



# Software Lifecycle Affordability Management (SLAM)

**PSM**  
**June 2009**



# Agenda

- SLAM Project Overview
- Introduction to Service Oriented Architecture (SOA)
- SOA Research Findings
- SOA Business Case Analysis



## SLAM Overview

- Research Project focused on affordability and process issues associated with Service Oriented Architecture (SOA)
- Study SOA projects with focus on cost drivers
- Identify where existing cost estimating technologies work for SOA
- Develop methodology for extending existing technologies where necessary
- Develop methodology for performing business case analysis for SOA projects



## SLAM Deliverables

- Prepare two case studies focused on costs of completed Army SOA projects
- Demonstrate methodologies for cost and BCA on two on-going Army projects



## SLAM Deliverables

- Research SOA topics and document findings
  - Cost Drivers
  - Cost Estimating Methodologies
  - Business and Acquisition process obstacles
  - Measurable benefits
  - Business Case Analysis (BCA) Methodologies



## Status

- Case Studies for 2 Army projects completed
- Data collection on SOA cost drivers on going within and outside of the Army
- Data collection completed on 2 in-process Army projects
- Will incorporate the methodologies developed into solution (prototype) customized specifically for Army requirements.



## Introduction to SOA

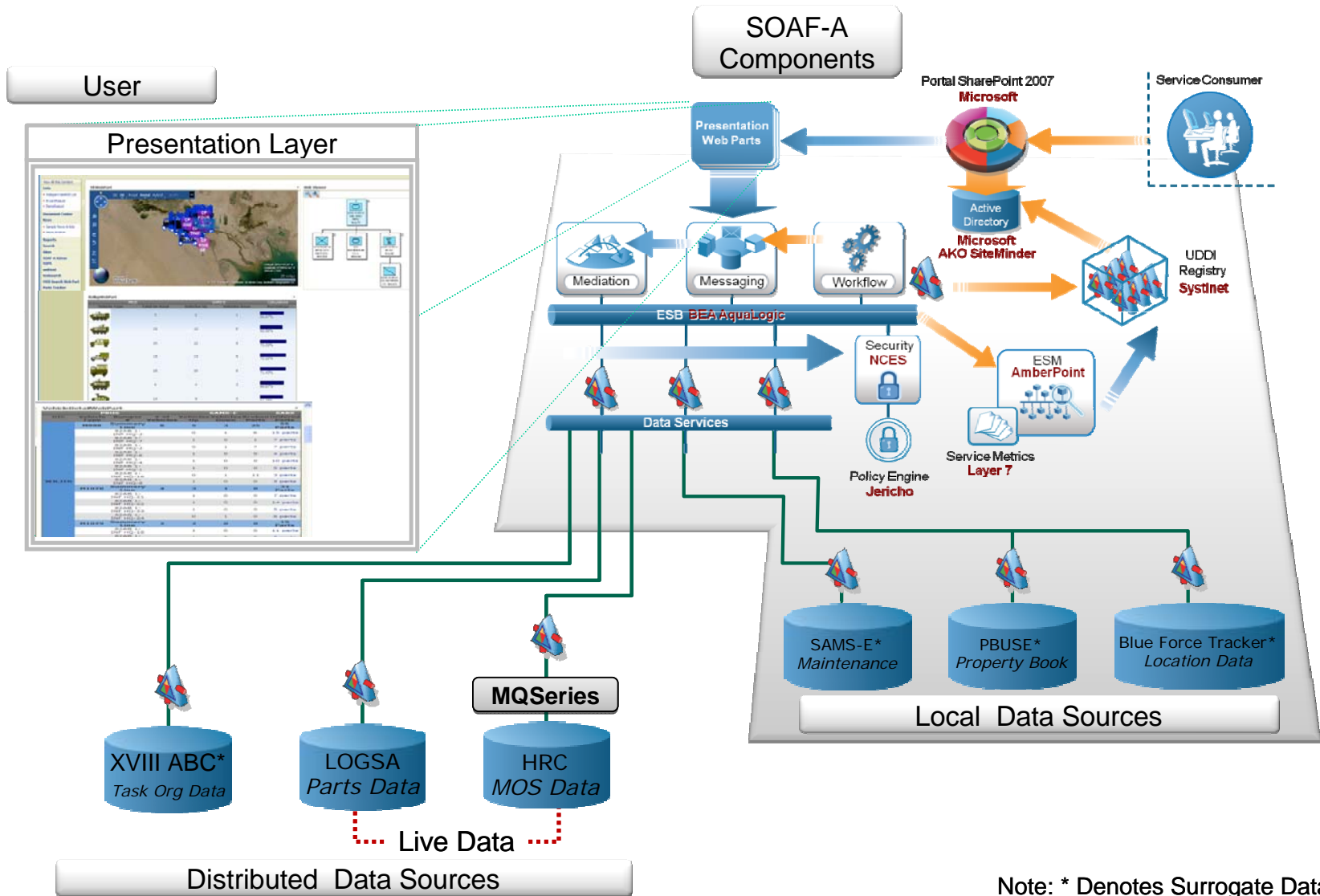
- SOA uses networking capabilities to integrate applications in a way that is independent of:
  - Architecture
  - Programming language
  - Development platform
  - Vendor
- Service Orientation can be thought of as the next generation of object orientation
  - New degree of abstraction
  - More sophisticated tools available to deploy

