# Cost Aspects of Service-Oriented Architectures

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# Agenda

- What is SOA?
- How SOA Changes Software Costing
- SOA Example – Amazon.com
- Considerations for Costing SOA
  - Scope, Scale, and Stage of the Project and its Environment
- Recommendations
  - SOA-Specific Data Collection
  - SOA-Specific Estimation Methodology

# What is SOA?

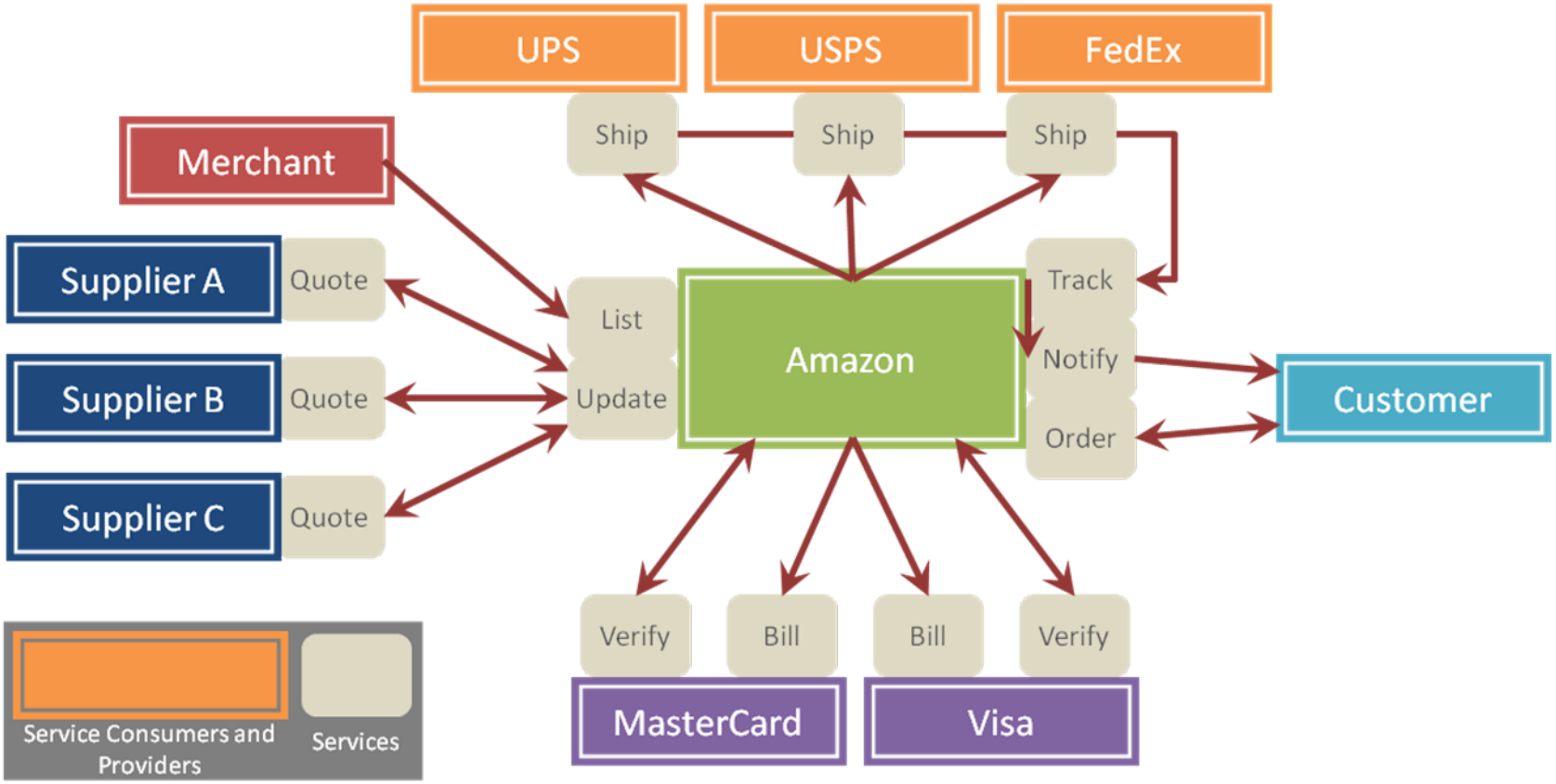
- SOA is…
  - Service Oriented Architecture…
    - Architecture: A logical or physical representation of a system and its components (including hardware, software, interfaces, and related documentation)
    - Service: A self-describing, self-contained, modular unit (software component) that can be combined in different ways with other services to represent an application.
    - Service-Oriented: A design concept that presumes to encapsulate application logic (an independent "piece" of software) within services
  - … ***a design approach*** that takes advantage of group resources, client-server relationships, and the fact that many different parts of an organization or community might have the same computing needs.

