AEGIS Platform:

Using KVA Analysis, Risk Simulation and Strategic Real Options to Assess Operational Effectiveness

Purpose

- Proof-of-concept test of a methodology for estimating return on investment (ROI) using an OA approach to upgrading and/or replacing the aging Integrated Weapons Systems (IWS) AEGIS and SSDS systems
- Estimates of total value of strategic alternative options for replacing existing AEGIS functionality

Methodology

- Approached from a customer-based, warfighter (i.e., ***Customer***) perspective (see Hammer's Seven Deadly Sins of Performance Measurement in Sloan Management Review Spring 2007)
- Utilized Knowledge Value Added/Real Options (KVA+RO) valuation/risk portfolio management framework to reengineer situational awareness (SA) procedures
- Analyzed the track management process and its sub-processes (Hammer, 2007 – focus on processes), used in the SA module for AEGIS and SSDS in terms of "As-Is" (baseline performance) and three "To-Be" scenarios

Knowledge Value Added and Real Options Analysis

- Measures the value and cost of human and IT assets
- Uses a “market comparables” valuation technique, to establish revenue surrogates for discounted cash flow estimates
- Allows for the use of powerful financial metrics in forecasting the value of strategic options for replacing IWS systems (Hammer’s “precision and robustness” concepts, 2007)
- Estimates value and risk of strategic options using real options analysis (Hammer, 2007 measures drivers of value and risk)

Potential Impacts of OA on Current Processes

PROCESS	SUB-PROCESS	Comments Potential Impact of OA
CORRELATE	**"Identify 'Same Contact, Multiple Track'"**	• Reduces reliance on manual identification of multiple tracks and updating current tracks. • Systems automatically correct anomaly of multiple tracks per target and update tracks. Only brief confirmation by the watch station operator necessary.
TRACK	**"Update GCCS-M"**	• Enhances operational value of systems through reduced time, manpower and possible training required to conduct process.
TRACK	**"Update Track"**	• Reduces reliance on manual identification of multiple tracks and updating current tracks. • Systems automatically correct multiple tracks per target anomaly and update tracks, resulting in brief confirmation by watch station operator.
IDENTIFY	**"Verify Point of Origin"**	• Enables greater sensor and data integration, providing enhanced correlation in pinpointing origin of aircraft or ship. • Point of origin for friendly force contacts could be queried from an open GCCS-M system, and ATO neutral-force contacts could be interrogated from host nation airports (assuming data format standardized and provided by host nations.). • Facilitates interfaces to these other systems to provide automated query for point of origin. • Frees watch standers to perform other tasks while providing faster data flow.
IDENTIFY	**"Match Against ATO"**	• Info provided in ATO could be integrated into the AEGIS and SSDS platforms, greatly reducing manpower requirements.
IDENTIFY	**"Verify EW Emissions"**	• Facilitates COTS-based environment that easily upgrades to accommodate greater processor speeds. • Electronic communication of data from EW to CIC personnel greatly enhances CIC efficiency through more timely situational awareness. • Frees operators to perform other tasks.
IDENTIFY	**"Match Against Intel Information"**	• Streamlines sub-process with automatic updates requiring merely manual confirmation.

Upgrade/Replacement Options

	"As Is"	"To Be"	"Radical 1"	"Radical 2"
Re-engineering	None	Limited re-engineering	Significant re-engineering	Substantial re-engineering
Technology Impact	**None**	• Info provided in ATO could be upgraded into AEGIS, reducing manpower requirements. • Enables greater sensor and data integration, providing enhanced correlation in pinpointing origin of aircraft or ship.	• Streamlined system automatically updates tracks. • Increased information-sharing and collaborative technology allows for automatic correction of multiple tracks per target. • Continuously updates tracks, allowing for pinpoint accuracy. • Collaborative technology minimizes possibility of multiple tracking of targets. • Includes changes from "To Be"	• Collaborative technology automatically updates ship's systems with Intel information. • Electronic communication of data from EW to CIC personnel facilitates COTS-based environment that easily upgrades to accommodate greater processor speeds. • Greatly enhances CIC efficiency through more timely SA. • Includes changes from "To Be" and "Radical 1."
Potential Benefits*	------	• Reduces maintenance costs. • Frees watch-standers to perform other tasks while providing faster data flow.	• Increases accuracy of tracking targets.	• Substantial re-engineering leads to drastic reduction in watch-stander work time, greatly reducing human error and further decreasing maintenance costs.