Map View



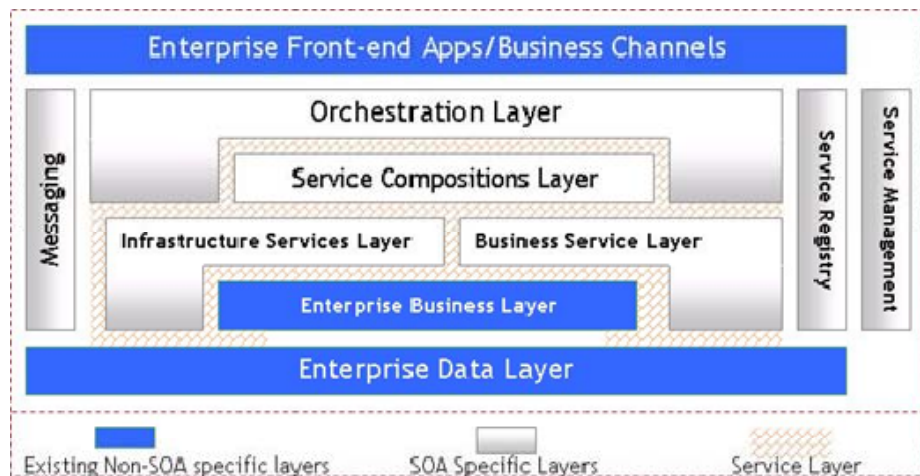


# Division Maintenance Status Portal



Note: \* Denotes Surrogate Data

# SOA – a more Technical Perspective



- Infrastructure provides services multiple apps need
- Business services implement rules specific to business or organization
- Business processes are composed through orchestration layer



## Why SOA? The Value Proposition

- Value to IT
  - Reduced redundancy
  - Development efficiency increase (as services are reused)
  - Loose coupling reduce impact of changed processes



## Why SOA? The Value Proposition

- Value to the business
  - Agility
  - Visibility of business processes
  - Business/IT alignments
  - Better, faster decision making



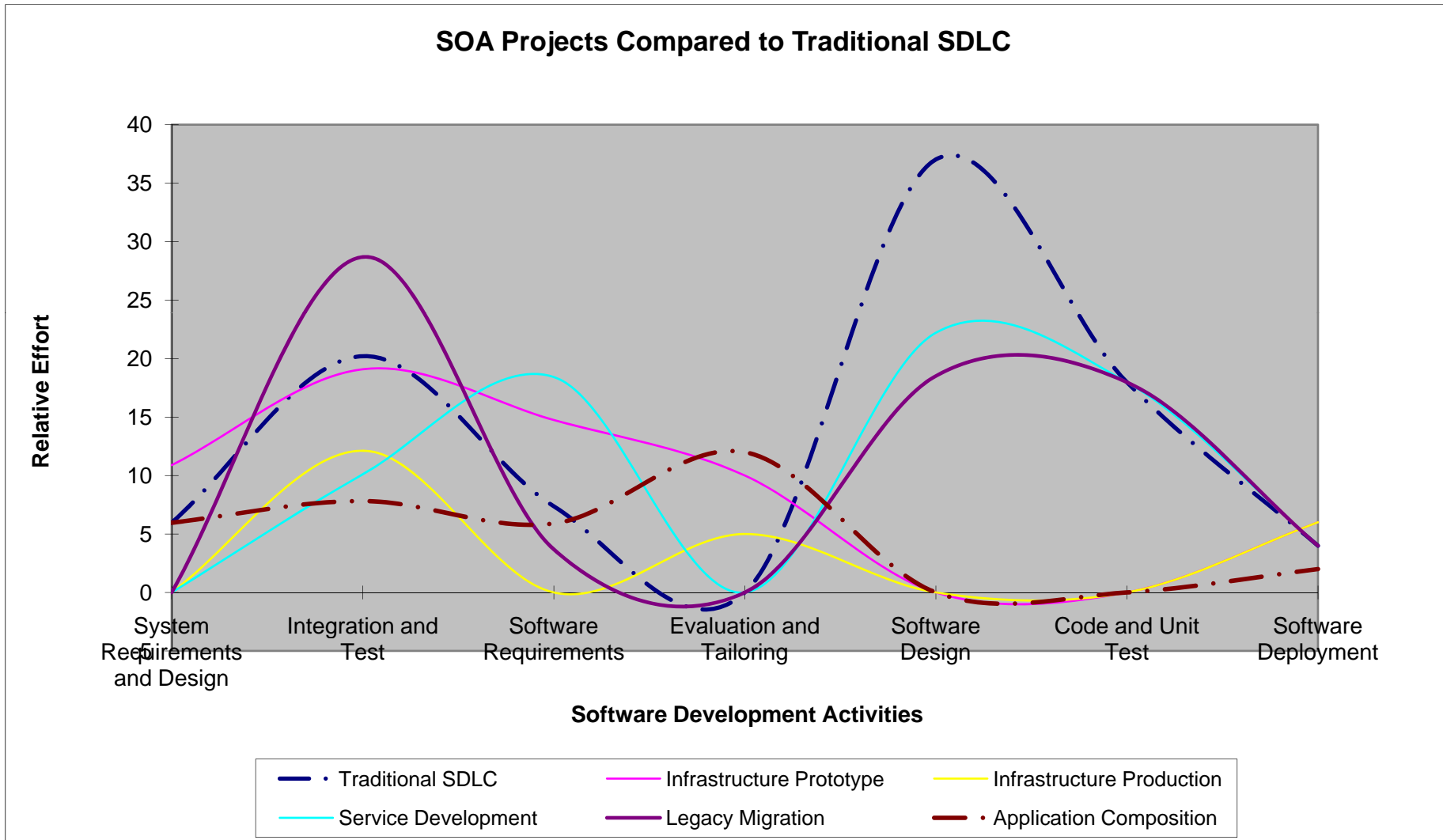
## SOA Research Findings – where are Costs Generated?