***The design approach <u>currently</u> called SOA is here to stay.***

# How SOA Changes Software Costing

- SOA is fundamentally different
  - Current methods of software cost estimation do not take into account the unique nature of SOA and SOA software development, maintenance, and reuse.
- SOA requires a new mental framework
  - SOA blurs the correlation between software utility, level of effort, and lines of delivered code.
- SOA is hard
  - Most marketing touts benefits of SOA without disclosing the new software development assumptions and challenges
- SOA changes the way that organizations do business
  - Capabilities are shared across the enterprise along with development and maintenance
- Little historical data on SOA is available
  - Estimates are based on cost data for systems developed using pre-SOA assumptions and methodologies

# SOA Example – Amazon.com



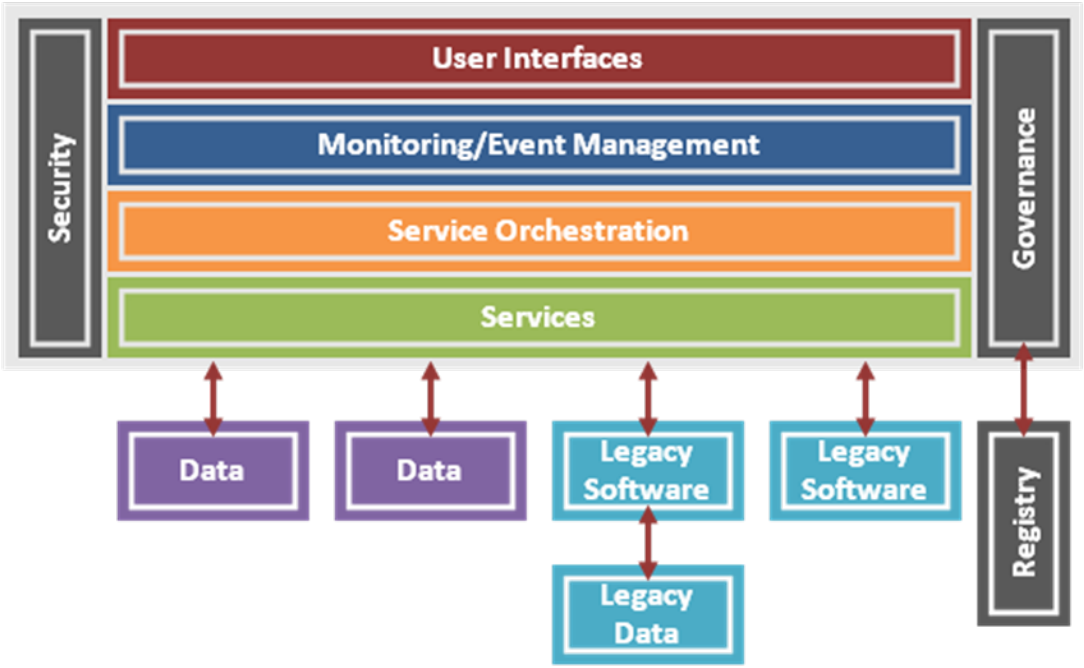
# Considerations for Costing SOA

- SOA is complex, heterogeneous, and dynamic
  - Most of the important cost drivers are the same, but impact cost differently than in traditional software development
- Consider the ratio of architecture development to software development
  - The development of under-funded components will be hampered
  - The over-development of over-funded components will skew the architecture's progress and cause implementation teams to get ahead of themselves
- Ensure that adequate up-front investment is planned to minimize cost during O&M
  - The architecture will need less maintenance
  - New services will have better technical requirements and a more stable integration environment

