BAE SYSTEMS

A Structured Approach to Developing System Solutions to Military Requirements

Kevin Smith
BAE SYSTEMS

ISMOR 18

BAE SYSTEMS

Future Systems - 2001

Future Systems

- Team Composition
  - Strike
  - Manoeuvre
  - Information Superiority
  - Strategic Deployment
- Concepts and Technology
- Business / Finance / Human Resources

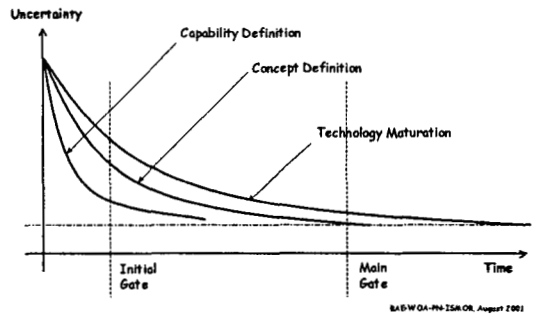
Team Locations

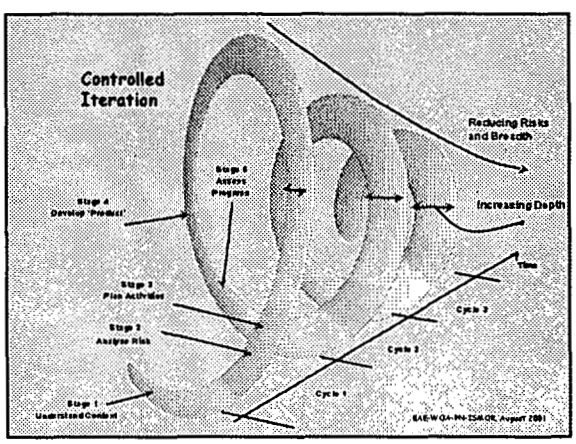
BAE SYSTEMS

The Problem

- Transition from Equipment to Capability Procurement
- Broader set of options to consider
  - developments/derivatives
  - new concepts / OTS
  - enablers
- Shortening Timescales
- Demands Rapid, Iterative process covering total system to support decision making

Options Convergence





Analysis Steps

- Characterise the Requirement
- Evaluate Customer Current Capability
- Explore Potential Solutions
- Evaluate Solutions

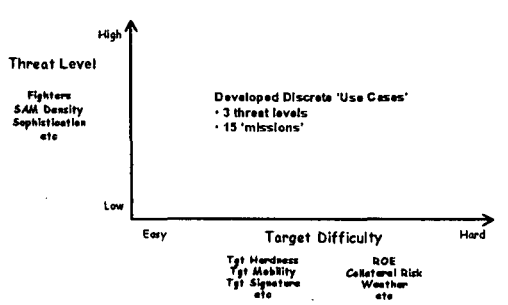
The Requirement

.. to have the desired effect on all potential targets under all operational conditions in a survivable manner ...

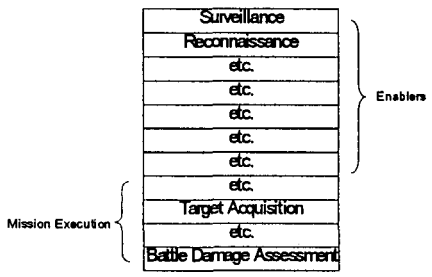
Requirement Characterisation

	Easy	Parameter	Hard
the target...	Soft Static Large etc	Hardness Mobility Signature etc	Very Hard Moving Small etc
the natural environment...	Relaxed Nil Clear etc	ROE Collateral Risk Weather etc	Stringent Extreme Cloudy etc
the threat environment...	Few 3rd Gen Point Legacy SHORAD etc	Fighters SAM Density Sophistication etc	Many 5th Gen Blanket Advanced LR etc