- Five distinct areas are being studied
  - Deploying infrastructure prototype
  - Deploying instances of infrastructure ('production')
  - Developing Services
  - Migrating legacy capabilities to Services
  - Application Composition



## Our Process

- Followed same process used for Software Product Line white paper
- For each of the 5 flavors of SOA
  - Standard set of Activities and Resources
  - Based on research, interviews and expert opinion configure the Activities and Resources
  - Apply initial framework to SOA projects and evaluate and revise as needed





- A pictures worth a thousand words
- But tables are sometimes easier to explain





	<i>Prototype of SOA Infrastructure</i>	<i>Production Instances of SOA Infrastructure</i>	<i>Development of Services</i>	<i>Migration of Legacy Capability to Services</i>	<i>Application Composition</i>
Project Initiation and Planning	Yes	Yes	Yes	Yes	Yes
Project Management and Control	Yes	Yes	Yes	Yes	Yes
Quality Assurance Management	No	Yes	Yes	Yes	Yes
Configuration Management	No	Yes	Yes	Yes	Yes
Vendor Management	Yes	Yes	Yes	Yes	Yes
Documentation	Yes	No	Yes	Yes	Yes
Requirements Definition and Analysis	No	No	Yes	Yes	No
System Design	No	No	Yes	Yes	No
Software Integration and Test	Yes	Yes	Yes	Yes	Yes
System Integration and Test	No	Yes	Yes	Yes	Yes
Operational Test and Evaluation	No	Yes	Yes	Yes	Yes
Software Requirements Analysis	Yes	No	Yes	Yes	No
Evaluation and Selection	Yes	No	Yes	Yes	No
Configuration and Tailoring	Yes	Yes	Yes	Yes	Yes
Software Design	Yes	No	Yes	Yes	No
Code and Unit Test	Yes	No	Yes	Yes	No
Software Qualification Test	No	No	No	No	No
Purchase Software	Yes	Yes	Yes	Yes	Yes
Software Deployment	No	Yes	Yes	Yes	Yes
Software Maintenance	Yes	No	Yes	Yes	Yes
Software Adaptation	Yes	No	Yes	Yes	Yes



	<i>Prototype of SOA Infrastructure</i>	<i>Production Instances of SOA Infrastructure</i>	<i>Development of Services</i>	<i>Migration of Legacy Capability to Services</i>	<i>Application Composition</i>
Business Analyst	No	Yes	Yes	Yes	Yes
Configuration Manager	No	Yes	Yes	Yes	Yes
Design Engineering	Yes	Yes	Yes	Yes	Yes
Material	Yes	Yes	Yes	Yes	Yes
Other Direct Costs	No	Yes	Yes	Yes	Yes
Programmer	Yes	Yes	Yes	Yes	Yes
Project Manager	Yes	Yes	Yes	Yes	Yes
Project Stakeholder	Yes	Yes	Yes	Yes	Yes
Quality Assurance	No	Yes	Yes	Yes	Yes
Software Engineering	Yes	Yes	Yes	Yes	Yes
Support Engineering	Yes	Yes	Yes	Yes	Yes
System Engineering	Yes	Yes	Yes	Yes	Yes
Technical Writer	No	No	No	No	No
Test Engineering	Yes	Yes	Yes	Yes	Yes



# General Observation

- SOA will tend to extend the reach of technology (mostly software) into day to day business/operations/missions
- Natural extension to IT capability increase
- This in turn increases the need /demand/ insistence for stakeholder & end user participation to a degree we have not seen before