# Considerations for Costing SOA

- Make cost estimates with an explicit understanding of perspective: service-level or SOA-level

*SOA-level perspective*




*Service-level perspective*

- Characterize the overall effort in terms of Scope, Scale, and Stage…

# Scope of SOA Development

Affected by:

- The nature of the numerous, various, and dispersed users that need to be served
- Rank of the project champion
- Which level in the enterprise/organizational hierarchy the project is being developed
- Risks inherent in the government machine
- Uncertainty in ownership and financial responsibility

Some of the questions to consider:

- At what level in the bureaucratic hierarchy (program office, directorate, organization, agency, inter-agency, etc.) is the effort spearheaded?
- At what level is the SOA being developed?
- At what level will the SOA be used?
- What is the degree of complexity in the SOA's federation plan?
- How developed or established is the federation plan?
- How developed or established are the architecture standards, governance, and practices?
- How motivated are the participants to collaborate?
- How stable and predictable is the budget?
- Is there a designated central orchestrator, a designated and established central organization that facilitates intra-federation collaboration, or no plan for either?

# Scale of SOA Development

Affected by:

- Nature of the work to be done
- Quantity of work to be done
- Processes for and expertise in SOA development
- Time allocation
- Technological method for communication
- Choice of software products, programming languages, and development environments
- Testing plans

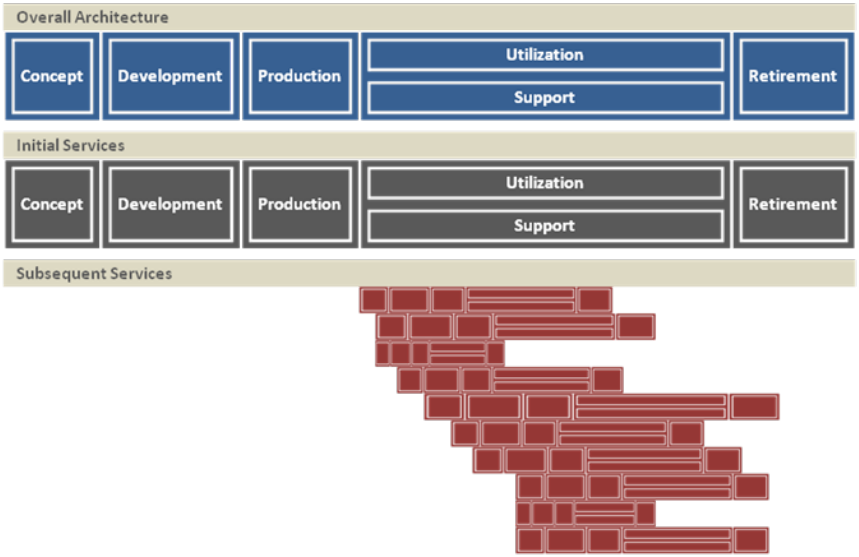
Some of the questions to consider:

- Does the project involve software development, software architecting, O&M support, or a combination of the three?
- Is enough time allotted to allow for appropriate technical specification and business coordination?
- How many stakeholders will be involved to handle security and information management for this effort?
- What method has the team chosen for communicating in the SOA (web services, DCOM, CORBA, JMS, etc.)?
- Has in situ testing been planned and allocated adequate time?
- To what degree is the team implementing best practices or incorporating lessons learned from previous SOA efforts?
- How experienced is the team with SOA and with the task at hand (e.g., programming web services)?
- What portion of the project is being contracted out, and at what point in the process?

