Cloud Service Models

ACKNOWLEDGEMENTS

- This presentation has been made from various sources with minimum modifications from the presenter.
- The presenter is grateful to the authors of those various sources.
- The presenter acknowledge the efforts of those authors and thank them wholeheartedly.

Cloud Computing Characteristics: Summary

Common Characteristics:

- Massive Scale
- Resilient Computing
- Homogeneity
- Geographic Distribution
- Virtualization
- Service Orientation
- Low Cost Software
- Advanced Security

Essential Characteristics:

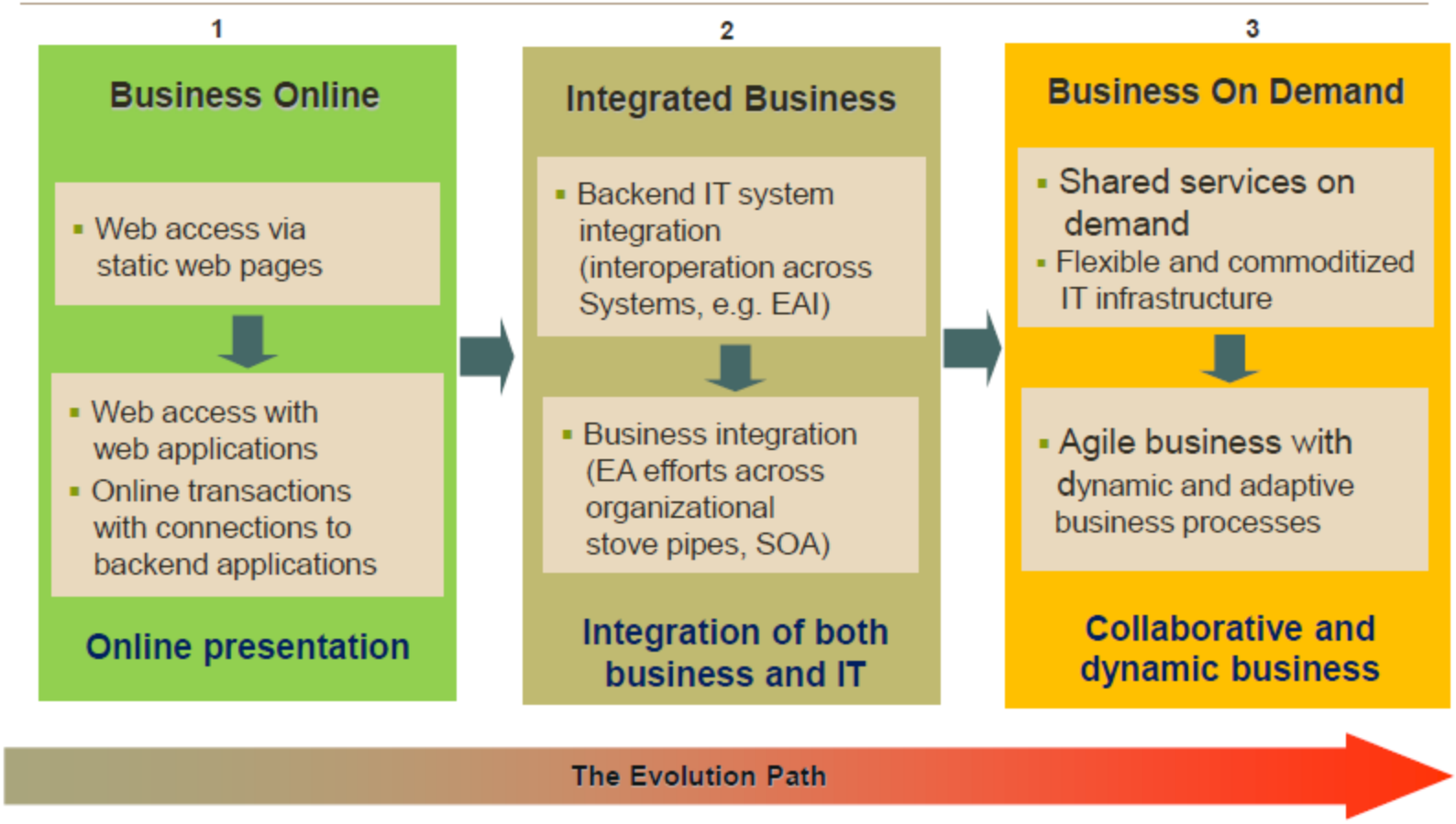
- On Demand Self-Service
- Broad Network Access
- Rapid Elasticity
- Resource Pooling
- Measured Service

Applications that move to Cloud: Summary

- Business/Enterprise Applications
- Resource Intensive Applications
  - Compute
  - Storage
- Collaborative Applications

ENTERPRISE IT

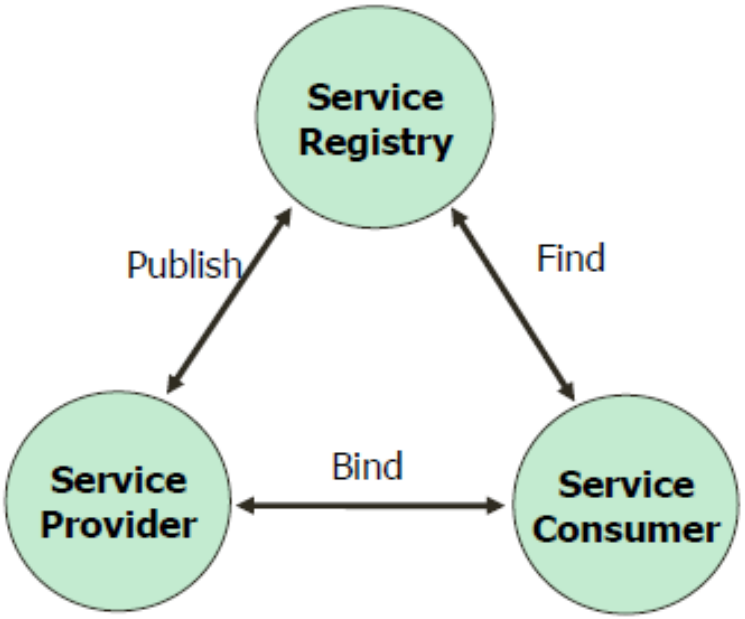
Business Evolution with IT



The Progress in Federal Enterprise Architecture

- **EA Federation**
  - The federation model fits federal government organization structure
- **EA Segmentation**
  - Segments are defined based on the lines of business (LoB)
- **Service Orientation**
  - As an architectural style and approach, is well adopted in architectural practice and solution implementation
- **Cloud Computing**
  - It is one form of the technical implementations of SOA concept

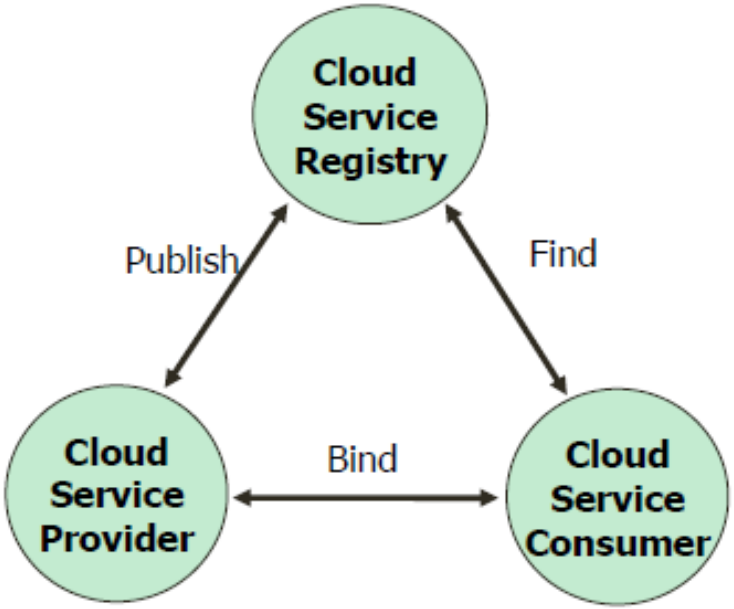
SOA Conceptual Model



- **Service Provider:** who publish services to Service Registry
- **Service Consumer:** who find services from Service Registry and use (or "bind" to) them
- **Service Registry:** where contains information for available services.
- **Publish:** providers announce service availability to consumers via Service Registry
- **Find:** consumers discover available services inside Registry
- **Bind:** a service provider and a service consumer reached agreement, and the consumer connected to the service to consume it.

