US Army Service Oriented Architecture
Life Cycle Management Model

Version 0.5b - Draft

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Table of Contents

PREFACE 1

CHAPTER 1 – INTRODUCTION 2

CHAPTER 2 – KEY SOA CHARACTERISTICS 4

2.1. Service Value ... 4

2.2. Holistic View of Service Layers ... 5

CHAPTER 3 – SOA LIFE CYCLE METHODOLOGY 9

SECTION 1 – OVERVIEW ... 9

SECTION 2 – BUSINESS ROADMAP ... 13

FEDERATED VISION AND STRATEGY ... 16

1. Activity: Evaluate the Need for SOA ... 16

2. Activity: Survey Business Domains, Systems and Services ... 18

3. Activity: Develop Service-Oriented Vision ... 19

4. Activity: Define a SOA Adoption Strategy ... 21

5. Activity: Develop Service-oriented Policy Guidance ... 24

FEDERATED ENTERPRISE ARCHITECTURE ... 25

6. Activity: Define Service-oriented Principles ... 25

7. Activity: Identify SOA-Related Standards ... 26

8. Activity: Identify the Service-Oriented Target State ... 27

8.1. Activity: Define Business Architecture ... 27

8.2. Activity: Define Information System Service Requirements ... 29

8.3. Activity: Define Information System Service Architecture ... 29

8.4. Activity: Plan Transition ... 30

PROGRAM MANAGEMENT ... 30

9. Activity: Develop SOA Governance & Management Strategy ... 30

10. Activity: Manage Organizational Change ... 34

EXECUTIVE/PORTFOLIO MANAGEMENT ... 36

11. Activity: Manage Investment Portfolio ... 36

SECTION 3 – SERVICE ENABLEMENT ... 37

SOLUTION ARCHITECTURE ... 40

1. Activity: Evaluate/Confirm the Need for SOA ... 40

2. Activity: Survey Present Business, Systems and Reusable Assets ... 40

3. Activity: Develop Service-Oriented Vision Business Area ... 40

4. Activity: Develop Business Service Architecture ... 41

5. Activity: Define Information System Service Requirements ... 43

6. Activity: Define Information System Service Architecture ... 43

SOURCING/DEVELOPMENT ... 44

7. Activity: Evaluate and Select Services ... 44

8. Activity: Develop Services ... 45

9. Activity: Develop/Update Service Infrastructure ... 45

ARCHITECTURE AND ENGINEERING MANAGEMENT ... 45

10. Activity: Develop SOA Plans ... 45

11. Activity: Define SOA Design Guidance ... 46

12. Activity: Define SOA Verification & Validation Approach ... 46

DRAFT

13. Activity: Implement/Update SOA Governance Approach 46
SECTION 4 – SERVICE SUSTAINMENT 48

CHAPTER 4 – SOA GOVERNANCE, FUNDING, AND ACQUISITION 50
SECTION 1 – OVERVIEW 50
SECTION 2 – SOA FUNDING OPTIONS 51
4.2.1. Description of Funding Options 51
4.2.2. Sequencing Plan 52
4.2.3. Governance Postures 53
SECTION 3 – SOA AS SHARED SERVICES 56
4.3.1. Introduction 56
4.3.2. Shared Service Principles 56
4.3.3. Demand/ Supply Distinctions 57
4.3.4. Plan/ Build vs. Deploy/ Operate 59
4.3.5. Developing the Appropriate Shared Services Governance Operating Model 60
Phase 1 – Designing the Operating Model Framework 61
Phase 2 – Detailed Operating Model Design 62
SECTION 4 – GOVERNANCE ROLES, RESPONSIBILITIES AND DECISION RIGHTS 64
4.4.1. Introduction 64
4.4.2. SOA Agreements Can Be More Complex Than Ordinary Shared Services Agreements 65
4.4.3. Plan/ Build Agreements 67
4.4.4. Deploy/ Operate Agreements 68
4.4.5. Representative Governance Roles and Responsibilities 69
4.4.6. Typical IT Governance Organizations and Committees 70
4.4.7. Special Incremental SOA Governance Considerations 71
Planning Stage SOA Governance 71
Build Stage SOA Governance 72
Deploy Stage SOA Governance 72
Operate Stage SOA Governance 73
SECTION 5 – BUDGETING AND FUNDING CONSIDERATIONS FOR SOA 74
4.5.1. Introduction 74
4.5.2. Development of SOA Plans and Standards 74
4.5.3. Development of SOA Components 76
Centrally Funded Development of SOA Components 76
Project Funding of SOA Components 77
Local Funding of SOA Components 77
4.5.4. Usage of SOA Components and Related Operational Support 78
Infrastructure Funding 78
Testing, Validation and Registration 79
Maintenance and Minor Enhancements 79
Administrative Functions 80
SECTION 6 – ACQUISITION OPTIONS FOR SOA IN THE DEPARTMENT OF DEFENSE 82
4.6.1. Introduction 82
4.6.2. Development of SOA Plans and Standards 85
4.6.3. Development of SOA Components 86
4.6.4. Usage of SOA Components and Related Operational Support 87

CHAPTER 5 – SOA CHANGE MANAGEMENT 89
SECTION 1 – OVERVIEW 89
SECTION 2 – ORGANIZATIONAL ASSESSMENT 92
5.2.1. Introduction 92

DRAFT

5.2.2. Organization and Environmental Drivers 92
5.2.3. Stakeholder Assessment 93
5.2.4. Organizational Change Readiness Assessment 96
SECTION 3 – CHANGE MANAGEMENT STRATEGIC APPROACH 98
5.3.1. Introduction 98
5.3.2. Overarching Goal and Measurement 99
5.3.3. Change Management Methodology 99
5.3.4. Roles and Responsibilities Guide 102
5.3.5. Training Needs Assessment 102
SECTION 4 – COMMUNICATIONS FRAMEWORK 103
5.4.1. Introduction 103
5.4.2. Communications Review and Approval Process 103
5.4.3. Communications Products and Channels 104
5.4.4. Feedback Mechanisms 106
5.3.5. Performance Measures 106
SECTION 5 – CHANGE/COMMUNICATIONS IMPLEMENTATION PLAN 108
5.5.1. Goals and Objectives 108
5.5.2. Success Factors, Criteria, and Metrics 108
5.5.3. Change/Communications Plan 109

ACRONYMS 111

REFERENCES 112

APPENDIX A– ADVANCED SOA FEATURES A-1
Introduction A-1
Dynamic Architecture Features A-2
Conjunctive Composition Features A-7

APPENDIX B – ADVANCED SOA DELIVERY TACTICS B-1
Introduction B-1
SOA Software Engineering B-1
Establishing a UML Profile for SOA B-4
Continuous and Concurrent Delivery B-7

APPENDIX C – SOA SECURITY AND INFORMATION ASSURANCE C-1
Introduction C-1
The Problems SOA Introduces C-1
The Impact of SOA on Security and Assurance C-2
Extending the SOA UML Profile for Security C-6
SOA IA Methodology Impacts C-7
Conclusion C-8

APPENDIX D – REPRESENTATIVE IT AND SOA GOVERNANCE STRUCTURE FOR A MULTI-TIERED ORGANIZATION D-1
Representative Governance Roles and Relationships D-1
Representative Governance Processes – Demand Side D-3
Representative Governance Processes – Supply Side D-4
Governance Committees D-4
Important Governance Roles D-6
Important Governance Relationships D-8
Governance Decision Rights D-8

DRAFT

Figures

FIGURE 2-1 SOA is Oriented Around Services 2-4
FIGURE 2-2 Business, Services, IT Resource Layers 2-6
FIGURE 2-3 Expanded Example of Business, Services, IT Resource Layers 2-8
FIGURE 3-1 SOA helps Army Organizations Overcome Complexity 3-9
FIGURE 3-2 Methodology Framework to Support SOA 3-11
FIGURE 3-3 Business Roadmap Processes 3-14
FIGURE 3-4 Major SOA Business Roadmap Activities 3-15
FIGURE 3-5 Overarching SOA Features and Benefits 3-17
FIGURE 3-6 Vision and Strategy Establishes the Basis for Portfolio Investment Decisions 3-19
FIGURE 3-7 Horizontal versus Vertical Integration 3-22
FIGURE 3-8 SOA Adoption Barriers and Tactics 3-24
FIGURE 3-9 SOA Helps Organizations Boost Value 3-28
FIGURE 3-10 Demand and Supply Sides 3-28
FIGURE 3-11 SOA Governance 3-31
FIGURE 3-12 Service Enablement Processes 3-38
FIGURE 3-13 Service Enablement Major Activities 3-39
FIGURE 3-14 Business Process and Business Services 3-41
FIGURE 3-15 Business and IT Services 3-43
FIGURE 3-16 Service Sustainment Processes 3-49
FIGURE 4-1 Sequencing Relationship between SOA Services and Components 4-52
FIGURE 4-2 Supply/ Demand Model for SOA Programs 4-58
FIGURE 4-3 Relationship of Plan/ Build and Deploy/ Operate Functions 4-60
FIGURE 4-4 Design of an Effective Shared Service Operating Model 4-61
FIGURE 4-5 Detailed Design of an Effective Shared Service Operating Model 4-63
FIGURE 4-6 Recursive Structure of SOA Component Hierarchy 4-66
FIGURE 4-7 Overview of Department of Defense Acquisition Process DoD 5000 4-83
FIGURE 4-8 Sample Options of a DoD 5000 Progression Toward Contract Vehicles 4-83
FIGURE 5-1 Phases of Change Management 5-90
FIGURE 5-2 Stakeholders Can Be Segmented Into Various Groups Depending On Their Level of Involvement 5-94
FIGURE 5-3 Engagement Changes Depending On the Desired Level of Stakeholder Support 5-95
FIGURE 5-4 Change Readiness Areas 5-97
FIGURE 5-5 SOA Represents A Paradigm Shift from Traditional IT Enterprise Architectures 5-98
FIGURE 5-6 Change Management Is A Continuous Process 5-100
FIGURE 5-7 Management Strategies Work In Conjunction with Communications Efforts . 5-101
FIGURE 5-8 Level Of SOA Acceptance Correlates to A Duration of Marketing 5-103
FIGURE 5-9 Communication Goals and Objectives 5-108

FIGURE A-1 SOA builds upon all previous architecture evolutions and adds unique features A-1
FIGURE B-1 Associative Model of SOA Architecture View Set B-5
FIGURE B-2 SOA UML Profile Snippet B-7
FIGURE B-3 Plan and Deliver by Feature B-8
FIGURE B-4 Planning and control of a SOA-based Concurrent and continuous delivery (example) B-9
FIGURE B-5 The Engineering of a Specific Sprint B-10

DRAFT

FIGURE C-1 Extending the SOA UML Profile to Address Security and Assurance C-7

Tables

TABLE 3-1. Purpose of the Framework Processes.....3-12
TABLE 3-2. Late Binding Feature Applicability to Different Business Services.....3-26
TABLE 3-3. Relationship between Other Business Roadmap Output and CM Steps and Workproducts.....3-35
TABLE 3-4. Service Information.....3-42
TABLE 4-1. Governance Continuum - Alternative Governance Postures 4-55
TABLE 4-2. Focus on Demand and Supply 4-59
TABLE 4-3. Relationship between Plan, Build, Deploy, and Operate and Major Methodology Components 4-59
TABLE 4-4. Funding Categories and Contract Types for SOA Plans and Standards 4-85
TABLE 4-5. Funding Categories and Contract Type/DoD 5000 Relevant for Development of SOA Components.....4-86
TABLE 4-6. Funding Categories and Contract Types/DoD Relevant for SOA Components and Related Operational Support.....4-87
TABLE 5-1. Example of Stakeholder Assessment Matrix.....5-93
TABLE 5-2. Example Stakeholder Roadmap Matrix.....5-96
TABLE 5-3. Example Stakeholder Feedback Matrix.....5-96
TABLE 5-4. Communications Product Approval Matrix 5-104
TABLE 5-5. Activity Matrix.....5-104
TABLE 5-6. Level of Engagement Matrix.....5-105
TABLE 5-7. High Engagement Vehicle Matrix 5-105
TABLE 5-8. Medium Engagement Vehicle Matrix.....5-105
TABLE 5-9. Low Engagement Vehicle Matrix 5-106
TABLE 5-10. CM Success Factors, Criteria, and Metrics 5-109

TABLE A-1. Features Necessary to Enable Dynamic Architectures..... A-2
TABLE A-2. SOA Features Enabling Conjunctiveness A-7
TABLE B-1. Comparison of Traditional and SOA Software Engineering..... B-1
TABLE C-1. Dynamic Architecture Security and IA Challenges C-3
TABLE C-2. Conjunctive Composition Security and IA Challenges..... C-4
TABLE C-3. Extending the Threat Model to accommodate SOA IA Threats..... C-5
TABLE D-1. IT Demand Governance Processes..... D-3
TABLE D-2. IT Supply Governance Processes..... D-4
TABLE D-3. Roles and Possible Membership for Enterprise IT Governance Committees..... D-6
TABLE D-4. Possible Business Unit Governance Bodies..... D-6
TABLE D-5. Additional Important Governance Roles D-7
TABLE D-6. Relationships between Various IT and Business Participants..... D-8
TABLE D-7. Decision Rights over Enterprise-wide Demand Considerations D9
TABLE D-8. Decision Rights for IT within a Business Unit D-9
TABLE D-9. Decision Rights over IT Supply Management Processes..... D-10

DRAFT

Boxes

BOX 2-1. Object Management Group's (OMG's) SOA Definition 2-5
BOX 2-2. Holistic Business and Technology Perspectives 2-6
BOX 3-1. Start with the Right People 3-21
BOX 3-2. Top-down to Bottom-up Approach? 3-22
BOX 3-3. City Planning Analogy 3-25
BOX 3-4. Business Process or Service? 3-42
BOX 4-1. Typical IT Governance Bodies and Committees 4-70

DRAFT

Preface

The Enterprise Solutions Competency Center (ESCC) is establishing a clear guide to support the Army transition to SOA. ESCC is developing guidance through the SOA Life Cycle Management Model (LCMM), which is described in this document. The SOA LCMM serves as a blueprint that articulates Army business benefits and includes business principles, architecture guidance, governance, and change management. The Army SOA LCMM provides support to manage the entire SOA lifecycle. It is focused on a business-centric approach where technology is adapted to support the business, its customers and value propositions.

This effort is being driven by the Army's desire to transition to a more flexible architecture that is also less costly to maintain. The intent of the LCMM is to help the Army transition from current inflexible stovepipe architecture to a modern SOA architecture, which is agile and easily adaptable. A SOA architecture can enable secure integration of disparate services in both planned and unplanned ways. SOA's increased value is mainly realized in the reuse of services and in the integration of legacy applications.

The LCMM described is not complete but represents progress to date. Objectives for documenting the current LCMM include:

- Its use in supporting a dialogue with stakeholders and subject matter experts
- Understanding how the model could work within the US Army environment
- Providing guidance on implementation including analysis of technical issues, governance, acquisition, and change management

This document is a work in progress. As the SOA concept is socialized and discussed with Army personnel, more Army specific information will be documented and included in the LCMM. The eventual goal is to provide a robust roadmap for the Army to use in its transition to SOA.

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CHAPTER 1 –

Introduction

The objective of this document is to provide the Army with a model to manage the SOA Life Cycle. Key SOA themes covered in the model include:

- Governance
- Adoption
- Standards
- Policy
- Service Specification
- Enabling Infrastructure
- Change management and sustainment strategies

This document is structured as follows:

Chapter 1: Introduction. This chapter introduces the objectives and provides some background.

Chapter 2: Key SOA Characteristics. This chapter introduces key SOA characteristics.

Chapter 3: SOA Life Cycle Methodology. This chapter provides the key methodology elements, including activities with defined inputs and outputs.

Section 1 – Overview. This section provides a brief overview of the methodology and describes the framework used to express it.

Section 2 – Business Roadmap. The Business Roadmap component, at an enterprise/program level provides overall direction for SOA in any organization.

Section 3 – Service Enablement. Service Enablement, at a project/business area/system level provides the processes for SOA delivery.

Section 4 – Service Sustainment. Service Sustainment maintains SOA in a steady state environment where an organization has all the support processes and infrastructure in place and is creating services as needed. Additionally, sustainment supports the organization that is on the path to SOA maturation and may be pursuing both a top down and bottom up strategy in its robust adoption of SOA.

Chapter 3 addresses SOA governance and change management activities and shows how they fit into the lifecycle. Chapters 4 and 5 cover these topics in more detail.

Chapter 4: SOA Governance, Funding, and Acquisition. This chapter discusses the concepts, principles and approaches to address the governance needs of an organization regarding SOA. This discussion focuses on the "fiduciary" aspects of SOA Governance – the organizational authority, roles, responsibilities, decision rights, funding and acquisition approaches used to implement and operate a SOA program within a federated or decentralized structure**.**

Chapter 5: Change Management. This chapter provides a discussion of change management concepts and activities for SOA implementation. The chapter offers

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details on performing organizational assessment, devising a change management approach, development of communications framework, and ultimately producing a CM implementation plan.

Acronyms

References

The Appendices contain advanced topics:

Appendix A: Advanced SOA Features. This appendix describes the dynamic architecture and conjunctive SOA features. Dynamic architecture features permit architecture to be established during execution. Conjunctive composition features enable conjunctive (emergent) compositions, i.e., SOAs should be designed to provide the ability to use or combine services in ways not conceived by the service's originators.

Appendix B: Advanced SOA Delivery Tactics. This appendix describes advanced aspects of SOA based delivery and its impact on the methodology.

Appendix C: SOA Security and Information Assurance. This appendix explores SOA Security and IA, specifically:

- **The Impact of SOA on Security and Assurance.** This section establishes a discrete basis for the differences to be accommodated in a SOA IA strategy.
- **Extending the SOA UML Profile for Security.** This section discusses extending the SOA UML Profile overviewed in Appendix B to include security and assurance parametrics and models.
- **SOA Security and Assurance Methodology Impacts.** This section discusses the impact of Security and Assurance on a SOA methodology. It considers the question: "If the essence of SOA is dynamic and conjunctive composition, what are the impacts on a SOA methodology that has to assure that Security and Assurance are built in"?

Appendix D: Representative IT and SOA Governance Structure for a Multi-tiered Organization. This appendix presents the roles, responsibilities, processes, organizational structures and decision rights used to perform IT and SOA governance across the IT function in a multi-tiered organization. This appendix provides the general framework for the specific SOA governance discussion in Chapter 4 (SOA Governance, Funding, and Acquisition).

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Key SOA Characteristics

2.1. Service Value

To ensure that the SOA Lifecycle Methodology can be applied to deliver a SOA, we must identify the key distinguishing characteristics of SOA. As shown in Figure 2-1, services are provided by collaborating components under the control of service providers to deliver value for customers and other stakeholders, including the service providers themselves. The SOA as defined in this way is applicable at all levels of the Army enterprise from the highest level organizational components to low level technology components across all mission areas.

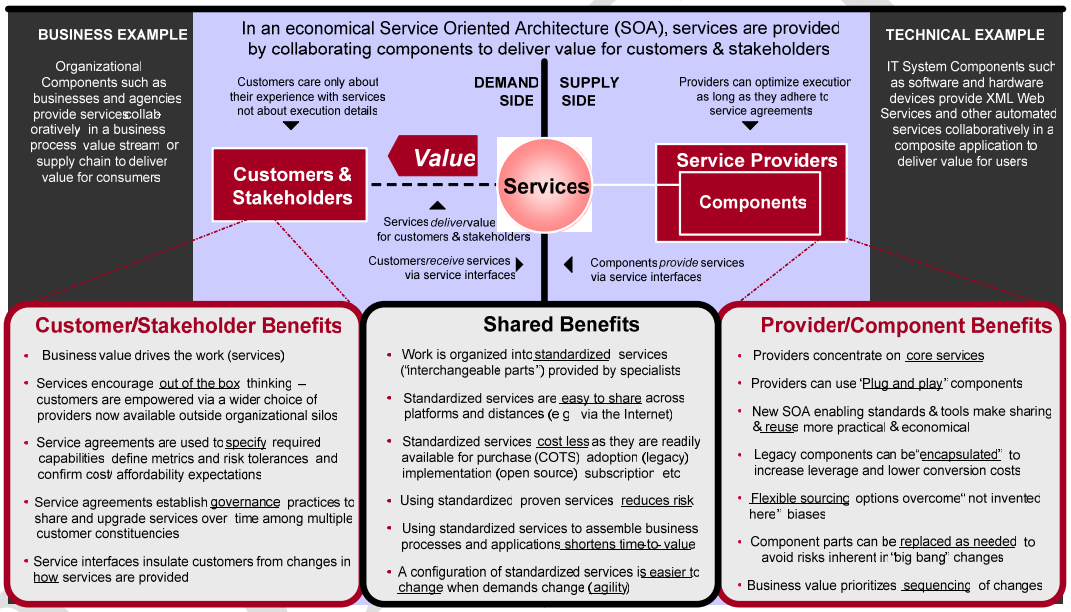

FIGURE 2-1
SOA is Oriented Around Services

This definition is congruent with the Object Management Group's (OMG's) harmonized definition of SOA, which is described in Box 2-1.

BOX 2-1. Object Management Group's (OMG's) SOA Definition

Object Management Group's (OMG's) SOA Definition
SOA is "an architectural style for a community of providers and consumers of services to achieve mutual value, that: • Allows participants in the communities to work together with minimal co-dependence or technology dependence. • Specifies the contracts to which organizations, people and technologies must adhere in order to participate in specific communities. • Provides for business value and business processes to be realized by the community. • Allows for a variety of technology to be used to facilitate interactions within the community."

The above definition aligns with key Army needs:

1. Satisfy operations and all the Army communities of interest needs for information, analysis, and reporting.
2. Accommodate and acknowledge the needs of different command levels, including Future Combat System principles.
3. Dynamically respond to tactical needs, adapt rapidly to changing realities, and enable operational tempo.
4. Use an open approach that permits fresh usage of the best technologies while assuring integration and not silo-based implementations.

While service orientation is beneficial at all levels of the Army Enterprise in both business and technical architectures as stated above, experience shows that advanced benefits are achieved when technical SOA features, standards and enabling tools are employed according to best practices. Appendix A discusses some of the advanced SOA features and current best practices.

2.2. Holistic View of Service Layers

One guideline to use to identify the major activities in a life cycle model is to consider the following six perspectives for each component (see Box 2-2). This provides a more holistic methodology ensuring that a key area is not forgotten. For one, the data/information perspective can belong both to the business-oriented view (information flows in services) and the information system view (data stores).

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BOX 2-2. Holistic Business and Technology Perspectives

Holistic Business and Technology Perspectives

There are three ***business-oriented perspectives*** and three technology-oriented ***information system perspectives:***

The business-oriented perspectives are

- The **business process** perspective, which addresses what the enterprise does, how it does it, in what sequence it does it, what rules it follows, and what type of results it obtains.
- The **organization** perspective, which addresses the people in the enterprise (their culture, capabilities, roles, team structures, and organizational units) and the (staffing, reward and recognition, education, and communication) support systems that make organizational change possible.
- The **location/facilities** domain, which addresses where the enterprise does business, both in terms of location types and specific physical facilities at a specific location.

The information system domains are

- The **application** perspective, which addresses the capabilities, structure, and user interface of software provided for the business users. Applications may be composed of services.
- The **data/information** perspective, which addresses the content, structure, relationships, and business data rules surrounding the information that the enterprise uses.
- The **technology** perspective, which addresses the hardware, system software, and communications components used to support the enterprise.

When we think about designing services in a methodology it is useful to view services as the level of abstraction that ties Business with IT resources as illustrated in Figure 2-2. If we are developing traditional (non-serviced oriented) applications, business people may provide requirements from the business perspectives (business process, organization, location) and IT people will provide the information system requirements from the IT perspectives (application, data, technology) to support the business requirements. In that case there is a tendency for each to focus on their particular domain with a limited exchange of ideas and needs between the two groups.

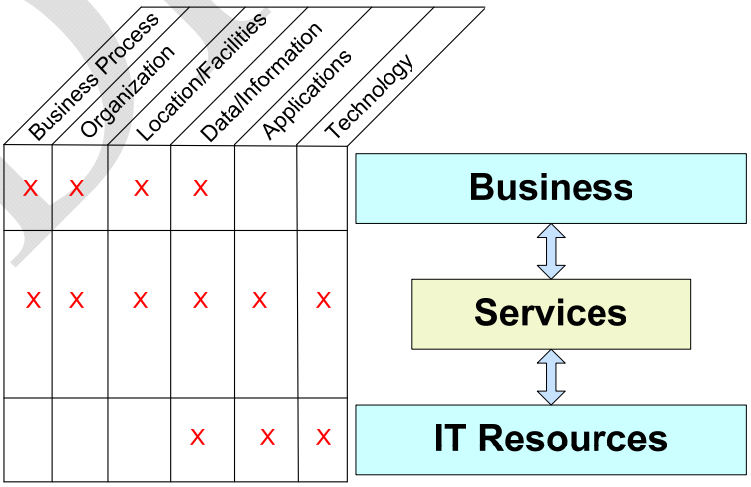

FIGURE 2-2
Business, Services, IT Resource Layers

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Figure 2-3 provides an example of a possible expansion of the diagram in Figure 2.2. As seen in Figure 2-3, service layering more intimately links the business to the technology. This approach significantly overcomes this traditional inclination for these two groups to work in isolation. Although an example, this expansion will prove useful later when describing the methodology.

The Business Process Services (orchestrations) in the Service Layer are automated representations of the Business Processes in the above Business Layer. These services are referred to as End-to-End Processes which are composed of Reusable Process Fragments.

A Business Process Service uses Composite Business Services, which are composed of one or more of the following services:

- **Entity Centric Services**. These are based on one or more entities, e.g., Customer. These services are context-free and are more stable and reusable than Task Centric Services.
- **Task Centric Services**. These services are based on some action or activity, e.g., Order Supplies. These services are usually context-dependent.
- **Hybrid Services**. These services are combinations of Entity and Task Centric Services.

Business Services use composite IT services. Composite IT Services are composed of the following services:

- **Application Services**. These services contain logic derived from a solution or technology platform. For example, these services could be wrappers around existing applications.
- **Data Services.** These services are the front end for data stores.
- **Utility Services.** These services offer reusable, generally solution-agnostic logic. For example, these services could be technical infrastructure support functions, e.g., messaging, transaction management.

Although not explicit in Figure 2-3, security plays a role in all three layers, e.g., security business processes, security services, and a security IT resources.

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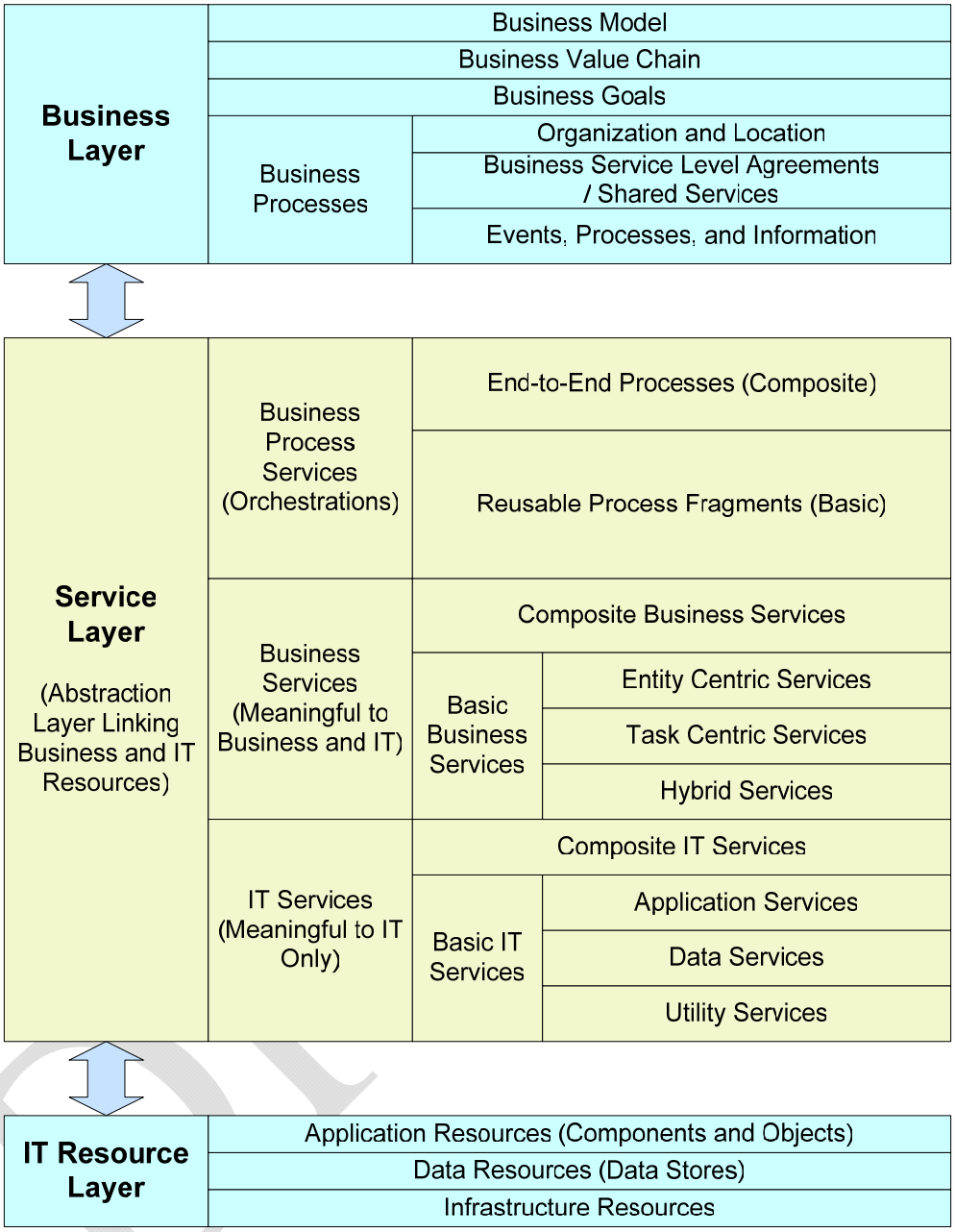

FIGURE 2-3
Expanded Example of Business, Services, IT Resource Layers

CHAPTER 3 –

SOA Life Cycle Methodology

SECTION 1 –

Overview

This chapter summarizes the SOA Life Cycle methodology model, which consists of three major components as illustrated in Figure, 3-1:

- **Business Roadmap.** The Business Roadmap component provides overall direction for SOA in any organization. It establishes business objectives, creates a future service-oriented vision, and defines and prioritizes a list of business areas in which SOA work is to be done. It creates a Federated Enterprise-like Architecture which is like the city plan for SOA deployment.
- **Service Enablement**. Service Enablement provides the processes for SOA delivery. Business process development in conjunction with the SOA implementation is necessary to realize the full benefits of this technology paradigm.
- **Service Sustainment.** Service Sustainment maintains SOA in a steady state environment where an organization has all the support processes and infrastructure in place and is creating services as needed. Additionally, sustainment supports the organization that is on the path to SOA maturation and may be pursuing both a top down and bottom up strategy in its robust adoption of SOA.

