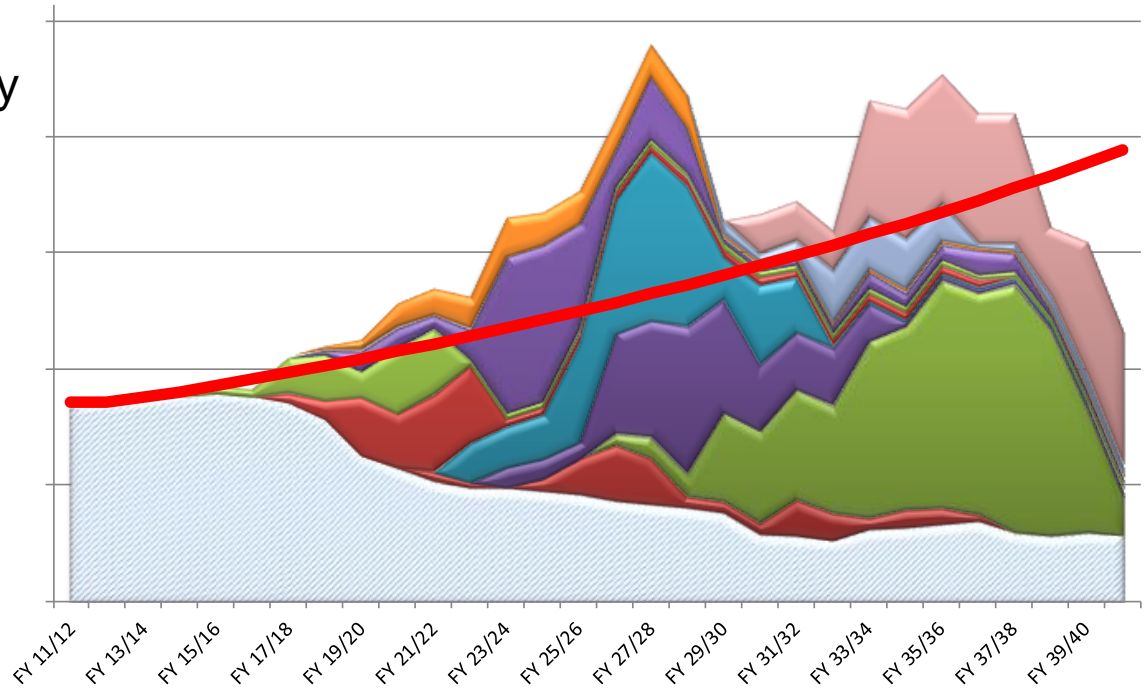
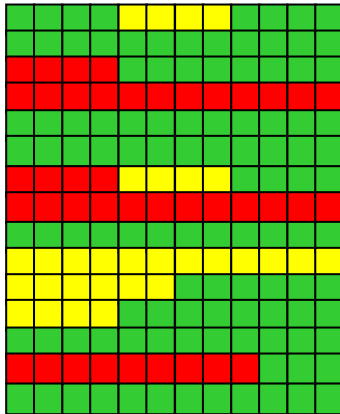
Portfolio Analysis Tool

- Large interactive spreadsheet tool, generally used offline
- Inputs
 - Portfolio composition (pick list of concepts)
 - Route map data for each concept with key events (ISD, OSD)
 - Cost data for each concept (plus committed programmes)
 - Capability score data for each concept
 - Export assessment for each concept
 - Sustainment metrics
- Outputs
 - Aggregate cost profile
 - Aggregate capability score by year
 - Industrial sustainment overview by year
 - Aggregate export potential

Typical Portfolio Output

Cost by programme, against budget

Portfolio Capability



- Iteration by deletion, deferment, descoping or collaboration
 - Some dynamically within tool
 - Others offline – e.g. new sequence with complex re-use



Highlights from the Analysis

- Significant opportunities for collaboration on future programmes based on Capabilities
 - UK & FR share the same strategic view
 - Many capability timescales are convergent
- The affordability challenges for future capabilities are very significant – every drop of collaborative saving is needed for affordability
 - This level of saving requires real work by both governments and industry, not just business as usual
 - Uncertainty as to how much saving will be delivered
 - Long lead process change
 - Pathfinder projects identified



Lessons Learnt

- Strengths - Can cover a variety of possible futures & priorities
 - Raises discussion to “Capabilities”, not “Products”
 - Promotes dialogue & provides insights
 - Breaks down “silo” thinking – shows interdependencies
- Weaknesses – Endless options and variations – needs clarity of purpose
 - Even low granularity data for many concepts takes considerable effort
 - Define an end point for iterative loops
- Process must to be tailored to audience and purpose
 - It is not a “Do Once” activity – it is a learning experience

Lesson: proactively manage complexity

- Analysis process has been used to explore the UK-FR future complex weapon capabilities and budgets showing potential for significant savings through collaboration
- High degree of innovation in the approach
 - Scope & complexity, interactive collaborative working
- Benefits
 - Highlights macro challenges for MoD and Industry
 - Provides context for specific concept studies – plus some quick orientation on key issues
 - Provides top level research orientation – likely fertile areas

A tool for decision makers and for exploration