Cloud Computing Model

Cloud Service Model



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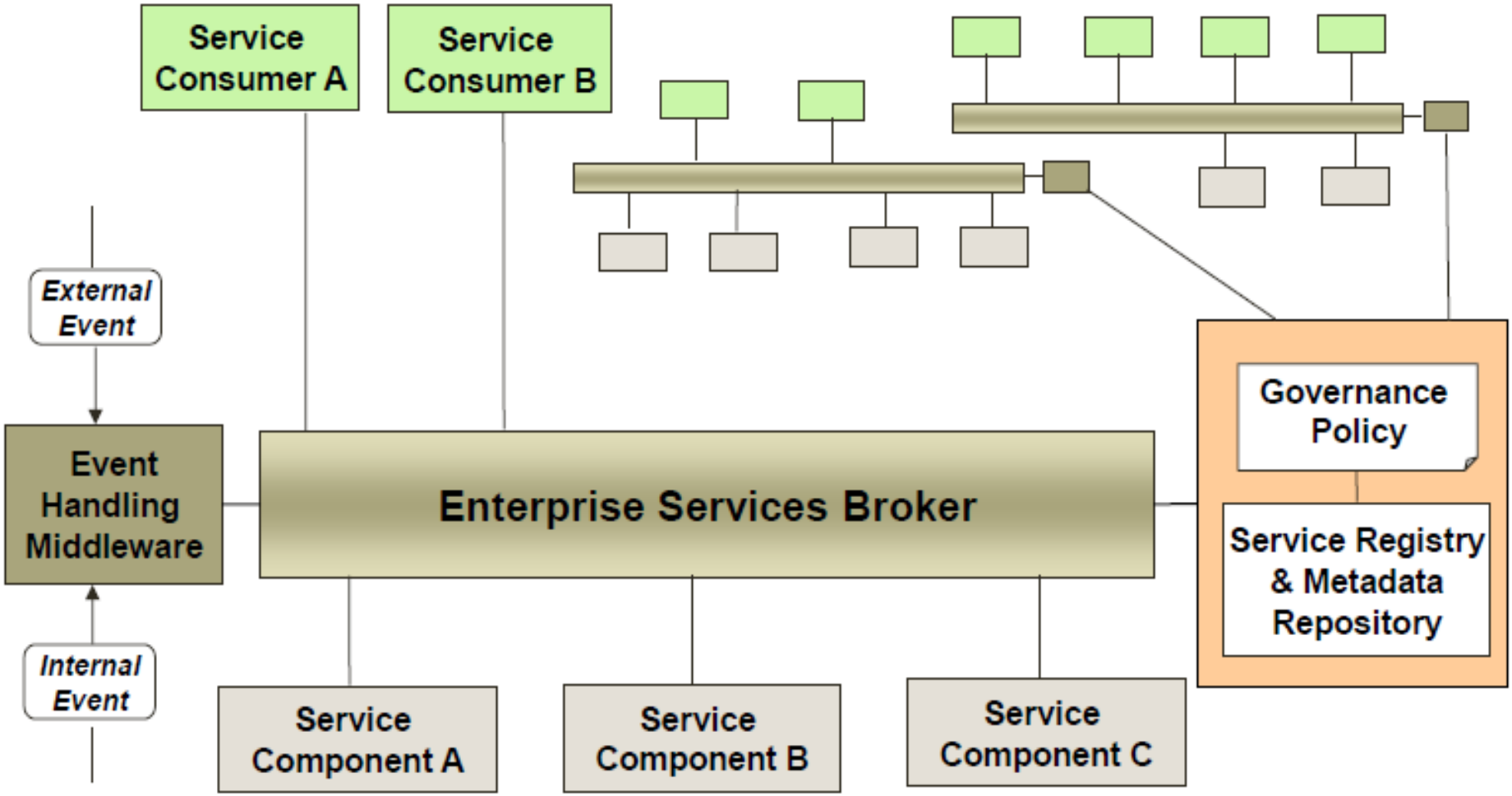
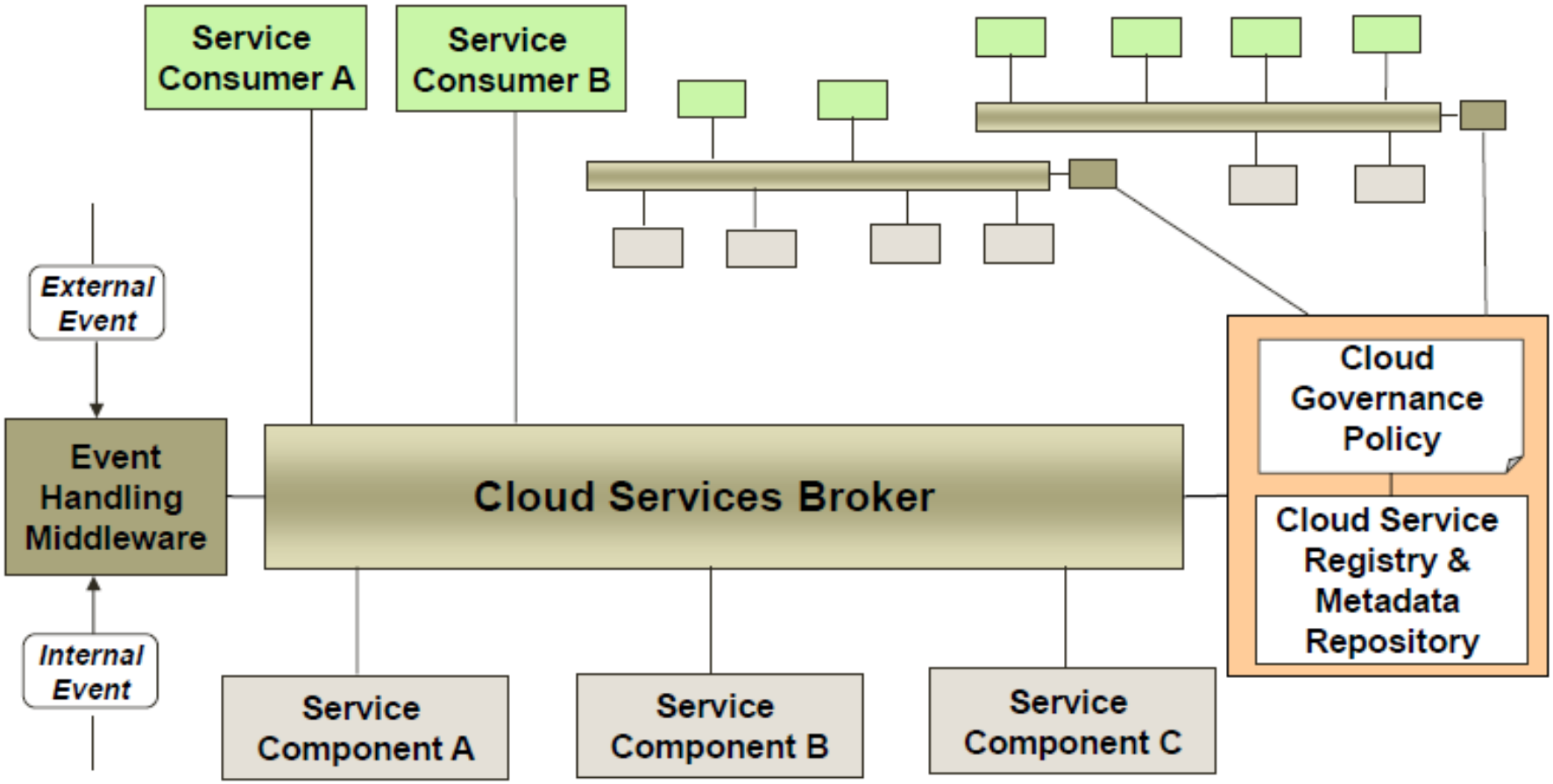
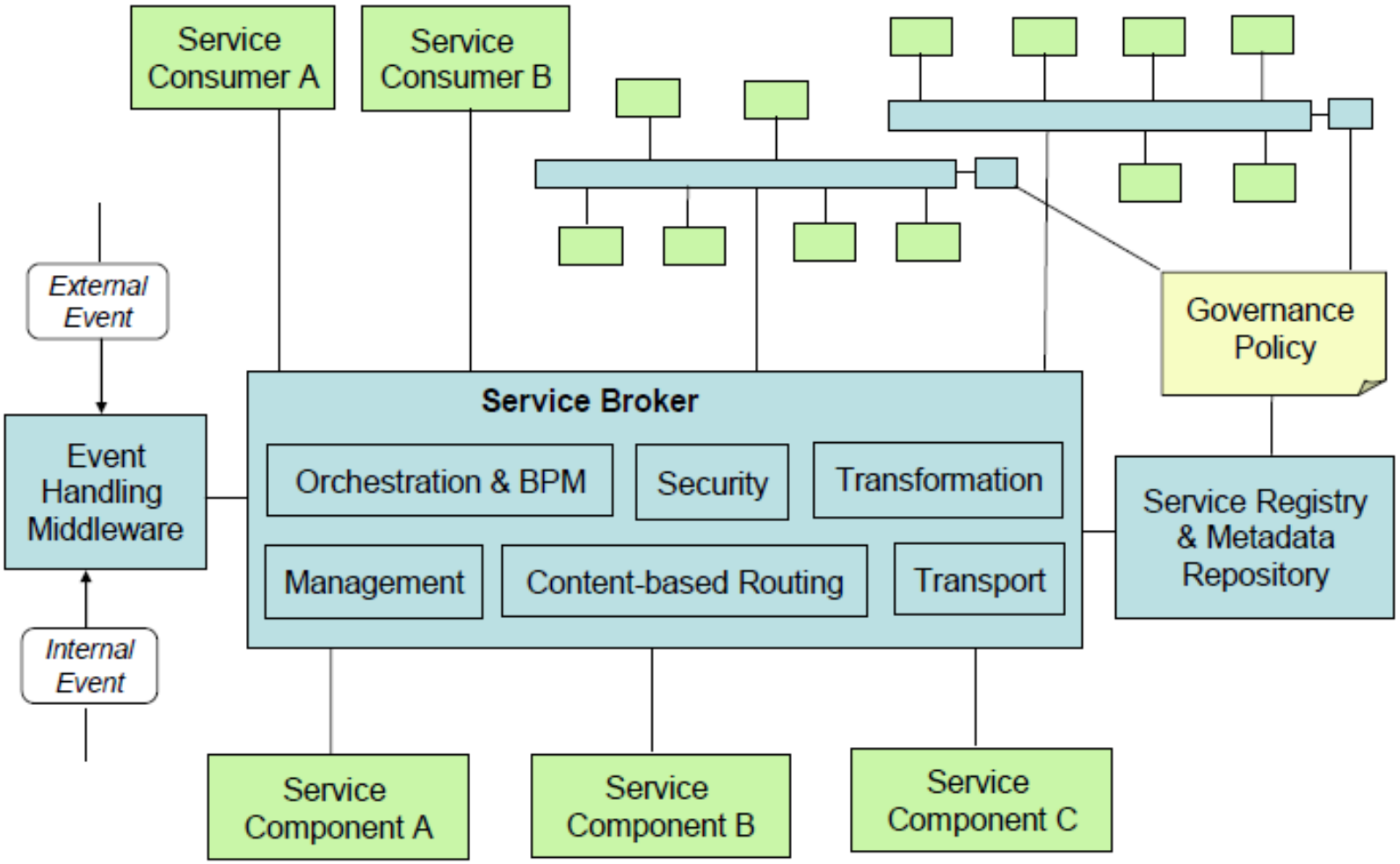
Federated Service Infrastructure