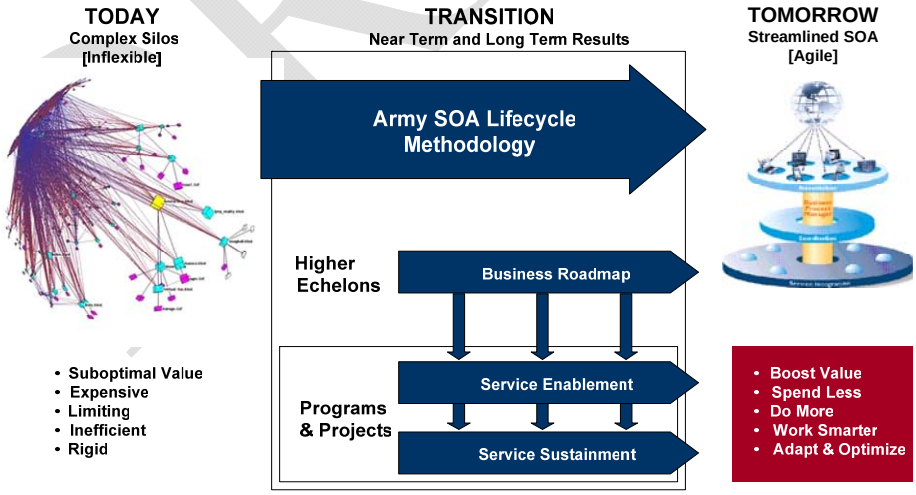

FIGURE 3-1
SOA helps Army Organizations Overcome Complexity

Each of these three methodology components is designed to be executed concurrently and continuously to realize agility, which is one of SOA's key benefits. Service

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Enablement and Service Sustainment methodology components are normally executed at the program and project level and apply to individual service features, components that deliver a set of services, and entire solutions comprised of collaborating components. Similarly, the Business Roadmap methodology component, normally executed by higher echelon organizational components and communities of interest, also applies to features, components, and "solutions" at a higher level. Throughout this methodology, all levels must evolve continuously and concurrently, and feature changes must be delivered frequently and rapidly in order to achieve agility and remain relevant with respect to changes in the technology landscape.

Chapter 4 (SOA Governance, Funding, and Acquisition) describes the various governance processes and organizational responsibilities that align with the three components of the SOA methodology. The specific decision making responsibilities, funding and acquisition vehicles best suited for each component of a SOA program depend upon the broader governance philosophy of the Enterprise itself. In particular, the organizational level at which SOA related actions or decisions are made depends upon the authority structure of the enterprise level under consideration (e.g., Department of Defense, Army, Business Domain, Program area).

Chapter 5 (SOA Change Management) provides a framework and tactical steps for the Army to take regarding change management. Change management is essential for the successful transition to SOA. Furthermore, to sustain a SOA environment, continuous change management is required. SOA is a free market strategy and without proper and ongoing communications and training, the system faces risks of failure.

To describe the activities in the SOA model we established a general framework for the business change and system development process. Using this framework, we can describe each of the three major components of the methodology.

Figure 3-2 illustrates the framework, which divides processes into the following two major groups. Table 3-1 provides a brief summary of each element of the framework and indicates which level of the enterprise has primary responsibility...

- **Life Cycle** – These processes span the entire life cycle from Vision and Strategy at an enterprise-level to Operations and Support of a fielded business system.

  The Federated Vision and Strategy and Federated Enterprise Architecture groups of processes occur at the enterprise-level. They are performed for the enterprise or any major organization (e.g., Department of Defense, Army, Business Domain, Program area) within the enterprise that manages a portfolio of capabilities and investments. These organizations initiate projects or programs (collections of projects).

  Development projects occur at the business area level and use the Solution Architecture, Sourcing/Development, Integration/Assembly, and Deployment life cycle processes. These projects create/update business systems. We use the term "business systems" rather that "systems" to stress the point that these systems are holistic and can cover all perspectives including related business process changes.

  Operations and Support depicts the life cycle processes necessary to support the service-oriented architecture in the operational (i.e., production) environment. Since services are often smaller than applications, they may be "tweaked" and redeployed more readily than traditional applications. Also, composite

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applications may be developed at any time through the assembly of finer-grained services, thereby creating new solutions without the cost and complexity of traditional software development. This approach is graying the boundary between Operations and Support and Sourcing/Development.

- **Management and Governance –** These include both management and governance processes. These management and governance processes span the three lifecycle components. Some of these management and governance processes address the fiduciary interests of the enterprise by establishing and enforcing principles, standards and guidelines that cut across all projects and organizational units within the enterprise (e.g., portfolio management, architectural standards). Other management and governance processes relate to the control over activities and methods employed to implement, deploy and operate specific projects (e.g., development methodology, project operational readiness assessment, SOA component certification for service reuse by others).

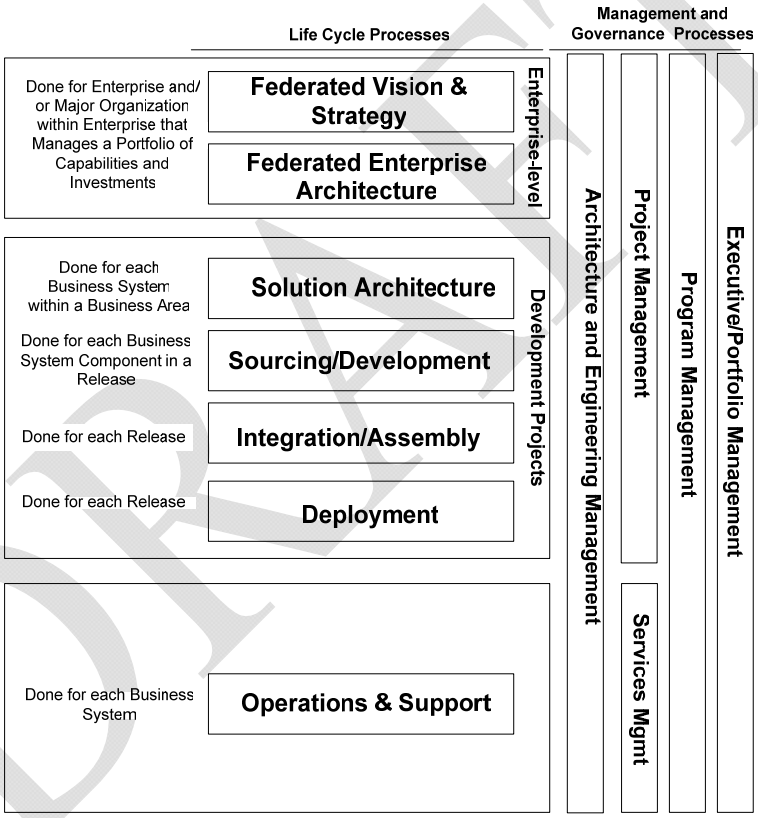

FIGURE 3-2
Methodology Framework to Support SOA

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Table 3-1 describes the purpose of each framework process.

TABLE 3-1. Purpose of the Framework Processes

Framework Processes	Purpose	Primary Responsibility Level
Federated Vision and Strategy	Establish business objectives, create future vision, and define and prioritize a list of business areas in which work is to be done	Enterprise
Federated Enterprise Architecture	Define and evolve Enterprise-like Architecture within a SOA context.	Enterprise
Solution Architecture	Define a Solution Architecture for each Business Area/System by elaborating the business/mission needs, defining the system requirements, designing the system including its major processes, and planning releases	Program/ Project
Sourcing/Development	Build, transform, or acquire services and infrastructure.	Program/ Project
Integration/Assembly	Validate entire business solution, optionally using an authentic pilot	Program/ Project
Deployment	Deploy all aspects of business solution.	Program/ Project
Operations and Support	Continuously operate and support the business system	Program/ Project or Shared Infrastructure
Executive and Portfolio Management	Provide high-level executive and investment portfolio management	Enterprise
Program Management	Direct and coordinate the activities and decisions within a program, maintaining a strategic view over a set of projects, aligning and coordinating them in support of a particular business strategy.	Program
Project Management	Identify, coordinate, and focus people and other resources to achieve project objectives within time, cost, resource, and quality constraints. Support the other management processes by providing the organizational and process infrastructure needed to make and implement effective management decisions. Project Management can include Configuration Management, Change Management, Financial Management, Knowledge Management, Planning and Measurement, Procurement Management, Quality Management, Release Management, Risk Management, and Requirements Management.	Project
Service Management	Guide and govern service projects that occur during Operations and Support.	Shared Infrastructure
Architectural Engineering and Management	Direct all architectural and engineering activities, including formulating integrated solution architecture; integrate and coordinate life-cycle activities; and ensure the deployed solution meets business objectives and complies with pre-established SOA standards and guidelines.	Enterprise and Program

The framework illustrated in Figure 3-2 provides the context for SOA activities, work products, and techniques. It serves as a means to organize the processes. Any framework can bring unwelcome entailments that can mislead. To guard against these entailments, we would like to add the following additional points:

- The framework is not meant to illustrate waterfall development. Although the goal is to synchronize them, the enterprise-level and business-level activities can and do occur at the same time in any realistic organization in order to achieve success.
- There can be many possible life cycle paths through Solution Enablement (e.g., COTS/GOTS, rapid application development, waterfall, iterative development). As solution development proceeds, a project may iterate through Solution Architecture and Sourcing/Development.
- The results of projects in Solution Enablement can inform activities in the Business Roadmap component.

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CHAPTER 3 –

SOA Life Cycle Methodology

SECTION 2 –

Business Roadmap

The Business Roadmap component provides overall direction for SOA in any organization and operates at the enterprise level. It establishes business objectives, creates a future service-oriented vision, and defines and prioritizes a list of business areas in which SOA work is to be done. It creates a Federated Enterprise-like Architecture which is like the city plan for SOA deployment.

The level at which the Business Roadmap is prepared depends upon the organizational level (e.g., Department of Defense, Army, Business Domain, Program area) at which the SOA program is operative. Although it is always desirable for the overall Vision and Strategy to reflect the highest organizational level possible, the amount of detail and specificity will often differ greatly depending upon which organizational tier has authority over the programs considered. Thus, for example, the Department of Defense may establish goals and objectives for Netcentricity or cooperation across the military services, but specific programs and projects will likely not be identified within the Vision and Strategy until the Business Roadmap is centered at the Army or Business Domain level.

Figure 3-3 illustrates the Business Roadmap processes, which are accomplished at the enterprise-level for the enterprise or a major organization within the enterprise that manages a portfolio of capabilities and investments. In the figure, the processes shaded yellow are the primary ones; those shaded turquoise can be involved in meeting Business Roadmap objectives but are not primary.

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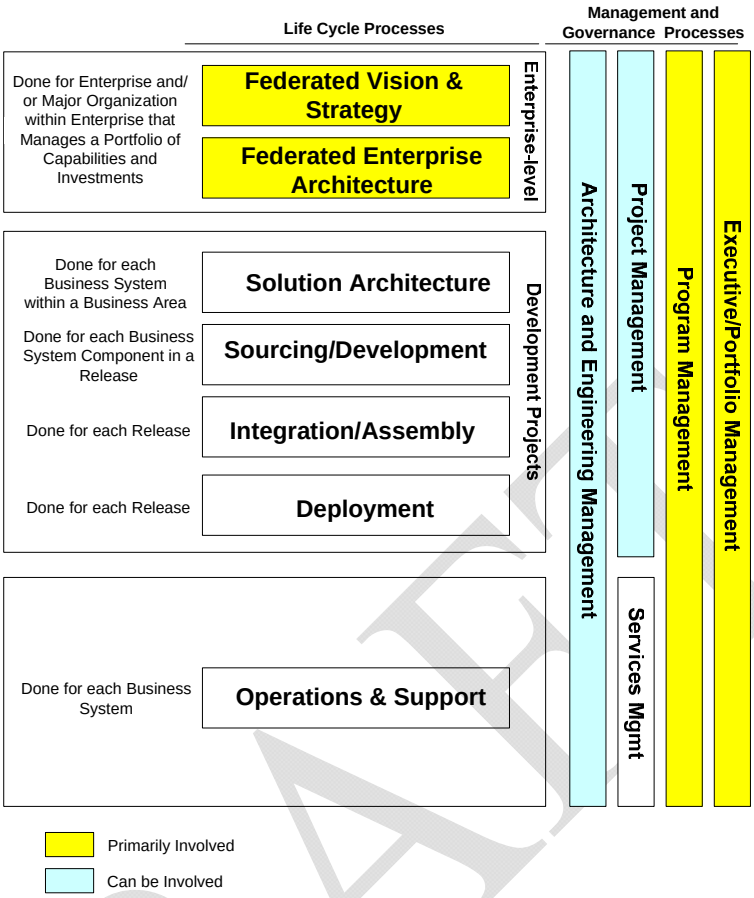

FIGURE 3-3
Business Roadmap Processes

The following figure lists the major activities within the Business Roadmap component. Multiple activities with no arrows between them in a box can be done concurrently (e.g., “Survey Business Domains, Systems and Services” and “Develop Service-Oriented Vision for Enterprise). Note that the Manage Investment Portfolio activity provides the priority setting and funding needed to translate the results of the Vision and Strategy, and Enterprise Architecture activities from general targets of opportunity into specific scheduled and funded projects over time. In particular, it is the combination of all of these activities that generates the Sequencing Plan that guides the timing and reflects the interdependencies of individual projects and related SOA components that are provided or consumed during the planning time horizon. In addition, these activities must be coordinated and integrated into development of the Change Management Plan as described in Chapter 5. In order to sustain the SOA environment, appropriate communications and training must accompany roll out of SOA components.

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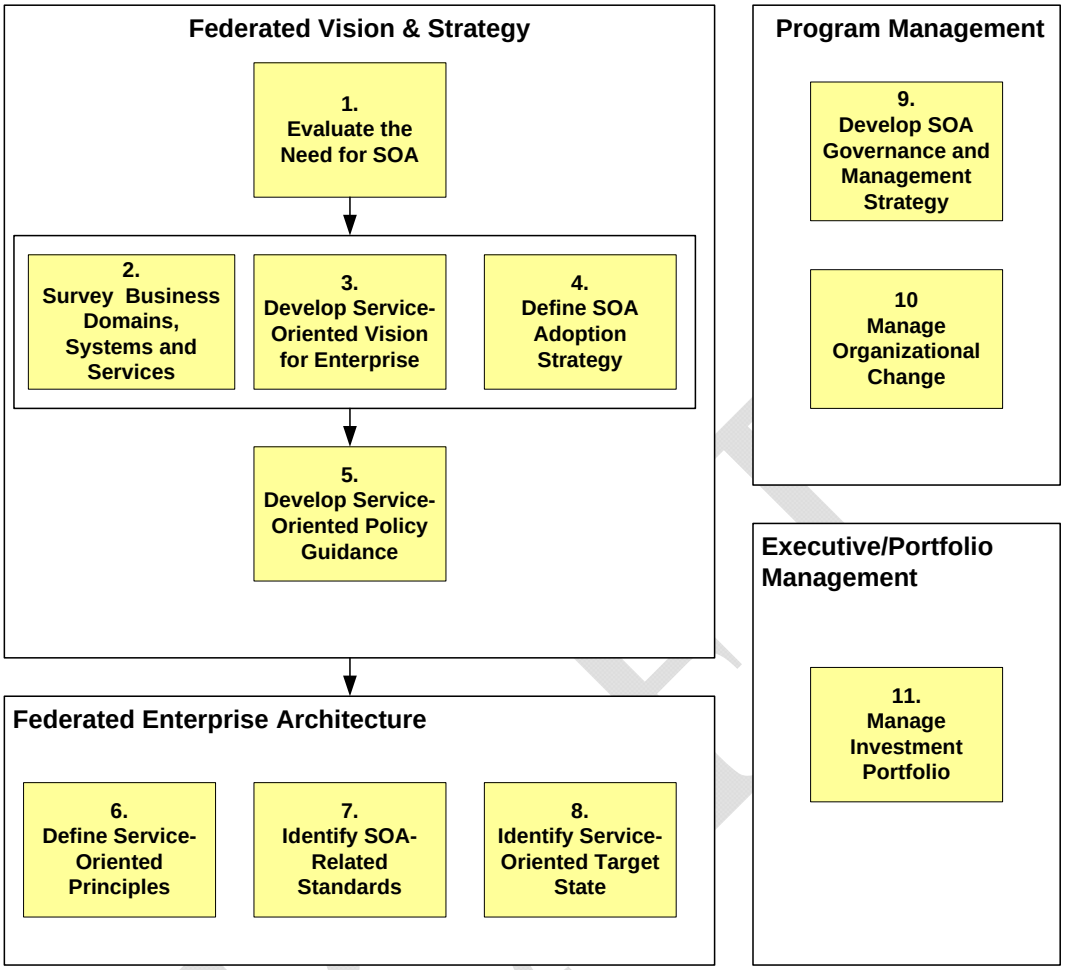

FIGURE 3-4
Major SOA Business Roadmap Activities

The following sections (as numbered according to the activity numbering in Figure 3-4) describe the major activities within the Business Roadmap component.

Federated Vision and Strategy

1. Activity: Evaluate the Need for SOA

Inputs	Outputs
• High-level business needs • Business issues • Existing strategy and vision documents, if available • Capability delivery documents, if available • Business capability descriptions, including stories (day in the life of) processes, goals and functions needed • EA principles, if available • Directives and mandates, e.g. FEA compliance	• Service Capability Needs Analysis • SOA Component characteristics required to supply the identified Service capability needs

This activity evaluates or confirms the need for SOA and determines the important business drivers that will affect architectural decisions. This is important for validation and for deciding on tradeoffs. Furthermore, output from this activity will feed directly to the case for change education and communications as discussed in Chapter 5, SOA Change Management. This activity is usually done concurrently with the Survey Business Domains, Systems and Services activity. It addresses the following areas:

- **SOA Appropriateness.** The main question to ask when evaluating the need for SOA is "What are the characteristics of the problem domain that necessitates the use of SOA features?
  - **Situational Processes.** Do you want to enable dynamic and situational processes? Dynamic processes mean that the selection of the specific individual services and components are based upon the specific situation encountered during execution.
  - **Situational Integration (Orchestration).** Do you need to combine components/services/systems into differing collaborations to satisfy specific needs? This differs from Situational Processes, in which time is explicit, i.e., the processes can change based on initiating events. In Situational Integration the type of service depends on the context and situation (e.g., the type of weather forecasting service needed depends on the situation).
  - **Interoperability.** Do you need interoperability among autonomous and concurrently developed and deployed components, systems, and services? The complexity of existing point to point interfaces may become too difficult to manage.
  - **Business Collaboration.** Is there a need for improved collaboration between sister services?
  - **Legacy Integration and Service Enablement.** Do you wish to reuse your legacy assets in a more dynamic and agile way?
  - **Best of Breed Assembly.** For example, typical solutions make compromises between functionality and use of a single product. Do we choose SAP or a collection of best of breed services that can integrate together to provide a better business fit?

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  - **Desire for Smaller Acquisitions.** The design principles of SOA enable autonomous deployment. Therefore, you can plan smaller and more numerous deployments, reduce the risk scope down to individual services, and allocate money in small chunks not big chunks.
- **SOA Features and Benefit.** What are the features and benefits of SOA? Although the features and benefits of SOA are many, five distinct overarching features and their associated benefits can be identified as shown in Figure 3-5 below. Note as above, these features and benefits are applicable at all levels of the Army Enterprise across both business and technical aspects of enterprise, solution, and individual component architectures. The value of SOA will often be derived from the collection of business benefits that the identified Service capabilities will provide and the cost reduction/ avoidance that can be achieved by reusing SOA components to deliver these business Service capabilities.
- **SOA Importance.** How important is SOA to this enterprise? Where can it be applied? Will the use of SOA materially reduce one time and ongoing costs, shorten the "time to market" for critical new business capabilities, or reduce the business and operational risks that would otherwise arise from non-SOA approaches?
- **Case Against SOA.** Understand when not to implement SOA. For example, SOA might not be appropriate when true-real time performance is critical, requiring nano-second responses (e.g., telephone switching).
- **Business Issues.** What are the issues driving us to consider SOA? Answers to this question can be embedded in SOA communications to stakeholders. These issues will help build the case for change and help "sell" SOA to the organization.
- **Business Needs.** Can SOA help us better address our burning business needs? Answers to this question will be essential to communicating benefits to stakeholders.

Features	Benefits to Clients
SERVICE RESPONSIBILITIES ARE CLEARLY DEFINED Work is organized into well-defined services that deliver clear value for customers & stakeholders, based on a mutual agreement on customer vs. provider responsibilities.	**CLIENTS BOOST VALUE THAT THEIR SERVICES DELIVER** Clients incorporate best practices used by commercial service providers into planning, enablement and operations. Clients focus on their customer, concentrate on their core services, and organize around these services.
MODULAR SERVICES ARE USED AS BUILDING BLOCKS Business processes, applications, and other complex services are assembled ("composed") using simpler, modular services as building blocks ("orchestration").	**CLIENTS SPEND LESS TIME AND MONEY AND ARE MORE AGILE** Clients save time because they don't have to build all needed capabilities from scratch. Clients save money because commodity services are usually cheaper than custom services, and because proven services reduce risk.
SOA STANDARDS AND TOOLS ACT AS THE GLUE New Internet standards such as XML and Web Services, new SOA enabling infrastructure, and other tools are used to provide a rich, scalable, and secure set of services.	**CLIENTS CAN DO MORE FOR THEIR CUSTOMERS** Services are easier to share across platforms and distances. As a result, clients can serve more customers, get more out of legacy systems, and choose from a wider selection of services to do more for their customers.
SERVICES ARE SHARED ACROSS ORGANIZATIONS Services are distributed among providers who specialize in their core competency (Division of Labor), and providers of like services are consolidated.	**CLIENTS WORK SMARTER WITH GREATER EFFICIENCY** Services are provided by the most effective providers, which yields the highest quality results. Also, services of like kind are provided by a limited set of providers, reducing waste and increasing efficiency.
SERVICES CAN EVOLVE INDEPENDENTLY Services are provided according to agreements that separate customer and provider concerns. Providers are free to make changes as long as they meet the terms of their agreements.	**CLIENTS CAN ADAPT BY MAKING CHANGES INCREMENTALLY** Clients can reduce the impacts of transformational changes such as re-engineering and automation by insulating customers via interfaces and using agile methods to deliver incremental features on a continuous basis.

FIGURE 3-5
Overarching SOA Features and Benefits

If it is determined that SOA is appropriate for the problem domain, this activity creates a Service Capability Needs Analysis and identifies potential SOA Components where SOA features and benefits are aligned with business needs and issues. This work product can be updated throughout the Business Roadmap component.

2. Activity: Survey Business Domains, Systems and Services

Inputs	Outputs
• Documentation of current business domains, systems and services (e.g., Enterprise Architecture-like documentation) • Business Needs • Community of Interest Expectations • Service-oriented Vision	• Asset Inventory • Business capability descriptions, including stories (day in the life of) processes, goals and functions needed

This activity is done concurrently with the Develop Service-Oriented Vision for Enterprise. If the organization has Enterprise Architecture-like documentation, it may be used as input to the asset inventory and business capability descriptions. The information gathered for the business capability descriptions can also be used in the communications efforts as described in Chapter 5.

In each business domain covered by the federated enterprise, assets need to surveyed and catalogued. Here the assets are captured at a high-level. They are captured more in-depth, as needed, during the Service Enablement component (see Section 3). Look only at assets that can be incorporated into a SOA environment consistent with the SOA vision.

An asset inventory serves many purposes. One is to support the service sourcing and usage strategy, which is about where to get the service and to whom to offer the service. Assessing the business value of each asset helps determine, for example, if it should continue to be maintained, needs to replaced or eliminated, or can be leveraged to support new services. This information can also be useful in communications to constituents about how SOA can transform current business functions and make them more efficient.

The assets cover all resources, e.g., business units, applications, systems, and services. This inventory can cover current and future assets and includes a description on how each asset will meet current and anticipated needs.

Note, although this survey activity is often coordinated at the enterprise level (e.g., Enterprise Architecture) to maintain consistency, the actual information gathering is usually performed at the program or project level using enterprise-wide templates and definitions.

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3. Activity: Develop Service-Oriented Vision

Inputs	Outputs
• SOA Needs Analysis • Business capability descriptions • Asset Inventory	• Service-Oriented Vision

The objective is to express the entire or a portion of the Federated Enterprise's vision and strategy as service-oriented and establish priorities. The vision includes:

- Identification of all stakeholders and their strategies
- Identification of the scenarios sponsored by those stakeholders
- For each scenario establish the high-level capabilities required including necessary processes, required functions and measurable goals.

This activity establishes the high-level demand for SOA as illustrated in the left side (Demand Side) of the following figure. The right side (Supply Side) of the figure identifies the components needed to deliver the required capabilities and identifies cases in which such components could be shared or reused (i.e., candidate SOA components).

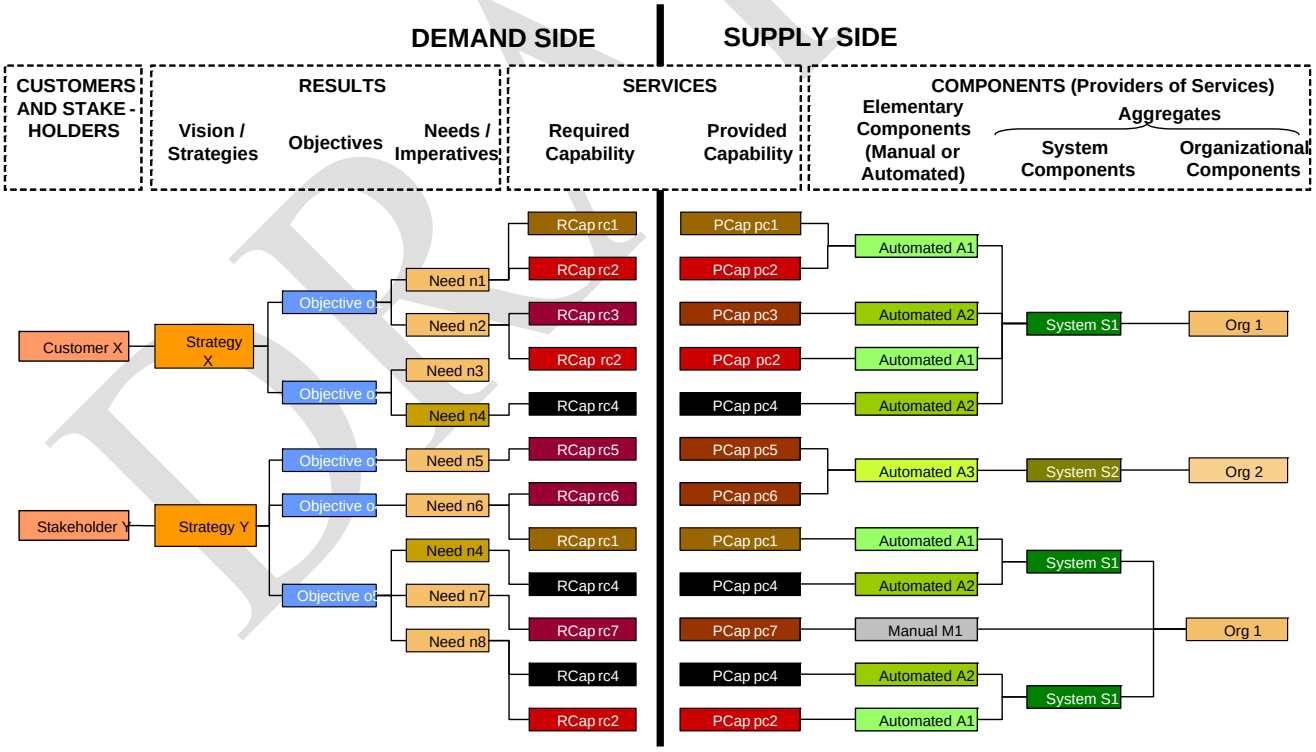

FIGURE 3-6
Vision and Strategy Establishes the Basis for Portfolio Investment Decisions

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Figure 3-6 is also useful in illustrating the thread of SOA development from customers and stakeholders with a vision to providers that provide services to realize that vision. The Service-Oriented Vision will useful in developing the change management objectives as described in Activity 10 (Managing Organizational Change) and Chapter 5.

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4. Activity: Define a SOA Adoption Strategy

Inputs	Outputs
• Stakeholders • Information about target organizations	• SOA Readiness Assessment • SOA Adoption Strategy • Identification of early adopters

This activity evaluates the organization's readiness for SOA and deals with the question how to introduce SOA into the organization. This is one level above the "as is" to "to be" transformation and deals with organizational change issues associated with the adoption of SOA. It creates a SOA Readiness Assessment and SOA Adoption Strategy based on the assessment. This activity is essentially the first step in the change management process as described in Chapter 5. Although there are many models for CM with different terminology, virtually all of them begin with an assessment of the organization and a determination of the willingness of stakeholders to embrace the proposed changes. This activity will parallel and feed into the change management effort (see Activity 10, Managing Organizational Change). Box 3-1 provides some insight and guidance as to whom to approach or contact when introducing SOA into an organization.