*Prototype of  
SOA  
Infrastructure*

Project Initiation and Planning	Yes
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<b>Activities</b>	Project Initiation and Planning	0.1	1	1	1	1
	Project Management and Control	0.1	1	1	1	1
	Quality Assurance Management	0	1	1	1	1
	Configuration Management	0	1	1	1	1
	Vendor Management	0.1	1	1	1	1
	Documentation	0.1	0	1	1	1
	Requirements Definition and Analysis	0	0	1	0.25	0
	System Design	0	0	1	0.25	0
	Software Integration and Test	1	1	1	1	1
	System Integration and Test	0	1	1	1	1
	Operational Test and Evaluation	0	1	1	1	1
	Software Requirements Analysis	0.1	0	1	1	0
	Evaluation and Selection	1	0	1	1	0
	Configuration and Tailoring	1	1	1	1	1
	Software Design	1	0	1	1	0
	Code and Unit Test	1	0	1	1	0
	Software Qualification Test	0	0	0	0	0
	Purchase Software	1	1	1	1	1
	Software Deployment	0	1	1	1	1
	Software Maintenance	1	0	1	1	1
Software Adaptation	1	0	1	1	1	
<b>Resources</b>	Business Analyst	0	1	1	1	1
	Configuration Manager	0	1	1	1	1
	Design Engineering	1	1	1	1	1
	Material	1	1	1	1	1
	Other Direct Costs	0	1	1	1	1
	Programmer	1	1	1	1	1
	Project Manager	1	1	1	1	1
	Project Stakeholder	1	1	1	1	1
	Quality Assurance	0	1	1	1	1
	Software Engineering	1	1	1	1	1
	Support Engineering	1	1	1	1	1
	System Engineering	1	1	1	1	1
	Technical Writer	0	0	0	0	0
	Test Engineering	1	1	1	1	1



## SOA Research Findings - Organizational Influences

- Organizational Cost Drivers
  - Number of stakeholders
  - Existing of governance policy
  - Clearly defined ownership
  - Organizational commitment
  - Degree of organizational agility
- Costs shift from project to enterprise level as SOA solutions are directed at business process issues
- Project Level activities impacted significantly



# Organizational Cost Drivers

- Number of stakeholders
  - Tremendous variation cross DoD programs have significant increase in stakeholder, business analyst, and system engineering (architect) effort
  - Existing of governance policy can also increase effort
  - Clearly defined ownership can streamline and accelerate
  - Organizational commitment good or bad (cheaper/expensive)
  - Degree of organizational agility (faster/slower)