Federated Cloud Service



What the Service Broker Means for Cloud



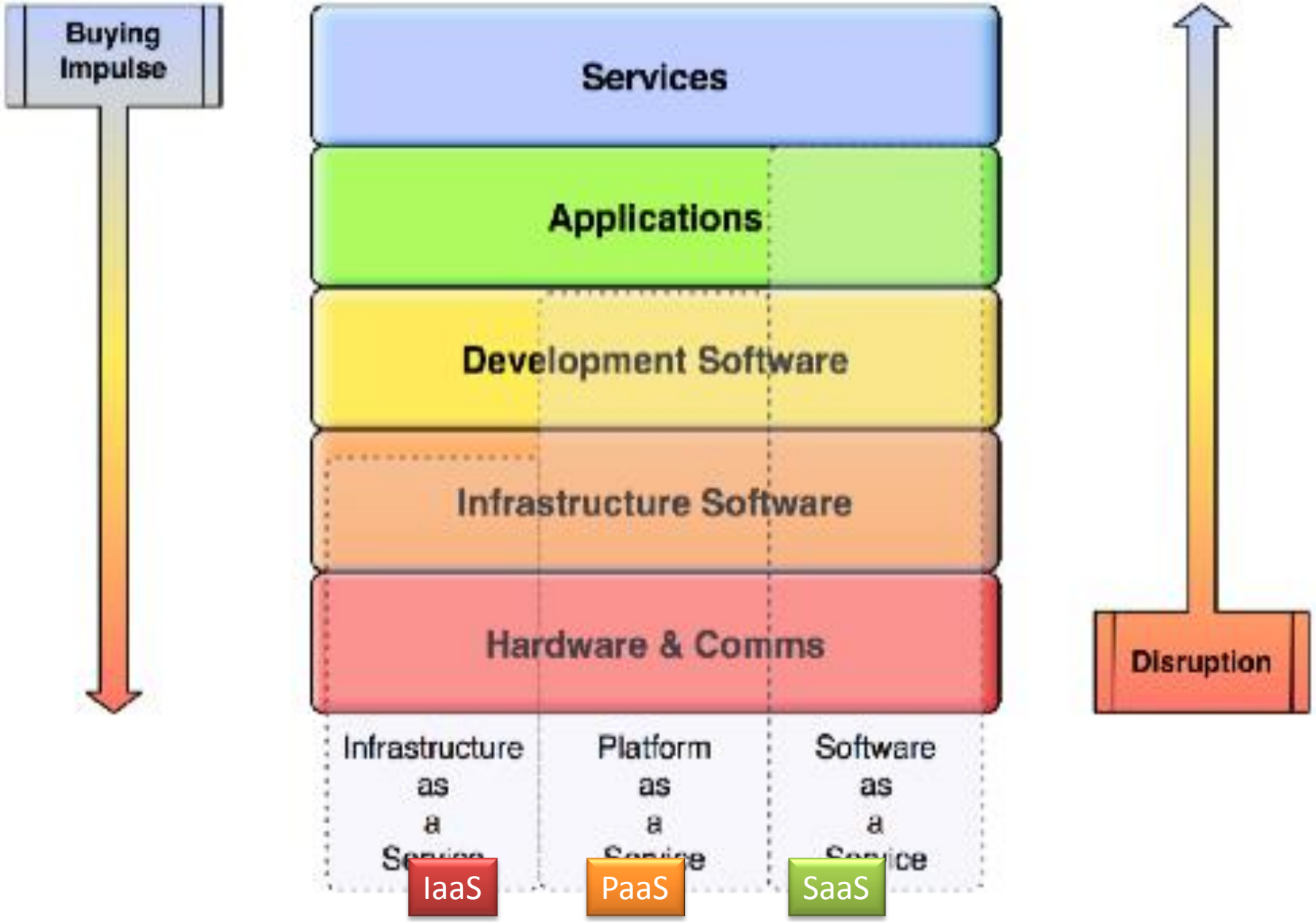
CLOUDS BASED ON “SERVICE”