Mission Level Assessment Structure



Attack Mission Total Functional View

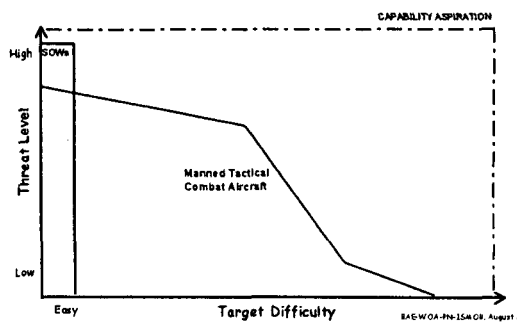


'Use Case' Evaluation

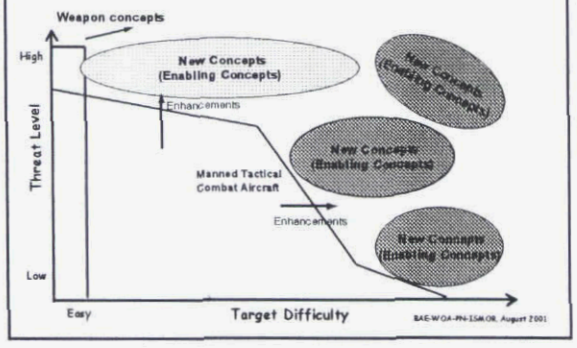
Framework enables evaluation at various levels:

- Does system under consideration posses the necessary functionality?
- Can it be used in a survivable manner?
-
-
-
- Is the system optimally cost-effective?

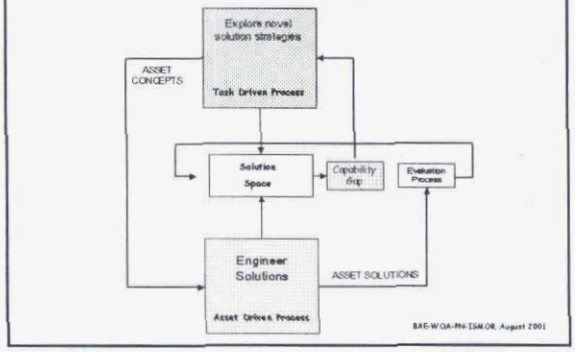
Generic Attack System Capability



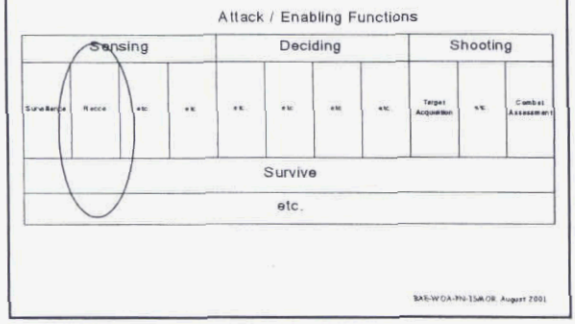
Solution Exploration - Concept Areas



Solution Exploration - Overarching Process



Novel Strategies - Example



Sensing Options

Passive	Non-Imaging	RF	ESM
		IR	PLIR/Hyperspectral
	Imaging	Visible	Film-Based
			etc.
		Infra-Red	IRLS
			PLIR/BLIR
			etc.
			etc.
		RF	MMW Radiometry
Passive (Bistatic)	Imaging	RF	SAR
	Non-Imaging	RF	MTI
Active	Imaging	RF	SAR
			etc.
		EO	Scanning LASER
			etc.
	Non-Imaging	RF	MTI
		EO	Vibrometry
Specific			Magneto Meter
			Gravimeter
			etc.
			etc.
			etc.

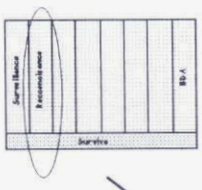
BAE-WOA-PN-ISMOR August 2001

Survivability Options

Survivability Strategy	Threat Avoidance (Avoid)	Deny opponent knowledge of platform's presence	Standoff
			Terrain Screening
			etc.
	Attack Evasion (Evade)	Deny opponent an attack/firing solution.	Saturation
			Deception
			Disrupt communications/data links
		Evade an incoming weapon or fire	etc.
			etc.
	Threat Elimination (Counter)	Destroy/Suppress opponent's:	Soft Kill
			Hard Kill
	High Damage Tolerance	Minimise effects of damage caused by opponent.	Hardening/Protection
			Damage Control Measures
			etc.
			etc.
			etc.

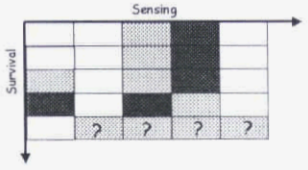
BAE-WOA-PN-ISMOR August 2001

Consideration of Viable Solution Options



Considering 2 Aspects of Multi-dimensional solution space:

Analysis



BAE-WOA-PN-ISMOR August 2001

In Summary

- Briefly illustrated an approach to developing system solutions to a military requirement
  - uncertainty managed through generically structured, then prioritised requirements
- Illustrated Operational Analysis in broader Systems Engineering context
- Any Questions?