

# **Cypress Management Group**

## **Cloud/SOA Guidance**

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# SOA or Cloud? Or, both?

Cloud Computing's appearance as a viable component and strategy – even a potential “game changer -- follows closely behind the push to adopt Service Oriented Architecture. Both are touted as paradigm shifts that provide more cost effective, flexible, and agile approaches to providing IT services to the business.

There continues to be a great amount of confusion about how these two paradigms relate to each other.

- Does Cloud replace or supersede SOA?
- Do we need SOA at all, now?
- Is there any relationship between the two?

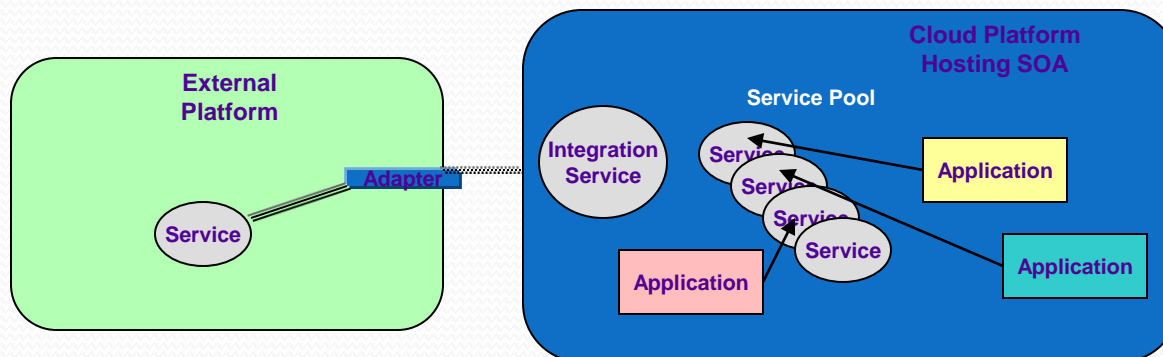
Based on our extensive experience implementing SOA solutions since 2001, and current experience implementing Cloud Computing solutions, we believe that the combination of both results in:

## The Ultimate Enterprise Service Architecture

# SOA and the Cloud: The Ultimate Enterprise Service Architecture

- A Synergistic Relationship (Cloud is a catalyst for SOA)
- Cloud Computing provides an application infrastructure
- SOA is an approach to building applications (and, infrastructure)
- Both SOA and Cloud promote resource sharing
- Both SOA and Cloud enable flexibility and agility
- Service demand is often elastic
- Services are sharable applications in the Cloud
- Services are location independent

A barrier to SOA adoption has been IT and business silos – ownership of processes and applications. Cloud platforms change the silos to a shared environment and acts as a catalyst to the adoption of SOA. The enterprise begins to think in terms of “services” and shared resources.





# Cloud Computing

# Definition of Cloud Computing

National Institute of Standards and Technology (NIST)

“Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model promotes availability and is composed of five essential characteristics, three delivery models, and four deployment models.”

<http://csrc.nist.gov/groups/SNS/cloud-computing/index.html>

# NIST's 5 Characteristics of a Cloud

IT-as-a-Service

1. On-demand self-service
  - User provisioned resources – e.g., servers, storage, network
  - Dynamically provisioned capacity – automatically without human interaction
2. Broad network access
  - Capabilities available over the network
  - Accessed through standard mechanisms – thin or thick client platforms
3. Resource pooling
  - Provider's resources pooled to serve multiple consumers (multi-tenancy)
  - Resources include storage, processing, memory, network bandwidth, virtual machines
  - Separate physical and virtual resources dynamically assigned on demand
  - Location independence (location of the cloud)
4. Rapid elasticity
  - Resources can be provisioned rapidly, in real time – elasticity
  - Can quickly scale out and can be released to scale in – pay only for what you use
  - Resources appear to be unlimited and can be purchased in any quantity at any time
5. Measured Service
  - Automatically optimize resources – e.g., storage, processing, bandwidth, user accounts
  - Resource usage can be monitored, controlled, and reported