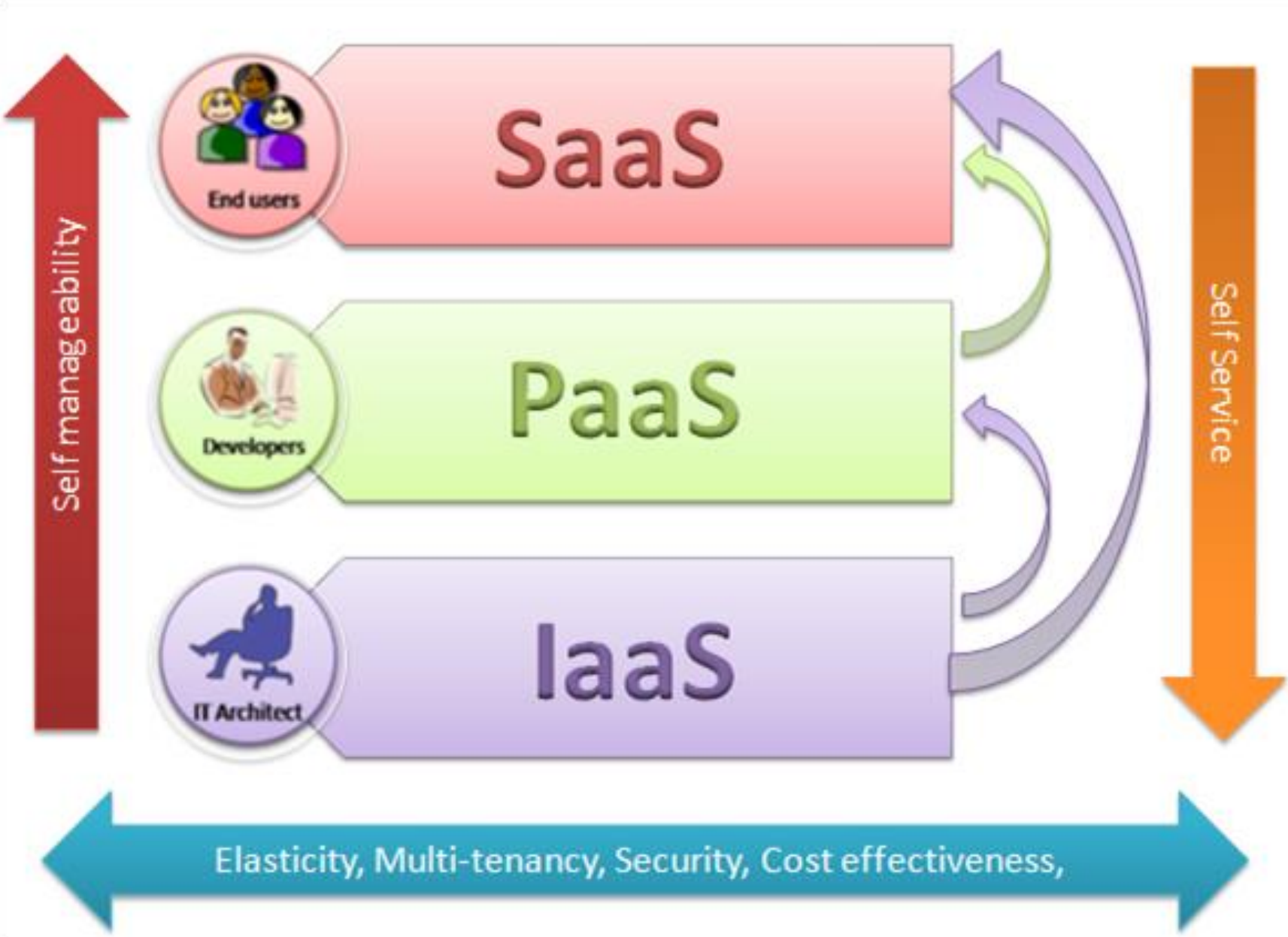
Cloud Categories based on SERVICE

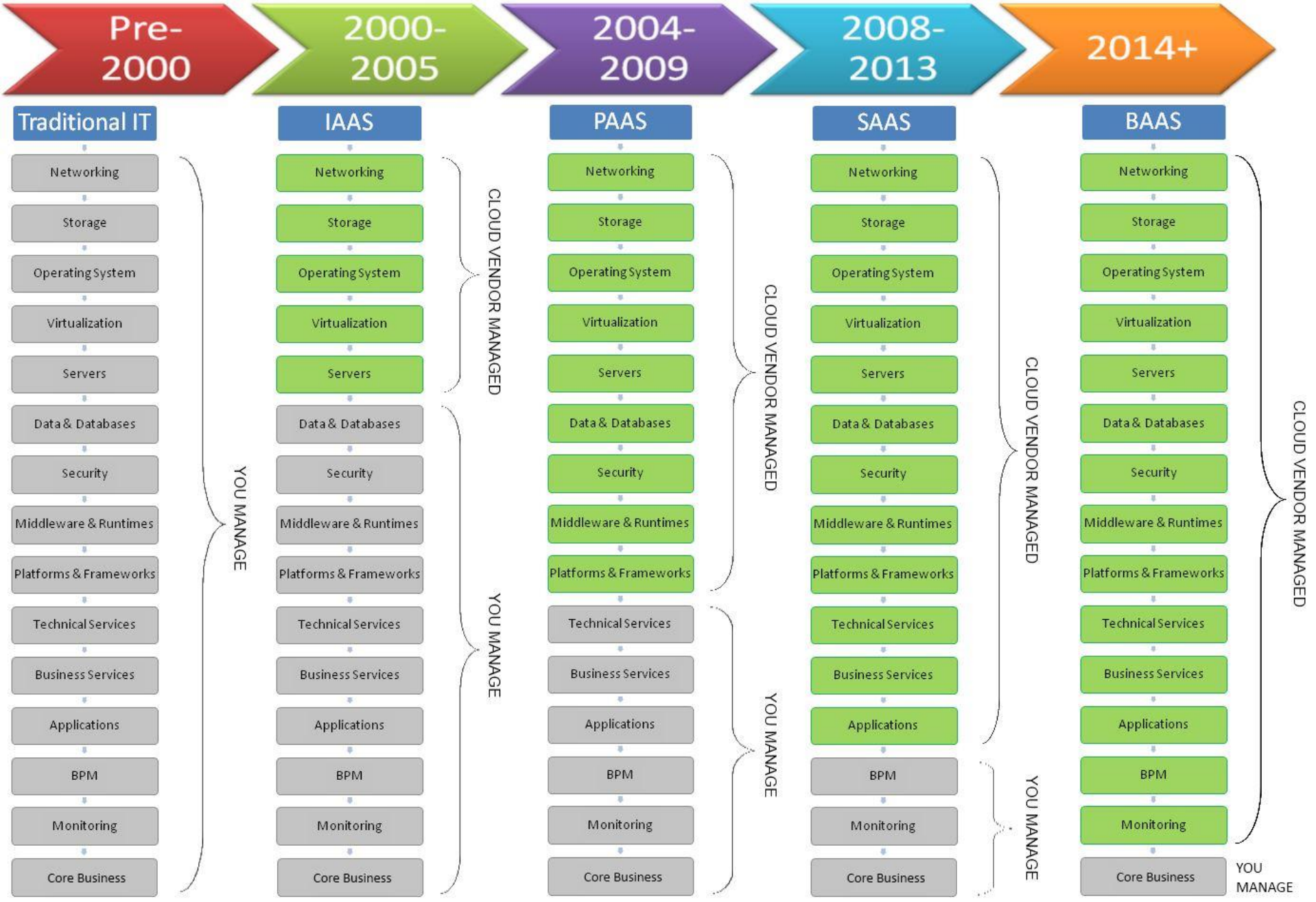
- Software as a Service (SaaS)
  - An application or suite of applications is offered as service
  - Eg., Salesforce.com
- Platform as a Service (PaaS)
  - Users can develop their own applications with given platform.
  - Ex: Google App Engine, Microsoft's Windows Azure platform
- Infrastructure as a Service (IaaS)
  - Users can setup their own platform and applications on virtual machines.
  - Ex: Amazon Elastic Compute Cloud (Amazon EC2), Amazon Simple Storage Service (Amazon S3).