BOX 3-1. Start with the Right People

Start with the Right People

In his book, *Diffusion of Innovations*, Everett Rodgers, suggests five adopter categories for any innovation, such as SOA: Innovators, Early Adopters, Early Majority, Late Majority, and Laggards.

- The "Innovators" take up a small percentage of the population and typically jump from one innovation to another so they may not be the best "champions" because they may not have the necessary influence with their peers.
- The "Early Adopters" don't need a formal business case and can see quickly how the innovation will pay off. They are ready to start using it.
- The "Early Majority" needs a business case and needs to see that people are using the innovation.
- The "Late Majority" will use the innovation if it is well-packaged and everyone else is doing it.
- The "Laggards" will never adopt the innovation.

One strategy is to focus your initial messages to the Early Adopters and build enough momentum to gain the attention of the Early Majority with metrics pulled from the Early Adopter SOA projects. Select SOA champions from the Early Adopter group.

In the organization there are numerous stakeholders: project managers, architects, etc. So it might be worth considering how each of the groups may need to be approached and influenced. For example the typical situation may be an early adopter architect with a late majority project manager.

The SOA Adoption Strategy identifies key characteristics of the approach, including deciding how much to invest and where. It also addresses an appropriate balance between top-down and bottom-up approaches (see Box 3-2). It will also identify SOA adoption barriers and the corresponding tactics to address these barriers.

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BOX 3-2. Top-down to Bottom-up Approach?

Top-down to Bottom-up Approach?

A pure top-down or a pure bottom up approach for enabling a sustainable SOA delivery process will not work. Service-oriented programs and projects that are underway cannot be easily changed. It is risky to assume that delivery of critical functions can wait for alignment of the Enterprise level strategy, business model, and delivery objectives.

But allowing programs and projects to be established independent of the assets that they deliver is equally risky. Without any integrating force to assure horizontal integration in the context of alignment to enterprise vision will most likely result in overlap of function, inconsistency, lack of timeliness of information delivered, less than efficient usage of scarce resources, and a sustained inability to respond quickly to new threats and opportunities.

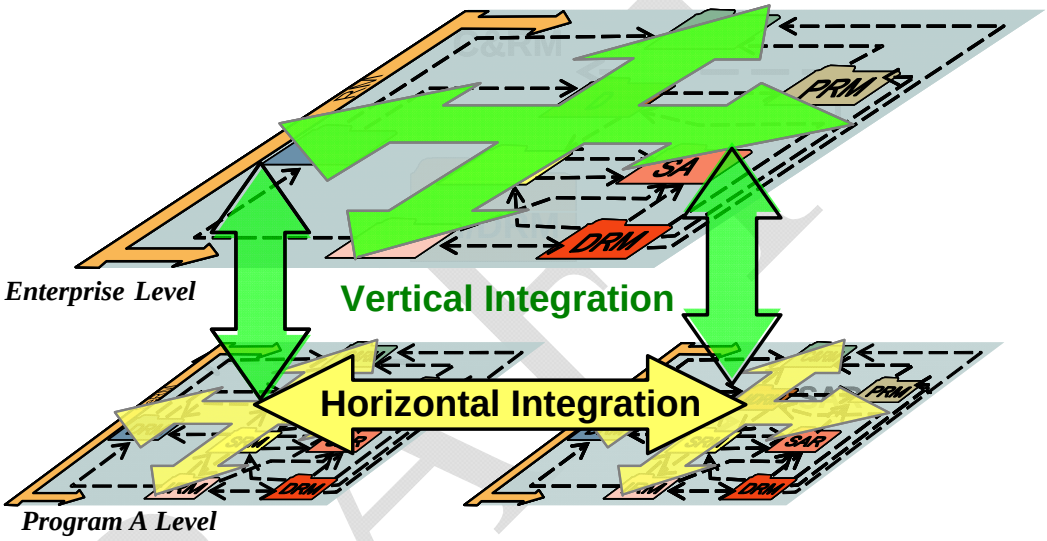

FIGURE 3-7
Horizontal versus Vertical Integration

Chapter 4 (SOA Governance, Funding, and Acquisition) presents a discussion of three ways in which SOA components can be provided, depending upon the enterprise governance posture used to control IT and business decision making:

- **Centrally Funded** - A central organization or entity is budgeted and funded to acquire, develop and deploy SOA components for use by multiple constituencies. Such centrally-funded initiatives are usually in accordance with cross-organizational or enterprise transition plans that are closely aligned with and supportive of the broader organization's Enterprise Architecture or IT Strategy. Centrally Funded SOA components can be provided free of charge to using organizations or can be paid for through one of a variety of chargeback mechanisms. The key characteristic of Centrally Funded SOA elements is that they are provided primarily as reusable components to be employed by projects other than the SOA component funded project itself.
- **Project Funded** – Business unit projects may acquire or build components for their own use that can then be made available to other organizational units across the Enterprise. Such Project Funded SOA components are justified primarily by the business case or rationale behind the broader project of which the specific SOA component is a part. Once created, the Project Funded SOA component is made available to other units either free of charge or on some form of chargeback

basis. The key characteristic of a Project Funded SOA component is that it would not have been created on its own without a justifiable project of which the SOA component is a part.

- **Locally Funded** – This funding approach is a newly-emerging variation on Project Funded. Under the Locally Funded approach, individual SOA components are created by local business areas for their own use (usually as part of an overall program to deliver enhanced business area functionality or as part of "steady state" maintenance and enhancement budgets). These SOA components are built in conformance with pre-defined enterprise SOA standards and pass a certification process that confirms that they can be used by other members of the enterprise. Once certified, these service components can be used by any other member of the enterprise without any further support obligation or funding agreement between the providers and users of the service component. (However, restrictions on reuse by certain business units may be employed within the enterprise to meet security or privacy concerns.) This Locally Funded approach differs from the Project Funded approach primarily insofar as the service component is funded on its own or through available funding vehicles that do not require the full business justification and investment decision making required for full discretionary projects. These SOA components tend to be small in size, relatively low in cost, and are able to be used once they are made available on a pre-existing service infrastructure (e.g., enterprise service bus).

Decisions about implementation of SOA will often involve consideration of which combination of ways to provide SOA components best fits the enterprise management and governance philosophies. In particular, a "top down" SOA approach is not likely to succeed in environments where most day to day decision-making authority is vested in the lower levels of the organization hierarchy. By contrast, a "bottom-up" SOA approach is more likely to be acceptable to dispersed organizational units in decentralized environments. However, such a "bottom up" SOA approach is less likely to deliver substantial transformational results in a very short time frame. The same factors that contribute to "bottom up" organizational autonomy impede rapid progress towards radical changes (transformation) that often threaten the interests of the individual dispersed units. Instead, bottom up SOA progress depends on the coincidence of individual unit needs and the resulting generation of relevant reusable components. Unless the individual units happen to have priorities and change agendas that are very closely aligned with enterprise-wide transformation objectives, the bottom up approach is unlikely to promote rapid and substantial transformational change.

Experience shows that widespread implementation of key SOA features and realization of their associated benefits faces significant challenges within a large enterprise. Any implementation of SOA needs not only to enable these key SOA features, but must also enable tactics that experience shows to have been successfully used to implement SOA within large enterprises, as shown in Figure 3-8.

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SOA Feature	Benefit for Clients	Adoption Barrier	Adoption Tactic
SERVICE AGREEMENTS Work is organized into well defined services with clear responsibilities	**BOOST VALUE** Concentrate on and organize around core services	**PROGRAM ORIENTATION** • Orgs manage programs - not used to services	**EDUCATION / OUTREACH** • Focus on managing services • Avoid techne jargon
MODULAR SERVICES Use as building blocks to assemble business processes and applications	**SPEND LESS** Modular services save time & money; proven ones lower risk	**SERVICE SELECTION** • Choosing the right module • What's needed vs. available	**SERVICE CATALOGS** • Easy to reuse (already exist) • Easy to buy (COTS, Open Src)
SOA STANDARDS & TOOLS XML, Web Services, SOA enabling tools, etc. act as the glue	**DO MORE** Use and provide a richer set of secure, scalable services	**ADDITIONAL COSTS** • Standards enforcement • Tools investment	**PILOT CUSTOMERS** • Willing partners and sponsor • Clear business case
SERVICE SHARING & REUSE Assign services to specialists and consolidate providers of like services	**WORK SMARTER** Minimize waste, increase efficiency, leverage legacy	**CULTURAL RESISTANC** • Loss of control (risk) • Low levels of trust	**BALANCED GOVERNANCE** • Increase transparency • Incentivize sharing
SERVICE INDEPENDENCE Services evolve independently as long as they adhere to the agreement	**ADAPT AND OPTIMIZE** Lower the impact of trans formational changes	**"IN-FLIGHT" CHANGES** • Change = Risk • Can't stop to make change	**INCREMENTAL CHANGE** • Interfaces insulate customers • Agile change management

FIGURE 3-8
SOA Adoption Barriers and Tactics

A robust change management effort can help educate stakeholders about the potential benefits and thereby mitigate the risks and barriers to adoption.

5. Activity: Develop Service-oriented Policy Guidance

Inputs	Outputs
• Existing policies • Service-oriented Vision	• Service-oriented Policies • Policy Implementation Action Plan

This activity develops or updates the policies needed to realize the SOA vision and associated strategies. It also creates an action plan to implement the strategies and an associated budget that implements the policies and prepares for SOA-based work across the complete life cycle. The outputs from this activity feed directly to the change management communications and education materials used to inform stakeholders (see Activity 10, Managing Organizational Change). A direct coordination of effort should be maintained between those responsible for CM and the individuals charged with creating these policies and plans. Getting communications "out in front" of any significant policy changes will enhance the likelihood of acceptance by all affected stakeholders.

This activity starts the process of specifying policies. This process can continue throughout the life cycle as an organization develops a service-oriented vision and strategy, SOA standards, and maturity in SOA development. Business areas may develop their own policies based on their own needs.

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Federated Enterprise Architecture

A Federated Enterprise Architecture defines the future or target state of an enterprise or of a major organization within the enterprise to more successfully accomplish its mission. Box 3-3 helps explain enterprise architecture using a city planning analogy. Successful enterprise architecture addresses all business areas that constitute the enterprise or major organization. The architecture aligns all six perspectives: business process/service, organization, location/facilities, data/information, application, and technology. Many service-oriented and SOA activities occur at an enterprise-architecture level.

BOX 3-3. City Planning Analogy

City Planning Analogy
A popular analogy is comparing enterprise architecture to city planning. City planning: • Identifies residential areas, shopping areas, industrial areas, recreational areas, and their relationship • Plans for common facilities such as parks and sports complexes • Provides for infrastructure planning such as roads, utilities, and transportation • Provides zoning regulations and building codes for the development of structures and facilities. Similarly, enterprise architecture guides the development and growth of the enterprise by providing both structure and standards.

Unlike the city planning analogy, however, Enterprise Architecture also plays an essential role in helping to orchestrate enterprise-wide Transition and Sequencing Plans. The Enterprise Architecture will usually map its standards and guidelines against individual business area plans to identify and synchronize the investment and technical initiatives across the enterprise. This synchronized set of initiatives is a critical input to the enterprise portfolio and investment management processes. Likewise, this planning helps the members of the enterprise at all levels understand the expected timing of new demand side capabilities and their related supply side components. It is this identification of the likely delivery of reusable components that provides the Sequencing Plan for business areas across the enterprise to use in determining when and where they can expect to be able to employ/ share a reusable component rather than need to build their own autonomous components.

6. Activity: Define Service-oriented Principles

Inputs	Outputs
• Service-oriented Vision • Standardized set of SOA features (see Appendix A)	• Service-oriented Principles

There are three parts to the defining principles:

- **Applicable Features.** Define the features that apply to each segment of the Federated Enterprise. Candidate features are listed in Appendix A. Table 3-2 provides an example using the late binding feature. For example late binding of services is usually more important to line operations then the standardized practices of back office business operations.

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- **Measurable Expectations.** Define specific measurable expectations for each of the SOA features. A measure for loose coupling will allow you to determine the degree of loose coupling so you can determine whether you have achieved loose coupling (based on predetermined criteria).
- **Guidance.** Guidance on the system architecture and delivery requirements so that the features are successfully delivered.

TABLE 3-2. Late Binding Feature Applicability to Different Business Services

Feature	Business Segment 1	Business Segment 2	Business Segment 3
Late Binding	Register formal service interfaces in a run-time repository	Only register the service interfaces of adaptor and façade services to other business segments (or outside entities) in a run-time repository.	Register the services interfaces of all adaptor, façade, and work flow services in a run-time repository.

Service-oriented principles will be part of the change management communications and training effort and thus this activity and its output should be coordinated with the overall CM effort.

7. Activity: Identify SOA-Related Standards

Inputs	Outputs
• Service-oriented Vision	• Identified SOA Standards, Guidelines and Conventions

Identify SOA Standards and Guidelines, including SOA patterns, XML standards, SOA related infrastructure standards. Consider standards/guidelines applicable for custom development and also for acquiring COTS/GOTS components. There will be SOA policies that direct organizations to implement the standards. The SOA-Related Standards development will involve input from affected stakeholders and therefore should be coordinated with the feedback mechanisms as described in Chapter 5, SOA Change Management.

Enterprise level Architecture Boards, including representatives from participating business areas, usually are employed to establish these SOA related standards. These same Architecture Boards or their designated subordinate Working Groups are then convened on a regular basis to confirm that new solutions comply with these architectural standards so that components can be certified for reuse by other organizations. Likewise, these Boards or their Working Groups will often also be convened to confirm that newly developed solutions comply with the standards and guidelines needed to operate on shared infrastructure and meet security and information assurance criteria. If a new solution does not comply with these standards a waiver process may be invoked, depending upon the governance philosophy of the enterprise, whereby approval of the non-standard solution may be escalated to higher levels of management. Such waivers may often result in the new solution and its components to not be certified for SOA reuse or sharing.

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8. Activity: Identify the Service-Oriented Target State

Inputs	Outputs
• Service-oriented Vision • Asset Inventory • Identified SOA Standards, Guidelines and Conventions • SOA Adoption Plan	• Service-Oriented Target State – Business Architecture – Information System Service Requirements – Information System Service Architecture • Identified SOA Standards, Guidelines and Conventions (updated) • SOA Integration Strategy • Near Term SOA Projects (identified) • Sequencing Plan (high-level)

8.1. Activity: Define Business Architecture

The following three steps are done concurrently.

1. IDENTIFY FUTURE HIGH-LEVEL BUSINESS SERVICES/PROCESSES

This step identifies:

- Key customers and stakeholders and their business needs.
- Services/processes that satisfy their business needs. This may include casting or reframing existing processes into a service point of view. Business processes orchestrate the services.
- Major business entities can also help identify services.
- The processes are identified down to the reusable process fragment level to identify planned reuse at the enterprise level -- decomposition to lower levels would be done by projects for business areas during Service Enablement.
- Organizations, IT systems, and facilities that provide the services.

Figure 3-9 illustrates some of this analysis. It illustrates how SOA helps organizations at all echelons boost value by aligning the services in the Value Stream with the strategic agenda

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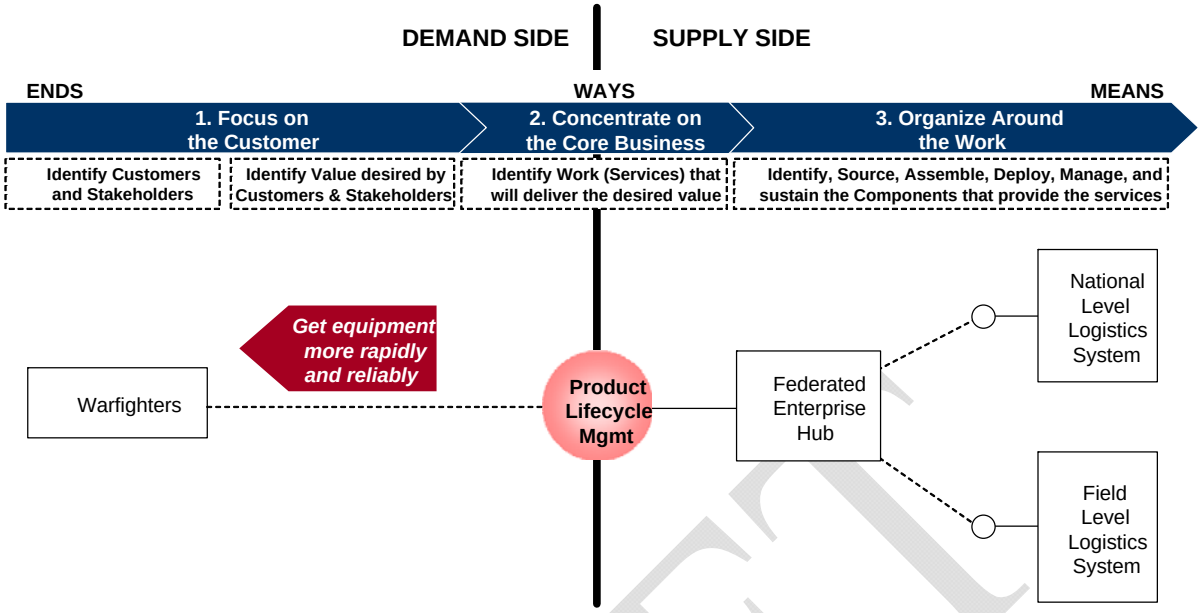

FIGURE 3-9
SOA Helps Organizations Boost Value

2. IDENTIFY HIGH-LEVEL COMMON ENABLING BUSINESS SERVICES

This step looks across the business processes and services for common fragments (see Figure 3-9). It considers services at a high-level, e.g., collaboration instead of e-mail.

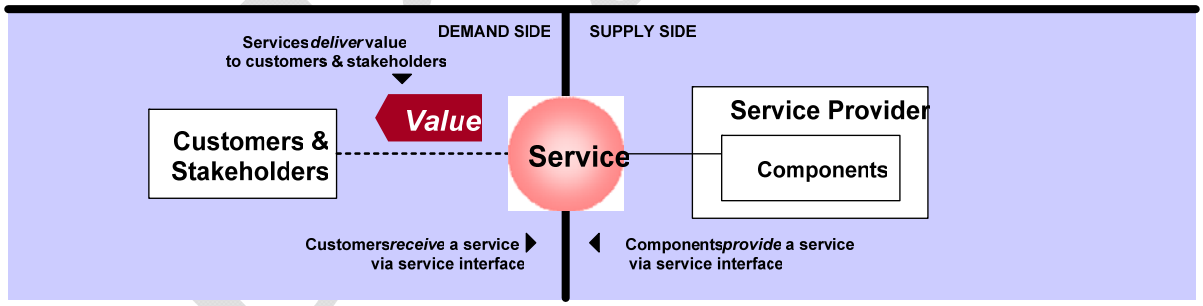

FIGURE 3-10
Demand and Supply Sides

3. IDENTIFY SOA OPPORTUNITIES

This step looks at business priorities (e.g., need for agility, need to integrate systems), business services, and processes and examines which parts of the enterprise have situations that could benefit from SOA. For example it looks for opportunities to:

- Consolidate redundancy
- Boost value of existing services
- Lower costs of existing services.

Note that these steps are performed at the organization levels that correspond to the governance philosophy of the enterprise. In more centrally managed environments these steps encompass all or most of the business architecture across all business areas. In less centrally managed environments, the business architectures are prepared by individual business areas and may or may not be consolidated into a combined business architecture for the entire enterprise. In particular, opportunities to coordinate like business architecture elements in decentralized environments are left to the discretion of the underlying business units, whereas such coordination or consolidation opportunities are usually subject to central management decision making in more centralized environments.

8.2. Activity: Define Information System Service Requirements

These are high-level requirements at the enterprise level. They include:

- SOA Functional Requirements
- SOA Infrastructure Requirements
- SOA Security and Information Assurance Requirements
- SOA System Management Requirements
- SOA Information/Data Requirements
- SOA Performance Requirements.

8.3. Activity: Define Information System Service Architecture

Define an information system service architecture to support the business architecture (i.e., business requirements) and the information system service requirements. This includes:

- **Defining a Federated Information Model**
- **Identifying High-level Automated Services**
- **Defining Information System SOA Reference Models**
- **Defining Service-oriented Application Architecture**
- **Defining Service-oriented Technology Infrastructure**. The infrastructure could include the enterprise service bus, messaging middle ware, technical services to support transaction management (compensation), message protocol conversion, message content format conversion, and security. The services required and the approach to fulfilling them can be defined in the Federated Enterprise Architecture (EA) and then (separate from EA) the organization can run an infrastructure project to realize those capabilities. This must be planned at the enterprise-level as it is the glue that enables enterprise SOA
- **Defining SOA Information Assurance Architecture.** See Appendix C for a discussion of SOA and information assurance.
- **Defining SOA Agreements Between Providers and Consumers** Providing and using SOA components requires both technical considerations as well as "contractual" agreements between providers and consumers of services. These agreements normally include:
  - Functionality and interface characteristics
  - Service level agreements (SLAs) and related metrics

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- Cost reimbursement or chargeback
- Change management process for modifying SOA components consistent with end consumer impacts
- Obligations on consumers who choose to cease using a SOA component (alimony) whereby the financial or functional interests of other consumers who continue to use the shared component are protected

8.4. Activity: Plan Transition

Plan transition to the service-oriented target state:

- **Define Near-term SOA projects.** Define initial projects. These should include projects that demonstrate feasibility and projects that would be quick wins.
- **Define SOA Integration Strategy.** For each type of problem that SOA will be solving a general approach will be defined. For example, integration strategies could include how to move from legacy systems to SOA. The integration strategy is more segmented than the adoption strategy and includes more for the technical concept of how you can expect to achieve integration.
- **Develop a Sequencing Plan (high-level).** Centrally Funded and Project Funded SOA components (see Activity 4, Develop a SOA Adoption Strategy) should be part of an overall agreed upon Sequencing Plan, which identifies the likely SOA components that will be made available for reuse by end user services over time. (Locally Funded components may or may not be identified ahead of time as part of a Sequencing Plan.)The Sequencing Plan also schedules the deployment of SOA components to reflect natural precedence relationships among different SOA components and also reflects known or anticipated project timing. For more details see Chapter 4 (SOA Governance, Funding and Acquisition).

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Program Management

9. Activity: Develop SOA Governance & Management Strategy

Inputs	Outputs
• Service-oriented Vision • SOA Policies	• SOA Governance and Management Strategy – Identified SOA governance bodies – SOA Governance Model • SOA Policies (updated)

This activity develops a strategy for governing and managing SOA. The strategy could be a hybrid mixing a top-down deliberate strategy and bottom-up emergent strategy. Chapter 4 (SOA Governance, Funding and Acquisition) focuses on the "fiduciary" aspects of SOA Governance – the organizational authority, roles, responsibilities, decision rights, funding and acquisition approaches used to implement and operate a SOA program within a federated or decentralized structure.

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This activity defines what governance means for the enterprise or organization and establishes governance mechanisms. Governance is extremely important, but is also deceptively challenging. You need just the right amount of governance – too much raises barriers and too little invites chaos. Either can cause SOA to fail. Furthermore, the output from this activity will be an essential part of the communications and training effort of change management. The SOA Governance and Management Strategy will feed the CM effort with respect to CM tactics and overall plan.

Through early SOA projects and pilots, the Policies enabling SOA need to be reviewed and updated based on lessons learned from these projects.

SOA initiatives can impact traditional IT governance mechanisms. Figure 3-11 illustrates the major question areas SOA governance needs to address. SOA Governance Bodies, a SOA Governance Model, and a SOA Life Cycle Model help address these questions:

FIGURE 3-11
SOA Governance

- **Who – SOA Governance Bodies.** SOA governance bodies that understand the business goals and SOA architecture and can sensibly resolve misalignments. These are the people that are responsible for the "What" and drive the "How / When". They address common questions such as:
  - Who "owns" the SOA services? (functional, technical, operational)
  - Who "owns" the SOA services development standards and processes?
  - Who "owns" the SOA infrastructure?
  - Who can use the SOA services?
  - Who will build the SOA services?
  - Who can change or fix the SOA services?
  - Who will pay for the SOA services' development & support?
  - Who will pay for the SOA service infrastructure?

- **What –- SOA Governance Model.** The SOA Governance Model defines where you are trying to get to and measures project architectures and designs against these requirements. It addresses common questions such as:

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  - What functionality is provided by the SOA architecture & infrastructure?
  - What enterprise architectural and/or regulatory standards must be supported by the SOA infrastructure?
  - What makes a good (well-designed, well-built) service?
  - What quality of service is required?
  - What services have been developed or will be developed that would be good candidates to become common services?
  - What SOA policies need to be established?

- **How / When – The SOA Life Cycle Model.** The lifecycle process includes review points where the governance process is engaged. This answers the requirements established in the "What". It addresses common questions such as:
  - How are interdependencies managed?
  - How will SOA services or standards be published?
  - How can we encourage use of SOA across the organization?
  - How will we enforce that SOA is being used properly?
  - How do we measure SOA services usage?
  - How will change requests be handled?
  - How will services be exposed to stakeholders?
  - How will we know that services are being used properly?
  - How will we measure and report on Service Level Agreements (SLAs)?
  - How will we measure and report on SOA program adoption?
  - How will we resolve issues between program participants?

Resolving these governance issues is normally accomplished as part of the development of the Operating Model for SOA and SOA Governance. Chapter 4 - (SOA Governance, Funding, and Acquisition) contains information about how to develop an appropriate operating model for the enterprise that provides the appropriate SOA roles, responsibilities and related operating principles that align with the broader enterprise governance model and business strategic objectives.

This SOA Operating Model development process consists of two phases:

Phase 1 - Designing the Operating Model Framework paints a picture of what the future Operating Model will look like. It usually consists of 4 tasks with related subordinate activities:

- Assess (Measure)
  - Identify Drivers and Principles
  - Conduct Self-Assessment
  - Conduct Voice of the Customer Interviews
  - Identify "Critical to Business" (CTB's) Measures
- Analyze
  - Identify Alternatives to be developed
  - Develop Alternatives

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  - Weigh alternatives against CTB's
  - Select alternative
- Architect (Improve)
  - Shore up weaknesses of selected alternative
  - Integrate strengths of other alternatives
  - Refine Model with Stakeholders
  - Technology Council and Executive Board Reviews
- Outcome (Operating Model Framework)
  - Key Drivers and Operating Principles codified
  - Financial (Funding and Recovery) Model identified
  - Governance Structures defined
  - Organizations / Functions identified
  - Positional Roles & responsibilities documented
  - Inter-organizational Relationships mapped
  - Critical processes identified

Phase 2 produces the detailed Operating Model design. It defines how the shared service/ SOA environment will work. Phase 2 tasks and activities depend on the specific Operating Model framework established as an outcome from Phase 1. Phase 2 tasks and activities tend to follow a classical design process (conceptual, logical and detailed design steps).

The scope of the Phase 2 analysis covers all of the selected functions identified as important during the Phase 1 Operating Model Framework.

Phase 2 employs an iterative design process. The "inputs" are the selected functions identified in the Operating Model Framework (Phase 1). The "process" is an iteration of conceptual, logical and detailed design steps. The "outputs" are detailed operating model processes and practices ("playbooks") for each selected function.

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10. Activity: Manage Organizational Change

Inputs	Outputs
• Service Capability Needs Analysis • SOA Component characteristics required to supply the identified Service capability needs • Business capability descriptions, including stories (day in the life of) processes, goals and functions needed • Service-Oriented Vision • SOA Readiness Assessment • SOA Adoption Strategy • Identification of early adopters • Service-oriented Policies • Policy Implementation Action Plan • Service-oriented Principles • Identified SOA Standards, Guidelines and Conventions • Service-Oriented Target State – Business Architecture – Information System Service Requirements – Information System Service Architecture • Identified SOA Standards, Guidelines and Conventions (updated) • SOA Integration Strategy • Near Term SOA Projects (identified) • Sequencing Plan (high-level) • SOA Governance and Management Strategy – Identified SOA governance bodies – SOA Governance Model • SOA Policies	• Organizational Assessment • CM Strategic Approach • Communications Framework • CM/Communications Implementation Plan

The change management activity takes virtually all the outputs from the Business Roadmap tasks and puts them to use in the management of organizational change. Change management is the essential "soft" activity that sets expectations, provides stakeholder feedback mechanisms, analyzes training needs, schedules strategic and tactical communications, and generally provides solutions to human impulses to resist change. Without this activity, significant risks to a successful transition are almost assured. With this activity, these risks can be mitigated.

Chapter 5 of this document provides greater detail of the change management steps that need to be taken for the SOA effort. In some cases, the outputs that serve as inputs to the CM effort will be worked concurrently with others and with development of CM artifacts. For instance, Identification of Early Adopters will be accomplished during the Stakeholder Analysis portion of the Organizational Assessment. In general, there must be a coordinated effort between the more technical aspects of the Business Roadmap and the human/organizational aspect to create a change environment for the entire SOA transition effort. Table 3.3 illustrates the relationship between other Business Roadmap activity outputs and CM work products.