# Stage of SOA Development

Affected by:

- Life cycle phase(s) of the project
- Life cycle phase(s) of the SOA
- Choice of life cycle model/ decomposition
- Cost perspective: service-level or SOA-level




Some of the questions to consider:

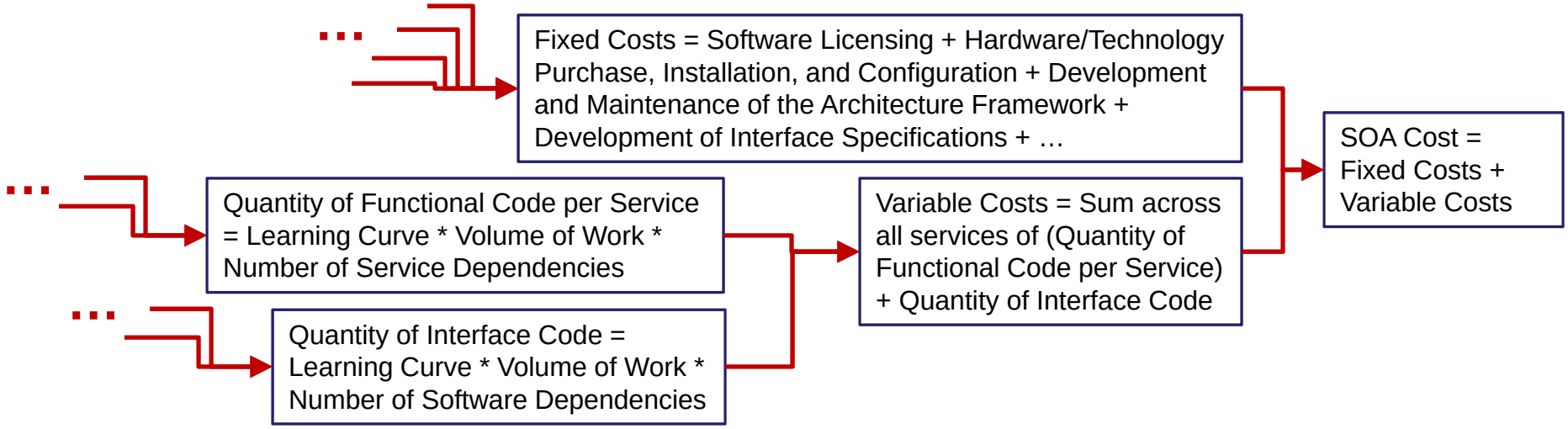
- During what phase(s) of the architecture's life cycle will the work occur?
- Is the project a development-phase effort or an O&M-phase effort?
- How does the life cycle phase of the project overlap with the life cycle phase of the overall SOA?
- How well has the team described and delineated the life cycle phases of the SOA?
- From what perspective (system or SoS) is the estimate being performed?

# Recommendations for SOA Data Collection

## Incorporate Questions of Scope, Scale, and Stage into Data Collection

- Learn from current SOA projects
  - Interview representatives from completed and ongoing SOA projects
  - Develop and maintain a list of domain-specific cost drivers and risk areas
  - Domain-specific recommended practices and standards (e.g. Information Assurance)
- Calculate the value of experienced teams
  - Draw comparisons among the costs and risks incurred by fully experienced teams, somewhat experienced teams, and completely inexperienced teams
  - Survey team members and analyze mid-level cost data, for example
- Develop/Identify metrics addressing Scope, Scale, and Stage
  - Potential metrics include: # services, # external dependencies
  - SLOC is easily obtainable but has less impact due to rise of automated code generation; compatibility of auto-generated code is of greater interest

- Experiment with parameters and their relationships
  - Develop a list of parameters that seem to impact the cost of a SOA project
  - Diagram the parameters' dependencies and mathematical relationships
  - Define model applicability constraints by considering exactly what type of SOA development each parameter or set of parameters relates to




***Difficulty assembling historical cost data for <u>complete</u> SOA implementations inhibits development of improved estimating methodologies***

# Summary

- SOA is a design approach that is here to stay
- SOA fundamentally changes to how organizations do business
- Consider Scope, Scale, and Stage of the Project and its Environment when costing a SOA implementation
- SOA-specific data collection and assembly of costs for a complete system will enable development of improved estimating methodologies