Cloud computing services

- Data as a Service
- Desktop as a Service
- Storage as a Service
- …


Buying Impulse
Services
Applications
Development Software
Infrastructure Software
Hardware & Comms
Infrastructure as a Service
Platform as a Service
Software as a Service
IaaS
PaaS
SaaS
Disruption


Self manageability
End users
SaaS
Developers
PaaS
IT Architect
IaaS
Self Service
Elasticity, Multi-tenancy, Security, Cost effectiveness,


Pre-2000
2000-2005
2004-2009
2008-2013
2014+
Traditional IT
IAAS
PAAS
SAAS
BAAS
Networking
Storage
Operating System
Virtualization
Servers
Data & Databases
Security
Middleware & Runtimes
Platforms & Frameworks
Technical Services
Business Services
Applications
BPM
Monitoring
Core Business
YOU MANAGE
CLOUD VENDOR MANAGED
CLOUD VENDOR MANAGED
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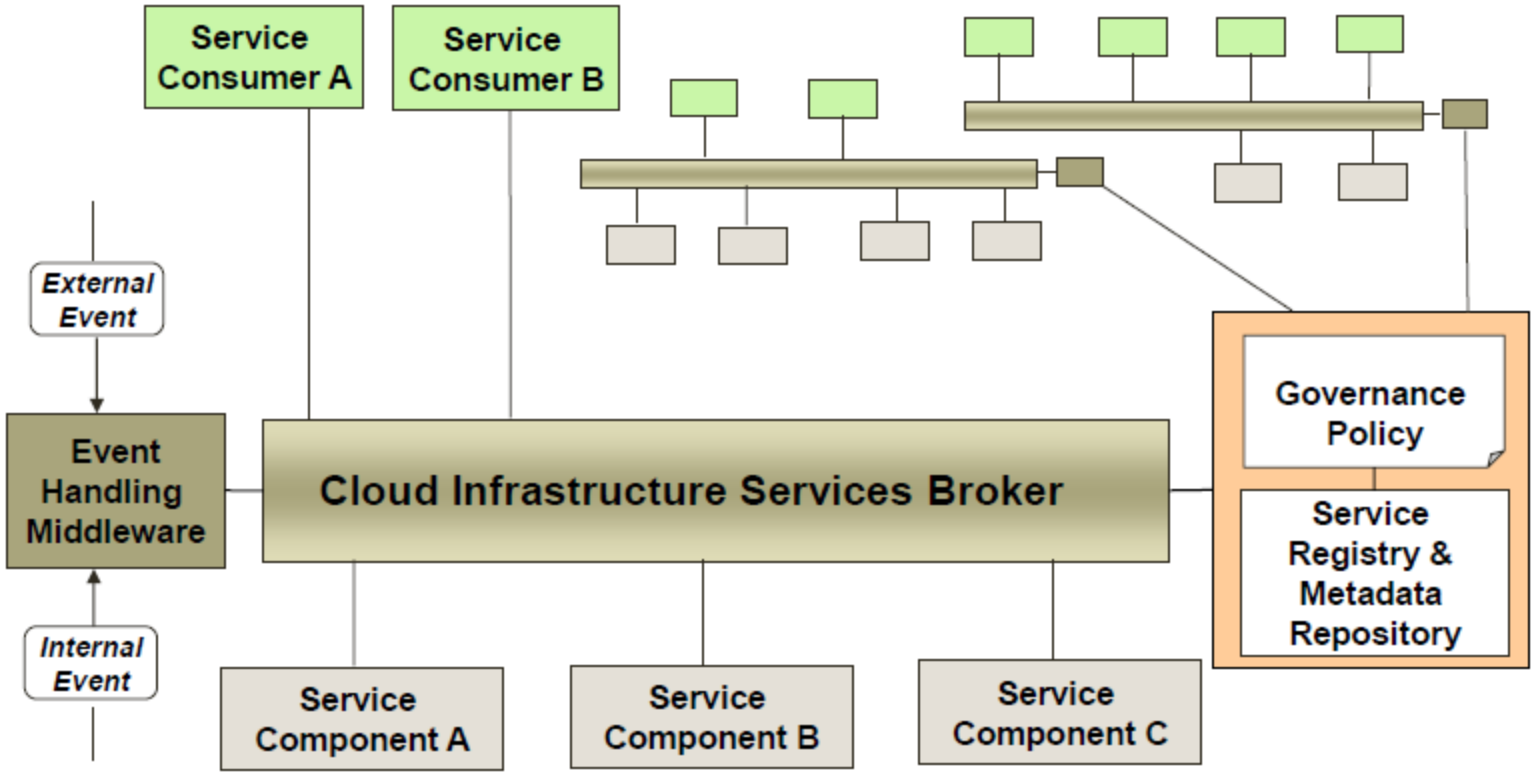
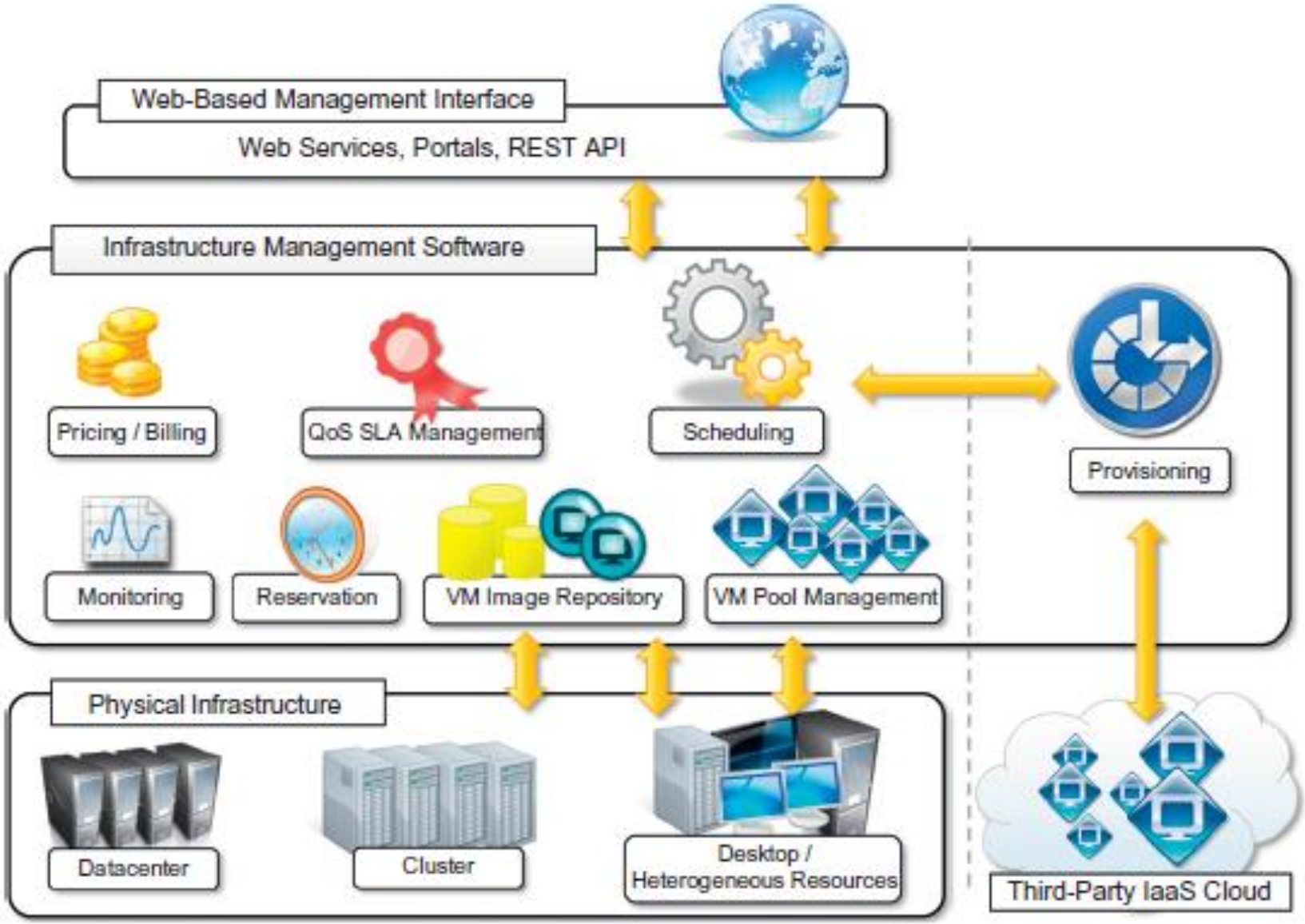
Infrastructure Cloud Service (IaaS)