# Cloud Service Models

## Software as a Service (SaaS)

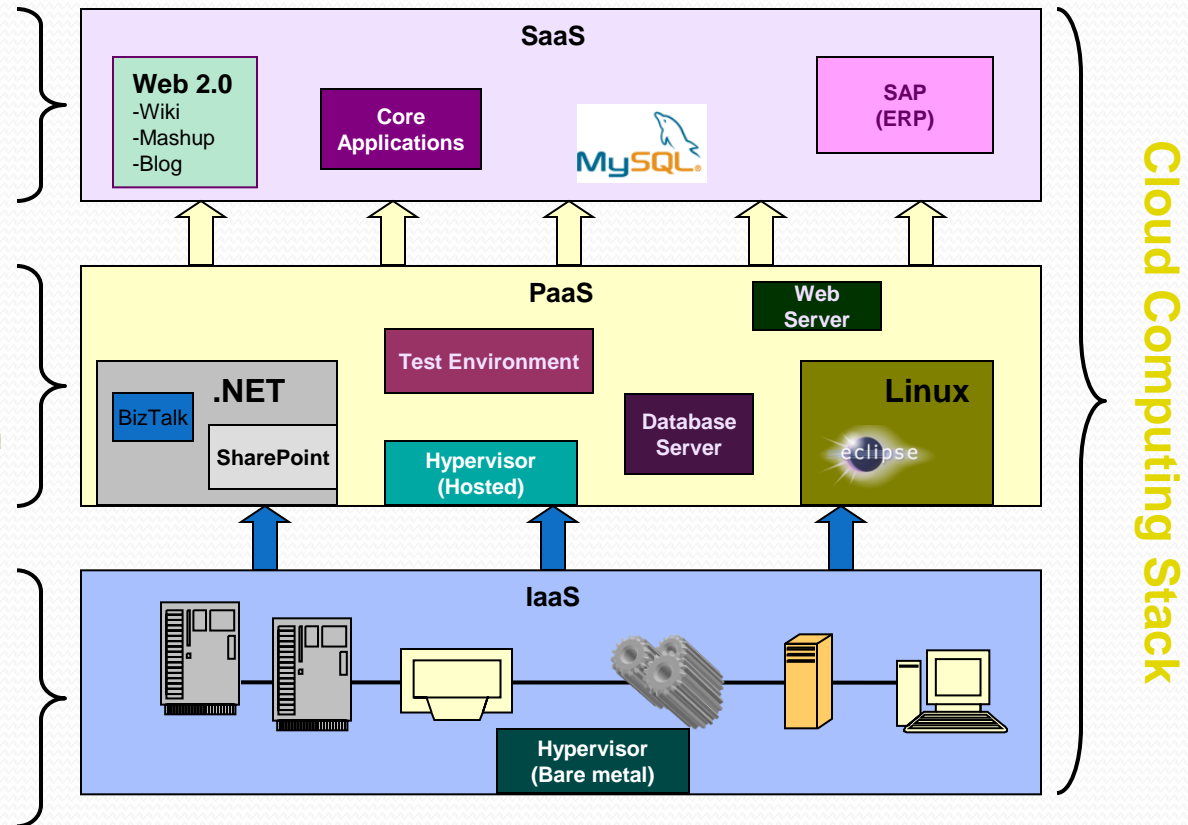
- Access to provider's applications on a cloud
- Accessible from various client devices
- Consumer does not manage the cloud, except user-specific app configuration

## Platform as a Service (PaaS)

- Capability to deploy consumers' apps onto the cloud
- Consumer does not manage underlying cloud infrastructure
- Consumer has control over deployed applications and app hosting environment configurations

## Infrastructure as a Service (IaaS)

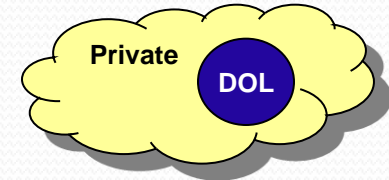
- Consumer can provision space, processing, storage, networks, and other computing resources
- Consumer can deploy/run software – e.g., operating systems, applications
- Consumer does not manage underlying cloud
- Consumer controls operating systems, storage, applications, and select networking components