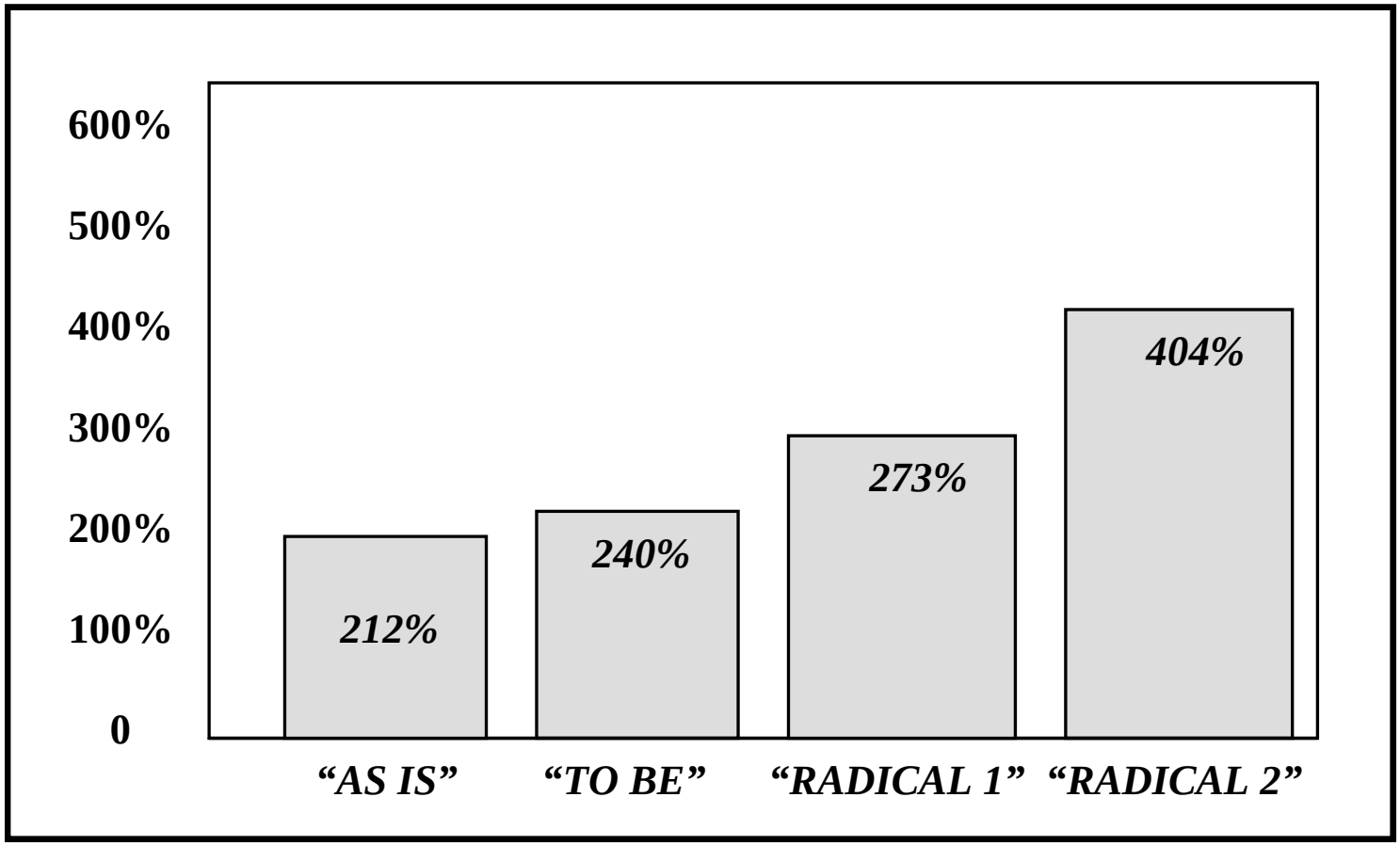
Results

- **Strategy C: Leave and Layer: most promising strategy with lowest total costs.**
  - highest potential rate of return with a valuation of $58.8 billion
  - 4.9 times the potential return than baseline -- Strategy A -- lowest valuation at $12 billion
  - Strategy B – Total replacement -- valuation of $23.2 billion
- **Collaboration is critical:** OA as an acquisition, development and deployment framework will only succeed with support of collaborative infrastructure
- **OA requires significant upfront investments** to ensure reusability, collaboration, upgradeability
- **Performance monitoring is required:** performance of acquisition strategies must be monitored to increase probability of success (Hammer's concept of systematic use of metric, 2007)

Real Options Results

	Strategy A	Strategy B	Strategy C
STRATEGIC OPTION	"As Is"	DDX OA "Develop and Retrofit"	AEGIS OA "Leave & Layer"
Net Present Value	$12B	$6.38B	$27.52B
Volatility	0%	80.5%	86.3%
Real Options Value	$12B	$23.155B	$58.84B
Strategic Real Options-based Return on Investment	N/A	72.36%	224.75%
Total Cost	$10B	$24B	$9.09B
Strategic Real Options-based Relative Return Ratio	1.0	1.9	4.9

ROI Static Financial Analysis Results



Implications of Research

- OA can provide tremendous benefits when used in collaborative environment
- Leave and Layer option in OA context allows build-out, upgrades faster and cheaper
- Value of OA can be estimated rapidly using KVA+RO approach and monitored over time

Next Steps

- Extend research to acquisition life cycle across platforms and process owners
- Perform trial implementation of approach for ongoing monitoring and updating of options using supporting performance measurement software (e.g., use in the experimentation process to determine ongoing value and options created in acquisition lifecycle)