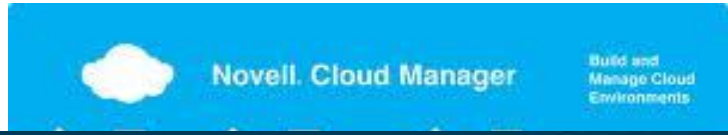
IAAS Reference

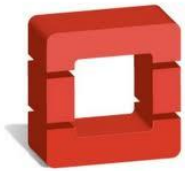


IaaS

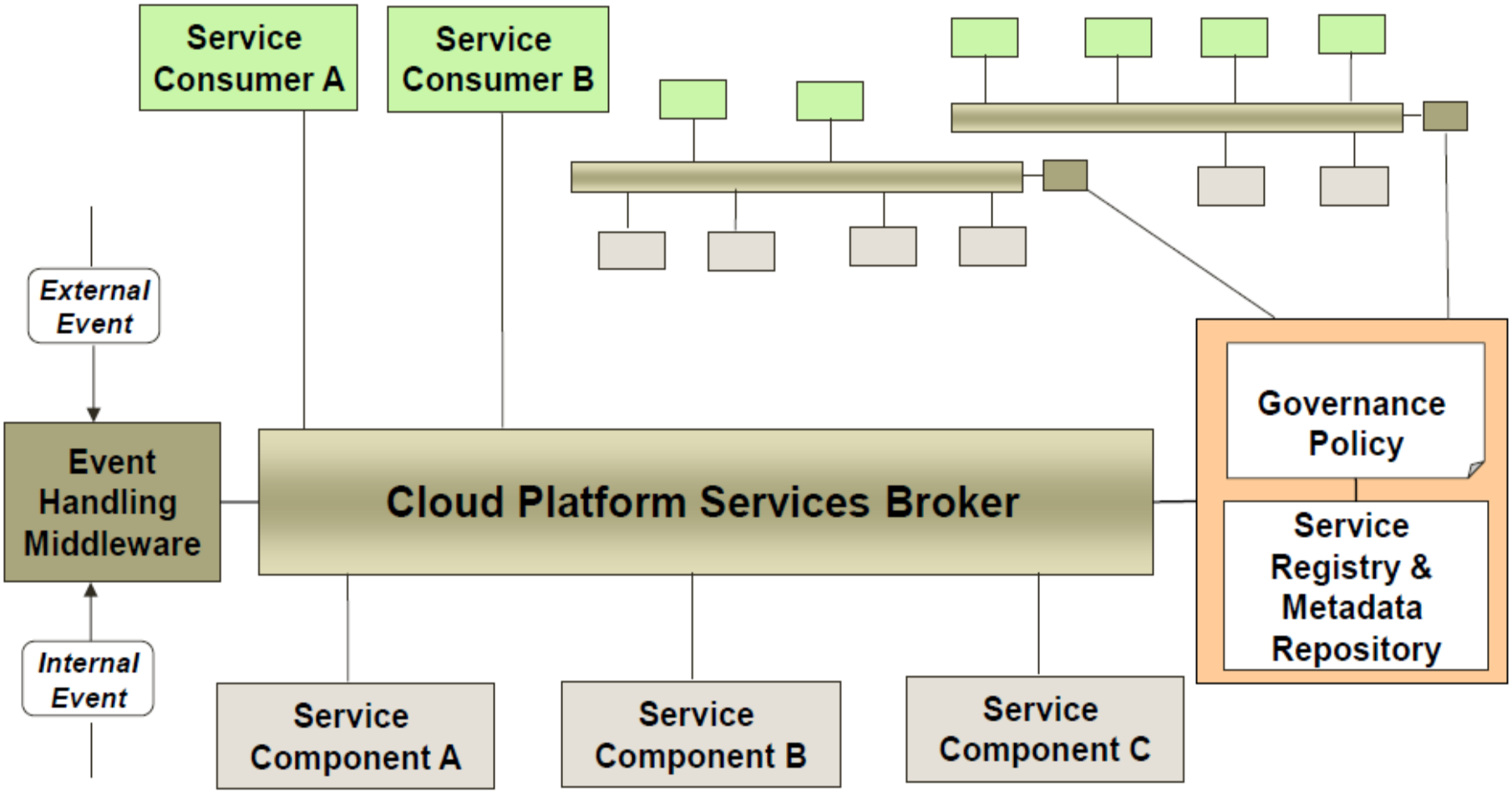
- Agathon Group - Cloud provider. Services include highly available VPS, virtual private datacenters and ready-to-use LAMP stacks. Self-service ordering. Custom development and managed services available.
- Amazon Web Services - Amazon EC2/S3 (Hardware-a-a-S & Cloud Storage)
- CohesiveFT - CohesiveFT Elastic Server On-Demand
- ElasticHosts - UK-based instant, on-demand servers in the cloud
- Flexiscale - Another instant provisioner of web servers with some advanced features like auto-scaling coming soon.
- GoGrid - instant, on-demand servers offering "control in the cloud". Deploy Windows/Linux servers via web-interface in minutes

Cloud Platforms (IaaS Software) [1]

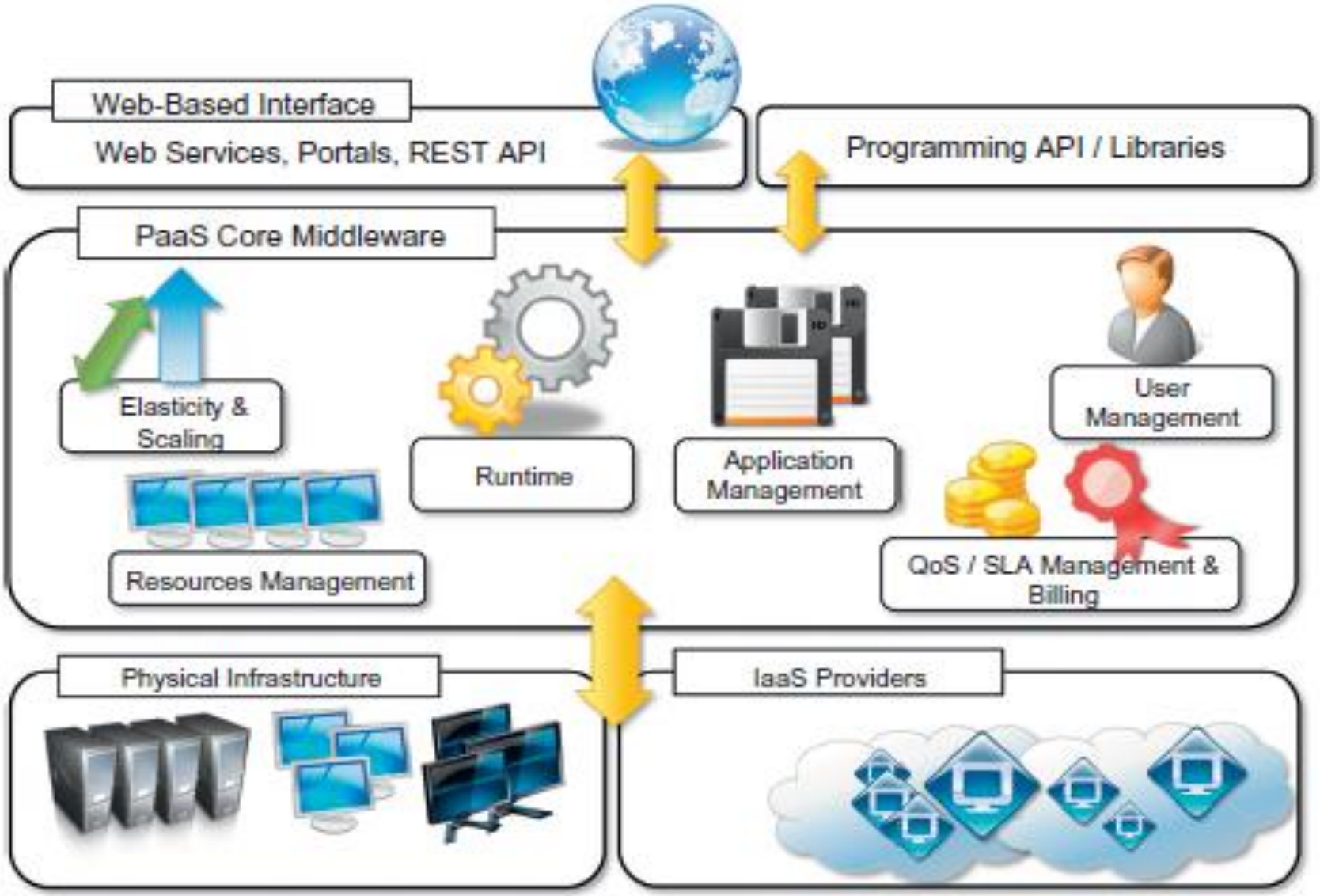




Platform Cloud Service (PaaS)



Paas Reference



PaaS

- Bungee Connect - Provides end to end tools and systems required to develop, deploy and host web applications (Platform as a Service)
- Coherence - Oracle Coherence Data Grid for EC2 and other cloud platforms
- Force.com - Salesforce.com's application development platform (PaaS)
- GigaSpaces - middleware for the cloud, "cloudware"
- Google AppEngine - (PaaS)Now support python
- Heroku - Ruby on Rails in their Cloud
- RightScale - RightScale provides a platform and expertise that enable companies to create scalable web applications running on Amazon's Web Services that are reliable, easy to manage, and cost less