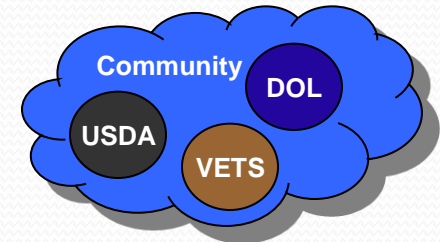
Also known in the industry as the **SPI** model – SaaS/PaaS/IaaS

# Cloud Deployment Models

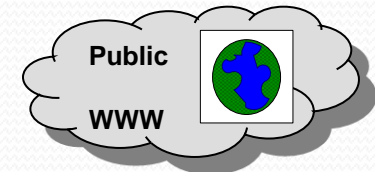
**Private cloud.** The cloud infrastructure is operated solely for an organization. It may be managed by the organization or a third party and may exist on premise or off premise.



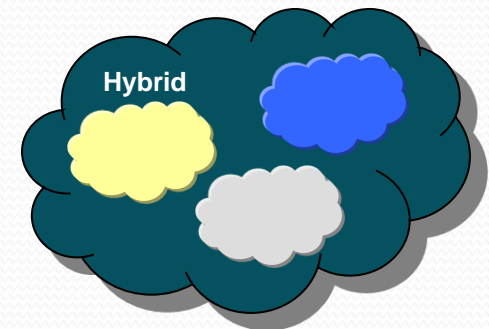
**Community cloud.** The cloud infrastructure is shared by several organizations and supports a specific community that has shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be managed by the organizations or a third party and may exist on premise or off premise.



**Public cloud.** The cloud infrastructure is made available to the general public or a large industry group and is owned by an organization selling cloud services.



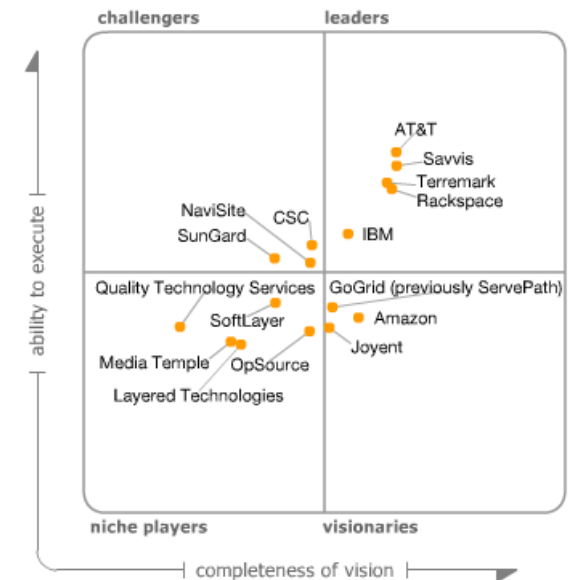
**Hybrid cloud.** The cloud infrastructure is a composition of two or more clouds (private, community, or public) that remain unique entities but are bound together by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load-balancing between clouds).



# Examples of Commercial Cloud Vendors

- Terremark
  - Hosts USA.gov and Data.gov
- Amazon Cloud Services
  - CloudFront: CloudFront can deliver files from multiple edge locations to provide delivery with low latency and high data transfer speeds.
  - Elastic Compute Cloud (EC2): Resizable (elastic) computing resources. EC2 allows users to launch and remove web servers as needed.
  - Simple Storage Service (S3): is a file storage system for major web applications.
- Microsoft Azure
  - Supports both private and public cloud infrastructures (hosted by MS).
- Flexiscale
  - Users mix virtual and dedicated servers as necessary, and can launch as many virtual boxes as needed from the web control panel or an API
- GoGrid
  - Users set up instant, on-demand servers with “control in the cloud” features
- VMWare VCloud
  - Leading vendor in virtualization market (foundation for Clouds).  
*Emerging* player in the “Cloud” market and addressing hybrid clouds

Gartner Magic Quadrant



As of June 2009

# Examples of Federal Cloud Services

Tactical solutions

GSA Cloud Storefront -- Apps.gov, offering four categories of services currently available from vendors on the GSA Schedules: Business Apps, Cloud IT Services, Productivity Apps and Social Media Apps

*Google is developing a "government cloud," which it expects to launch in 2010. It will operate much like Google Apps, but will be tailored for U.S. federal, state, and local governments, and will be FISMA\* compliant.*

NASA Nebula – Nebula.NASA.gov, "A Cloud Computing environment combining a set of open-source components into a seamless self-service platform." Provides IaaS, PaaS, and SaaS services.