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TABLE 3-3. Relationship between Other Business Roadmap Output and CM Steps and Workproducts

Workproducts from Other Business Roadmap Activities	Potential Impacts To Major CM Steps	Associated CM Work Products
• Service Capability Needs Analysis • SOA Component characteristics required to supply the identified Service capability needs • Business capability descriptions, including stories (day in the life of) processes, goals and functions needed • SOA Readiness Assessment • Identification of early adopters	Organizational Assessment	• Organizational and Environmental Drivers • Stakeholder Assessment Matrices • Organizational Change Readiness Assessment
• SOA Adoption Strategy • Service-oriented Policies • Policy Implementation Action Plan • Service-Oriented Target State – Business Architecture – Information System Service Requirements – Information System Service Architecture • Identified SOA Standards, Guidelines and Conventions (updated) • SOA Integration Strategy • SOA Governance and Management Strategy – Identified SOA governance bodies • SOA Governance Model	Change Management Strategic Approach	• CM Goals and Metrics • Change management Methodology • Roles and Responsibilities Template • Training Needs Assessment
• Business capability descriptions, including stories (day in the life of) processes, goals and functions needed • Service-Oriented Vision • Policy Implementation Action Plan • Service-oriented Principles • Identified SOA Standards, Guidelines and Conventions • Service-Oriented Target State – Business Architecture – Information System Service Requirements – Information System Service Architecture • Identified SOA Standards, Guidelines and Conventions (updated) • SOA Integration Strategy • Near Term SOA Projects (identified) • Sequencing Plan (high-level) • SOA Governance and Management Strategy – Identified SOA governance bodies – SOA Governance Model • SOA Policies (updated)	Communications Framework	• Communications Process Review and Approval Matrix • Communications Products and Channels Activity Matrix • Engagement Matrices • Feedback Mechanisms • Performance Measures
• Policy Implementation Action Plan • Service-oriented Principles • Identified SOA Standards, Guidelines and Conventions • Service-Oriented Target State – Business Architecture – Information System Service Requirements – Information System Service Architecture • Identified SOA Standards, Guidelines and Conventions (updated) • SOA Integration Strategy • Near Term SOA Projects (identified) • Sequencing Plan (high-level) • SOA Governance and Management Strategy – Identified SOA governance bodies – SOA Governance Model • SOA Policies (updated)	Change/Communications Implementation Plan	• Communications Goal and Objectives • Success Factors, Criteria, and Metrics • Change/Communications Plan

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Executive/Portfolio Management

11. Activity: Manage Investment Portfolio

Inputs	Outputs
• Investment Portfolio	• Investment Portfolio (updated)

Each organization has its own processes for portfolio management. We make this activity explicit because of its importance to SOA. Chapter 4 (SOA Governance, Funding and Acquisition) contains more detailed information about funding options for SOA. In particular, it reflects the differing investment management approaches needed for:

- Development of SOA plans and standards
- Development of SOA components (including infrastructure)
- Usage of SOA components and related operational support

Chapter 5 (SOA Change Management) discusses sustaining activities for SOA and this activity falls under that category. Portfolio Management going forward must be coordinated with ongoing CM efforts

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CHAPTER 3 –

SOA Life Cycle Methodology

SECTION 3 –

Service Enablement

Service Enablement provides the processes for SOA delivery. It is done for each business system within a business area and is managed as a program with many projects or as one project. It relies on Business Roadmap artifacts to provide high-level direction. Service Enablement projects may also provide results that inform and change some of these enterprise-level artifacts.

Figure 3-12 illustrates the Service Enablement processes, which are accomplished for each Business System within a business area. In the figure, the processes shaded yellow are the primary ones; those shaded turquoise can be involved in meeting Service Enablement objectives but are not primary.

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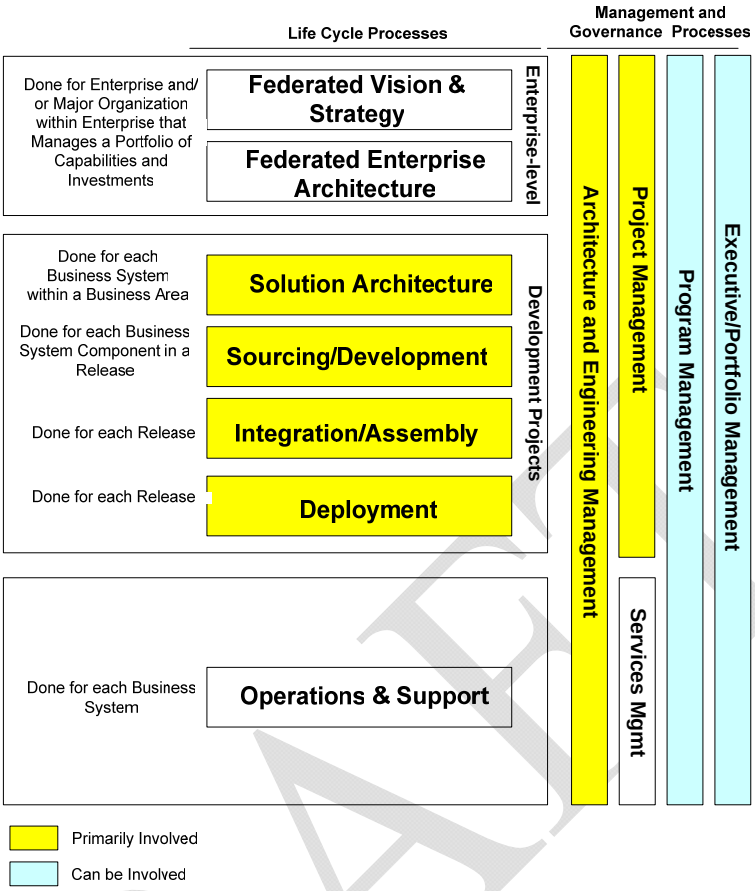

FIGURE 3-12
Service Enablement Processes

The following figure lists of the major activities within the Service Enablement component.

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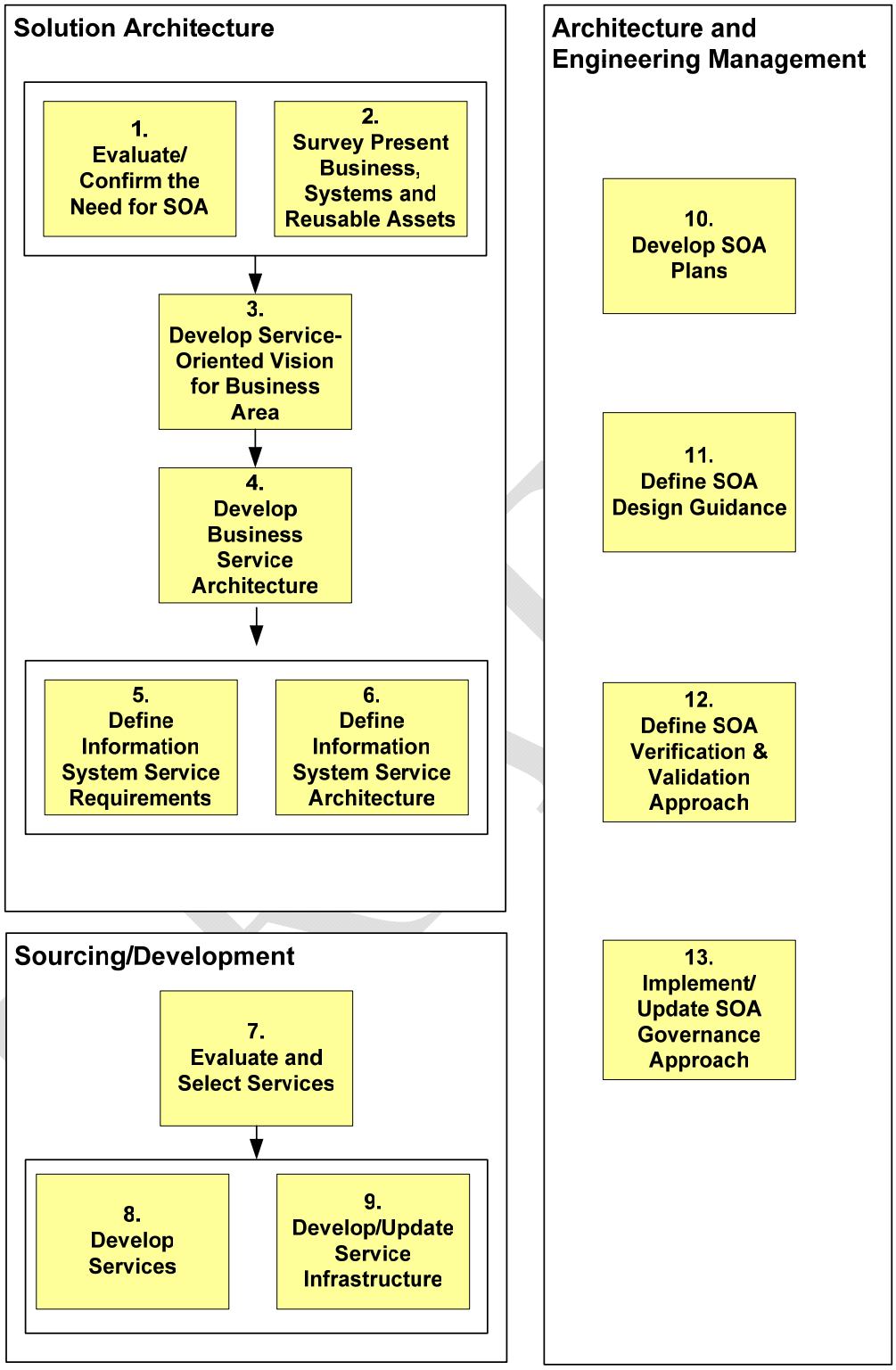

FIGURE 3-13
Service Enablement Major Activities

The following sections ((as numbered according to the activity numbering in Figure 3-13)) describe the major activities within the Service Enablement component

Solution Architecture

1. Activity: Evaluate/Confirm the Need for SOA

Inputs	Outputs
• SOA Readiness Assessment (Enterprise-level) • SOA Implementation Strategy (Enterprise-Level)	• Confirmed need for SOA

Here you evaluate or confirm the need for SOA in your business area. This activity is done concurrently with the "Survey Present Business, Systems, and Reusable Assets" activity.

For business areas that already have a SOA foundation, this evaluation may be self-evident for additional solution components and this activity may not be needed.

2. Activity: Survey Present Business, Systems and Reusable Assets

Inputs	Outputs
• Asset Inventory (Federated Enterprise level)	• Asset Inventory (Business Area level)

Review the Federated Enterprise Asset Inventories. These inventories were created at a high level. Select relevant assets that are applicable to your business area and add additional detail as needed.

3. Activity: Develop Service-Oriented Vision Business Area

Inputs	Outputs
• Asset Inventories • Service-Oriented Vision (Federated Enterprise level) • Service-oriented Policies	• Service-Oriented Vision (Business Area Level)

Develop a service-oriented vision for the business area. This is consistent with the enterprise-level vision but would have more detail for your business area.

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4. Activity: Develop Business Service Architecture

Inputs	Outputs
• Service-oriented Vision • Asset Inventories • Service-oriented Target State	• Business Service Architecture

This activity identifies and defines the business services as illustrated in the shaded portion of Figure 3-14. The steps in the Business Roadmap activity "Identify the Service-Oriented Target State" also apply here, except at a lower level (i.e., for a business system). At the business area level you would deal with the services at a lower level than those considered in Business Enablement, e.g., e-mail instead of collaboration.

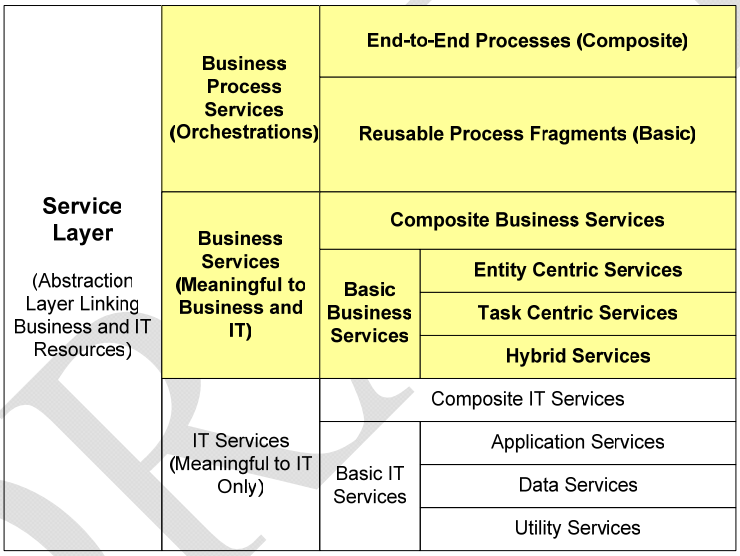

FIGURE 3-14
Business Process and Business Services

Major steps include:

- Confirm SOA opportunities identified at the enterprise-level. Examining the business area's business processes, business entities, and services may lead to additional SOA opportunities.
- Define business entities
- Identify Candidate Business Services from processes and/or entities. During this step, care should be taken to realize distinction between business processes and services as described in Box 3-4.
- Identify Common Enabling Business Services.

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BOX 3-4. Business Process or Service?

Business Process or Service?

Some people say "business process = service." Actually, the two are separate concepts, with some interrelationship.

If a service is a behavior performed by a structure (actor) to achieve some desired effect (state) for a customer (another structure / actor), then business process fails that test. Consider a process that involves two different entities (e.g., a company and its customer). The process is a collaboration of the two entities. Each entity has its own view of that process and treats the other as a black box. Each entity can implement a process service to run their side of the process and to keep tabs on the external state of the other's participation in the process (e.g., has the customer accepted the bid yet?). So the business process is not performed in this case by one actor for benefit of another, but by two actors for mutual benefit. Taking a service view of that process requires viewing the process from the viewpoint of just one of the participants. So I think that this indicates that there are processes that are larger than a single process service and are performed by more than one actor, and therefore not all processes are services.

Conversely, we assume that a business process is a stateful context-aware orchestration of events (a path through a series of activity states) -- in our case an orchestration of services. However, we recognize that the ideal nature of the underlying services is that they be stateless and context-neutral. Therefore there are services that are not processes.

Combining these two arguments, we can draw a meaningful distinction between the concepts of process and service. Like a Venn diagram, there is some overlap of the two concepts. A process can be represented by one or more process services, and some services are process orchestrations. However, there is also a distinction (not all services are processes, and not all processes can be represented by a single service), so the two are not identical.

If the project is delivering services, it will need to elicit information such as the information in Table 3-3 from Customers/Stakeholders on the Demand side and Service Providers on the Supply Side (see Figure 3-9) to further define the service.

TABLE 3-4. Service Information

Concerns for Both Customer/Stakeholder and Provider	Concerns Of The Provider Only
What is the Service? (Service Name and Description)	Who are the Customers and Other Stakeholders? Knowing who could potentially use the service is important in designing the service. However, we define a service based on a well defined contract and "any customer" that adheres to the contract could potentially have use of the service.
What value does the service deliver?	What components are used to provide the service?
What work gets done? (Functionality)	What data is stored within the components?
What is acceptable performance? (e.g., SLAs)	How do the components work together? (orchestration)
How do you use the service? (Interface)	How the components are sourced (e.g. built, purchased, leased, subscribed to, etc.)?
What are the Inputs and Outputs?	How are the components assembled?
What does the subscription cost and how is payment made?	How are the components deployed (sequencing, etc.)?
What other subscription agreements apply? (separation, other terms)	How is the service operated?
How do I get problems resolved?	How is the service financed? (Central vs. Customer Funded)
How do I request and track changes?	What optimizations are planned?
What improvements are planned?	

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5. Activity: Define Information System Service Requirements

Inputs	Outputs
• Business Service Architecture • Information System Service Requirements (Federated Enterprise-level)	• Information System Service Requirements (Business Area Level)

Define the following SOA information system requirements:

- SOA Functional Requirements
- SOA Infrastructure Requirements
- SOA Security and Information Assurance Requirements
- SOA System Management Requirements
- SOA Information/Data Requirements
- SOA Performance Requirements

6. Activity: Define Information System Service Architecture

Inputs	Outputs
• Information System Service Requirements • Business Service Architecture	• Information System Service Architecture • Business Service Architecture (updated)

This activity updates the Business Services and defines IT Services as illustrated by the shaded portions in the Figure 3-15:

<table>
<tr><td rowspan="12">Service Layer
(Abstraction Layer Linking Business and IT Resources)</td><td rowspan="2">Business Process Services (Orchestrations)</td><td colspan="2">End-to-End Processes (Composite)</td></tr>
<tr><td colspan="2">Reusable Process Fragments (Basic)</td></tr>
<tr><td rowspan="4">Business Services (Meaningful to Business and IT)</td><td colspan="2">Composite Business Services</td></tr>
<tr><td rowspan="3">Basic Business Services</td><td>Entity Centric Services</td></tr>
<tr><td>Task Centric Services</td></tr>
<tr><td>Hybrid Services</td></tr>
<tr><td rowspan="4">IT Services (Meaningful to IT Only)</td><td colspan="2">Composite IT Services</td></tr>
<tr><td rowspan="3">Basic IT Services</td><td>Application Services</td></tr>
<tr><td>Data Services</td></tr>
<tr><td>Utility Services</td></tr>
</table>

FIGURE 3-15
Business and IT Services

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This activity also:

- Updates the Information Model
- Identifies Automated Services
- Selects/Confirms Information System Reference Model
- Defines Service-oriented Application Architecture
- Defines SOA Information Assurance Architecture.

Sourcing/Development

7. Activity: Evaluate and Select Services

Inputs	Outputs
• Asset Inventories • Business Service Architecture • Information System Service Requirements • Information System Service Architecture • Service registries • Service Catalogs • Taxonomies	• Sourcing Analysis Results – Selected reusable services

Evaluate and select services using the following major steps:

- **Review Service Catalogs and Taxonomies.** Review existing service catalogs for reusable services to meet the business needs. Using industry analyst taxonomies may help define the types of services needed (e.g., Gartner). For example, consider:
  - Enterprise Service Registry
  - Internet-based Registry (e.g., Google earth)

  If an organization is taking the first steps in their SOA strategy, in the first few small SOA projects they might just rely on the services they construct themselves.
- **Perform a Gap-fit Analysis**
- **Perform Source-Make Decisions.** Based on the review of service registries and the gap-fit analysis, decisions can be made from among the following options for each needed service:
  - Subscribe to an existing one. The decision can be made to reuse the service without change or extend it by adding functionality.
  - Buy (could be open source or COTS) the service.
  - Build the service.
  - Adopt what the organization already owns (e.g., GOTS).

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8. Activity: Develop Services

Inputs	Outputs
• Business Service Architecture • Information System Service Requirements • Information System Service Architecture	• Service Registry • Services – Service Specification

Develop the services. For services that are off-the-shelf commodities, there may be very little development but the majority of endpoint services today would require customer development and integration to bolt onto an architecture. The deployment and use of new acquired or developed services must first be approved by a certification board (often a subcommittee or working group of the Architectural Board.) This certification confirms that the service does what it is claimed to do and complies with the operating and infrastructure standards of the enterprise. In this way, newly certified services can be employed by other business areas with confidence that the new services will perform as specified. Such new services are entered into the enterprise Service Catalog to facilitate use by others.

9. Activity: Develop/Update Service Infrastructure

Inputs	Outputs
• Information System Service Requirements • Information System Service Architecture	• Service Infrastructure (logical and physical)

Develop or update the service infrastructure.

Architecture and Engineering Management

10. Activity: Develop SOA Plans

Inputs	Outputs
• SOA Adoption Strategy • Information System Service Architecture • Business Service Architecture • Sequencing Plan (from Business Roadmap)	• SOA Adoption Plan • Sequencing Plan (updated)

Create a plan to adopt SOA in the organization. Update the Sequencing Plan (see Business Roadmap Activity 8.2, Plan Transition).

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11. Activity: Define SOA Design Guidance

Inputs	Outputs
• Information System Service Architecture • Service-oriented Principles • SOA Standards, Guidelines and Conventions	• SOA Design Guidance

Define SOA design guidance. See Appendix A for a description of how SOA features can be enabled.

12. Activity: Define SOA Verification & Validation Approach

Inputs	Outputs
• SOA Information System SOA Requirements	• SOA Verification and Validation Plan –

Develop a SOA Verification and Validation Plan. Include Orthogonal Array Testing System (OATS), which is a method of deriving a set of test cases. The technique selects combinations of test parameters that minimize the number of test cases and maximize the test coverage. See the discussion of Verification and Validation in Table B-1 (Comparison of Traditional and SOA Software Engineering) in Appendix B (Advanced SOA Delivery Tactics).

13. Activity: Implement/Update SOA Governance Approach

Inputs	Outputs
• SOA Governance and Management Strategy • SOA Policies (enterprise-level)	• Governance approach • SOA Policies (business area – level)

Implement or update a governance approach for the business area. Decide what parts of the enterprise-level SOA Governance and Management Strategy apply to the business area. Add the additional business area-level detail needed. For example, a business area may need to develop and enforce additional policies. Any governance decisions made by the Business area should be compatible with the broader Enterprise Governance Policies. If differences occur, a waiver may be required from the enterprise level governance committees (e.g., CIO Council or Architectural Board) to permit the Business Area to adopt governance practices or technical standards that differ from the enterprise-wide conventions. Depending upon the broader enterprise governance posture (more or less centralized) such waivers may require the Business Area to prepare a detailed justification for such variances (more centralized governance posture) or may require the central organization (more decentralized governance posture) to prepare rigorous arguments for why the

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Business Area should be prevented from adopting the non-compliant policies or standards.

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SECTION 4 – Service Sustainment

Service Sustainment provides the processes to support and maintain SOA in an operations environment. This occurs not only in a steady state environment where an organization has all the support processes and infrastructure in place and is creating services as needed, but in an environment where an organization is on the path to SOA maturation and may be pursuing both a top down and bottom up strategy as they adopt SOA. See Appendix B, Advanced SOA Delivery Tactics for a detailed discussion of feature-based development and continuous and concurrent delivery. Sustainment is also part of the change management methodology as described in Chapter 5.

Figure 3-16 illustrates the Service Sustainment processes, which are accomplished for each Business System. In the figure, the processes shaded yellow are the primary ones; those shaded turquoise can be involved in meeting Service Sustainment objectives but are not primary.

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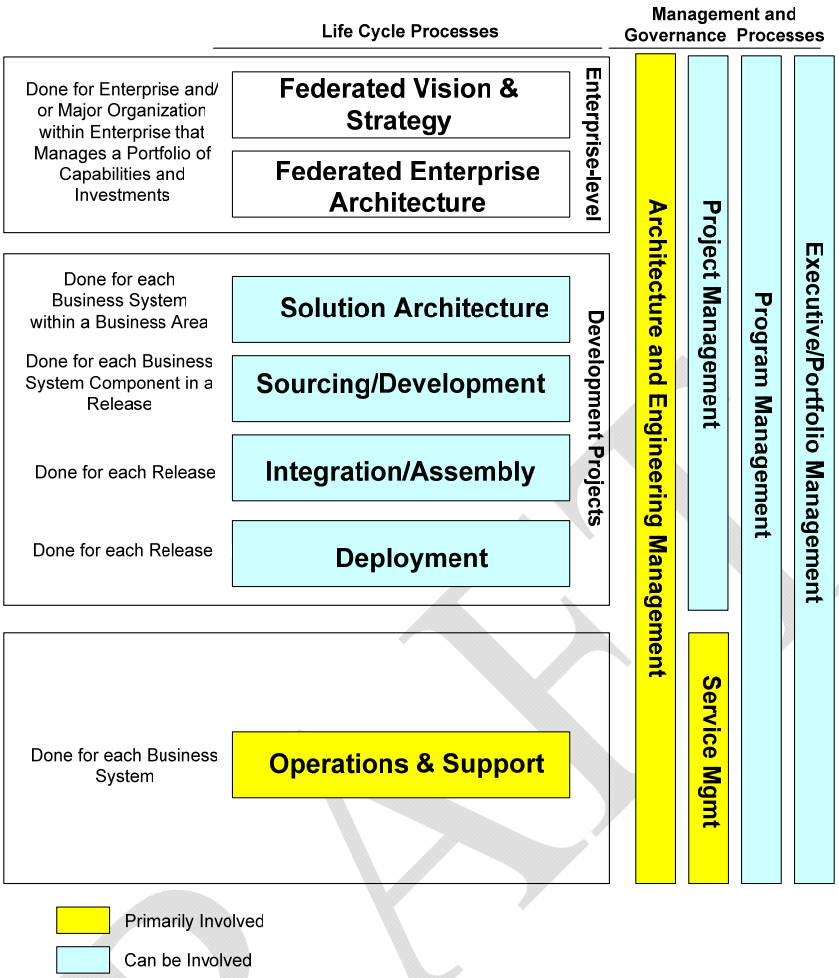

FIGURE 3-16
Service Sustainment Processes

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CHAPTER 4 –

SOA Governance, Funding, and Acquisition

SECTION 1 –

Overview

SOA programs, by definition, provide components that can be used by multiple constituencies to provide capabilities needed to achieve individual project or business area results. Because SOA components are used across an organization, SOA Governance, Funding and Acquisition policies must reflect the variety of interests and needs of the affected stakeholder organizations impacted by the provision or use of SOA components.

This chapter discusses the concepts, principles and approaches to address the governance needs of an organization regarding SOA. This discussion focuses on the "fiduciary" aspects of SOA Governance – the organizational authority, roles, responsibilities, decision rights, funding and acquisition approaches used to implement and operate a SOA program within a federated or decentralized structure. We assume that the federated or decentralized structure consists of at least three levels (e.g., enterprise, sector, business unit). This "fiduciary" SOA Governance fits within a broader IT and business governance structure. The most important aspect of "fiduciary" SOA Governance is that it be aligned with and part of the existing enterprise governance model.

There are other types of SOA technical decision-making (e.g., criteria for certifying or registering a SOA component for use by others, rules for accessing and using SOA components in real time) that are sometimes referred to as "governance." These types of detailed technical decisions are not treated directly in this chapter. These detailed technical issues are assumed to be addressed by the organizational and governance committees (e.g., Architectural Working Group, Standards Setting committees) that are identified within the "fiduciary" governance topics covered in this chapter.

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4.2.1. Description of Funding Options

There are three primary ways in which SOA components can be provided:

- **Centrally Funded** - A central organization or entity is budgeted and funded to acquire, develop and deploy SOA components for use by multiple constituencies. Such centrally-funded initiatives are usually in accordance with cross-organizational or enterprise transition plans that are closely aligned with and supportive of the broader organization's Enterprise Architecture or IT Strategy. Centrally Funded SOA components can be provided free of charge to using organizations or can be paid for through one of a variety of chargeback mechanisms. The key characteristic of Centrally Funded SOA elements is that they are provided primarily as reusable components to be employed by projects other than the SOA component funded project itself.
- **Project Funded** – Business unit projects may acquire or build components for their own use that can then be made available to other organizational units across the Enterprise. Such Project Funded SOA components are justified primarily by the business case or rationale behind the broader project of which the specific SOA component is a part. Once created, the Project Funded SOA component is made available to other units either free of charge or on some form of chargeback basis. The key characteristic of a Project Funded SOA component is that it would not have been created on its own without a justifiable project of which the SOA component is a part.
- **Locally Funded** – This funding approach is a newly-emerging variation on Project Funded. Under the Locally Funded approach, individual SOA components are created by local business areas for their own use (usually as part of an overall program to deliver enhanced business area functionality or as part of "steady state" maintenance and enhancement budgets). These SOA components are built in conformance with pre-defined enterprise SOA standards and pass a certification process that confirms that they can be used by other members of the enterprise. Once certified, these service components can be used by any other member of the enterprise without any further support obligation or funding agreement between the providers and users of the service component. (However, restrictions on reuse by certain business units may be employed within the enterprise to meet security or privacy concerns.) This Locally Funded approach differs from the Project Funded approach primarily insofar as the service component is funded on its own or through available funding vehicles that do not require the full business justification and investment decision making required for full discretionary projects. These SOA components tend to be small in size, relatively low in cost,

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and are able to be used once they are made available on a pre-existing service infrastructure (e.g., enterprise service bus).

Regardless of the funding approach used, SOA components are only made available for reuse after they have been certified to conform to predefined SOA standards and guidelines, and are certified to execute the functions that they are described to perform. Usually, a central architecture group is responsible for coordinating the setting of such standards and guidelines and for certifying new SOA components for reuse.

4.2.2. Sequencing Plan

Centrally Funded and Project Funded SOA components should be part of an overall agreed upon Sequencing Plan, which identifies the likely SOA components that will be made available for reuse by end user services over time. (Locally Funded components may or may not be identified ahead of time as part of a Sequencing Plan.) The Sequencing Plan schedules the deployment of SOA components to reflect natural precedence relationships among different SOA components and also reflects known or anticipated project timing. Figure 4-1 below illustrates the relationship between SOA Components and the multiple Services that these more elementary components may support.

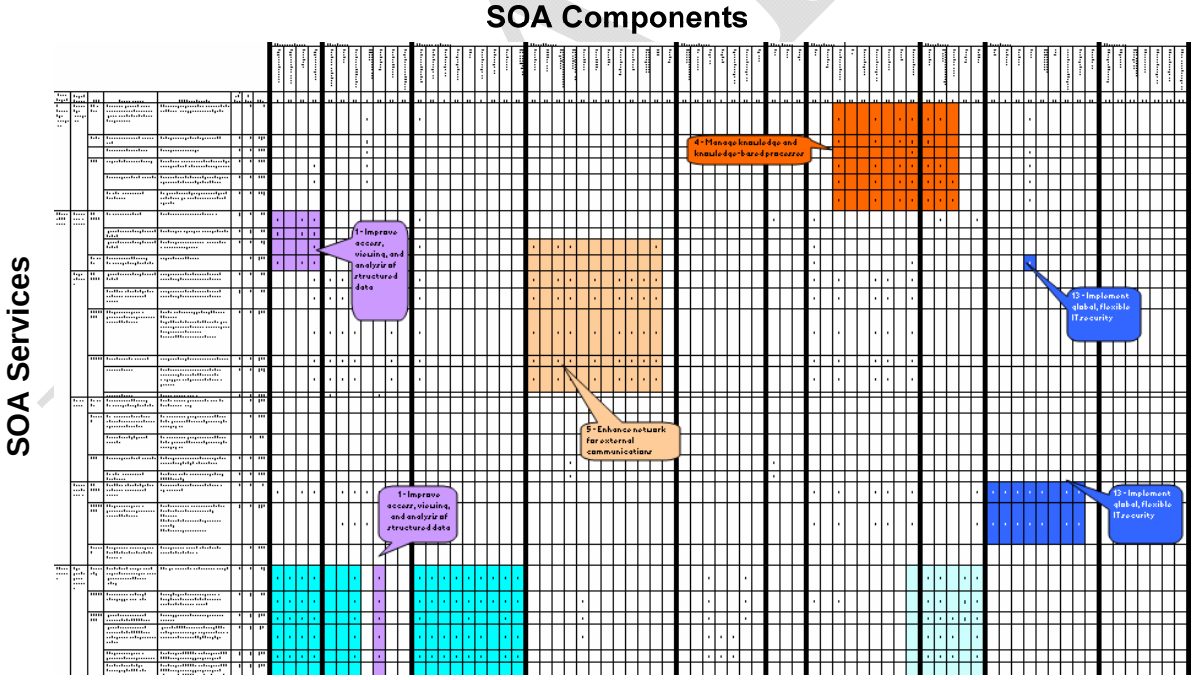

FIGURE 4-1
Sequencing Relationship between SOA Services and Components

The Locally Funded approach tends to be less centrally managed and leaves the emergence and potential use of components to the participating organizational units without the same degree of pre-planning or coordination. Under a Locally Funded approach, consumers are free to identify potential service components through a

service directory and employ the pre-existing infrastructure to use what they perceive to be relevant components. There is no guarantee that the component will do anything other than what is described in the service directory. If the end consumer wishes to make changes to the service, they are on their own and have no claim to receive further support from the provider. In addition, there may be a multitude of similar service components available through the service directory. The selection and use of particular service components is dictated by the "Darwinian forces" of the marketplace rather than directed by a formal Sequencing Plan

For the Centrally Funded and Project Funded approaches, the Sequencing Plan helps to coordinate the scheduling and use of SOA components in four ways:

- Depicts the groupings of components and their relationship to demand (service requirements)
- Provides a way to depict implementation strategies across service requirements and supplied components (i.e., provide a line of sight to trace back the implementation of specific SOA components through the services that they enable and back to the business capabilities, objectives and goals that they support)
- Reflects the required business capabilities, IT services, IT strategies, and business criticality and gap assessments
- Enables the SOA implementation planner to sequence relevant clusters of components aligned with business priorities

More generally, the Sequencing Plan provides a schedule for the cost effective deployment of shared capabilities. By providing this schedule over time, organizations can avoid the risks and complexities of a "big bang" conversion to SOA all at once. This Sequencing Plan provides a type of blueprint for project planners to understand what components they may be able to reuse, and for component providers to understand the currently envisioned community of potential component users.