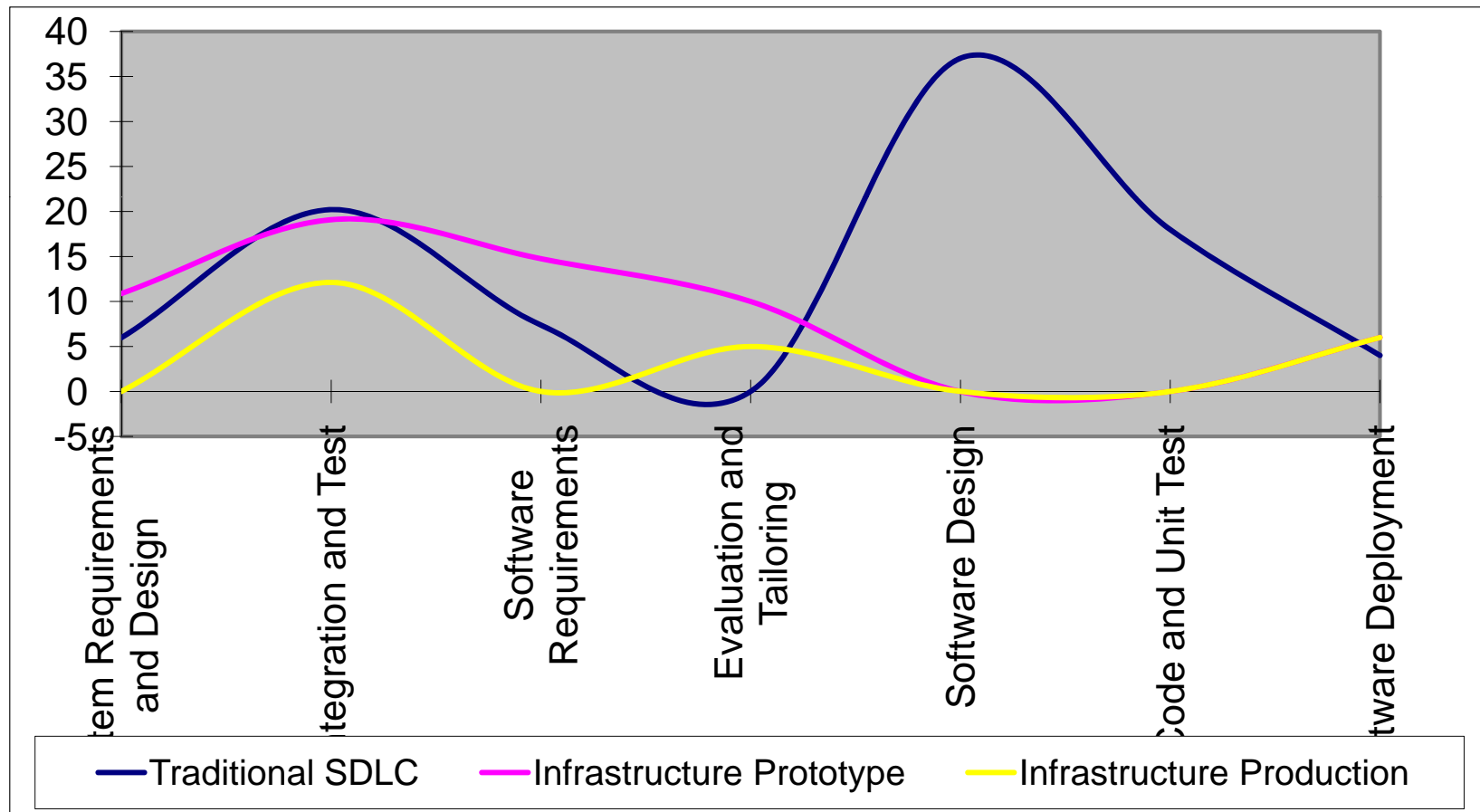




# Organizational Cost Drivers

- Costs shift from project to enterprise level as SOA solutions are directed at business process issues
  - Configuration management and Quality Assurance as overhead vs. project functions
  - Training costs
- Project Level activities impacted significantly
  - Project Cost will rise as organizational costs rise

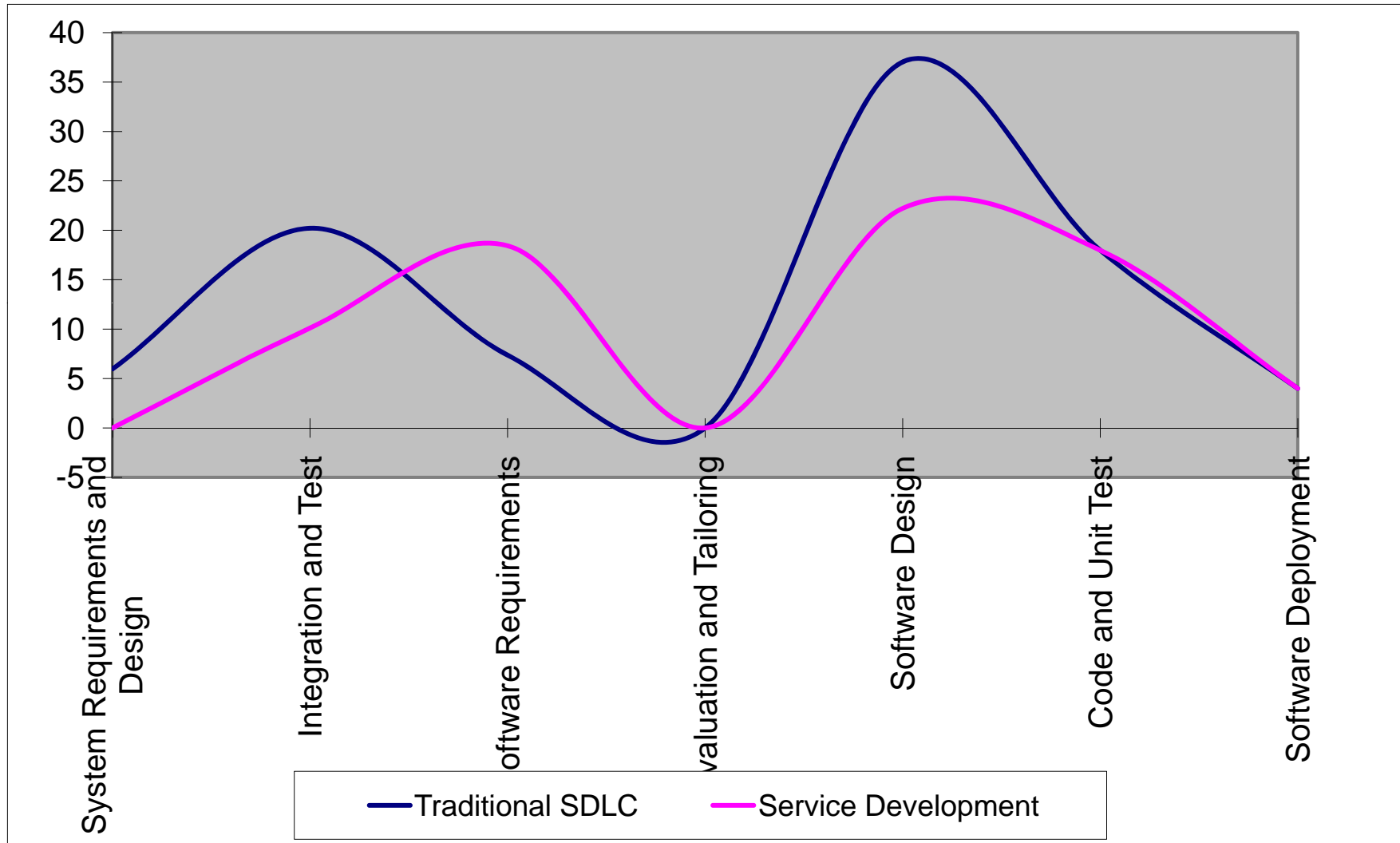
## SOA Research Findings - Infrastructure





## SOA Research Findings - Infrastructure

- Prototype
  - Mostly an evaluation, tailoring, and I&T activity
  - Skill set of architects and systems engineers
  - Relevant pilot/demo important early on for successful deployment
  - Existing Enterprise Architecture components create technology starting point.
  
