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LOCKHEED MARTIN

Optimization of Information Systems Life Cycle Costs

A Case Study using Parametric Models for Estimates of Alternative Architectures and Operational Approaches

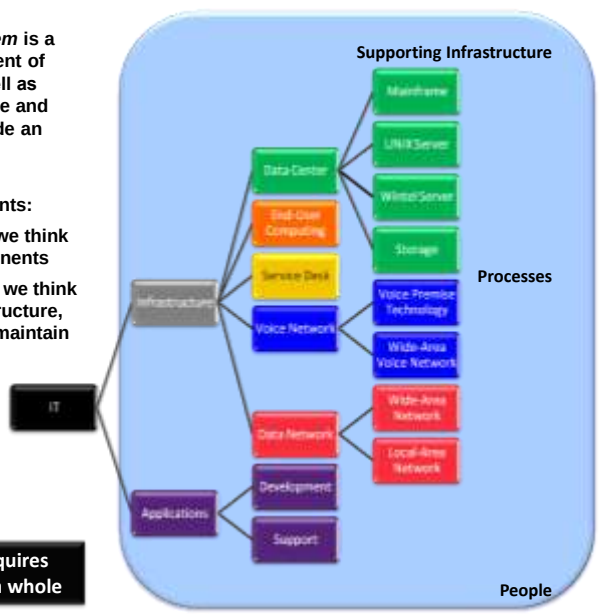
Kevin Woodward, Lockheed Martin IS&GS
Reggie Cole, Lockheed Martin IS&GS
Denton Tarbet, Galorath Incorporated

The Scope of Enterprise Information Systems

An *Enterprise Information System* is a complex system – an arrangement of technology components…as well as supporting infrastructure, people and processes that interact to provide an enterprise capability

It consists of two key components:

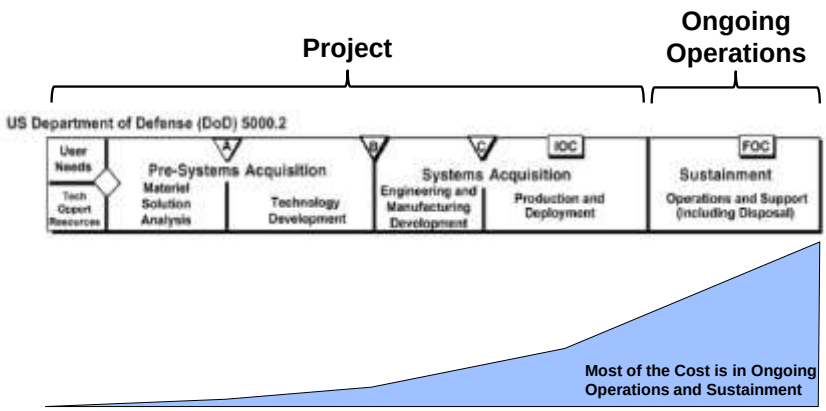
- **Primary System – The part we think of as the technology components**
- **Enabling System – The part we think of as the supporting infrastructure, people and processes that maintain the primary system**



Optimizing lifecycle costs requires treating the entire system as a whole

Optimizing Information System Lifecycle Costs

Most of the cost for enterprise information systems is in ongoing operations and sustainment...optimizing lifecycle costs involves making trade-offs between the primary system and the enabling system.



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Best Value Defined

Striking the optimal balance among the components of system performance, cost, schedule and risk, as defined by the customer/user, over the life of the system.

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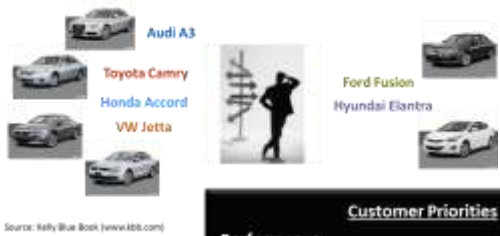
Best Value Example: Purchasing an Automobile



Source: Kelly Blue Book (www.kbb.com)

Customer Priorities

- Performance
- Cost
- Schedule
- Risk/Uncertainty

Customer Priorities

-Performance
*Transmission (Auto/6Spd/FWD)
*Max Seating/Doors
*Warranty
*Crash Rating
*Horsepower
*MPG (City/Hwy)