The screenshot shows the GSA Apps.gov website. The header includes the GSA logo, 'Apps.Gov', and 'A Service Provided by GSA'. There are navigation links for Home, Business Apps, Productivity Apps, Cloud IT Services, and Social Media Apps. A search bar is present. The main content area features a central graphic of a globe with various devices connected to it, titled 'Federal Cloud Computing Services'. To the right, there is a section titled 'What is Cloud Computing?' with a video player. Below this, there are four service categories: Business Apps, Cloud IT Services, Productivity Apps, and Social Media Apps, each with a brief description and a 'Watch the video now' button.

The screenshot shows the NASA Nebula Cloud Computing Platform website. The header includes the NASA logo and 'NEBULA Cloud Computing Platform'. There are navigation links for Home, About, Services, and Blog. The main content area features a central graphic of a computer monitor displaying a dashboard, titled 'Cloud Computing For a Universe of Data'. Below this, there is a section titled 'A Cloud Computing environment combining a set of open-source components into a seamless self-service platform.' with a 'More About NEBULA' button. At the bottom, there are three columns of text describing the platform's features: Rapid Deployment, Scalability, and Built for NASA.

\* FISMA — Federal Information Security Management Act

# Drivers and Risk Management

## Green IT

Supports goal to reduce federal energy consumption by 15% by 2020

Consolidation and shared IT resources dramatically reduce energy consumption

## Sustainable, Elastic, Resilient Platform

Accommodate fluctuations in resource demands (e.g., seasonal)

Ability to service unplanned spikes caused by unanticipated external events

Provide failover protection/high availability

## Cost Savings or Avoidance

Reduce current cost of operations by consolidating or outsourcing

Reduce or avoid capital expenditures required to meet new demands

Achieve economy of scale by sharing resources

## Risks

Security (FISMA compliance)

Network Bandwidth


Availability and Reliability

Vendor Lock-in

Loss of Operational Control

# Risk vs. Cost

- Risk Exposure
  1. Private clouds may have the least threat exposure
  2. Community clouds have manageable threat exposure
  3. Public clouds have the greatest (potential) threat exposure
- Cost Effectiveness
  1. Public clouds are usually the most cost effective
  2. Community clouds may offer significant cost reductions
  3. Private clouds may be least cost effective (although they offer significant cost improvement)
- Control of Security Architecture
  1. Private clouds provide an organization the greatest control
  2. Community clouds may introduce risk of inconsistent security policies
  3. Public clouds rely on the vendors' security policies and enforcement



Appropriate  
for sensitive  
data and  
processes

# Planning for the Cloud

**Always qualify what kind of Cloud you're talking about! Issues and Strategies are different.**

**Concerns common to (almost) all Cloud strategies, include:**

- Governance
- Change Management
- Service Level Requirements
- Security
- Disaster Recovery
- Capacity Planning

**Specific strategies and concerns vary, depending on the Service & Deployment Models**



# Service Oriented Architecture

# Definitions of Service Oriented Architecture

“Service-Oriented Architecture (SOA) is an *architectural style* that supports *service orientation*. *Service orientation* is a way of thinking in terms of services and service-based development and the outcomes of services.”, The Open Group

“Service-Oriented Architecture (SOA) is an IT architectural style that supports the transformation of your business into a set of linked services, or repeatable business tasks, that can be accessed when needed over a network.”, IBM

SOA is a set of Principles followed during design, and is applicable at all levels of the business-IT “stack”  
SOI -- SOA -- SOE