PaaS Providers [6,7]

Current Products Classification

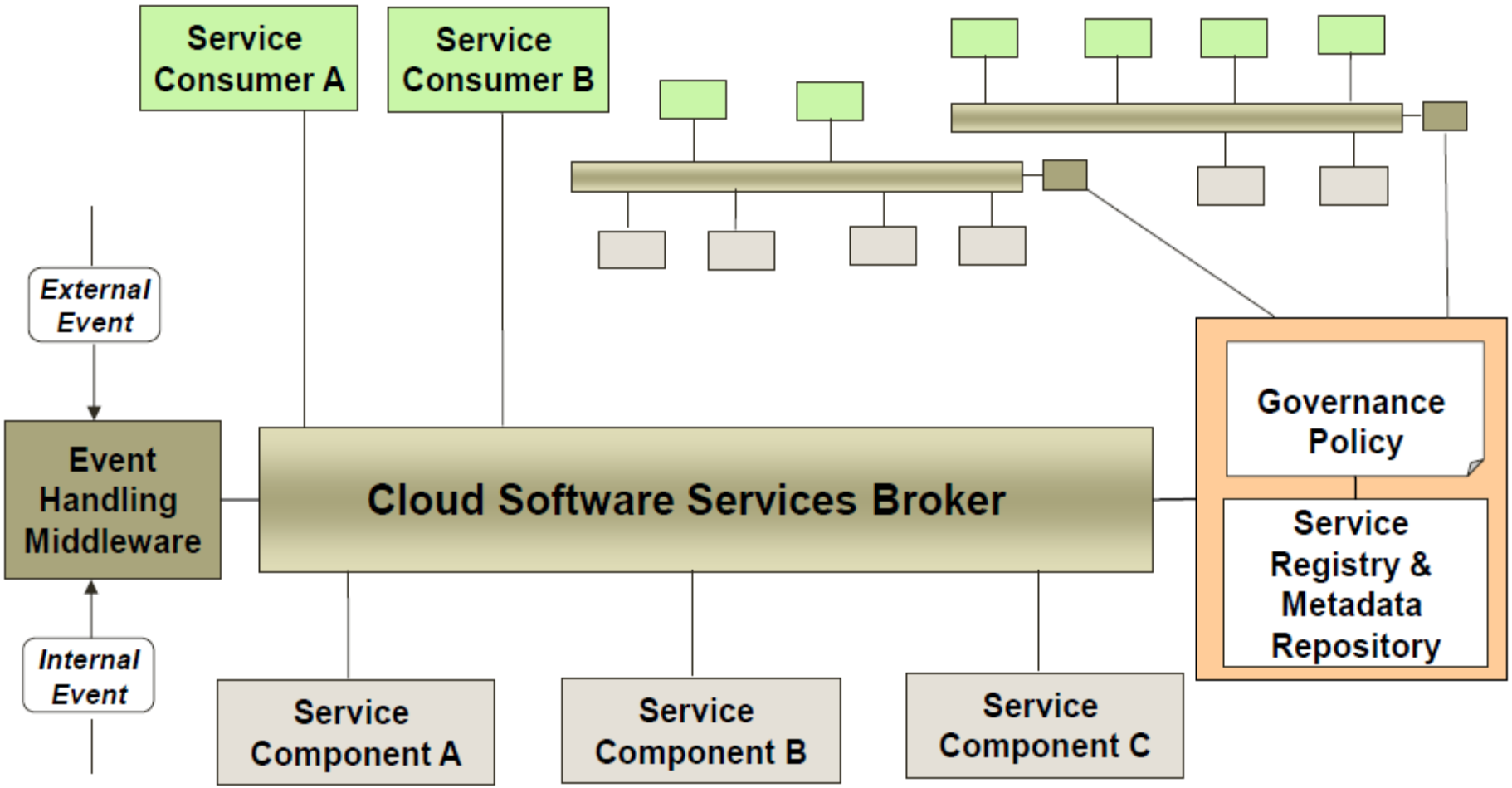
Table 4.2 Platform-as-a-Service Offering Classification

Category	Description	Product Type	Vendors and Products
PaaS-I	Runtime environment with Web-hosted application development platform. Rapid application prototyping.	Middleware + Infrastructure Middleware + Infrastructure	Force.com Longjump
PaaS-II	Runtime environment for scaling Web applications. The runtime could be enhanced by additional components that provide scaling capabilities.	Middleware + Infrastructure Middleware Middleware + Infrastructure Middleware + Infrastructure Middleware + Infrastructure Middleware	Google AppEngine AppScale Heroku Engine Yard Joyent Smart Platform GigaSpaces XAP
PaaS-III	Middleware and programming model for developing distributed applications in the cloud.	Middleware + Infrastructure Middleware Middleware Middleware Middleware Middleware	Microsoft Azure DataSynapse Cloud IQ Manjrasof Aneka Apprenda SaaSGrid GigaSpaces DataGrid

Software as a Service (SaaS)

- SaaS is a model of software deployment where an application is hosted as a service provided to customers across the Internet.
- Saas alleviates the burden of software maintenance/support
  - but users relinquish control over software versions and requirements.
- Terms that are used in this sphere include
  - **Platform as a Servic**e (PaaS) and
  - **Infrastructure as a Service** (IaaS)

Software Cloud Service (SaaS)