-Cost
*MSRP
*Dealer Discount
*5-Yr Ownership
*Insurance

-Schedule
*Time to Delivery

-Risk/Uncertainty
*Likelihood of Performance, Cost and Schedule Realization

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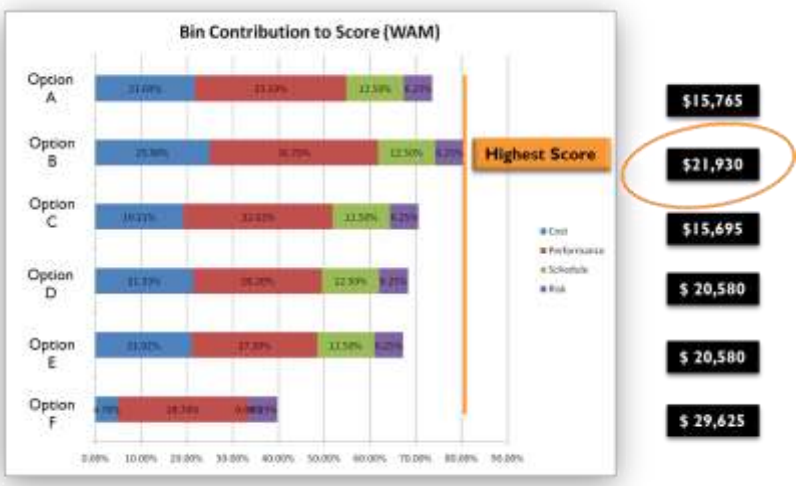
There is no one answer, no single formula for defining best value – it must be defined by the customer – but once defined, it CAN be optimized

Best Value Example: Purchasing an Automobile



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The best value solution is most closely aligned with the weighted set of customer/user priorities. It may not be the least costly solution.

Optimization of Information Systems

- ★ **Establish the Objective Function**
  - An objective function that is expressed as best value for the information system
- ★ **Define the Trade Space**
  - A trade space which considers the total operational life of the information system, recognizing that ongoing operations are more expensive than the initial project
- ★ **Evaluate the Trade Space**
  - A process which readily facilitates an analysis of alternative solutions
  - A process which employs parametric estimation to establish the life cycle cost component of the best value analysis

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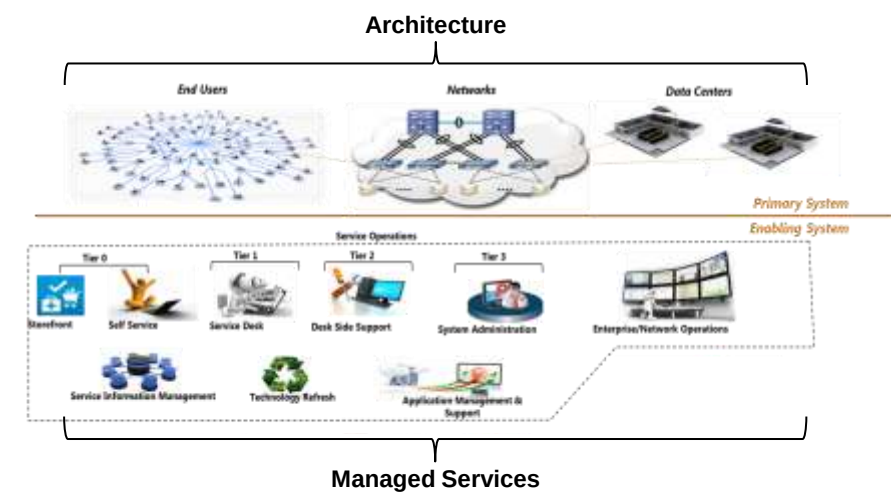
The Information Systems Trade Space



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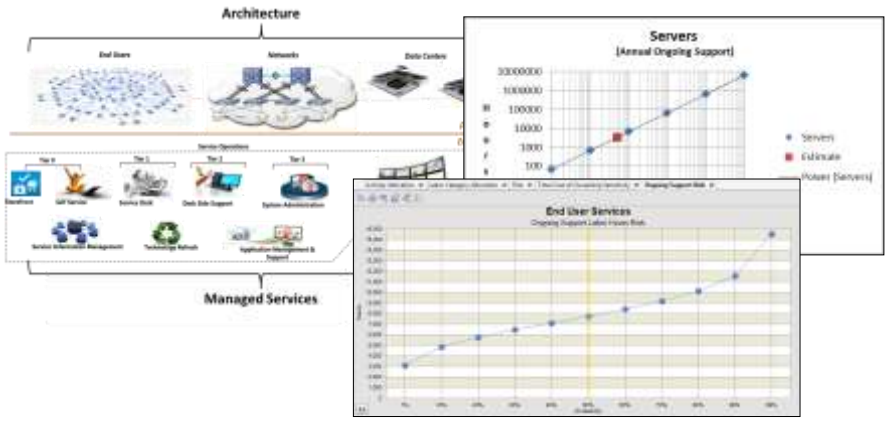
To identify the best value solution, there must be a means to effectively evaluate alternative architectures and services over the operational life of the system

Evaluating the Trade Space



Parametric estimation methods provide the ability to evaluate design alternatives rapidly with consistent measures for cost, performance, schedule and risk between alternatives

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Case Study – Introduction

- ★ The Problem – Cloud Migration
  - – It is not a matter of whether an enterprise should move to cloud
  - – Cloud computing will be part of the enterprise IT landscape
  - – The real question is to what degree cloud and what applications to migrate
- ★ The Debate So Far Has Been About Security and Performance
  - – Can applications be securely hosted in the cloud?
  - – Can applications hosted in the cloud meet performance requirements?
  - – Things to which the outcomes are "Pursue" or "Don't Pursue"
- ★ Cloud is Not Really a Debate – It's a Tradeoff
  - – For which applications does cloud security suffice?
  - – For which applications is cloud performance adequate
  - – For which applications is – and to what degree – is cloud a better value than organic hosting?