- Production
  - Stack defined during 'prototype' or initial investigation
  - Additional deployments for redundancy, scalability, performance, etc can be done with reduced effort
  - Effort influenced by
    - Degree of invention
    - Legacy technology
    - Communication between deployment teams





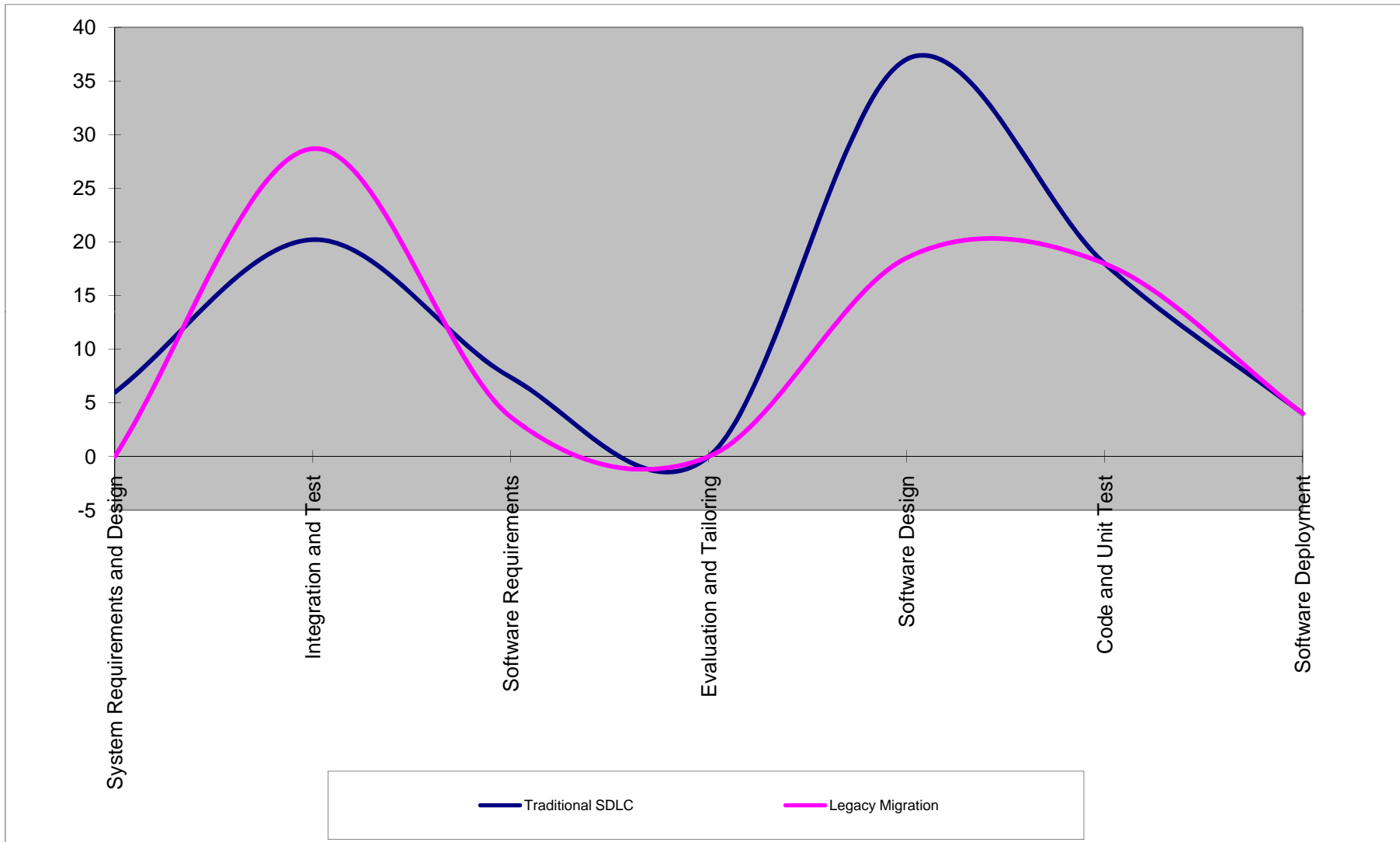
## SOA Research Findings Service Development

- ‘Design for Reuse’ on steroids
- Requirements analysis impacted by
  - Data issues
  - Granularity issues
- Skill set of developers
  - Familiar with SOA
  - Understanding of business processes
- Design and code activities only need to focus on specific capabilities service delivers