The premise behind the Locally Funded approach is that good solutions will "bubble up" naturally and that better solutions will be revealed by their degree of actual use (market demand). This approach is similar to the concept of Open Systems in which a minimal set of standards provide the "glue" among piece parts (interoperability) but provision or consumption of particular software modules is left to market forces to resolve. The Locally Funded approach fosters more innovation than a more planned approach would ever yield. The assumption is that the innovation and potential agility that such an open approach provides will mitigate the seemingly extra expense that potential redundant and independently generated service components would entail.

4.2.3. Governance Postures

One important difference among the different SOA component approaches relates to the governance factors that affect the rights and obligations of SOA component providers and users.

- Centrally Funded SOA components are generally offered as part of an agreed upon plan to provide shared services across the broader organization. For example, a Department may decide to provide a standard way of meeting newly

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established requirements, such as e-Authentication, by providing centrally-funded components to enable each participating agency or program area to meet authentication requirements by sharing technology and related authentication processes.

- Project Funded SOA components are usually made available by the originating project based on the individual project schedule rather than on an agreed upon enterprise-wide Sequencing Plan. Users of Project Funded SOA components are often subject to the willingness and priorities of the providing organization to provide or share services. Project Funded SOA components are often available "as is" by the providing unit with little or no commitment to ensure that the reusable component will be adjusted to satisfy external user needs if they differ from that of the originating project.
- Locally Funded SOA components are expected to be available through the service directory and pre-existing infrastructure. Whether or not particular capabilities are available depends on what components have been offered up for use. Since Locally Funded modules are usually small and focused around a narrow functional scope, the Locally Funded approach is viable so long as there are a large number of such SOA components available. The likelihood of there being a sufficient number of such components available derives from the relative ease of funding such smaller components (as opposed to full projects) and by the availability of enterprise funding and contract vehicles to promote the creation, deployment and operation of such components.

Today, most large organizations employ a mix of Centrally Funded and Project Funded SOA components. This mix complicates the governance process. Project Funded SOA components often are offered on a "take it or leave it" basis. Centrally Funded SOA components often are provided as a more robust shared service complete with customer initiated change management processes, service level agreements, scheduled technical release upgrades, end user support and related formal funding. A user of a Project Funded SOA component has no guarantee that the originating project will continue to support the component over time; users of Centrally Funded SOA components usually have greater confidence that the shared capability will be available over time and that changes to the shared service component will not be made unilaterally by the provider.

The use of Locally Funded approaches is emerging as part of the commitment to Netcentric models. In this case, no central group has authority over what is being done. Instead, a central group or, more likely, a coordinating body, helps establish the guidelines and standards to promote autonomous development and use of compliant SOA components. This approach avoids the need to impose control by one part of an organization over another. Rather, it reflects far more of a peer to peer working relationship among the participants.

The propensity to use Centrally Funded, Project Funded or Locally Funded SOA approaches reflects the Governance posture of the underlying enterprise. Figure 4-1 below illustrates a continuum of possible Governance postures and the most likely funding approaches.

- If the Enterprise tends to employ a more centralized Governance posture, such as "Autocratic" or "Shared Services," then it is more likely to use a Centrally Funded approach.

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- If the Enterprise employs a more decentralized Governance posture, such as "Federated" then it will be far more likely to use a Project Funded or Locally Funded approach.
- If the Enterprise is run as only a very loosely coupled collection of organizational units then a Locally Funded approach may prove more natural.

The "Center of Excellence" Governance Posture provides an interesting cross between centralized and decentralized options. Although "Center of Excellence" Governance postures tend to employ a Project Funded approach (i.e., the center of excellence resides within a specific business unit that might not be chartered to provide services to others), nonetheless, the "Center of Excellence" Governance Posture tends to place a higher degree of obligation on the providing organization to support its sister business units.

TABLE 4-1. Governance Continuum - Alternative Governance Postures

Locally Funded	Project or Locally Funded	Project or Centrally Funded	Centrally Funded	
Laissez Faire	**Federated**	**Center of Excellence**	**Shared Service**	**Autocratic**
All IT responsibilities and resources in business units	Most IT responsibilities and resources in business units	Mix of resources between business units and cross enterprise centers of excellence	Services provided to business units for a fee and subject to Service Level Agreements	All resources and priorities controlled centrally
Minimal enterprise coordination	Business units coordinate efforts when efforts benefit individual organizations	Enterprise coordination in areas determined to be strategic	Core services managed by enterprise	Enterprise sets priorities for business unit use of It resources
Few standards or architectures	Minimal standards; common architecture for coordinated efforts	Enterprise standards and architecture to facilitate cooperation and data sharing	Compliance to enterprise standards and architecture imposed by shared services	Standards and architecture enforced by central group
No CIO, or CIO purely a staff role	CIO facilitates cooperation among business units	CIO manages or coordinates centers of excellence and ensures satisfactory performance	CIO runs shared services as a distinct "business" offering	CIO runs central group

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4.3.1. Introduction

Regardless of the source of SOA components (Centrally, Project or Locally Funded), use of SOA components and resulting services works best when the principles and operating models for generic "Shared Services" are employed. For example, the coordination of the overall SOA Program should reflect the tenets that guide the operation of any service providing business:

- Understand the business profile and corresponding technology needs of each customer and "market segment"
- Provide a clearly defined set of products and services, at agreed to costs and service levels, to meet customer/market demands
- Employ a transparent cost recovery model that allows the customer to understand what they are paying for.
- Employ a set of performance metrics and measurement processes to ensure timely delivery of high quality and cost effective products, services, and solutions
- Adopt a sound management model that allows the organization to effectively address strategic, tactical and operational issues simultaneously
- Adopt an organizational model that minimizes cost and redundancy while providing clear end to end accountability through a governance structure that inspires leadership, communication, optimization, and end to end accountability
- Assure that effective governance structures are in place to resolve cross organizational issues quickly and effectively.

The Locally Funded approach presupposes that these tenets will emerge naturally from the interplay among the providing and consuming parties if appropriate guidelines and standards are used to design, build and operate SOA components. Centrally Funded and Project Funded approaches tend to conform more closely to these shared services tenets.

4.3.2. Shared Service Principles

Applying shared service tenets to guide SOA operating practice can be summarized into four Core Principles employed by successful shared service providers:

- Supply and demand should be separated to replicate an external market mechanism and create a positive tension between suppliers and customers

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- Separate product/service planning and development functions ("Plan/Build") from Operations functions to allow each to excel in their own individual disciplines and assure that the strategic, tactical and operational imperatives are met.
- Internal IT Organizations and SOA component providers should structure their financial interactions with their customers as a transaction with the same degree of fiscal discipline, rigor and transparency as is expected in any business transaction
- A "service centric" model should be employed, which integrates multiple functional disciplines, assures accountability for the services provided to the customer and delivers the best overall solution for the customer

The first three of these principles apply equally as well regardless of which approach is used. The fourth principle is more applicable to Centrally Funded or Project Funded approaches. Locally Funded approaches assume that the end users will be responsible for their own assembling of component parts into intermediate functions. No intermediate "service centric" providing organization is employed other than the guidelines coordination group and the provider of the underlying SOA enabling infrastructure (e.g., enterprise service bus).

These shared services tenets and principles work best when there is clear accountability for a central shared service providing organization (Centrally Funded). However, the same tenets and principles can prove useful even in a Project Funded or Locally Funded model. In these less centralized environments, it is still important for some central or coordinating body to operate consistently with these Shared Services principles. At a minimum, the central coordinating body should make clear the roles, responsibilities and expectations of SOA component providers and users.

4.3.3. Demand/ Supply Distinctions

Figure 4-2 below illustrates the relationships between the use (demand side) and provide (supply side) of a SOA program. Successful SOA Programs recognize the distinct roles and obligations of both suppliers and users of SOA components. These distinctions between demand and supply factors form the basis for the "contract" or "agreements" between SOA component providers and users. It is these agreements that form the basis for enabling providers and users to interact even if they have no other relationships.

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The Power of a SOA Program Derives From Its Distinction between "What" (Demand) and "How" (Supply)

WHAT Is Done (Demand)	HOW It Is Done (Supply)
Functionality • Customer • Outputs • Interface/ delivery channels **Metrics** • Cost/ affordability • Service Level Agreements (SLA) • Risk tolerance ***Governance*** • Change management • Pre-nuptial/ alimony agreements	**Assembly of Component Parts** • Orchestration among parts • Harmonization of data • Dependency chains (recursion) **Sourcing** • Make/ buy component parts • Reuse **Deployment** • Sequencing plan • Legacy "wrapping" **Operations**

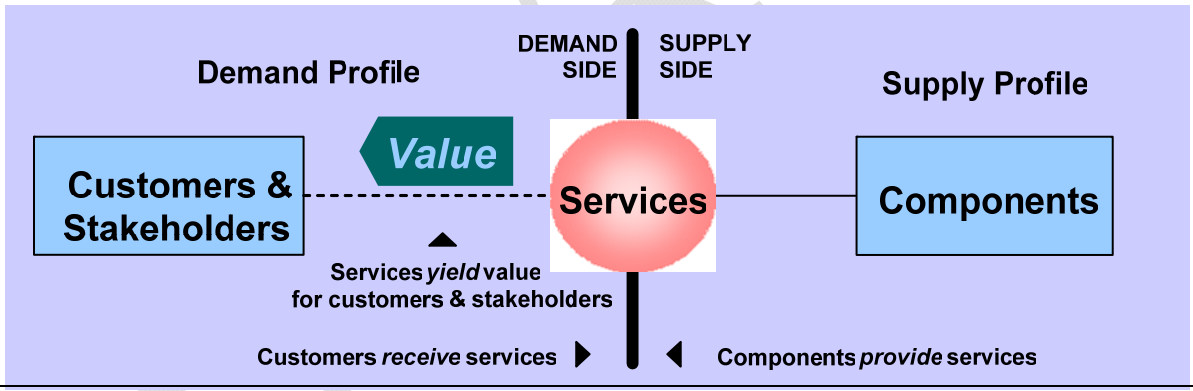

FIGURE 4-2
Supply/ Demand Model for SOA Programs

Focusing separately on Supply and Demand factors establishes the context for much more robust service solutions, as summarized in the following table:

TABLE 4-2. Focus on Demand and Supply

Focusing on Demand	Focusing on Supply
• Ties functionality to business value • Promotes "out of the box" thinking – new products/ service incubation protected from preconceived implementation constraints • Provides formal way to specify required capabilities, define performance metrics, confirm cost/ affordability expectations and define risk tolerances • Establishes governance practices to share and upgrade services over time across multiple customers • Insulates customer from changes in how services are provided	• Component hierarchy encourages "plug and play" components to be incorporated into solutions at all levels • Component sourcing flexibility overcomes "not invented here" bias • New SOA enabling products make reuse practical and economic • Legacy components can be "encapsulated" to minimize conversion costs • Component parts can be replaced as needed to avoid "big bang" risks • Sequencing of changes are prioritized by business benefits enabled

4.3.4. Plan/ Build vs. Deploy/ Operate

In addition to distinguishing between Supply and Demand factors, effective Shared Services also distinguish the activities required for Plan/ Build from Deploy/ Operate. Table 4-2 relates Plan/Build and Deploy/Operate to the methodology components in Chapter 3.

TABLE 4-3. Relationship between Plan, Build, Deploy, and Operate and Major Methodology Components

	Plan	Build	Deploy	Operate
Business Roadmap	X			
Service Enablement	X	X	Deployment	
Service Sustainment				X

The distinction between Plan/Build and Deploy/Operate is especially important for the incorporation of SOA components that are not Centrally Funded. The factors governing the planning and building of SOA components within Project or Locally Funded environments tend to reflect supplying unit specific considerations. The supplying unit is rarely concerned with the requirements to support "Deploy and Operate" functions for users outside of its own business domain.

Centrally Funded environments, on the other hand, will normally have a more complete plan (e.g., Federated Enterprise Architecture and Sequencing Plan) that identifies the specific Plan/ Build actions and distinguishes these activities from the Sustainment functions comprising the Deploy/ Operate stages.

SOA Governance needs to distinguish the accountabilities and decision rights relating to the investment, design and construction (Plan/ Build) from the accountabilities for deployment and use of components and related shared services. These accountabilities reflect the obligations and agreements between suppliers and users of shared services or SOA components.

Figure 4-3 below illustrates the relationships among the Plan/ Build and Deploy/ Operate functions.

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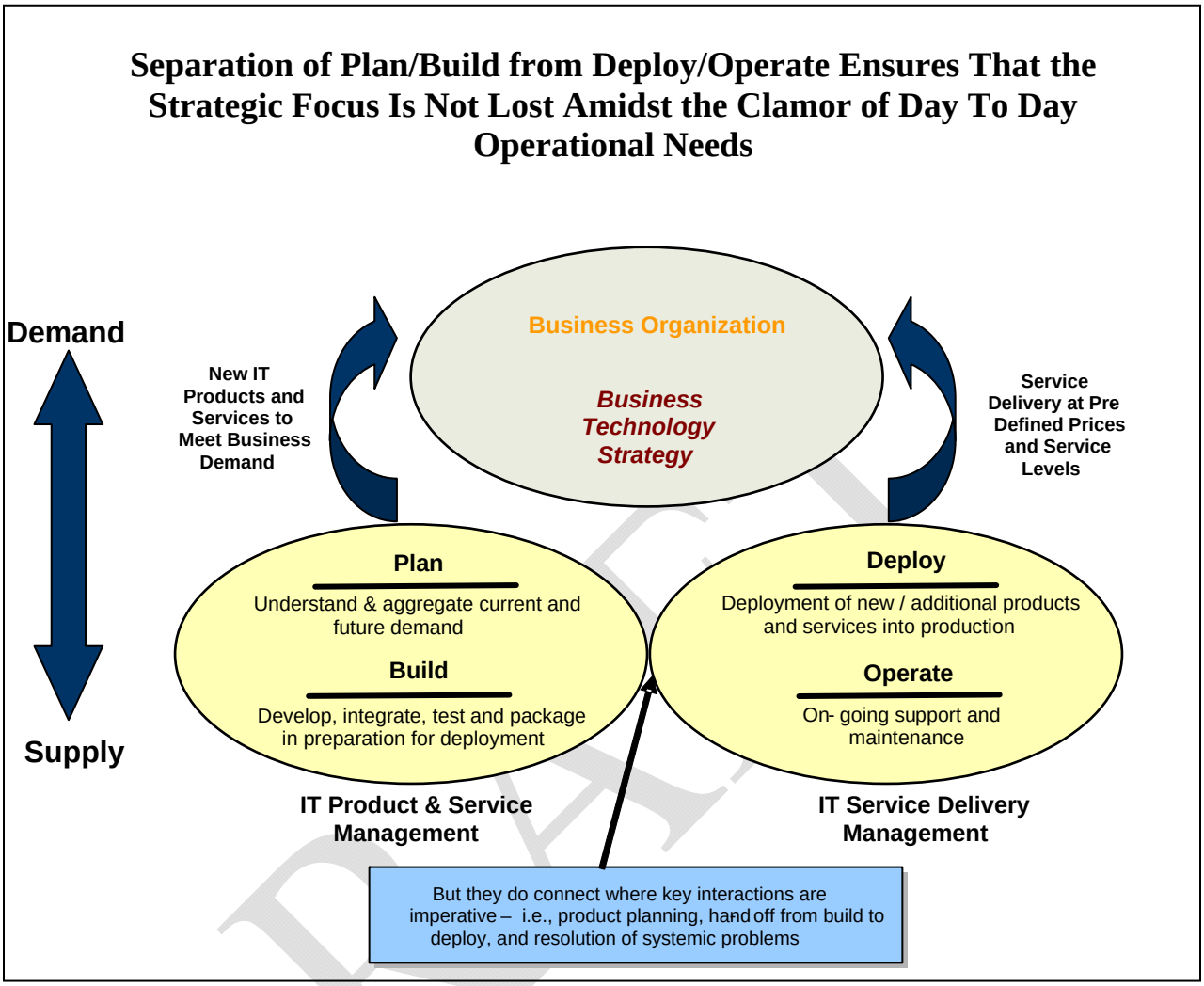

FIGURE 4-3
Relationship of Plan/ Build and Deploy/ Operate Functions

Note that in SOA environments the process of "deploying" a SOA component differs from that in a traditional application development process. The traditional application builder normally works with the infrastructure operator and end users to "deploy" a new application. SOA components, by contrast, are normally "deployed" by providing them to the central certification body (Architecture group), who confirms that the SOA components do what they are described as doing and comply with predetermined standards and guidelines. Once certified, the SOA components are then entered into the service directory and related infrastructure environment, whereby they become available for use by others.

4.3.5. Developing the Appropriate Shared Services Governance Operating Model

Creating an appropriate operating model for any type of shared service environment requires the clarification of relevant governance elements among the customers and

suppliers of shared service components. The design of an appropriate governance operating model should reflect the broader enterprise governance posture (see Figure 2 above). Moreover, the design of the appropriate governance process needs to reflect all of the elements needed to provide a sustainable shared service.

Figure 4-4 below illustrates the Design Process and the Design Framework for establishing an effective Operating Model for shared services.

Turning Principles into Practice Requires That an Organization Clearly Define Key Interactions and Rules Of Engagement among All Participants

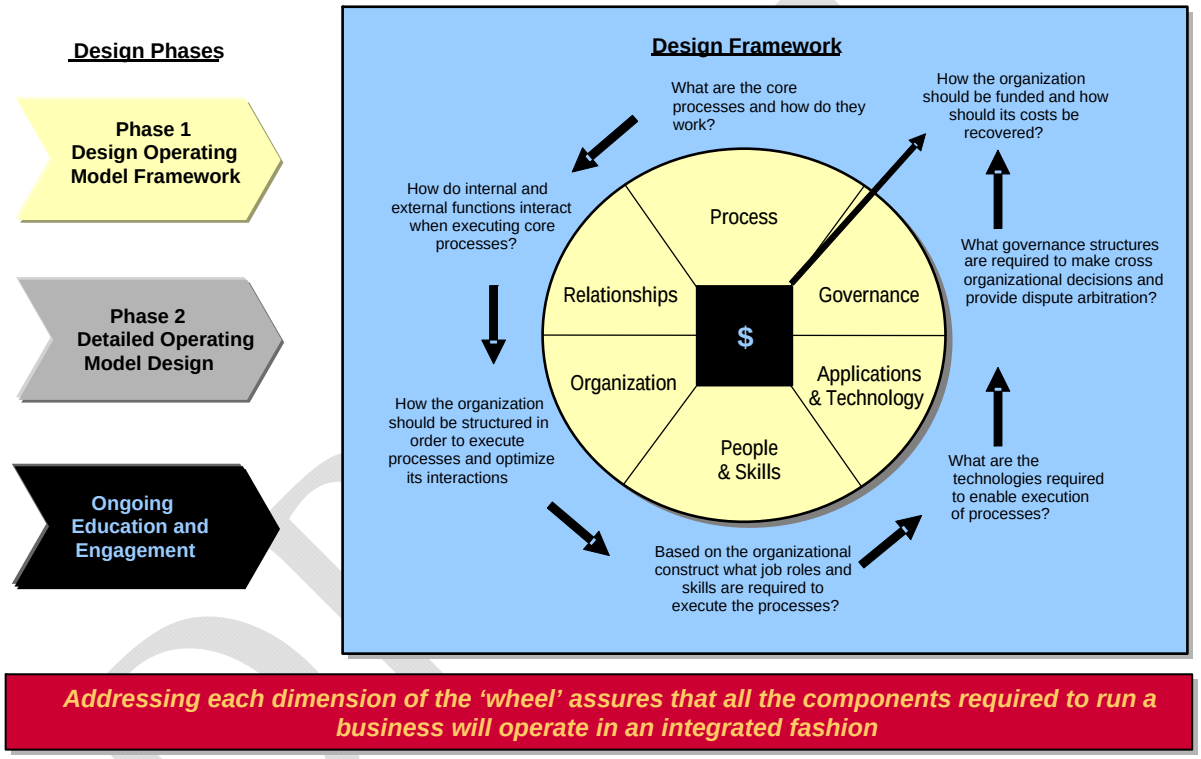

FIGURE 4-4
Design of an Effective Shared Service Operating Model

Phase 1 – Designing the Operating Model Framework

Designing the Operating Model Framework (Phase 1) paints a picture of what the future Operating Model will look like. It usually consists of 4 tasks with related subordinate activities:

- Assess (Measure)
  - Identify Drivers and Principles
  - Conduct Self-Assessment
  - Conduct Voice of the Customer Interviews
  - Identify "Critical to Business" (CTB's) Measures

- Analyze
  - Identify Alternatives to be developed
  - Develop Alternatives
  - Weigh alternatives against CTB's
  - Select alternative
- Architect (Improve)
  - Shore up weaknesses of selected alternative
  - Integrate strengths of other alternatives
  - Refine Model with Stakeholders
  - Technology Council and Executive Board Reviews
- Outcome (Operating Model Framework)
  - Key Drivers and Operating Principles codified
  - Financial (Funding and Recovery) Model identified
  - Governance Structures defined
  - Organizations / Functions identified
  - Positional Roles & responsibilities documented
  - Inter-organizational Relationships mapped
  - Critical processes identified

Phase 2 – Detailed Operating Model Design

Phase 2 produces the detailed Operating Model design. It defines how the shared service/ SOA environment will work. Phase 2 tasks and activities depend on the specific Operating Model framework established as an outcome from Phase 1. Phase 2 tasks and activities tend to follow a classical design process (conceptual, logical and detailed design steps).

The scope of the Phase 2 analysis covers all of the selected functions identified as important during the Phase 1 Operating Model Framework.

Figure 4-5 below illustrates the iterative nature of this Operating Model design process. The "inputs" are the selected functions identified in the Operating Model Framework (Phase 1). The "process" is an iteration of conceptual, logical and detailed design steps. The "outputs" are detailed operating model processes and practices ("playbooks") for each selected function.

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During Phase 2 Detailed Operating Models Are Developed For Each of the Key Functions Defined In the Operating Model Framework

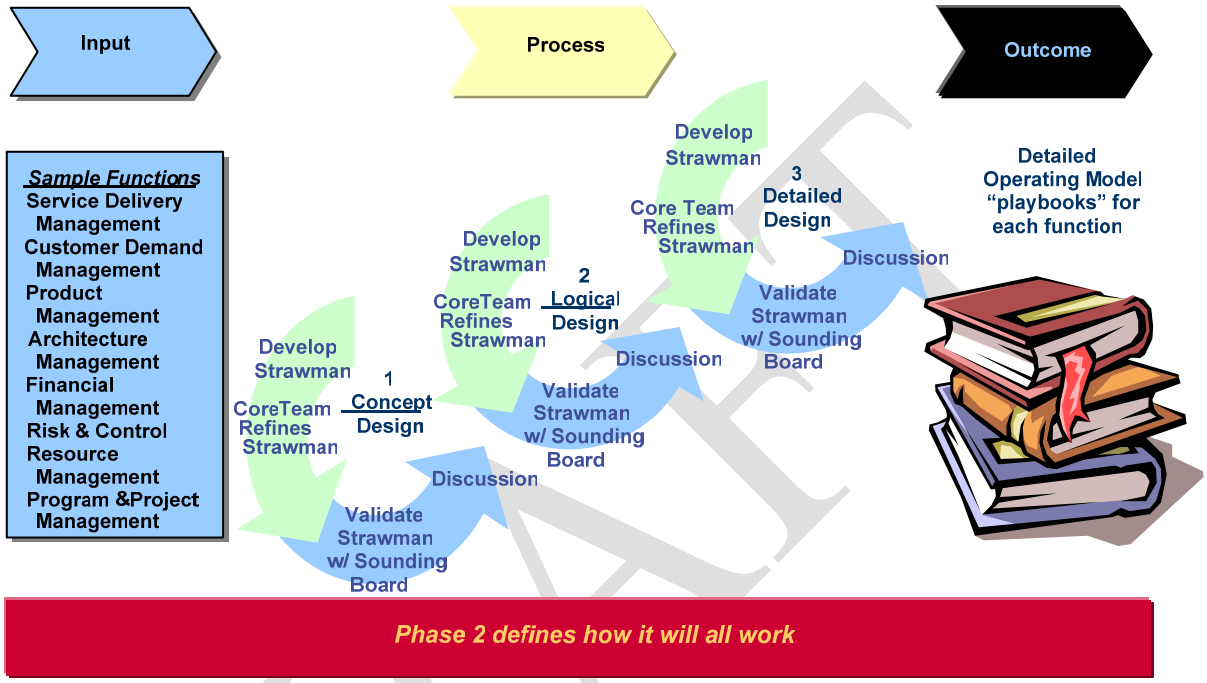

FIGURE 4-5
Detailed Design of an Effective Shared Service Operating Model

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4.4.1. Introduction

As mentioned above, Planning/ Building and Deploying/ Operating any type of shared service require clarity about the roles and responsibilities of participating organizations and stakeholders. For example, the Data Sharing and Services Strategy Working Group (February 2006) identified 5 policy areas affecting successful use of shared services across the Department of Defense:

- **Governance and Control Policy** to provide a cross-portfolio legal and management process (both a *forum* and *trusted process* across users) that accommodates multiple business models tailored for shared services
- **Common Information Standards and Technical Standards Policy** to enable interoperability by creating a system that allows visibility and access (e.g., a "service broker") coupled with agreed upon vendor neutral common standards for the multiple Netcentric communities and technologies
- **Security, Trusted Information and Certification Policy** to enable a shared security C&A mechanism for the intelligence and defense communities to support parallel changes of assuring information access and interoperability, while maintaining necessary security and trust in both information and information providers
- **Performance Accountability and Risk Policy** to help provide metrics and historical performance records to mitigate risk to both industry and government employing reusable services across distinct programs
- **Incentives for Government and Industry** to provide a favorable climate, inducement or reward for sharing services and a deterrent or penalty for not sharing services.

While these issues cover topics beyond the scope of "Governance" *per se*, they do indicate the scope and complexity of challenges encountered in developing and promoting the use of shared services in place of unique dedicated capabilities. Each of these issues applies equally to the use of shared SOA components and end user shared service capabilities.

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4.4.2. SOA Agreements Can Be More Complex Than Ordinary Shared Services Agreements

The SOA Methodology provides a framework for creating reusable parts (components) that can be employed by others to assemble more complex service solutions. SOA Governance follows the same pattern as that needed for any other type of shared service. However, SOA Governance can be more complex than ordinary shared services because of SOA's recursive nature in which tiers of SOA components can be arrayed hierarchically to deliver a resulting business service.

Whereas a traditional Shared Service (e.g., payroll processing) can be delivered by a designated service provider to specific end customers subject to explicit service level agreements (SLA) and funding arrangements, SOA components may arise from a multitude of sources. Some more elementary components may be incorporated into intermediate level components assembled out of still more primitive elements. The end consumer of services may have no awareness of the complex "atomic" and "molecular" chain of SOA components assembled to deliver the end service. Instead, each part of the SOA "chain" must have clear agreements about the SLA, funding and change management issues that govern the relationship between each provider and user of a SOA based component. The agreements between provider and consumer at each level of the chain need to provide the higher level consumer (i.e., demand side of the relationship) with all of the assurances needed to commit to service and cost agreements with still higher members of the chain. Figure 4-6 below illustrates the recursive nature of this SOA "chain."