## SOA is not:

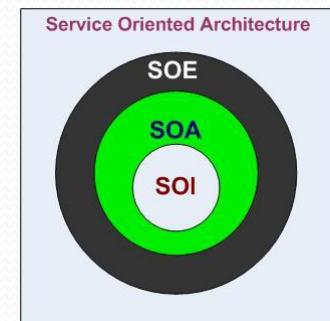
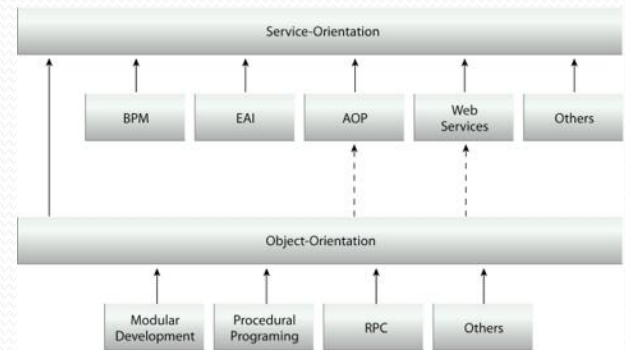
- a methodology;
- an architecture;
- technologies

“SOA represents an open, agile, extensible, federated, composable architecture comprised of autonomous, QoS-capable, vendor diverse, interoperable, discoverable, and potentially reusable services, implemented as Web services.”, Thomas Erl, SOA author and thought leader

SOA is an architectural paradigm--applicable at any level of the business/IT stack--that promotes loose coupling, interoperability and reuse.

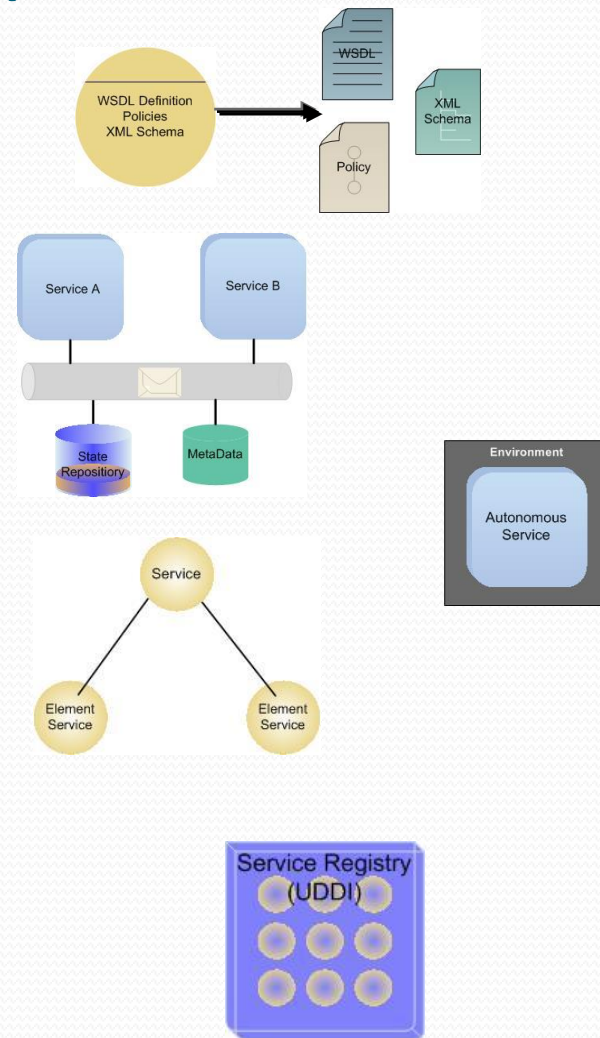
# Evolution of SOA

- First used by Gartner in 1996
- Gained initial acceptance with the introduction of SOAP, then Web Services
- Major applications of SOA from 2001–2005 resulted in
  - Rich set of lessons learned
  - Best practices emerged
  - Realistic expectations, better understood
- Extended to define Service Oriented Infrastructure (SOI) and Service Oriented Enterprise (SOE)
- Followed the classic Gartner Hype Cycle with a very deep Trough of Disillusionment