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Case Study – Overview

- ★ Enterprise with Approximately 800 Applications
  - – 75% Windows-Based Applications
  - – 25% Unix/Linux-Based Applications
  - – 50% require little care and feeding
  - – 20% require a lot of care and feeding
  - – Almost none of the applications are virtualized
  - – Server administration efficiency is pretty low
- ★ Parameters
  - – Minimize five-year costs
  - – Constrain annual expenditures to within 10% of current budget
- ★ Multiple Courses of Action – What Improvements to Make
  - – COA 1 – Do Nothing Different
  - – COA 2 – Make Improvements in Admin Efficiencies
  - – COA 3 through COA 7 – Also Virtualize and Port to Cloud
    - Starting with 30%...Going Up to 80% (split evenly between virtualization and cloud)

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Parametric Analysis Approach

- ★ Evaluate Support Costs
  - – Different types of applications require different levels of care and feeding
  - – Windows is different from Unix/Linux
- ★ Evaluate Hosting Cost
  - – Hosting cost reduces with virtualization…and even more with cloud
- ★ Model Improvement/Conversion Investments
  - – Improving system administration efficiency requires an investment
  - – Virtualizing applications can be a significant investment
  - – Making applications “cloud-ready” requires even more work
- ★ Model Incrementally Increased Virtualization and Cloud Hosting
  - – The payoff is the reduced operating costs
- ★ Find the Best-Value Point
  - – Define “Best Value” and optimize towards it
  - – In this case…minimize five-year costs while constraining operating budget to within 10% of current budget

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Case Study – As-Is & To-Be Architecture

- ★ As-Is Architecture
  - – Multiple Data Centers
  - – Low System Administration Productivity
- ★ To-Be Architecture
  - – COA 1 Same as As-Is
  - – COA 2 Makes Fundamental Improvements in Data Center Operations
  - – COA 3 Through COA 7 Makes Incremental Increases In:
    - Consolidation of Data Centers
    - More Virtualized Applications
    - More Cloud-Hosted Applications
- ★ Cloud and Virtualization for COA 3 Through COA 7
  - – COA 3 – 15% Virtualized & 15% Cloud
  - – COA 4 – 25% Virtualized & 25% Cloud
  - – COA 5 – 30% Virtualized & 30% Cloud
  - – COA 6 – 35% Virtualized & 35% Cloud
  - – COA 7 – 40% Virtualized & 40% Cloud

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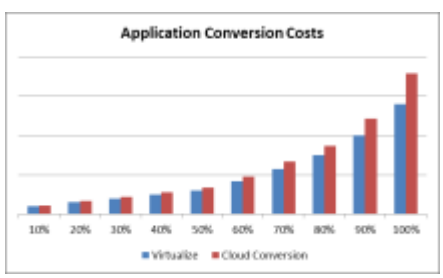
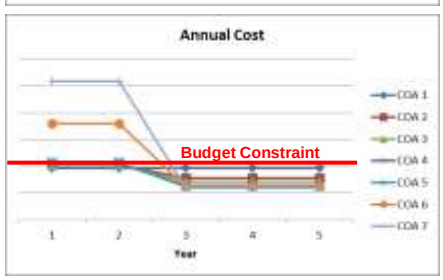
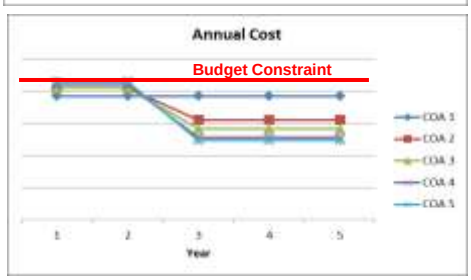
Analysis of Parametric Modeling Results







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Broadening the Concept

- ★ It is Not Sufficient to Estimate Costs
  - – Lifecycle costs need to be optimized
  - – Optimized against an objective function
  - – Optimized within budgetary constraints
- ★ Parametric Cost Estimating Tools Are Critical
  - – The analysis is labor intensive – that's why it is not routinely performed
  - – Parametric tools can be of great benefit
  - – But more tools need to look at optimization of investment and operating costs
- ★ This Was Just One Example….But There Are Many Others
  - – Help Desk Optimization
  - – Improvement in Field Technician Support
  - – Implementation of Virtual Desktop Infrastructure
  - – And Many Others Too

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Summary

- ★ Performing best value analysis requires the ability to quickly evaluate costs, benefits and sacrifices
- ★ True optimization REQUIRES the use of parametric analysis – bottoms-up analysis is too time-consuming and inaccurate to perform optimization
- ★ Tools are already in place to start doing the analysis
- ★ Some tool improvements would be helpful – but the good news is that the foundation is well established

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