## SOA Research Findings – Legacy Migration

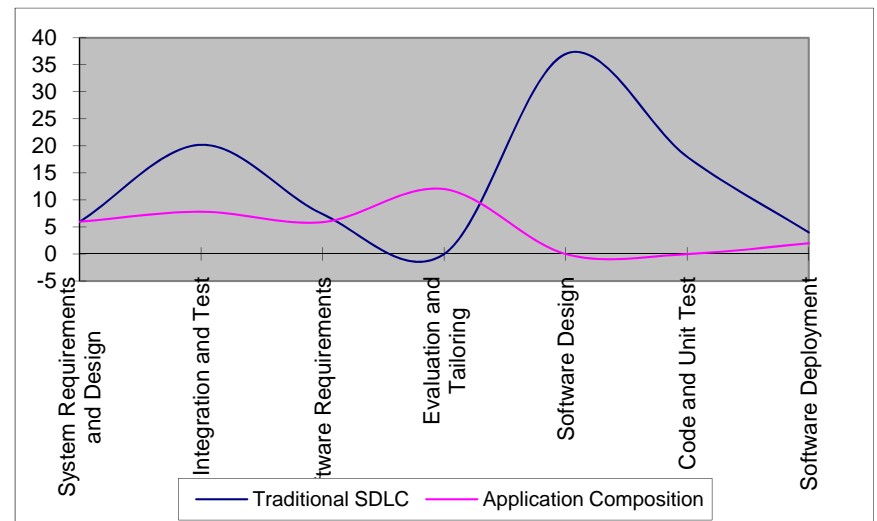
- Technology Maturity
- Dependence on Commercial Products
- Type of migration/migration requirements
- Data issues
- Skills of developer
  - Familiarity with SOA and SOA Migrations
  - Familiarity with Legacy Application
  - Familiarity with SOA Infrastructure Technology





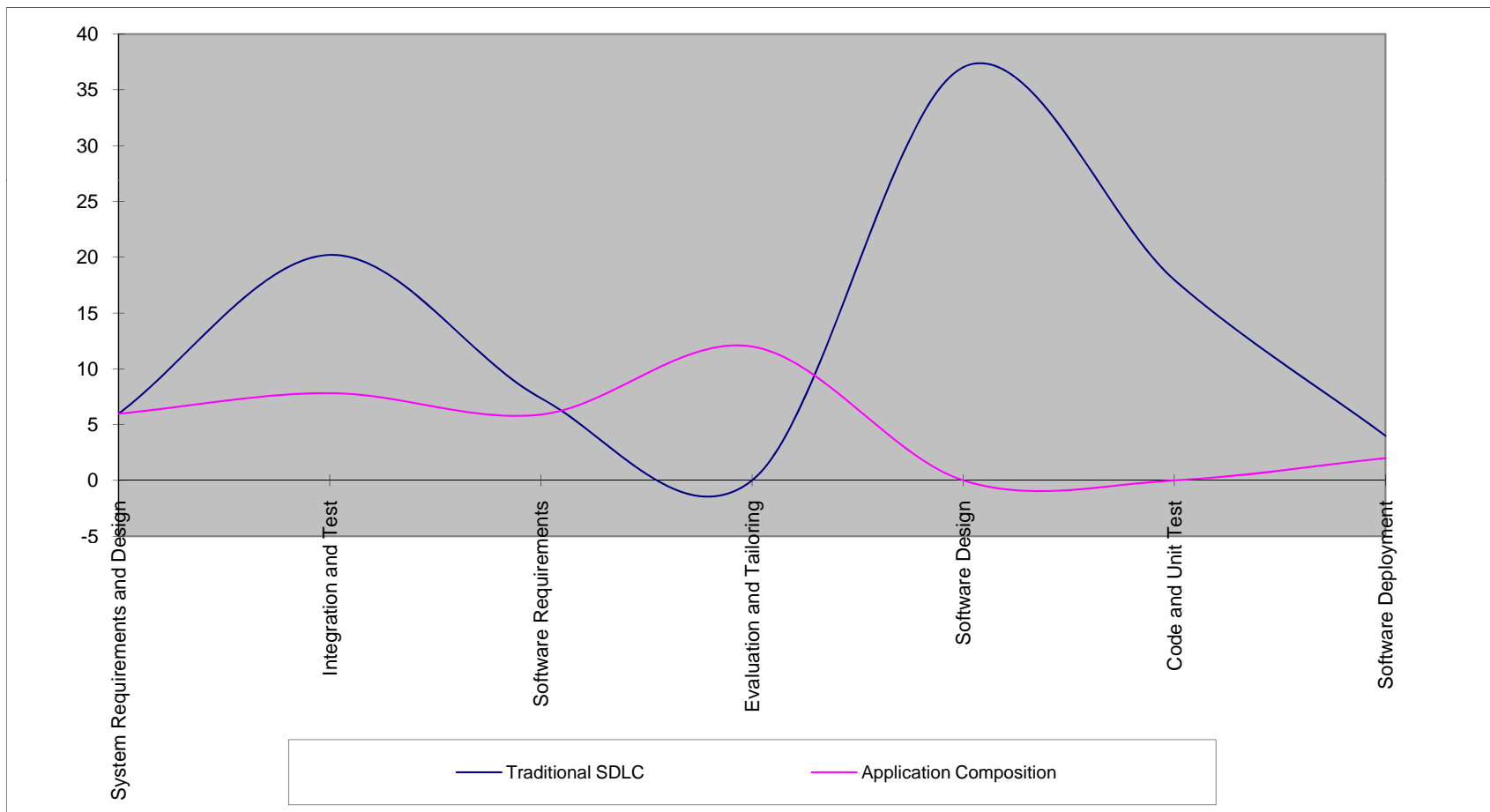
## SOA Research Findings – Application Composition

- Application Composition
  - Service identification – requirements and evaluation type activities
  - Integration and deployment activity
  - Data issues
  - Skill and Knowledge of IT Staff
    - Integrators rather than developers
    - Level of understanding of business processes
    - Familiarity with SOA Infrastructure Technology