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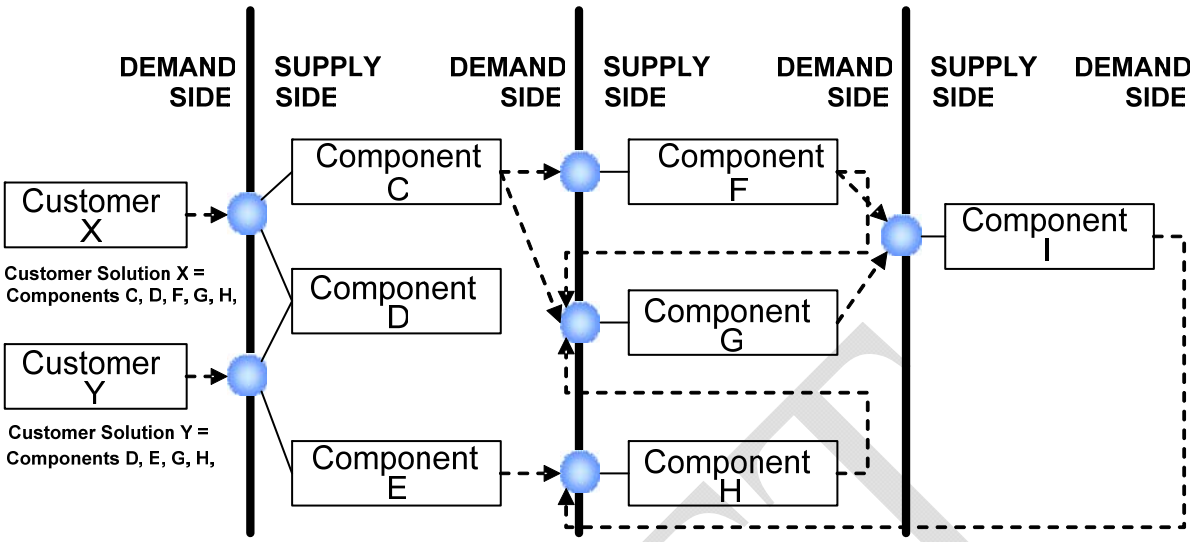

FIGURE 4-6
Recursive Structure of SOA Component Hierarchy

For example, a payroll processing shared service may have established service and pricing agreements with its customers. At the same time, the payroll processing service provider may be buying computer processing services from an infrastructure provider further "down" the SOA chain. Agreements between the payroll processor and its end customer need to insulate the end customer from possible changes in the service or pricing of related infrastructure services. In short, the characteristics of the lower level agreements between payroll processor and infrastructure provider should be invisible to the end customer. The payroll processor is the only partner that the consumer of payroll processing should need to care about. It is the payroll processor's responsibility to manage its costs and service levels consistent with its end customer agreements regardless of changes that may occur between the payroll processor and its infrastructure provider. This invisibility of lower level SOA component considerations to the end user places a burden on the payroll processor to establish a business model that both keeps the detailed sub-component structure invisible to the end customer yet provides enough flexibility to accommodate changes in the sub-component provider relationships and technical characteristics.

The Locally Funded approach described above assumes that relationships between providers and consumers of SOA components involve no obligations other than compliance with agreed upon standards and guidelines consistent with a Netcentric model. Under this approach, the "contractual" obligations between consumer and provider are replaced by a set of standard understandings or "guide rails" regarding the limited obligations of consumers and providers. In other words, consumers and providers both understand that their mutual relationship is limited to complying with the Netcentric interoperability standards and guidelines. Providers bear no other obligation to potential consumers nor are they likely to be aware of who uses their components. Likewise, consumers have no recourse beyond opting to use another replacement component if they are dissatisfied with the actual performance of a SOA component employed. Consumers may not even know who has provided the SOA components that they use.

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The governance challenge for SOA is to establish the agreements and Standard Operating Procedures (SOP) for each SOA component so that improvements at the component level can take place without negatively affecting higher (i.e., demand side) members of the SOA chain for whom the lower level configuration of SOA components should remain invisible ("black box"). Since the sources of elementary and intermediate SOA components may vary, consistency in establishing the roles and responsibilities of providers and consumers of SOA components becomes all the more important. For example, costs to upgrade a COTS package to a newer release should not come as a surprise to an end user relying on an intermediate service provider, who employs the COTS package as part of a SOA-based suite of end user solutions. Either the costs of the upgrade should be embedded in the service provider's overall cost structure (invisible to the end customer) or an explicit agreement should be pre-established with the end customer to alter the price to the end customer to cover the upgrade costs.

4.4.3. Plan/ Build Agreements

Agreements between providers and consumers of SOA components at the Plan/ Build stage can vary widely depending upon the Enterprise Governance posture and the Centrally vs. Project vs. Locally Funded nature of SOA component origination.

- For more centrally managed SOA programs, SOA functional requirements, investments, interface characteristics, service levels and timing of component availability to end users are determined as part of the enterprise Sequencing Plan. Variances from the Sequencing Plan schedule can be tracked and communicated to all participants, including likely "upstream" consumers of planned SOA components. If variances are great enough, end consumers who had planned to use the new planned SOA component may need to make a case to employ an alternative component that differs from the Sequencing Plan and related enterprise standards. Although such departures from the SOA program are unfortunate, the need to meet stringent business and mission objectives may require such departures form the plan. In the more centrally managed environments, waivers can be granted by the central organization to accommodate such departures from plan so that business and mission performance are not held hostage to delays in SOA component availability.
- In less centrally managed SOA programs, Sequencing Plans can still prove helpful to communicate among potential providers and consumers of SOA components. However, in the less centrally managed environment, participants in the SOA program are likely to participate only to the extent that such participation meets their local business, mission and cost objectives. Providers are unlikely to feel any obligation to meet their SOA component delivery schedule as changes in local business unit priorities may influence their schedule. Likewise, potential consumers of SOA components are less likely to wait for the expected SOA component if delays occur. In such environments, central management has only limited authority over the participants and is likely to rely only on "moral" persuasion rather than on a more formal waiver process.
- In the most decentralized Locally Funded approach, Sequencing Plans, if they exist, provide some sense of probable evolution of SOA component availability, but these Sequencing Plans provide no assurance that Service components will be available when needed. Consumers of SOA components can only depend upon SOA components that are already available to be used. Although a consumer may

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anticipate that a useful new component may become available in time, the consumer has no influence over the provider to deliver the desired component in a timely fashion. Rather, the consumer is wise to assume that component availability is limited to the components already available. Any reliance on a future stream of new desired components is speculative at best. A consumer may be aware that a sister organization is working on providing a new desired component, but such awareness imposes no obligation on the provider. Instead, the consuming unit needs to determine whether or not it is willing to incur the timing and functionality risks of awaiting the possibility that the "rumored" component may be available in time.

In summary, in more centrally controlled environments, the burden is on the non-compliant participant to make the case for non-standard usage (waiver). In less centrally controlled environments, the burden is on the central authority to make the case for why the potentially non-compliant participant should subordinate its own interests to the interests of the larger enterprise. In the most decentralized environment (Locally Funded) each participant is left on its own; central authorities have no control over the timing or functionality of new SOA components that become available. Decisions to use or to build one's own components are at the discretion of the individual units and do not require any "waivers" from a governance body.

4.4.4. Deploy/ Operate Agreements

Agreements between providers and consumers of SOA components at the Deploy/ Operate stage depend primarily on the way in which the developed component is made available and maintained. Often the individually developed (project funded) component will be "taken over" by a more central service provider who will address the various Sustainment responsibilities for keeping the SOA component available and relevant to anticipated and potential dispersed end users.

If the SOA component is developed through a Centrally Funded model, then such assumption of deployment and operation responsibilities follows naturally from the original Plan/ Build assumptions (i.e., the original Centrally Funded business case would have included the future costs and usage of the SOA component by multiple users as part of its original business case).

If the SOA component is developed through a Project or a Locally Funded model, then the justification for the original investment is likely to rely primarily on the originating unit's business needs and economic rationale. If other units can benefit from using the SOA component, that is fortuitous; such additional usage is not the primary concern of the providing unit. Instead, funding and operation for using the SOA component by non-originating units need to be established separately from the originating unit. This separate arrangement can take one of four forms:

- **Center of Excellence** – The consuming units work out a unique agreement with the originating unit to fund ongoing "steady state" support needed by consuming units beyond that of the providing unit.
- **Federated** – The consuming units themselves need to fund and operate the provided SOA component. This can occur in at least two ways. They could use:
  - An enterprise license for common COTS products that are incorporated into business area unique solutions

  - The SOA component as a "starter kit" to which they are free to make their own modifications or customizations.
- **Laissez Faire** – Suppose a central standard setting group establishes the criteria for interoperability and provides the service directory and infrastructure support (e.g., enterprise service bus) through which available components can be accessed and used by consuming units. Then, in a Laissez Faire environment, consuming units are otherwise on their own to use or modify components selected for their own end use purposes. Changes or modifications to selected components lead to the creation of still additional SOA components that will normally be reoffered for use by other units across the enterprise (assuming that any such changes or modifications continue to comply with the centrally established standards for interoperability).
- **Shared Service** – A central unit takes over responsibility for deploying and operating the project funded SOA component for use by other non-originating units.

4.4.5. Representative Governance Roles and Responsibilities

Although the specific governance roles and responsibilities of central and distributed structures will vary depending upon the overall Governance posture adopted by an organization, the types of roles and responsibilities needed still remain relatively constant. These IT Governance requirements fall into four major categories:

- Roles and Relationships
  - Governance bodies to manage the demand side of IT
  - Governance bodies to manage the supply side of IT
  - Roles and responsibilities for the Federated Enterprise-level versus business unit level decisions
  - Key relationships
- IT Governance Processes
  - Business Demand – Planning, priority setting and funding processes responsive to common enterprise and business unit unique needs
  - Technology Supply – Technology management, architecture, standards and control to assure efficient and responsive IT delivery to support business demand
- Decision Rights
  - Project life cycle decisions and control points
  - Decision authority and control for common IT administrative functions
  - Central responsibility for technology infrastructure management
- Funding
  - Funding mechanisms for Enterprise-wide and business unit specific priorities

These governance requirement categories apply both to overall IT management within a shared services context as well as to the creation and use of shared SOA components across various levels of the Enterprise.

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4.4.6. Typical IT Governance Organizations and Committees

Appendix D (Representative IT Governance Structure for a Multi-tiered Organization) contains a description of the governance roles, responsibilities, processes, committees, and decision rights for overall IT within a three tiered organization (Enterprise, Sector, and Business Unit).

The typical organizational units and committees employed to govern IT activities across a federated organization structure are illustrated in the box below. SOA Governance activities are typically executed through these same governance bodies and committees. The governance bodies and boards listed below can be considered organizational roles that can be associated with any existing Army governance boards.

BOX 4-1. Typical IT Governance Bodies and Committees

Typical IT Governance Bodies and Committees

Executive Committee - IT Management
- Set IT strategic direction for the Enterprise
- Determine overall IT spend
- Ratify and prioritize Enterprise-wide IT programs
- Assign business responsibility for Enterprise-wide IT initiatives

Enterprise Project Steering Committees (created as needed)
- Share information about project schedule
- Make recommendations regarding issues
- Report on status to Executive Committee

CIO Council
- Develop technology strategy for the Enterprise
- Set high level R&D agenda
- Reconcile cross Enterprise IT agenda/ issues
- Arbitrate disputes

Architecture Board
- Set architecture and standards
- Resolve technology disputes
- Issue building permits
- Determine R&D projects

Shared Services Board
- Service level agreements
- Pricing

Specific SOA Governance needs to fit within this overall IT Governance model employed for IT across the Enterprise. That is, SOA Governance is not an

DRAFT

independent governance function. Rather, SOA governance involves specific roles, responsibilities, processes, committees and decision rights that conform to the broader IT governance structure described in Appendix A.

4.4.7. Special Incremental SOA Governance Considerations

Each of the steps in the SOA lifecycle need to comply with the overall Enterprise governance processes for IT. However, SOA requires certain additional or modified governance considerations in the four areas that correspond to the Plan, Build, and Deploy and Operate stages.

Planning Stage SOA Governance

During the Planning Stage business units and central enterprise functions (if relevant to the overall governance posture employed within the enterprise) develop their plans, prepare investment justifications for initiatives and identify integration or reuse opportunities consistent with the Enterprise Architecture and Sequencing Plan. These plans are usually reviewed and approved by some type of Enterprise, Sector or Business Unit **Executive Committee for IT Management** as illustrated in figure 8 above and described further in Appendix D.

SOA influences the normal IT planning, priority setting and investment process by providing an opportunity to incorporate the reuse of SOA components into program, project and business area plans. The degree to which the use of SOA components will be mandated, encouraged or sanctioned varies with the type of funding approach used for SOA components (Centrally, Project of Locally Funded approaches). Considerations about the potential use of SOA components should be part of the review of any project proposals. Budget requests should reflect the possibility or likelihood of reusing components and thereby reducing the cost to build wholly new capabilities.

- In more centralized environments, proposals to build redundant capabilities rather than use available SOA components will normally require a waiver from the higher level IT investment decision making committee. The business unit bears the burden of making the case for why they should be allowed to depart from the SOA reuse principles. The request for a waiver should demonstrate why the needs of the business unit should outweigh the harm done to the broader enterprise objectives.
- In less centralized environments, the onus shifts to the central IT organization to make the case for why the business unit should not build the redundant capability. It must demonstrate why the interests of the broader enterprise outweigh the needs and priorities of the business unit itself.

The Enterprise may also choose to create special plans and related funding to promote the development of high priority SOA components that may not otherwise be developed by funded projects on their own. Such specially funded SOA activities are most typical within a Centrally Funded model though some SOA components may be planned and funded centrally even within a predominantly Project Funded environment.

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Special funding pools may be set aside in Locally Funded environments to encourage the creation by business units of new SOA components that might subsequently be shared with other units. Such special funding pools operate more like a grant process than an investment decision process. That is, no explicit Return on Investment is required. Rather, the enterprise decides to set aside a certain amount of funding each year to promote SOA component development. This process is similar to the process of setting aside a predetermined level of funding to promote research and development.

Build Stage SOA Governance

During the Build Stage SOA governance requires the addition of specific SOA guidelines and standards that any SOA component must meet in order to be reused by others. Note that these standards and guidelines include the relevant security and privacy requirements established by the larger organization. These guidelines and standards can be set by existing **Architectural Boards** as illustrated in Figure 8 above. If no such Architectural governance body exists, then a special committee may need to be established to reach consensus on the guidelines and standards to be employed to promote interoperability.

Individual projects that produce reusable components directly or as a byproduct would normally be reviewed at each phase of the enterprise systems development lifecycle to insure compliance with the defined guidelines and standards. This review would normally take place before a **Project Steering Committee** as illustrated in Box 4-1 above. In some cases, modifications to software modules may be required to create components that are sufficiently "open" to facilitate reuse. Often development teams may be tempted to take shortcuts to meet project time and cost pressures. The decision whether or not to provide sufficiently "open" features to promote reuse may require higher management intervention (escalation) if a conflict persists between the needs of the developer and the potential reuse of resulting work products. The nature of such escalation and resolution of local business unit vs. broader enterprise priorities will depend heavily on the overall governance posture (Governance Continuum position) adopted by the organization as a whole. Such escalation will often bring the outstanding issue for resolution before the **Architectural Board** or more senior **CIO Council**, as illustrated in Box 4-1 above.

Deploy Stage SOA Governance

Governance responsibilities during the Deploy Stage relate primarily to the certification that each new SOA component complies with the architectural standards and guidelines, is available to be deployed on relevant enterprise infrastructure, provides agreed upon component descriptions for the inclusion in the Service Directory, and clearly defines any future support or funding assumptions that potential consumers need to agree with in order to make use of the SOA component. These future support and funding assumptions are the basis for any explicit Service Level Agreements (SLA) established by component providers to component users.

The central **Architectural Board** will often be the body that provides the appropriate certifications for deployment. Alternatively, or in addition, the central infrastructure provider may perform the certification confirmations as part of a **Shared Services Board**, as illustrated in Box 4-1. Likewise, the central infrastructure provider will usually maintain the Service Directory and Registry for use by all SOA component

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consumers. This Service Directory and Registry will facilitate access (often online) to SOA components that are available for use by business areas and related projects.

Operate Stage SOA Governance

Governance responsibilities during the Operate stage fall into two primary areas and are normally executed as part of the decision making functions of the **Shared Services Board**:

- **Infrastructure Operations** – A central infrastructure provider or enterprise service bus (ESB) is normally the platform on which SOA components are deployed and accessed. The infrastructure can be a centrally-operated suite of equipment and telecommunications or can be a more loosely linked collection of processing facilities that comply with predetermined interoperability standards. An ESB is often used to enable SOA components to access each other in real time as part of dynamic assembly and execution of higher level SOA services comprised of the more atomic SOA components. The way in which infrastructure services are provided and by who is an organizational design choice that normally reflects the overarching organizational design philosophy of the enterprise and its IT executive leadership.
- **SOA Component Maintenance and Enhancements** – Modifications, enhancements, technical upgrades and associated releases (especially when components make use of externally provided software products) can be provided either by the original SOA component provider, by a central organization that takes on responsibility for maintaining and enhancing independently-originated SOA components, or may be left to the end consumer to address. If the SOA provider will supply any post release support, then the commitment to provide such support is specified at the time of initial SOA component deployment along with any SLAs and chargeback or usage fees required to be paid by consumers to providers. If such post release support is provided by a central maintenance organization, then the same SLA and funding stipulations will be established by the central maintenance organization (often overseen by the **Shared Services Board**). The central maintenance organization will comply with the SLA and funding stipulations established by the **Shared Services Board**. If the end consumer is left on its own to provide post release support, then the consumer should include an estimated budget for such post release support in its overall project budget and associated business case for the project that uses the SOA component.

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4.5.1. Introduction

Budgeting and funding considerations for the development and use of SOA fall into three broad categories:

- Development of SOA plans and standards
- Development of SOA components (including infrastructure)
- Usage of SOA components and related operational support

Although the specific enterprise governance posture will dictate the organizational level at which budgeting and funding authority will reside (enterprise vs. sector vs. local business unit), the three categories of SOA related budgeting and funding will still apply. Priority decisions and budget authorization will follow the same pattern as used for any other type of IT investment (e.g., business case for new functionality, steady state funding for on-going operations and maintenance).

Because sharing of SOA components can impact multiple business areas, the normal budgeting and funding process for IT investments needs to be adjusted to reflect the benefits that SOA components provide beyond the scope of the rationale for the originating investment. In other words, whereas the justification for a traditional IT investment is based upon the direct economic and mission benefits provided by the IT investment, the corresponding benefits of a SOA component include the potential use and related cost avoidance made possible by the reuse of the SOA component by end users not necessarily envisioned by the SOA component originator. Such "extended" benefits are somewhat more difficult to quantify since the SOA component originator has no way of assuring that such reuse benefits will ensue since the decision to reuse lies with organizational units that may lay outside the authority of the originating group.

4.5.2. Development of SOA Plans and Standards

Regardless of the governance posture of the enterprise, funding is still needed to develop appropriate Sequencing Plans to guide and coordinate the development and usage of SOA components. Funding is also needed to support the development of specific SOA architectural standards, guidelines and related security principles. The way in which such planning and standards formulation activities are funded depends upon the budgeting process used within the broader Enterprise.

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- Embedded Funding - In some cases, planning and standards formulation activities are considered to be part of IT overhead. Funding for such activities will be included in the central CIO budget. The creation of the SOA Sequencing Plan and the development of SOA standards will be funded from more general budgets for Federated Enterprise Architecture and **Architecture Board** coordination. Justification for such SOA planning and standards are incorporated into overall CIO "fiduciary" funding for managing and coordinating IT activities across the enterprise or relevant business areas. Embedded funding levels are often endorsed by the **CIO Council** since such funding impacts all IT organizations across the Enterprise. Embedded funding is most appropriate in Centrally Funded environments.
- Distinct Funding – In other cases, funding for SOA-related planning and standards are separated from other IT overhead and require an explicit business case of their own. The funding needed is for the incremental work done to prepare the Sequencing Plans and Architectural Standards. If a separate SOA budget justification is needed, the business case for the SOA planning and standards may also include funding for staff or contractor resources needed to monitor SOA projects and to certify SOA components for use by others. The business justification for the SOA planning and standards work reflects the anticipated benefits of the overall SOA program:
  - Cost avoidance from reuse,
  - Increased speed in providing new functional capabilities,
  - Greater business agility from the flexibility derived from being able to swap individual components rather than abandon entire legacy solutions,
  - Reduced Total Cost of Ownership (TCO) due to the increased useful life of the SOA-based assembly of individually replaceable components.

  Although these benefits may all apply to the use of SOA across the enterprise, care must be given not to "double count" the planning and standards benefits with the individual benefits of specific SOA components, which are likely to be easier to quantify since they relate to specific uses. Distinct Funding applies equally well in Centrally Funded or Project Funded environments
- SOA "Tax" – A third approach to SOA planning and standards funding is to "tax" the suppliers and users of SOA components. Such a "tax" reflects the fair market value of the services provided by the planning and architecture functions used to coordinate SOA sharing. This "tax" would normally be part of individual project justifications and would be used to defray the costs of the central planning and standards coordination functions. The SOA "Tax" approach does not require a separate budget justification for the SOA planning and architecture. Rather, the value of such planning and architecture is considered to be realized by the individual projects in which the SOA components are used. This "tax" tends to relate the cost of such planning and architecture to the underlying business uses that benefit from SOA in proportion to SOA use. That is, business areas that make more extensive use of SOA will fund a larger portion of the SOA planning and standards costs than will business areas that make little use of SOA. The SOA "Tax" approach is especially applicable to Project Funded and Locally Funded environments. The SOA "tax" allocations would normally be approved by the **CIO Council**.

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4.5.3. Development of SOA Components

Budgeting and funding for the development of SOA components generally follow one of the three funding approaches mentioned above (Centrally Funded, Project funded or Locally Funded). Regardless of which funding approach characterizes the governance posture of the enterprise as a whole, there still remains the need to provide appropriate budget and funding justifications either for relevant projects or for standalone SOA components.

Centrally Funded Development of SOA Components

Within Centrally Funded organizations there tend to be two types of funding approaches that reflect (1) priority setting across a collection of proposed projects, or (2) separable funding for an entire SOA Program, which usually spans a variety of more traditional projects.

- **Project Priority Setting** – Under this approach, individual projects compete with each other for a share of a generally limited overall central IT budget. There are a variety of priority setting techniques that can be used to compare individual project costs and benefits, but the final portfolio of investments generally follows from the centrally coordinated prioritization of enterprise IT spending. Under this approach, funding for individual SOA components are embedded within the individual project budget requests. Funding for SOA components differs somewhat from traditional central priority setting insofar as individual project requests may assume the use of other SOA components already available or scheduled to be delivered within the project development timeframe. In these cases, the use of a Sequencing Plan proves quite useful in helping individual project requests to anticipate the availability and features of SOA components that can be used to reduce individual project development and operations costs.
- **SOA Program Funding** – Under this approach the central IT organization develops an overall plan for the development and deployment of a collection of SOA components, which taken together enable a substantial transformation in the enterprise technology and business architecture. This funding approach is most relevant in cases where the enterprise goals and objectives require a substantial overhaul (transformation) in the underlying way in which business is conducted and in how IT delivers the required business capabilities. The budget and funding justification for the integrated program of change is based on the collective effects of the SOA Program as a whole rather than as an aggregation of the individual project benefits. This approach is often used to justify a wholesale change from an extensive legacy base of obsolete IT capabilities, or is used to respond to external pressures forcing a radical change in the way that business is conducted. Individual components that comprise the overall SOA Program are generally decided as part of the architecture and engineering activities within the SOA Program rather than as executive level prioritization decisions about each component. The decisions about individual component design, functionality and timing are part of the integrated SOA Program plan and reflect technical and interdependency considerations. Differential benefits from individual modules are not usually evaluated at the SOA component level. Management and coordination of SOA Program Funding and activities falls under the supervision of a specially created **SOA Program Steering Committee**.

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Project Funding of SOA Components

When organizations use the Project Funded approach they place priority on the individual justification of specific self-contained projects. SOA components are part of each project, but are not justified separately or in isolation. Instead, the budget and funding decisions are made based on the ability of the requesting organization to demonstrate sufficient cost benefit value to the funding source. SOA components can affect the cost benefit analysis of the projects that generate the SOA components in three ways:

- **Reuse Benefit.** Project costs and timing can be reduced based on the assumed use of externally-provided SOA components
- **Provider Reimbursement.** Project life cycle costs may be reduced if the enterprise compensates the originating project for making SOA components available to others
- **Business Benefit.** Project business benefits may be expanded by claiming some degree of business benefit realized by other projects that are likely to reuse the new SOA component created by the project

A Sequencing Plan can be quite helpful in identifying and scheduling the likely availability of relevant SOA components for reuse. The Sequencing Plan can be employed to validate the expected reuse or external business benefits claimed by the individual project business case. Reimbursement benefits can also be claimed if the enterprise has an established process for such reimbursement or chargeback among participating business units. Such reimbursement can be in the form of a direct budget credit or can be provided by spreading the cost of external license fees across the originating and future users of the SOA component in question.

Local Funding of SOA Components

Local Funding of SOA components is a variation of project funding. The primary difference is that local funding of SOA components is generally provided through existing operations and maintenance budgets rather than through separate discretionary funding of a wholly new project. Small components may be developed to improve operating performance or upgrade aging legacy technology. The size and cost of such standalone modules are usually small and fall “under the radar screen” of the broader IT investment decision making process.

The SOA components developed under this method generally are narrow in scope and can be used by others without much support from the originating unit. So long as the SOA components produced comply with the SOA interoperability and security standards (established by the **Architecture Board)**, they can be used by any other organization within the enterprise. But providing such Locally Funded SOA components does not obligate the provider to any future support to potential users of the SOA component. Likewise, the provider generally does not expect to receive any reimbursement for use of Locally Funded SOA components.

Justification for the funding needed to construct the new SOA component is usually embedded in more basic justification for continuing “Steady State” funding of existing capabilities. The cost to develop new SOA components under this funding approach usually needs to be small compared to the overall Steady State budget. SOA components that require more extensive investment will likely be covered

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through the use of the Project Funding approach (i.e., standalone business case for the new project of which the SOA component is a part).

4.5.4. Usage of SOA Components and Related Operational Support

Budgeting and funding for SOA component operations and maintenance depend upon the organization and operating practices within the enterprise. Specific agreements and pricing arrangements are normally overseen by the **Shared Services Board**

Funding is needed to cover four areas:

- Infrastructure cost for the operating platforms on which SOA components operate
- Transaction costs associated with testing, validation and registering of new SOA components for use by others
- SOA component maintenance and minor enhancement costs
- Administrative costs for monitoring performance, conformance with SLAs and related chargeback.

Infrastructure Funding

Funding for infrastructure upon which SOA components operate can be provided by a central infrastructure organization or may be included within the scope of the SOA component itself.

- Shared Infrastructure is the most common form through which SOA components are made available to consumers. The use of an ESB and associated SOA registration and directory functions enable SOA components to be accessed dynamically by consuming systems. Funding for the underlying technology platform and computing services used to support such SOA components are provided centrally by an infrastructure service provider. The costs for this central infrastructure are usually incurred by the central infrastructure organization. These costs are then recouped from business area users in one of three ways:
  - Centrally funded infrastructure with no direct costs to end users
  - Allocation of shared infrastructure cost based on business unit factors other than direct usage of the infrastructure
  - Chargeback of central infrastructure costs based on business unit utilization of shared infrastructure resources
- Dedicated Infrastructure costs may be part of a SOA component itself. Dedicated infrastructure costs could include both hardware and system software needed to enable the SOA component to operate. Consumers of such SOA components normally will establish some form of reimbursement or usage payment to the provider to help defray operating costs that could be higher than what the providing unit would incur if it were not to make the SOA component available for use by others.

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Testing, Validation and Registration

Before a SOA component can be used by others it must first be validated or certified. Such validation and certification is normally performed by the **Architectural Board** or its designated Working Group. That is, appropriate tests are performed to demonstrate that the SOA component does what it is supposed to do and that it conforms to established interoperability and security standards. Once a SOA component is so certified, it is registered in the enterprise service directory with the information needed to allow others to "discover" the SOA component and understand the relevant technical and functional features needed to interface with the SOA component for seamless use with other SOA components.

Funding for this testing, validation and registration of a SOA component is normally borne by the project that delivers the SOA component. This funding is akin to the funding needed to perform unit, full integration and acceptance testing in traditional development environments. The costs for such validation steps should be part of the overall deployment costs of the project. Once a SOA component passes these tests and is certified, other units should be able to employ the certified SOA component without needing to perform an additional certification activity (though it is often wise for the consuming organization to confirm that the SOA component does what it is described as doing.)

Maintenance and Minor Enhancements

Funding for SOA component maintenance and minor enhancement varies primarily based on the set of agreements established, if any, between the SOA component provider and end consumers. Bug fixing and new release management (e.g., when an underlying component is provided by an external vendor who issues periodic updated releases) are normally made by the initial SOA component provider since the provider needs to make these changes for its own use. Complications arise when modifications or minor enhancements are needed by end consumers other than the SOA component provider. Such enhancements or modifications can take one of three forms:

- **Provider Makes Changes** – This is the preferred way to make changes. The provider understands the underlying code of the SOA component and is best positioned to make modifications. The cost of such modifications can be borne by the original provider, by the requestor, or by a collection of consumers of the same SOA component. The way in which such changes can be funded will usually depend upon how the SOA usage is funded in the first place.
  - If the provider receives compensation for making the SOA component available to others, then the provider will often assume any minor costs to fix bugs or make minor enhancements.
  - If the provider receives no compensation in return for making a SOA component available then it is more likely that the requesting consumers will be asked to fund any modifications.

  Critical to any such changes is a careful process of change management in which all current consumers are made aware of any changes that could affect the functionality of the SOA component. In some cases, it may be more practical to maintain two versions of the SOA component – the original version used by some consumers and the enhanced version used by the enhancement requestors. One

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version will normally suffice if the only changes are bug fixes or underlying technical upgrades.

- **Individual Consumer Funds Changes** – This method is appropriate if the requesting consumer is the only current user that needs the enhancements. In this case, the requestor funds the changes. The changes themselves may be made by the consuming organization (assuming that they have enough information about the underlying component to make the desired changes). Alternatively, the consuming organization may be able to convince the providing organization to make the requested changes for a fee. In either of these cases, the resulting enhanced SOA component would then be made available to others along with the continued availability of the original SOA component.
- **User Group Funds Changes** – In this situation multiple consumers need the same enhancements or changes to the currently used SOA component. The multiple consumers are akin to a User Group for software products. The User Group may be able to induce the original provider to make the enhancements for a fee even when the originating unit does not need the enhancements itself. Alternatively, the User Group may need to fund and commission an enhancement effort of the SOA component that is performed by a development unit other than the original provider. In this situation, the resulting enhanced SOA component would normally be offered as a new SOA component available as an alternative to the original SOA component.