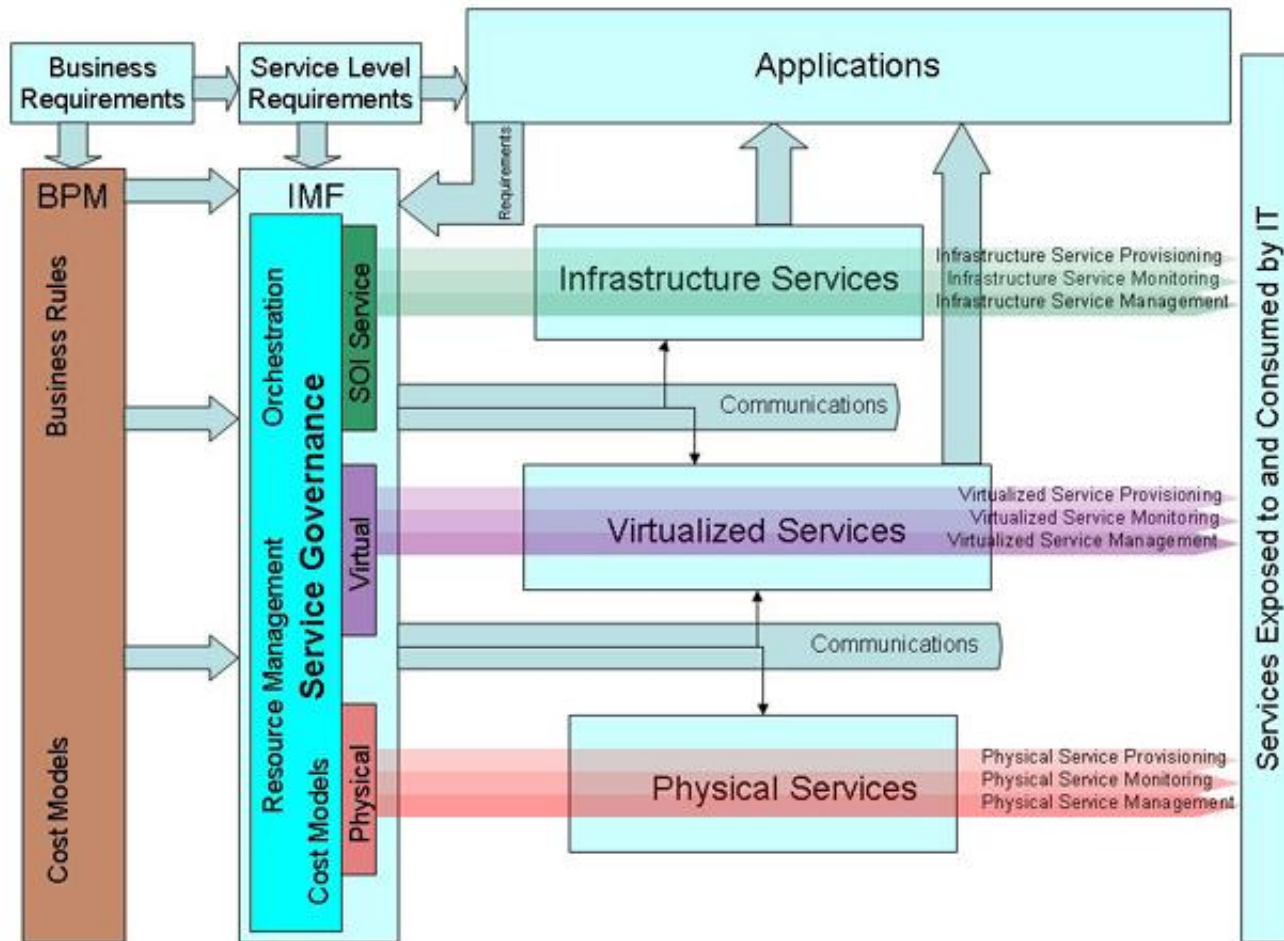
# SOA Principles

- Standard Service Contracts
- Loose Coupling
- Service Abstraction
- Service Autonomy
- Service Composability
- Statelessness (minimum state)
- Service Discoverability