# SOA Research Findings – Application Composition





## SOA Business Case Analysis Framework

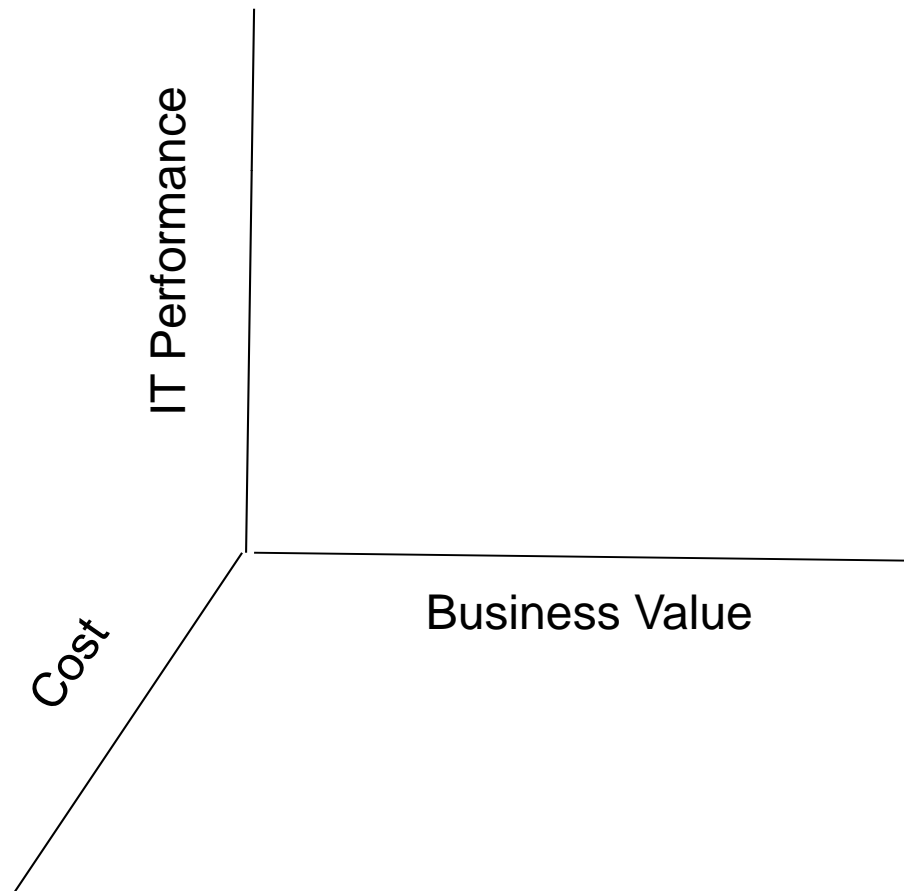
- Modified Business Value Index
  - Uses Intel's Business Value Index as base
- Includes elements of OMB e300 to include Performance Reference Model
  - Measurement Areas: General Areas of Interest
  - Measurement Categories: Performance Criteria
  - Measurement Indicators: Specific methods of measure
- Includes elements of Gartner's ITFM concepts





## Recommended SOA Business Case Analysis Framework

- Measurement Areas:
  - IT Performance
  - Business Value
  - Cost





# Measurement Categories

## IT Performance

- Efficiency
- Quality Assurance:
- Efficacy

## Business Value

- Continuous Process Improvement
- Organizational Re-Design.
- Enterprise Situational Awareness

## Cost

- Resources
- Efforts
- Time



# Measurement



## Measurement Indicators

- Within each category, there are specific measurement indicators
- Indicators are mapped to items that are measured in each project
- These metrics are approximations
- Some indicators do not have metrics and are not considered



# IT Performance: Efficiency

## Measurement Indicators

- Hardware and Software Cost Avoidance on New Services
  - On-time Delivery of Services
  - Employee Productivity
  - Attrition Rate Improvement
  - Percent of non-core positions outsourced



# IT Performance: Quality Assurance

## Measurement Indicators

- % of IT at Compliance Standards
- Risk Avoidance





# IT Performance: Efficacy Measurement Indicators

- Customer Satisfaction
- System Availability



# Business Value: Continuous Process Improvement

## Measurement Indicators

- Non-Employee Cost Avoidance
- Operational Readiness
- Risk Avoidance
- Improved Mission Capability
- Expanded Mission Capability



# Business Value: Organizational Re-design

## Measurement Indicators

- Headcount Avoidance or Reduction (non-IT)
- Employee Productivity (non-IT)
- Reduced Employee Attrition



# Business Value: Enterprise Situational Awareness

## Measurement Indicators

- Optimize Access to Existing Data
- Access New Data



# TruePlanning<sup>®</sup> Cost Metrics by PRICE<sup>®</sup> Systems

- Resources: **Monetary cost to complete the project.**
  - Measurement Indicator: U.S. Dollars
- Time: **Time to complete project.**
  - Measurement Indicator: Years, Months, Days, Hours
- Labor Effort: **Time required per resource**
  - Measurement Indicator: Hours, FTEs