Administrative Functions

In addition to operating the underlying infrastructure, including an Enterprise Service Bus, the enterprise may need additional administrative services performed to coordinate agreements among SOA component providers, operators, and consumers. These administrative services could be performed by the infrastructure operator or by a separately constituted organizational unit that is separately funded in a way similar to the Infrastructure funding options. Administrative services comprise the activities needed to enable SOA component providers and users to ensure that any SOA agreements are being met. These administrative services can cover any of the following:

- **Monitoring Performance**– Reports are provided to both SOA component providers and consumers that document the performance of the SOA component. The performance indicators are based upon the characteristics established when the SOA component is first provided or may be revised when additional consumers choose to use the same SOA component. These indictors will normally reflect volume throughput and response time factors. Such monitoring is especially important for confirming that the addition of new SOA component consumers does not degrade the performance delivered to original consumers.
- **Monitoring Service Level Agreement (SLA) Indicators** – Reports are provided to SOA component consumers that track the conformance of the SOA component to agreed-upon SLAs. These SLAs may differ from one consumer to another. The actual reporting may be done by the SOA component originator, by the infrastructure operator or by a combination of both. Such SLA reporting is only relevant insofar as an agreement between the originating provider and consumer has been established. If no such agreement has been established (as may be the case in the Locally Funded approach) then the end consumer is responsible for tracking compliance with consumer-defined SLAs. In such cases, if the SOA

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component fails to satisfy the consuming units needs then the consuming unit will need to determine its own course of action. Costs to monitor SLA indicators would be borne by the SOA component provider, if such SLA factors are part of the agreement between provider and consumer. Otherwise, the tracking of service levels would be performed and funded by the consuming unit.

- **Chargeback for Services Rendered** – Compensation to the infrastructure operator or to the SOA component provider may be part of the set of agreements between SOA providers and consumers. Chargeback for infrastructure usage is generally based on a measure of end consumer usage of infrastructure facilities. This chargeback could be based on transaction volumes (variable costs) or could be based on a fixed period charge that does not vary with volume fluctuations. Chargeback for SOA component usage may also be part of SOA provider and consumer agreements. These agreements can be as simple as a one time "license" fee to use the SOA component or can be as complicated as a full SLA-based pricing schedule that reflects actual usage and performance factors. The simpler model is typical when the SOA component is provided on an "arms length" basis from provider to consumer with little accountability by the provider other than assuring that the SOA component does what is specified in the SOA directory. The more complex approach is useful when a more complex service is provided in which a mix of functionality is provided as a package (e.g., business process outsourcing, such as payroll processing).

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4.6.1. Introduction

Once funding is established for the creation or maintenance of SOA components and related operations and management functions, contractor support may be required to execute the activities for which funds have been budgeted. Different types of acquisition vehicles are most appropriate depending upon the type of contractor services sought and the SOA related function to be provided.

The Department of Defense has established an acquisition management process called the Defense Acquisition System (DoD 5000 series). This acquisition management process describes all of the steps needed to plan, budget and acquire contractor support for major military projects and equipment. Although DoD 5000 is intended to cover all procurements for the Department of Defense, it is primarily structured to guide the procurement of major weapons systems and related large scale support services. This procurement approach has extensive checks and balances, as are required to protect the buyers' interests in complex procurements. Figure 4-7 below presents a high level overview of the DoD 5000 acquisition framework, including Pre-Systems Acquisition, Systems Acquisition and Sustainment Phases.

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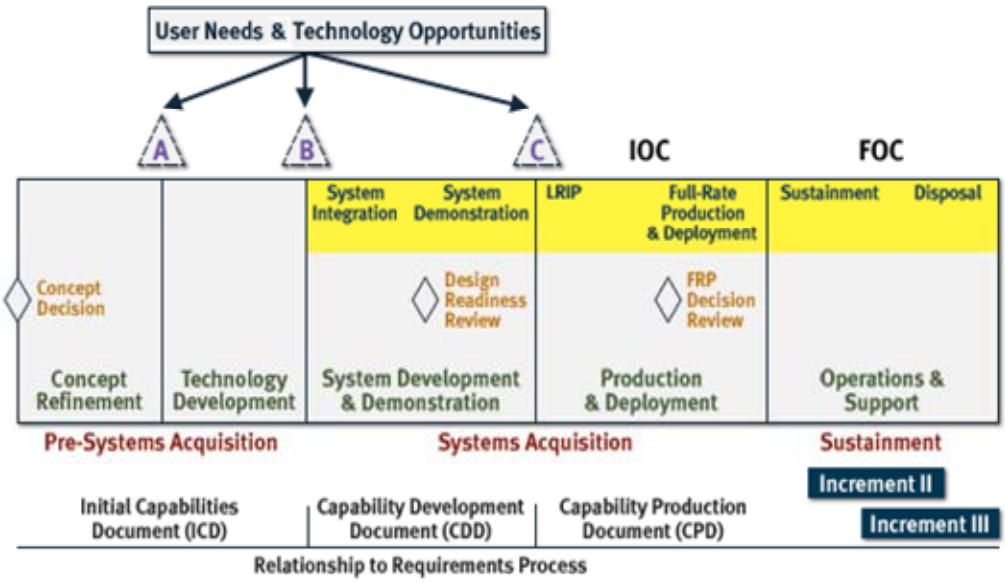

FIGURE 4-7
Overview of Department of Defense Acquisition Process DoD 5000

Although DoD 5000 provides an overview of the entire acquisition life cycle from priority ranking and budgeting, through procuring, milestone tracking, sustainment and eventual retirement, the level of complexity and controls are designed to be adjustable given the nature and size of procurements. Nonetheless, the strategy underlying DoD 5000 reflects the needs and concerns associated with planning, designing, procuring and deploying complex systems including those that cross military service boundaries (i.e., joint weapons systems). Key to this strategy is the careful decision making and step by step planning to insure that such complex projects prove successful.

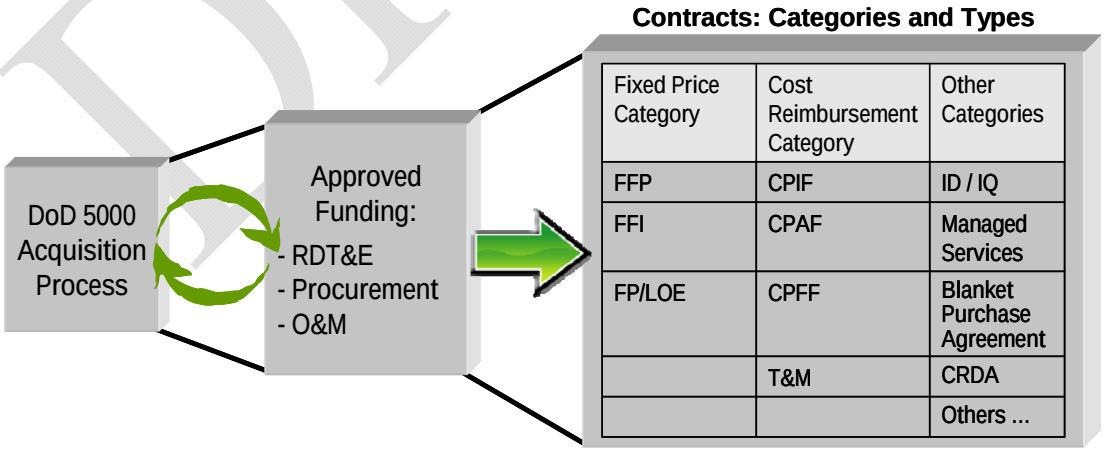

FIGURE 4-8
Sample Options of a DoD 5000 Progression Toward Contract Vehicles

The above graphic illustrates a high-level perspective of how the DoD 5000 acquisition process leads to funding decisions which in turn lead to various candidate contract vehicles suitable to individual program needs. The foundation processes of this progression provide the underlying framework upon which all large systems are designed and fielded.

The processes associated with procuring and sustaining SOA components do not fit seamlessly under the above large scale procurement strategy. The overall DoD acquisition framework is primarily structured to oversee the development and deployment of complete weapons programs and stovepipe systems, Whereas SOA components are often small, are used by a variety of beneficiaries (not just the original SOA component creators) and operate subject to cooperative standards and guidelines that often transcend project and organizational boundaries. Furthermore, through its core tenets of reuse and enterprise commonality, SOA challenges existing cultural and accepted acquisition practices that focus on maintaining structure and management control over a well-defined program entity.

As an example, infrastructure capacity to support SOA use (such as an ESB) may be part of an overall DoD 5000 project procurement for shared computing infrastructure support or may be constructed out of the infrastructure components of individual large projects, which fund their own infrastructure capacity and then transfer such capacity to a central infrastructure group for operations and maintenance. Alternatively, infrastructure support may be funded directly through Operations and Maintenance contract types (see below), which often better match the sustainment needs of ongoing infrastructure support.

Acquisition methods to support SOA follow the above mentioned categorization of SOA funding needs:

- Development of SOA plans and standards
- Development of SOA components
- Usage and sustainment of SOA components and related operational support

Although DoD 5000 may be used to acquire resources to support major projects which may produce SOA components as reusable byproducts for others, *simpler* procurement vehicles are often needed to acquire support resources for other aspects of the SOA program. DoD has been exploring the use of faster and more flexible acquisition and investment decision processes, such as the Enterprise Risk Assessment Model (ERAM), to better support smaller projects and projects using more of an iterative development process. ERAM is a subcomponent of the Business Transformation Agency (BTA)/Business Capability Lifecycle (BCL) and is designed to simplify the review steps used in the normal DoD 5000 milestones for smaller projects. Projects designated as ERAM use the contractor's Systems Integration methodology after Milestone A. So far these projects are also required to use DoD 5000 Milestone B criteria (e.g., Independent Cost Estimate and Cost As an Independent Guideline (Variable)).

This emerging change in acquisition and investment decision milestone policy does not apply to all types of qualifying projects. Many projects that produce SOA components or that use SOA components are likely to qualify under the emerging more streamlined Business Case Lifecycle.

Three other acquisition approaches are appropriate for certain parts of the SOA Program:

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- **Operations and Maintenance (O&M)** funded contracts are often used to support systems and operating infrastructure that are already in place from prior development work. This funding stream can commonly be leveraged to enable certain SOA programs that qualify under this funding line.
- **Indefinite Duration Indefinite Quantity (IDIQ**) contracts can be used to pre-select a set of qualified contractors to perform a certain class of services. The individual tasks to be performed are determined subsequent to the award of the IDIQ contracts and generally involve a simpler competition for each task order among the pre-selected vendors.
- **Managed Services** contracts are a type of O&M contract in which the contractor owns the required capital equipment, incurs the costs of maintaining technical currency and delivers services to the government based on a predetermined usage schedule and set of Service Level Agreements (SLAs).

The tables in the following sections identify the contract types that fit most naturally with each type of funded work. The tables are organized by major and subordinate type of funding category.

4.6.2. Development of SOA Plans and Standards

TABLE 4-4. Funding and Contract Types for SOA Plans and Standards

FUNDING CHARACTERIZATION	TYPICAL CONTRACT TYPE
Embedded Funding	IDIQ
Distinct Funding	IDIQ
SOA "Tax"	IDIQ or Managed Service

IDIQ contracts are especially useful for tailoring the types of management and technical support needed over time. Project leadership can focus on planning and standards setting during the earlier phases of a SOA program and can shift to compliance activities later in the life of the SOA program. Different task orders can be issued to acquire different types of support during different phases of the SOA life cycle.

Managed Services may also be used to support SOA "Tax" type situations. In this case, the Managed Services provider includes a predetermined set of planning, standards creation and compliance support as part of the managed services contract. These services are "paid for" as part of the chargeback for managed services usage by SOA participants.

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4.6.3. Development of SOA Components

TABLE 4-5. Funding and Contract Type/DoD 5000 Relevant for Development of SOA Components

FUNDING CHRACTERIZATION	TYPICAL CONTRACT TYPE	DoD 5000 RELEVANT
Centrally Funded: Project Priority Setting	Time and Materials, Fixed Price	Yes
Centrally Funded: SOA Program Funding	Time and Materials, Fixed Price or IDIQ	Possible
Project Funding	Time and Materials, Fixed Price	Yes
Local Funding (O&M)	Time and Materials, Fixed Price	No

DoD 5000 acquisition vehicles are appropriate for Project Funded or Centrally Funded SOA component development, especially when such developments are parts of major projects and not undertaken solely to develop small SOA components in isolation.

Sometimes, such smaller SOA components may be commissioned as part of a centrally managed SOA program to “fill in” the blanks in the Sequencing Plan that no other major project will provide in time for widespread beneficial reuse. In other cases, such components may be part of an infrastructure enhancement (e.g., enhanced collaboration services) that might never qualify as a separate DoD 5000 level project. IDIQ contracts or O&M funding from various sources can be appropriate in such cases.

Locally Funded SOA components are assumed to be small (i.e., not qualifying as a major project) and normally developed as an enhancement to existing local systems capabilities. In these cases, O&M funding is normally the most appropriate means, although support of the new SOA component may be structured as a separate task under the O&M contract.

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4.6.4. Usage of SOA Components and Related Operational Support

TABLE 4-6. Funding and Contract Types/DoD Relevant for SOA Components and Related Operational Support

FUNDING CHARACTERIZATION	APPROPRIATE CONTRACT TYPE	DoD 5000 RELEVANT
Infrastructure Shared	Cost Plus or Managed Services	No
Infrastructure Dedicated	Time and Materials, Fixed Price	Possible
Testing, Validation and Registration	IDIQ	No
Maintenance and Minor Enhancement – Provider Makes Changes	Time and Materials, Fixed Price, Cost Plus	Possible
Maintenance and Minor Enhancement – Individual Consumer Funds Changes	Time and Materials, Fixed Price, Cost Plus	No
Maintenance and Minor Enhancement – User Group Funds Changes	Time and Materials, Fixed Price, Cost Plus	No
Administrative – Monitoring Operating Performance	Time and Materials or Managed Services	No
Administrative – Monitoring service Level Agreements	Time and Materials, Managed Services or IDIQ	No
Administrative – Chargeback	Managed Services	No

Shared infrastructure is normally provided either through an O&M contract with an external vendor or through a Managed Services contract. This shared infrastructure may be dedicated to SOA usage (e.g., Enterprise Service Bus) or may provide broader shared infrastructure services only a part of which is to support SOA. In either case, an O&M or a Managed Services contract is the most appropriate acquisition type.

Dedicated infrastructure is more likely to be acquired as part of a DoD 5000 type of project procurement. In some cases, an O&M contract may be established to maintain the DoD 5000 acquired system after deployment. In either case, the operational support to external users of the dedicated infrastructure is best provided through the same contract vehicle that is used to support the original project sponsor's usage.

Testing, Validation and Registration support is specialized assistance beyond that of the normal project testing. That is, these services are provided to insure that the new components are fully compliant with the SOA Standards and Guidelines used to insure satisfactory reuse of certified components. Such services are easiest to provide through an IDIQ contract since they are separate from the project funding process. A separate procurement is also appropriate the certifiers should be independent of the project creating contractors to preserve objectivity. In some cases, an existing O&M contract for infrastructure services may be used to perform this certification process

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to insure that the new components will operate satisfactorily in the existing infrastructure environment.

Administrative Functions (Monitoring Operating Performance, Monitoring SLA Compliance and providing Chargeback information) are generally contracted through the O&M function responsible for providing infrastructure and operating support.

- **Monitoring Operating Performance** - The infrastructure contractor is best positioned to monitor run time performance and raise alerts if expanding usage of individual SOA components by new users threatens availability by existing users. Managed Services contracts can provide such monitoring when Managed Service contracts are employed for infrastructure support.
- **Monitoring SLA Compliance** – O&M or IDIQ contracts work best for monitoring SOA component functionality in compliance with agreed upon SLAs. If the SLAs primarily relate to operating performance characteristics (e.g., response time) then O&M contractors responsible for infrastructure operations are usually best suited for this monitoring task. If SLAs are more complex and make use of a variety of business related metrics, then a special IDIQ task order may be preferable to monitor such compliance. Note that such monitoring may be helpful as well in producing business performance statistics as needed to report on annual performance progress for major projects.
- **Chargeback** – If the SOA providers and consumers have agreed to provide some form of reimbursement for usage either to the SOA component provider (e.g., a "license" fee) or to the operator (usage charges), then appropriate recordkeeping and "invoicing" will be needed to communicate to both consumers and providers of the relevant services. Although a special IDIQ task might be used for such support, it is generally easier to have the O&M contractor or the Managed Services contractor (whichever is used) provide this chargeback information. These "operator" contractors are usually much closer to the underlying data and know whether any corrections to reported usage data need to be made.

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CHAPTER 5 –

SOA Change Management

SECTION 1 –

Overview

SOA represents a significant change from more traditional IT architectures and as such requires great attention to detail with regard to implementation. SOA can be characterized as a melding of IT and Business and thus requires not only a different mindset but also introduces new players to the IT realm. The business driven nature of SOA (see figure 3-6) enables organizations to do more. As a result of the business involvement, the burden of SOA implementation falls more heavily on the people and organizational side of the enterprise. Often, new skills and responsibilities have to be introduced along with attention to the business requirements and to the relationship between IT and business than done previously.

How the transition to SOA is addressed can greatly influence the degree to which this new environment is accepted and integrated into an organization. Therefore, change management should not be overlooked during planning for SOA. Appropriate resources, both people and dollars should be made available for the CM effort. In Chapter 4 (Governance, Funding, and Acquisition), different types of funding options were introduced. Depending on where an organization falls within the scale (from centrally funded to locally funded), the change management effort and resources for CM will need to be tailored.

Change management can be described as a methodical and structured approach for moving an organization from a current state to a desired state. The goal of CM is to help remove human and organizational barriers/risks to successful change. The Army, on its Change Management web page (www.army.mil/escc/cm) describes key objectives, a CM process, and references several change management models. The information contained on the ESCC website can be useful as an additional source of change management ideas. The description of change management that follows is consistent with the ESCC CM information.

For Army organizations change management with respect to SOA involves an adoption step, a demonstration step, and finally the more tactical effort that comes once the SOA concept has been “sold” to Army organizations. Figure 5-1 illustrates these steps. The adoption step entails creating an “elevator speech” and presenting it as an executive communication. If this first step peaks the interest of those in the organization who make decisions and directives, the demonstration step will seal the deal by taking an on-paper concept and demonstrating the benefits in real time. Once the organization makes the decision to proceed with SOA, the tactical change management effort begins. The bulk of this discussion focuses on the post-adoption timeframe.

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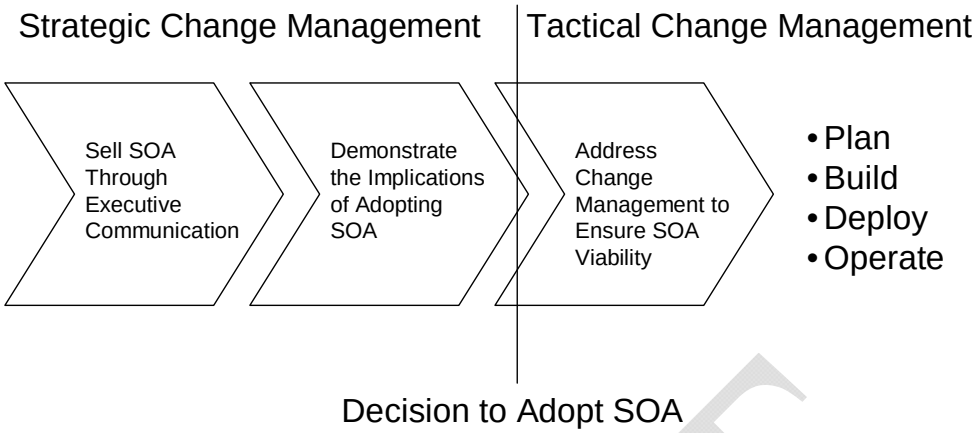

FIGURE 5-1
Phases of Change Management

This chapter provides an overview of change issues that need to be addressed to make SOA viable. As with any major cultural change, communication is the key to avoiding resistance to change. While it is widely recognized that there will always be resistance to change, the degree of pushback can be lessened by getting out in front of changes and including stakeholders, constituents, and communities of interest in the change process. Communications is a major theme in this chapter.

Transition to a SOA environment will also require a hard look at the organization structure of the Army and DOD as a whole. Is the Army structured to deal with SOA and the customer/supplier mentality? Determining how IT will be funded in the SOA environment will determine whether some aspects of the structure need to be changed to deal with a customer/supplier scheme. The Organizational Assessment will provide the proper analysis to enable these structure decisions to be made.

Once the requisite changes regarding SOA are cemented, a Change Management Strategic Approach can be tailored to help accomplish the desired end result. The SOA effort must begin with an education campaign. This education step will ensure that constituents will not be surprised that there is a new way of obtaining both IT and other types of business services Both suppliers and customers will need to be aware of the changes to how services are specified, assembled, developed, and deployed and change both their mindsets and processes accordingly. The Communication Framework will help constituents to understand and make those changes more smoothly. Finally, a Change/Communications Implementation Plan will be the roadmap to guide all the change management activities.

Finally, the change management effort does not end with the implementation of SOA. In fact, the implementation of SOA is a difficult thing to nail down in terms of a specific date when it can be said “we have now implemented SOA”. The nature of the SOA concept is much more free form than the installation of a specific product. With any enterprise architecture, movement to the end result is a methodical and evolutionary process, and SOA is no different in that respect. In fact, there will be continued marketing of services and customer/supplier relations issues to manage as SOA evolves as well as SOA project-specific maintenance. There is no “steady state” within the SOA environment with respect to services. Therefore, although this chapter focuses on specific front end change management activities, there will be

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ongoing communications requirements associated with SOA long after the Army transitions to this new way of operating.

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5.2.1. Introduction

A good change management effort begins with an assessment of the organization to determine a baseline for readiness to change. This assessment reviews documentation as well as conducts interviews and performs other data gathering efforts to better help understand the Army environment and culture.

During the assessment period, the following areas are reviewed:

- **Strategy** – A look at the Army organization's strategy as it pertains to IT and SOA implementation and within the context of DOD.
- **Organizational Structure** – Review of the current organizational structure and how it responds to IT needs.
- **IT Business Processes** – Review of IT business processes including governance, acquisition, and communications associated with IT and other associated processes will need to be conducted.
- **People –** Since people drive the implementation and transition to SOA, a review of skills will be required to see which SOA specific skills will need to be reinforced.
- **Technology –** A solid baseline of current technology being used serves as the basis for decisions moving forward regarding reuse, new purchases, etc. for the SOA environment.
- **Stakeholders –** A stakeholder analysis to see who is affected by this SOA transition.

This assessment will most likely reveal significant information about the organization and enable effective change management plans to be created. An organizational assessment of the Army helps drive the structure and communications change management strategies.

5.2.2. Organization and Environmental Drivers

In the course of data gathering, drivers of change are determined. Potential drivers could include:

- **Mission –** Changes to the mission could be driving the move to SOA. This could include changes to the mission of the Army itself, specific Army organizations, or DOD as a whole. SOA may expedite the development of mission critical capabilities by shortening the 'time to market" of new capabilities by exploiting reuse opportunities to compress the amount of time and resources required to perform new development work.

DRAFT

- **Economics –** Reduced or shifted budgets may make SOA attractive. As such, build a strong case for SOA by demonstrating sound business reasons for this transition. Economies of scale and lowered cost of technology per specific measure can help "sell" SOA on economic terms.

The Mission and Economic drivers can be used in messages that help build the case for the adoption of SOA as a means of realizing strategic goals. These messages will resonate with stakeholders in a more effective way because they tie directly to the actual reasons that upper management/authority has provided. Analysis will help determine which messages will resonate more with segmented groups. Targeted communication will be developed accordingly.

5.2.3. Stakeholder Assessment

A comprehensive stakeholder assessment is performed as part of the baseline effort. This assessment is not an effort to baseline technical components (although as noted in chapter 3, a technical inventory is part of any organizations transition to SOA) but rather a culture and mindset baseline. The baseline of current stakeholder mindset will enable the Army to measure its change management progress throughout the transition to SOA. This assessment first identifies individuals and groups impacted by the transition to SOA and enables messages to be tailored to the various levels of interest. The information about various stakeholders will be especially valuable when compared to the skills needed to operate under the SOA-Related Standards and SOA Governance described in chapter 4. The gap between the current stakeholder skills and those identified will help form the basis for identifying communications and training needs associated with the transition to SOA.

The stakeholder assessment could benefit from stakeholder overview and descriptions. The table below shows how the information can be displayed in a matrix form.

TABLE 5-1. Example of Stakeholder Assessment Matrix

Stakeholder	Description	Name/Organizational Unit	Number and Location
Senior Officials/ Project Advocates	Army leaders with authority to direct	Various, TBD	TBD
Army Project Program Managers/Leads and Staff	Army Mid-level management in a position to implement SOA principles	Various, TBD	TBD
Lead Architects	Members of an Architecture Review Board	TBD	TBD
Service Providers/Customers and Facilitating Body	Front Line stakeholders of SOA	Various	TBD

Benefits of the Stakeholder Overview and Descriptions include:

- **Stakeholder:** Provides a comprehensive overview of all stakeholders
- **Description:** Provides insights into relationships and potential areas of influence
- **Name/Organizational Unit:** Provides the starting point for a contact list for targeted communications and relationship development throughout the Army
- **Number and Location:** Provides information to support the selection of appropriate communications products, channels, and other logistics.

DRAFT

This process also identifies the various hierarchical lines of authority and multiple organizational layers and reveals some working relationships along IT and business functional lines. These informal lines of communications can be leveraged in the effort to transition Army organizations to a SOA based environment. In addition, the geographically dispersed nature of the Army requires a variety of communications channels and vehicles. The geographical data collected here is vital in the change management effort.

The broad range of potential stakeholders requires segmentation to provide the most effective change management effort and increase the likelihood of success of the Army SOA project. Stakeholders can be divided in several categories as illustrated in the figure below.

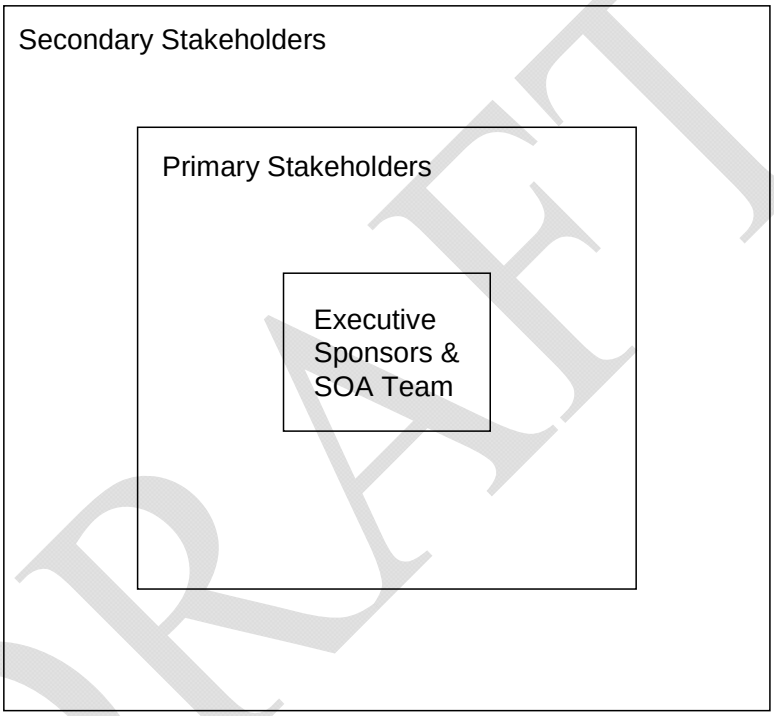

FIGURE 5-2
Stakeholders Can Be Segmented Into Various Groups Depending On Their Level of Involvement

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The inner box in Figure 5-2 represents the primary stakeholders who must be engaged at the earliest possible time. These individuals will be critical to the implementation of SOA. The outer box represents stakeholders whose buy-in will be critical moving forward. Once they have bought in to the transition, they can be utilized as change agents throughout the Army.

The stakeholder assessment will require a definition of the desired level of commitment needed from each stakeholder group identified as requiring communications. The figure below illustrates how each segment will require a different approach based on the objective for each particular stakeholder group.

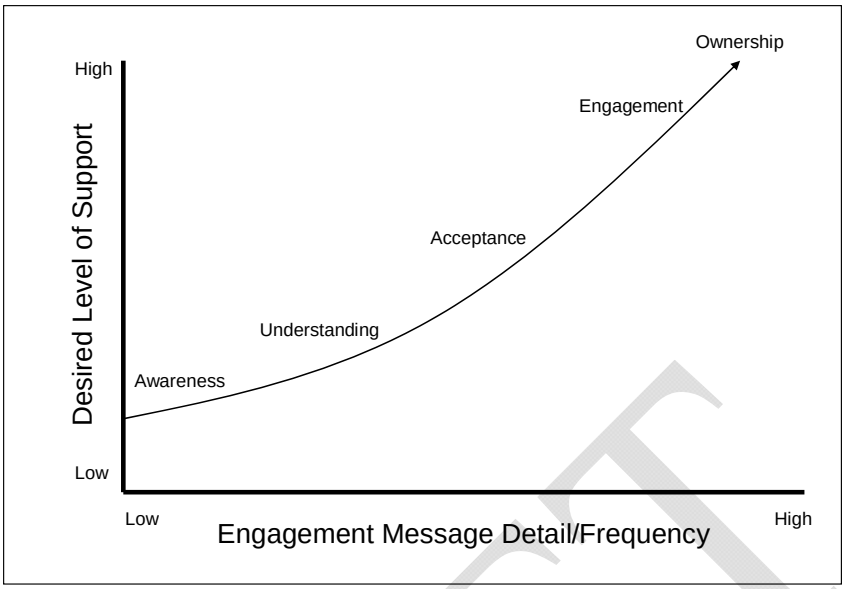

FIGURE 5-3
Engagement Changes Depending On the Desired Level of Stakeholder Support

Include the following guidance for messages addressing stakeholders who need a particular objective:

- **Awareness –** Those stakeholders who need initial awareness regarding SOA and its main themes. Messages of awareness should focus on the basics of SOA, e.g., scope and purpose.
- **Understanding –** This objective is for stakeholders who need a greater appreciation for the benefits and other impacts that SOA will bring to the Army. Messages to this group will contain more detail to address the features, benefits, and other impacts of the transition to SOA.
- **Acceptance –** Messages to these stakeholders are tailored to help them accept the SOA changes and support the transition effort. The information contained in these communications will describe the actions required of the individuals receiving them.
- **Engagement –** Stakeholders in this segment are going to have to take action to support the SOA initiative. Messages will incorporate tasks/needs and the recipient's role in achieving and sustaining SOA.
- **Ownership –** These stakeholders are fully responsible for owning SOA change and are completely aligned with the new processes/procedures or the SOA way of doing business. Messages reflect new processes and SOA success stories.