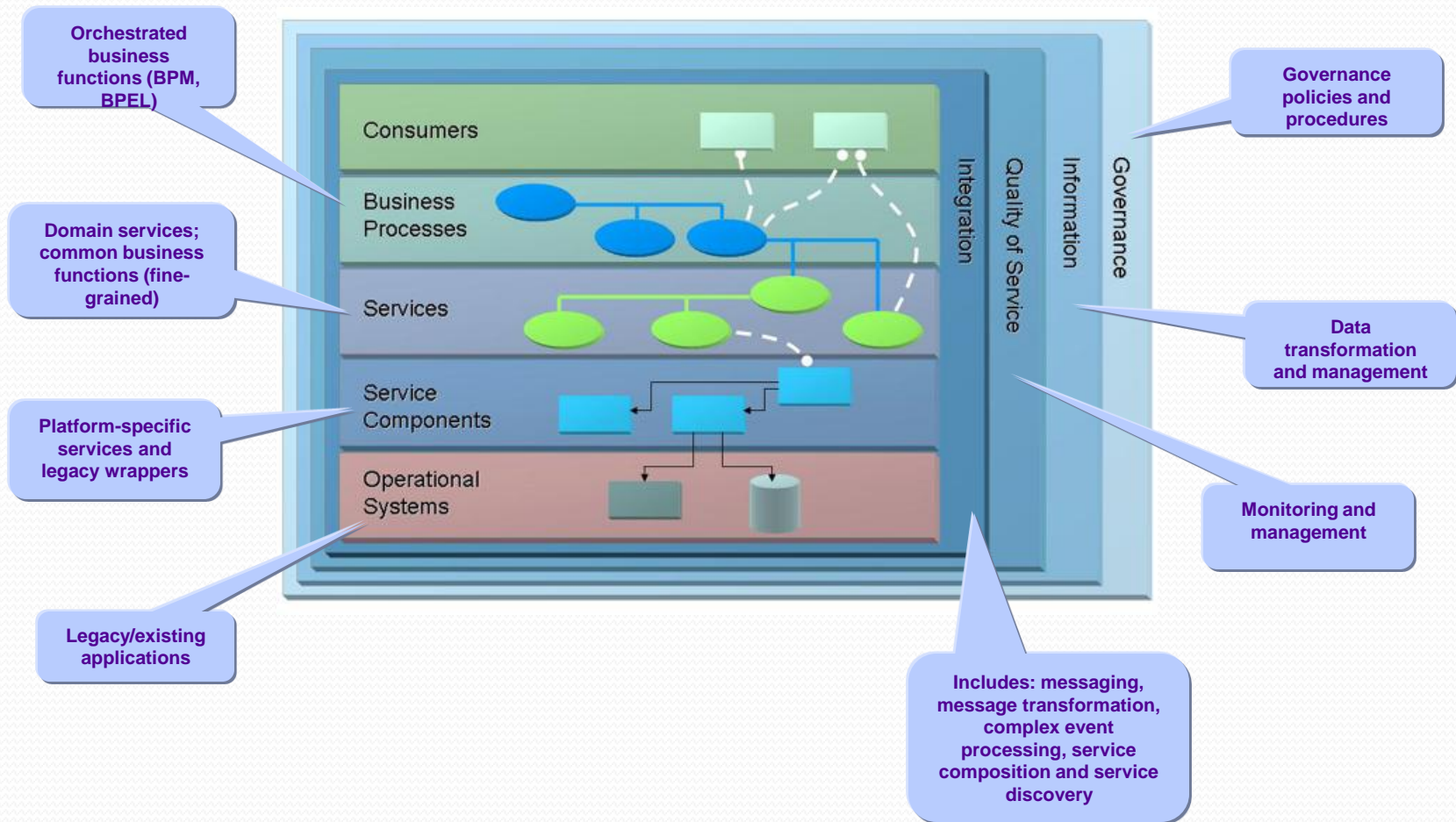
Diagrams courtesy of Thomas Erl

# Enterprise SOA Architecture Stack



Source: The Open Group

# SOA Reference Model



# SOA Framework: Features and Benefits

- **Event-enabled distributed architecture**
  - Event framework fully distributed
  - Symmetric across all instances of the cloud (location transparency)
- **Flexible service-enabled composable processes**
  - Course-grained enterprise services
  - Loose coupling
- **Enterprise standards support**
  - Data exchange (XML, JSON, NEIM)
  - Messaging
  - LDAP

# SOA Framework: Features and Benefits

- **Fault tolerance, reliability, and scalability**
  - Symmetric, peer-based
  - No single-point-of-failure
- **Security in distributed environment**
  - User/role based
  - Service access policies
  - Data access and encryption
- **Run-time Governance**
  - Process deployment
  - Service lifecycle monitoring and management
  - Service versioning
  - Queue management



# Service Oriented Architecture and Cloud Computing

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