Once the objectives have been identified for each stakeholder group, an initial roadmap for change and communications activities is created. The first part of this phase of the stakeholder assessment is to design this initial roadmap. Below is an example of an initial roadmap matrix.

DRAFT

TABLE 5-2. Example Stakeholder Roadmap Matrix

Stakeholder	Impact	Objective	Current Awareness/ Interaction	Desired Awareness/ Interaction	Potential Change/ Communication Approaches
Senior Officials/ Project Advocates	High	Ownership			

The Stakeholder Matrix definitions include:

- **Stakeholder –** Information regarding targeted groups leads to tailored communication approaches
- **Impact –** Level of impact on the SOA transition effort
- **Objective –** Goal for the given stakeholder group
- **Current Awareness/Interaction –** Current level (baseline) of involvement in SOA transition
- **Desired Awareness/Interaction –** Target engagement strategy for the stakeholder group
- **Potential change/Communication Approaches –** Approaches to be used with the stakeholder group to guide/lead the stakeholder to the desired level of awareness/participation with regard to SOA

In addition, the stakeholder assessment will provide a mechanism for recording stakeholders' potential concerns about the transformation to SOA. This information will be valuable in tailoring messages specific to these stakeholder concerns. The chart below is an example of how this information can be captured.

TABLE 5-3. Example Stakeholder Feedback Matrix

Stakeholder	Potential Concerns	Potential Benefits	Tailored Messaging

The Stakeholder Feedback Matrix consists of:

- **Stakeholder –** List of segmented stakeholder groups
- **Potential Concerns –** Details of potential concerns impacting the ability of stakeholders to support or their interest in the success of SOA
- **Potential Benefits –** Details of potential benefits to stakeholders that can be used to reinforce the acceptance of SOA in messages
- **Tailored Messaging –** Potential reference messages to be used in message development for segmented stakeholders

5.2.4. Organizational Change Readiness Assessment

The purpose of assessing organizational change readiness is to determine how ready Army personnel are to support SOA. The change readiness assessment ensures that the pace of SOA deployment is consistent with the Army's ability to respond to and absorb the proposed changes. This step also helps with the development of a strategy for reducing any risks associated with the SOA transition and mitigates issues related

DRAFT

to the speed of the transition. In addition, this assessment determines or estimates how willing all the stakeholders are to accept and adapt to SOA, understand the new SOA concept and operating model, and operate in the new SOA environment. Finally, when readiness is present in an organization, there is a greater openness to new ideas, a lower resistance to education and growth, and much earlier acceptance of change.

The Table below illustrates an example of how change readiness can be accomplished in the Army with respect to SOA.

Technical Readiness Implementation-Specific Change Readiness Assessment	Organizational Readiness Monitoring Organizational Climate for Change
• Purpose: – To baseline and monitor the organization's readiness and ability to implement a SOA environment – To specifically assess if employees are fully aware of what is required of them and if they are trained and ready to support the transition – To assess if organizational structures and systems are aligned to support SOA • Planned method: – Development and implementation of a structured and sequenced survey plan • Outcomes: – Adjust organizational design, change management, training and communications to ensure the successful implementation of SOA	• Purpose: – To take stock of the organizational climate, willingness and ability to embrace SOA – To anticipate the impacts of other initiatives on the potential success of SOA implementation • Planned Methods: – Leverage ongoing mechanisms to secure qualitative and quantitative feedback from stakeholders, such as: • Employing comment cards at the end of workshops or town hall meetings • Conducting feedback sessions at the end of workshops or town hall meetings – Develop targeted assessment tools, such as: • Conducting focus groups • Conducting interviews • Outcomes: – Adjust and plan the sequencing, timing, pacing and approach of changes regarding SOA

FIGURE 5-4
Change Readiness Areas

Initially, this effort will focus on the culture of the Army with respect to IT and the interrelationships of the various organizations. How these different groups interact will affect the change management effort. Essentially, the result of this step is a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis that clearly identifies the Army's climate for change.

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5.3.1. Introduction

Transition from the current state to a SOA environment requires a robust change management effort to address the paradigm shift and its acceptance. The diagram below illustrates some examples of the changes propagated by this new SOA paradigm.

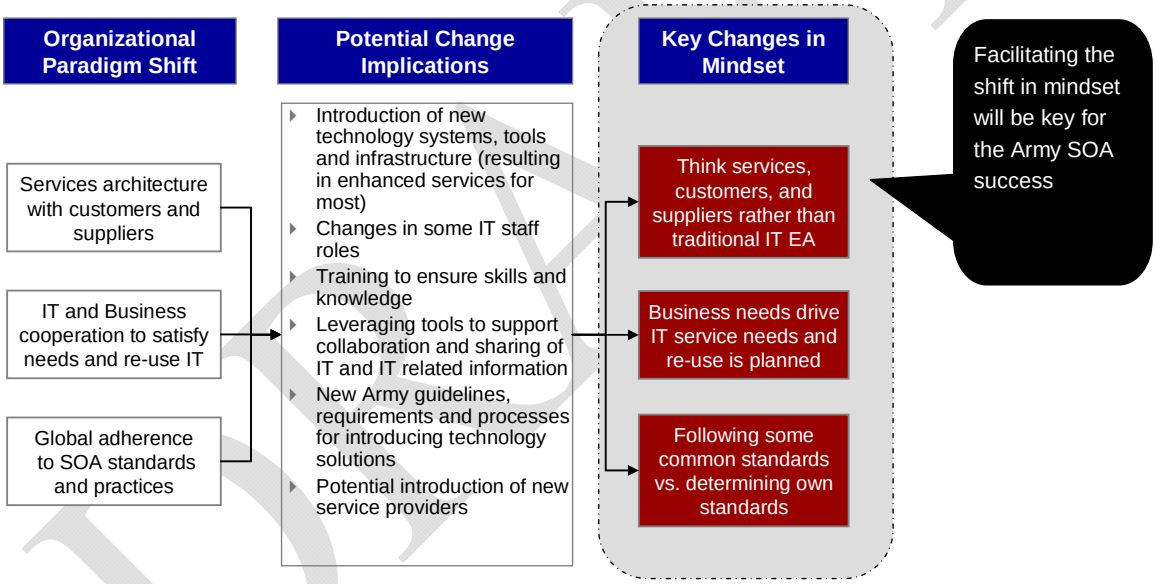

FIGURE 5-5
SOA Represents A Paradigm Shift from Traditional IT Enterprise Architectures

The strategic approach to change management will focus building ownership in SOA within the Army. The effort will seek to align organizational behaviors with those required to support and sustain the transition to a SOA environment.

- Organizational and stakeholder assessment serves as a basis by providing a view of cultural norms within the Army
- The change management strategic approach leverages this information to determine the scope and effort of the required changes
- Risks to the SOA implementation are identified and factored into the change strategy

DRAFT

- As the Army is in a constant state of change, it is important to be aware of functions changing on multiple fronts by keeping abreast of phases, timing, and expectations of other organizational changes as they have a direct impact on stakeholders of the SOA transition.

As with any paradigm shift, there will be early adopters of SOA but also stakeholders that are tougher to convince of SOA benefits. Some stakeholders may not have the proper incentives to buy-in early and thus will need to have a barrier removed. The early adopters will need to be cultivated as agents of change to help these later adopters see the benefits as well has help provide incentives to stakeholders questioning the value of SOA. The SOA Adoption Strategy described in Chapter 3 will also play a significant roll in shaping this strategic approach.

5.3.2. Overarching Goal and Measurement

The measurement of the Army SOA transition goals should be customer based. If the goal is to create a SOA that provides needed services on demand to customers, reuse of capital investments, and a customer base for supplier produced services, these items must be measured.

5.3.3. Change Management Methodology

The move from the current state to a SOA environment requires employment of a comprehensive change management methodology. The Army's methodology must begin with "Change Definition" and culminate with long-term, sustaining activities for the transition. The steps described below are done in conjunction with the efforts to define both the Service-Oriented Vision and the SOA Adoption Strategy as described in chapter 3, section 2.

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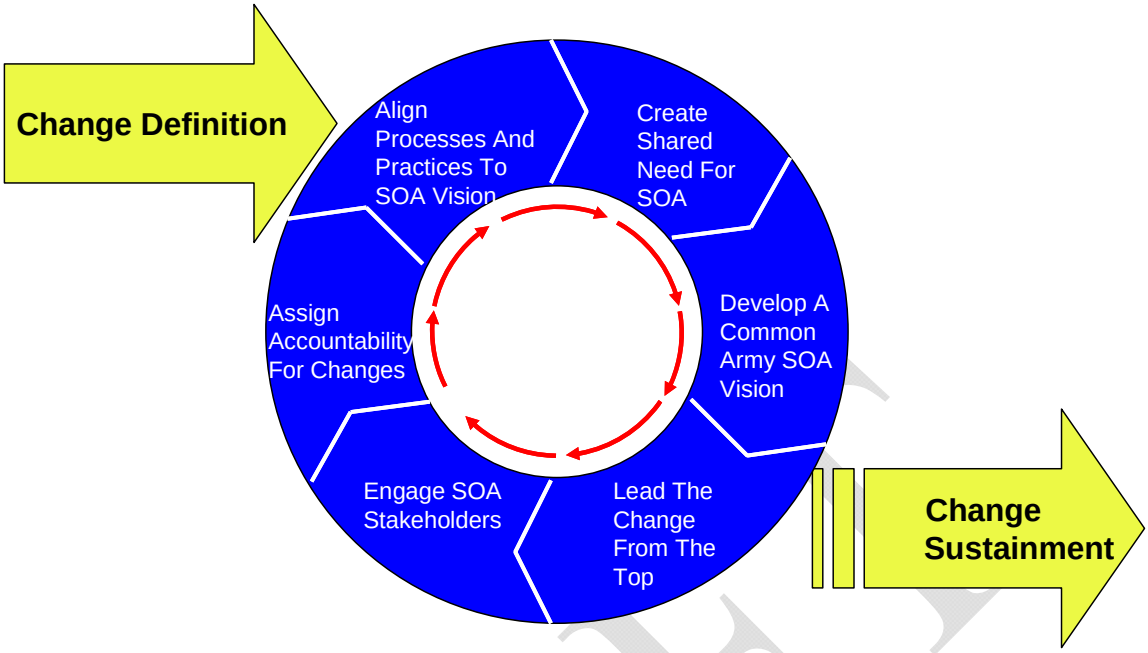

FIGURE 5-6
Change Management Is A Continuous Process

Using the above model for Army SOA transition with respect to SOA planning, design, and implementation will help facilitate ownership for the change and help ensure that stakeholders and leadership are on board. In addition, processes will support the successful implementation and sustain the transformation effort longer term. Here is a description of the process:

- **Defining the Change –** Identify the exact changes the Army can expect to see with the transition to SOA including the purpose, scope, and desired/preferred outcomes.
- **Creating a Shared Need –** Present to key stakeholders a compelling case for this change/transition to SOA that clearly states the benefits/expected outcomes
- **Developing a Common Vision –** Build a common vision to help foster genuine commitment from stakeholders and communicate this vision to the organization
- **Leading the Change –** Engage senior Army leadership to sponsor the SOA transformation and actively participate in an ongoing basis. Secure commitment form sponsors to communicate the changes, model the desired behavior and be held accountable (along with others designated team members) for this participation.
- **Engaging and Motivating Stakeholders –** Use multiple and diverse communications mechanisms to involve and inform all stakeholders and reach varied audiences. Use practical messages to provide practical solutions to overcome any identified resistance within or outside the Army.
- **Creating Accountability –** Establish clear priorities specific to stakeholders or groups of stakeholders and hold organizations or project teams accountable for successful decisions. Create a work plan with realistic benchmarks and milestones that can be monitored. Continuously monitor progress and performance so that course corrections can be made in a timely manner.

DRAFT

- **Aligning Processes and Practices –** Align management practices (staffing, development, rewards, measures, communication, information technology, and organizational design) to help smooth the transition to the SOA environment. Develop business processes and organizational functions to help deliver and sustain results.
- **Sustaining the Transformation –** Consolidate and integrate changes with other change projects going on throughout the organization. Ensure that individuals are trained and that overall organizational capabilities are present to adapt to the new changes. Place the right people, processes and metrics in place to sustain the desired changes. Identify and mitigate risks as they arise to threaten progress of the transition.

Defining the change and creating the shared need must be developed in light of results from other large scale change efforts within the Army. Incorporating any lessons learned from these previous efforts will help mitigate any resistance issues. In addition, a baseline study of resources already in place within the Army that can help support the change management effort will be helpful. This will entail a critical look at people, processes, and technology available for the transition to SOA. The Army change management strategies for SOA should be integrated with the existing communications efforts as illustrated in the figure below.

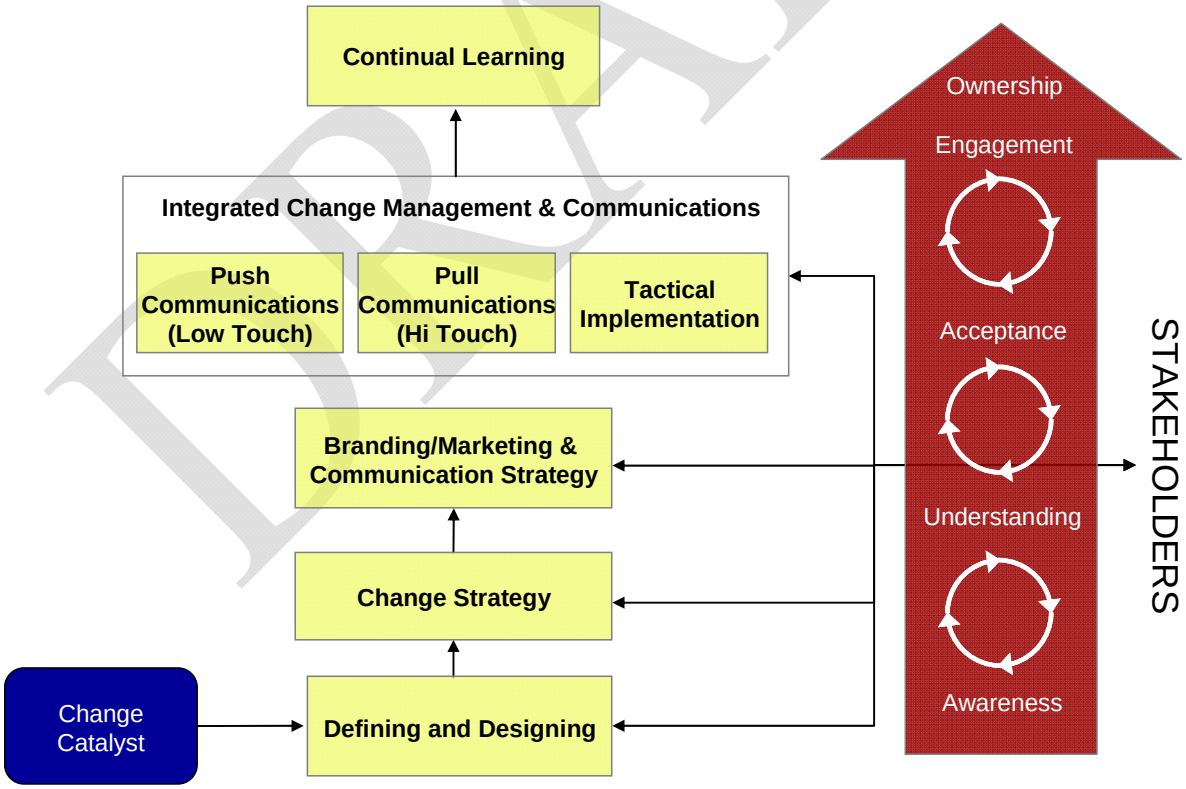

FIGURE 5-7
Management Strategies Work In Conjunction with Communications Efforts

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5.3.4. Roles and Responsibilities Guide

In order for the Army's transition to SOA to be successful, clear roles and responsibilities for the change management effort must be delineated. The responsible parties will be charged with collectively identifying risks to the SOA transition and take appropriate steps to mitigate or elevate the risk.

TABLE 5-4. Roles and Responsibilities Template

Role	Name	Key Activities

5.3.5. Training Needs Assessment

Certain aspects of SOA will require training for stakeholders. Specifically those involved with governance and the acquisition of IT may need training in new ways of doing business. A training needs assessment will rely heavily on the decisions made in the acquisition area and in the proposed governance structure as discussed in chapter 4.

For the training needs assessment the Army can divide SOA stakeholders into segments to determine training needs. This assessment can piggyback on the methods to assess the baseline of stakeholder mindset as listed previously. Finally, training methods and schedules are coordinated within the overall change management strategy and plans and other communications efforts.

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5.4.1. Introduction

The diagram below illustrates the challenge of moving from awareness to acceptance. The length of time to accomplish this shift will depend on the organization and its embedded norms. The communications framework will need to take into account this challenge. Change agents must use the information from the stakeholder analysis to craft the right messages, send them over the right channels, and provide them in the frequency to be most effective.

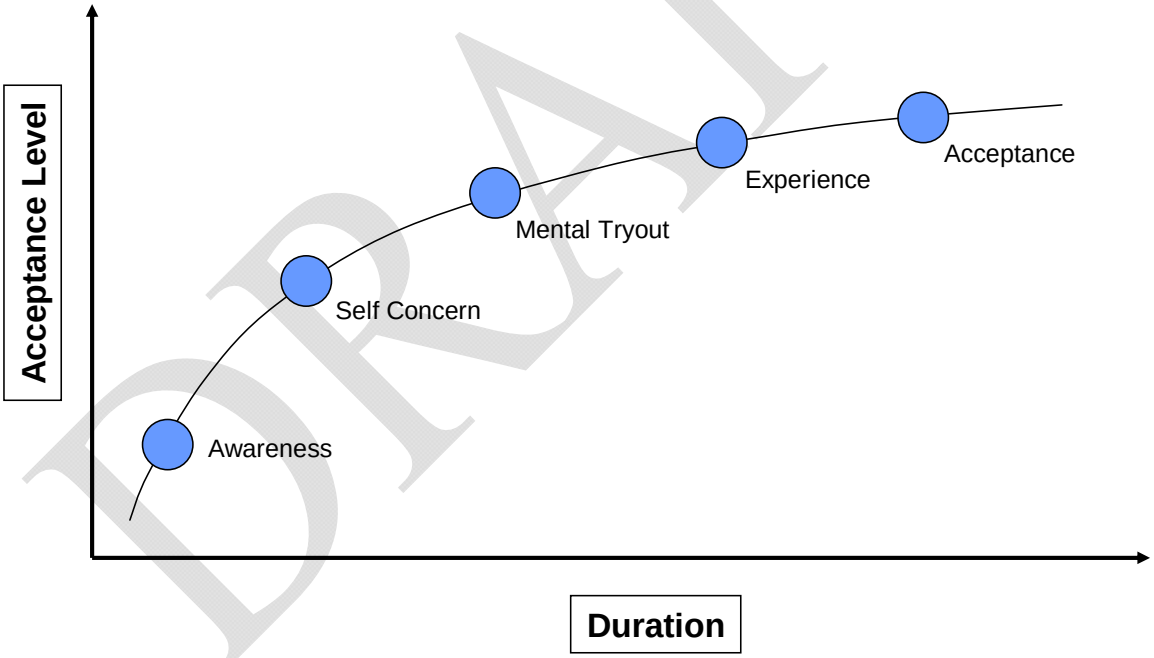

FIGURE 5-8
Level Of SOA Acceptance Correlates to A Duration of Marketing

5.4.2. Communications Review and Approval Process

The Army will need to ensure there is a solid communications framework for the transition to SOA. This framework begins with a communications review and

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approval process. To track the approval process for communications products, the table below can be populated and referenced.

TABLE 5-4. Communications Product Approval Matrix

Product Type	Intended Audiences	Review	Approval

5.4.3. Communications Products and Channels

Communications efforts will be most effective utilizing a standard set of activities to ensure that the Army SOA messages are received and are understood. The table below can be used to manage communications activities.

TABLE 5-5. Activity Matrix

Activity	Purpose or Key Message	Audiences	Frequency

Communications products can include:

- **FAQs** – A list of frequently asked questions suitable for most or all audiences with updates as required
- **Talking Points** – A short one page general overview of the Army SOA transition for all audiences. This document should include an overview, background, future state goals, and major milestones.
- **Key Messages** – A single PowerPoint slide touting the SOA transition for use with all audiences that is updated as required
- **SOA Transition Update Talking Points** – A set of talking points updated monthly with the latest information on the transition. This document is intended for Army upper management and high level stakeholders.
- **PowerPoint Presentation** – A more detailed set of approximately 10 slides to be posted online and for use with in-person presentations. This presentation should be updated when needed and is suitable for most Army audiences.
- **Slide Catalog** – A comprehensive set of slides for the Army SOA transition with details regarding the benefits, intentions, and desired changes.
- **Business Scenarios** – Overviews of business processes in both graphical and narrative forms illustrating the current state and future visions of how services will be used by various Army organizations to fulfill IT needs
- **SOA Implementation Timeline** – A high level Gantt chart depicting the implementation steps and milestones for the SOA transition

DRAFT

These and other types of communication can and should be used to market SOA and keep it fresh and up to date within the minds of both "consumers" and "producers" of services. A variety of communications vehicles should be used to provide specific messaging to segmented stakeholder groups.

TABLE 5-6. Level of Engagement Matrix

Level of engagement	Description	Army Application
High		
Medium		
Low		

Vehicles for communication can be divided into High, Medium, and Low engagement levels. High engagement is best used for key leaders/stakeholders or management to foster ownership foster ownership. The medium and low engagement activities will be used for all other Army SOA stakeholder segments to further the objectives of the transition.

High engagement communications should be created to build ownership and help build trust and credibility. The table below can be used to track high engagement vehicles.

TABLE 5-7. High Engagement Vehicle Matrix

Vehicle	Objectives	Audiences	Frequency

Medium engagement communications vehicles offer a simpler and less time consuming method to interact with stakeholders. The table below can be used to track medium engagement vehicles.

TABLE 5-8. Medium Engagement Vehicle Matrix

Vehicle	Objectives	Audiences	Frequency

Low engagement communications vehicles provide the Army with lower cost mechanisms to increase SOA awareness. The table below can be used to track low engagement vehicles.

DRAFT

TABLE 5-9. Low Engagement Vehicle Matrix

Vehicle	Objectives	Audiences	Frequency

5.4.4. Feedback Mechanisms

A subset of the products/vehicles described above can be used to obtain important stakeholder feedback.

- **Interviews** – One on one conversations to help understand individual perspective and to obtain input
- **Focus Groups** – An efficient method to obtain direct feedback from a select group
- **Advisory Councils** – A set of stakeholders that provide regular and consistent feedback from major stakeholder groups
- **Surveys** – Both web/email and paper based surveys are a great way to solicit anonymous feedback and lower resistance to honest answers
- **Feedback/comment Cards** – Quick method to solicit comments in an *ad hoc* manner
- **Websites or Wikis** – Can be used as a forum for discussion and feedback

All these mechanisms for feedback are used to obtain valuable information from stakeholders. This information can then be used to gauge the "mood" of the constituents and, when reacted to quickly, can serve to head off further issues or enhance positive thinking. Any feedback mechanism that is presented to stakeholders must be legitimately monitored, read, and responded to with timely acknowledgment back to the stakeholder where possible. Failure to do so will cause a serious loss of credibility and potentially harm the SOA change effort.

5.3.5. Performance Measures

Performance measures are an integral part of the change management/communications process. Measuring effectiveness of the SOA transition change management effort is necessary to gauge the degree to which changes in beliefs or behaviors are realized. To accurately measure the change management communications effort, the following steps should be taken:

- Identify measurable SOA implementation outcomes that the items in the communications plan can realistically impact
- Highlight the specifically desired behaviors or actions that stakeholders need to exhibit to realize the Army SOA goals

DRAFT

- Determine and identify the communications channels that would be most effective and preferred by recipients for information and feedback
- Where applicable, use qualitative research to help understand stakeholders knowledge and current attitudes in order to tailor messages and actions accordingly
- Continuously adjust the communications strategy to respond to changes in the organization or to reflect things that work or do not achieve the desired goals

Measuring how effective the communications efforts are in propagating the desired changes will enable the Army to better understand what messages are being sent, delivered, and actually received or understood. Effectiveness can be measured in several ways:

- Volume and frequency
- Actual specific audience exposure
- Changes in segmented stakeholder knowledge, attitudes, or actions

To accomplish these measurements, a combination of both qualitative and quantitative measures can be used including:

- Track numbers and types of messages/products delivered
- Track key topic areas in messages delivered
- Track types of messages stakeholders are actually exposed to
- Survey stakeholders via focus groups, interviews, or other face to face and email/web survey tools to determine recall of messages, etc.

DRAFT

5.5.1. Goals and Objectives

The first step to designing a successful plan for the transition to SOA is to develop the initial change/communications overarching goal. Objectives can then be created to support the agreed upon goal. This is an "initial" goal because there may be changes to the goal as progress is made and other factors come into play.

Initial Change/Communications Goal:

To build a credible foundation for the Army SOA Program by involving leaders and stakeholders in the planning process and securing early buy-in for the recommended solutions, paving the way for successful incremental implementation.

Corresponding Objectives:

#1: Program Mgt/Planning	#2: Leadership Engagement	#3: Stakeholder Engagement	#4: Awareness
To build the necessary team structures and integration activities to effectively lead change.	To actively engage Army leadership and secure commitment to lead change throughout the transition to SOA.	To engage representative stakeholders for Army SOA team to ensure transparency of the process, validity of the inputs and early acceptance for high-level plans.	To establish awareness and build credibility amongst key stakeholders within targeted audiences about the SOA objectives and progress.

FIGURE 5-9
Communication Goals and Objectives

5.5.2. Success Factors, Criteria, and Metrics

Success factors need to be determined along with appropriate criteria and metrics for the Army SOA transition. Below are some examples of these.

DRAFT

TABLE 5-10. CM Success Factors, Criteria, and Metrics

Success Factors	Criteria	Metrics
• Army leaders have actively sought to secure SOA buy-in • Key stakeholders have embraced the SOA concept and agreed to work towards SOA • "Consumers" feel that their needs/concerns are being addressed	• Key Army leaders have been briefed • Support from Key leaders has been secured	• Number of Army leaders briefed • Briefed leaders clearly understand the SOA concept • Number of active leaders who support for the SOA effort

5.5.3. Change/Communications Plan

The culmination of the Army SOA change management efforts is a comprehensive plan to implement the change management goal. This plan must incorporate all the information gathered and address all the relevant stakeholders.

1. PROGRAM MANAGEMENT AND PLANNING

Take the following steps:

- **Integrate with Strategic Initiatives.** To ensure that SOA implementation change management is aligned with the overall Army strategic goals, there must be integration with other efforts including establishing and/or participating in forums for integration with other strategic initiatives. This will help ensure that the plan reflects the needs of the Army and that the pace of change is tailored accordingly.
- **Equip Team with Tools.** Tools for the change team will allow them to manage stakeholder engagement and help ensure that stakeholder communications are consistent in form and feel. Some tools that can be helpful include a system to track communications and guidance provided to stakeholders, templates for the SOA "brand", and training on message creation for the team.
- **Develop and Maintain Change/Communications Strategy**. A strategy for change/communications should be developed to provide guidance to the change team and their interactions with stakeholders. This living document should be revisited regularly to reflect new information and guide ongoing efforts.

2. LEADERSHIP ENGAGEMENT

Develop clear roles and responsibilities for Army leadership to ensure solid support and specific change leaders. An understanding of how Army leadership is structured with respect to IT (and possibly how this structure may be evolving over time) is critical to SOA implementation and therefore must be factored into the leadership engagement step. Specific key change leaders should be identified who will champion the cause from the top. In addition, bottom up change can be accomplished by mobilizing the lower echelon to create SOA ownership and influence up.

DRAFT

3. STAKEHOLDER ENGAGEMENT

A timeline for communicating with stakeholders regarding the transition to SOA should be developed. This schedule should include details for fostering stakeholder input and dialogue and early buy-in.

4. AWARENESS

Generate and maintain awareness through targeted and measured communications. Provide ongoing and consistent updates to the targeted audiences.

DRAFT

Acronyms

The following is a list of relevant acronyms.

BCL	Business Capability Lifecycle
BTA	Business Transformation Agency
CM	Change Management
COI	Communities of Interest
Crystal	Is not an acronym but a word. It is used to label a kind of agile development process.
CSC	Computer Sciences Corporation
DISA	Defense Information Systems Agency
FDD	Feature-Driven Development
FEA	Federal Enterprise Architecture
FTF	Federal Transition Framework
IDIQ	Indefinite Delivery Indefinite Quantity
ITIL	Information Technology Infrastructure Library
MDA	Model Driven Architecture
NCES	Net-centric Enterprise Services
OASIS	Organization for the Advancement of Structured Information Standards
OATS	Orthogonal Array Testing Strategy
OMG	Object Management Group
PDP	Policy Decision Point
PEP	Policy Enforcement Point
QoS	Quality of Service
SAML	Security Assertions Markup Language
SAR	Systems Architecture Requirements
SCRUM	Is not an acronym but a word. It is used to label a kind of agile development process.
SOA	Service-oriented architecture
SOAP	Simple Object Access Protocol
SPRINT	Is not an acronym but a word. A very short iteration of delivery. A part of the SCRUM program management method
TPM	Technical Performance Measure
UDDI	Universal Description, Discovery and Integration
UML	Unified Modeling Language
WS-CDL	Web Services Choreography Description Language
WSDL	Web Services Description Language

DRAFT

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DRAFT