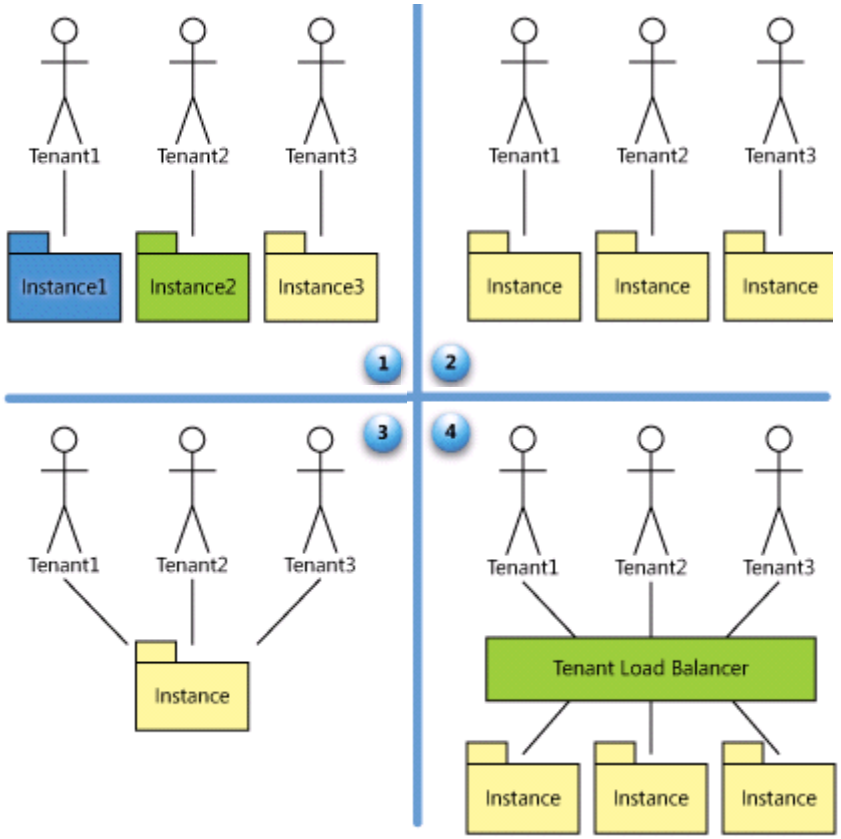
SaaS Maturity Model

Level 1: Ad-Hoc/Custom – One Instance per customer

Level 2: Configurable per customer

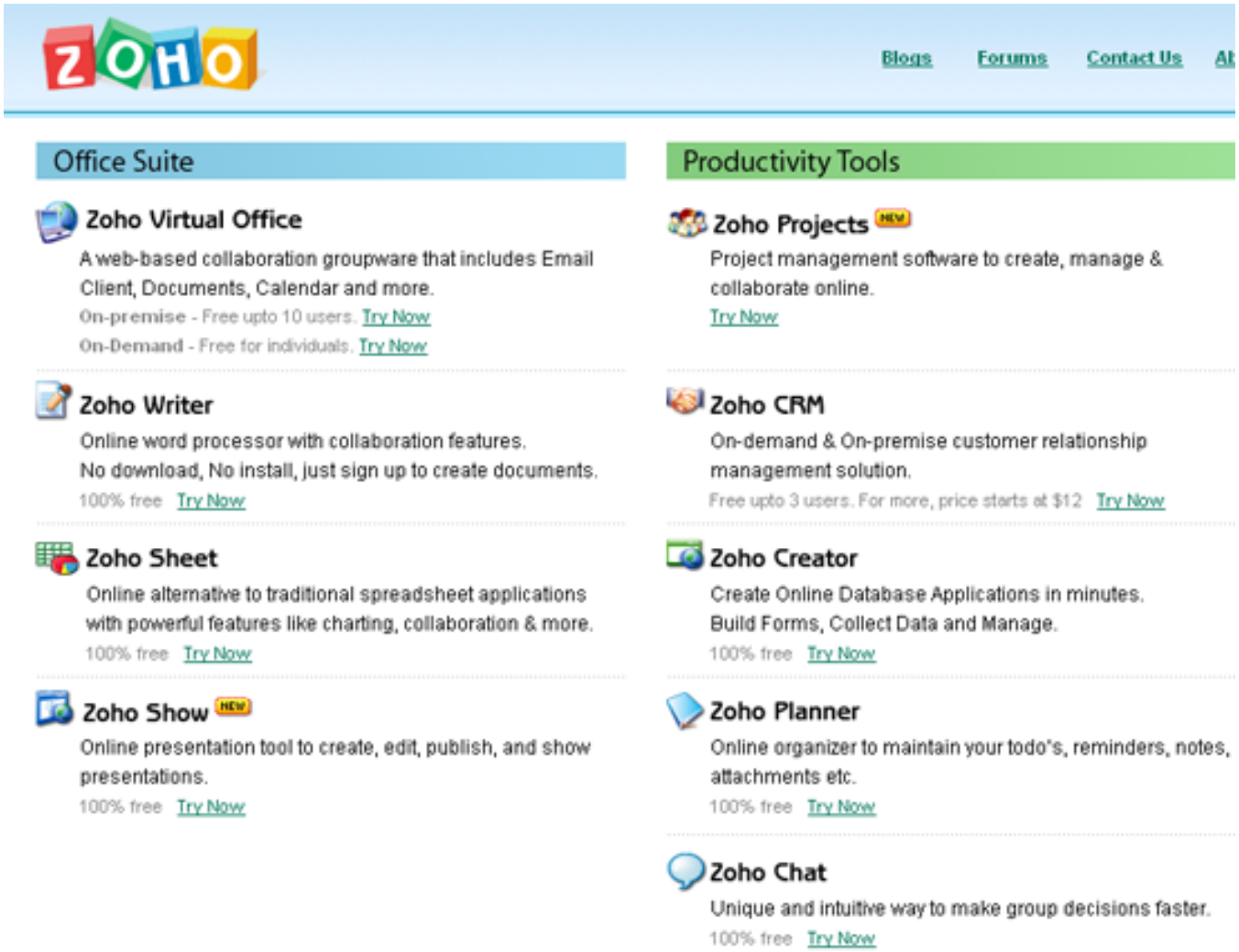
Level 3: configurable & Multi-Tenant-Efficient

Level 4: Scalable, Configurable & Multi-Tenant-Efficient



Source: Frederick Chong and Gianpaolo Carraro, "Architectures Strategies for Catching the Long Tail"

SaaS


ZOHO
Blogs
Forums
Contact Us
Office Suite
Zoho Virtual Office
A web-based collaboration groupware that includes Email Client, Documents, Calendar and more.
On-premise - Free upto 10 users. Try Now
On-Demand - Free for individuals. Try Now
Zoho Writer
Online word processor with collaboration features.
No download, No install, just sign up to create documents.
100% free Try Now
Zoho Sheet
Online alternative to traditional spreadsheet applications with powerful features like charting, collaboration & more.
100% free Try Now
Zoho Show
Online presentation tool to create, edit, publish, and show presentations.
100% free Try Now
Productivity Tools
Zoho Projects
Project management software to create, manage & collaborate online.
Try Now
Zoho CRM
On-demand & On-premise customer relationship management solution.
Free upto 3 users. For more, price starts at $12 Try Now
Zoho Creator
Create Online Database Applications in minutes.
Build Forms, Collect Data and Manage.
100% free Try Now
Zoho Planner
Online organizer to maintain your todo's, reminders, notes, attachments etc.
100% free Try Now
Zoho Chat
Unique and intuitive way to make group decisions faster.
100% free Try Now

Top 25 Most Popular SaaS Providers -

(http://www.saasdir.com)

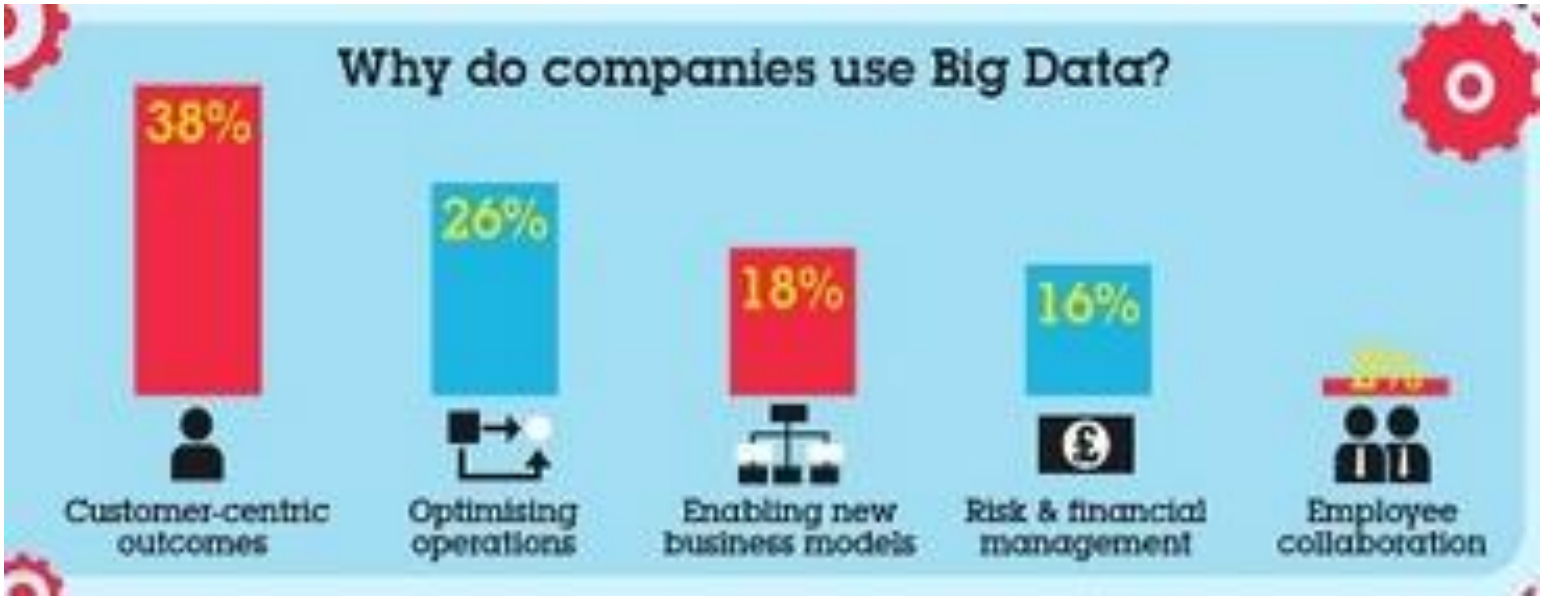
DaaS

- Cloud strategy used to facilitate the accessibility of business-critical data in a well-timed, protected and affordable manner.
- Useful data can be supplied to users on demand, irrespective of any organizational or geographical separation between consumers and providers.

Why DaaS

- Elastic scalability
- Universal network accessibility
- Integration with mobile platforms
- Pay-per-use efficiencies
- Avoidance of capital costs
- The ability to work with widely scattered structured and unstructured data (ie. Big Data)

(BIG)Data as a service

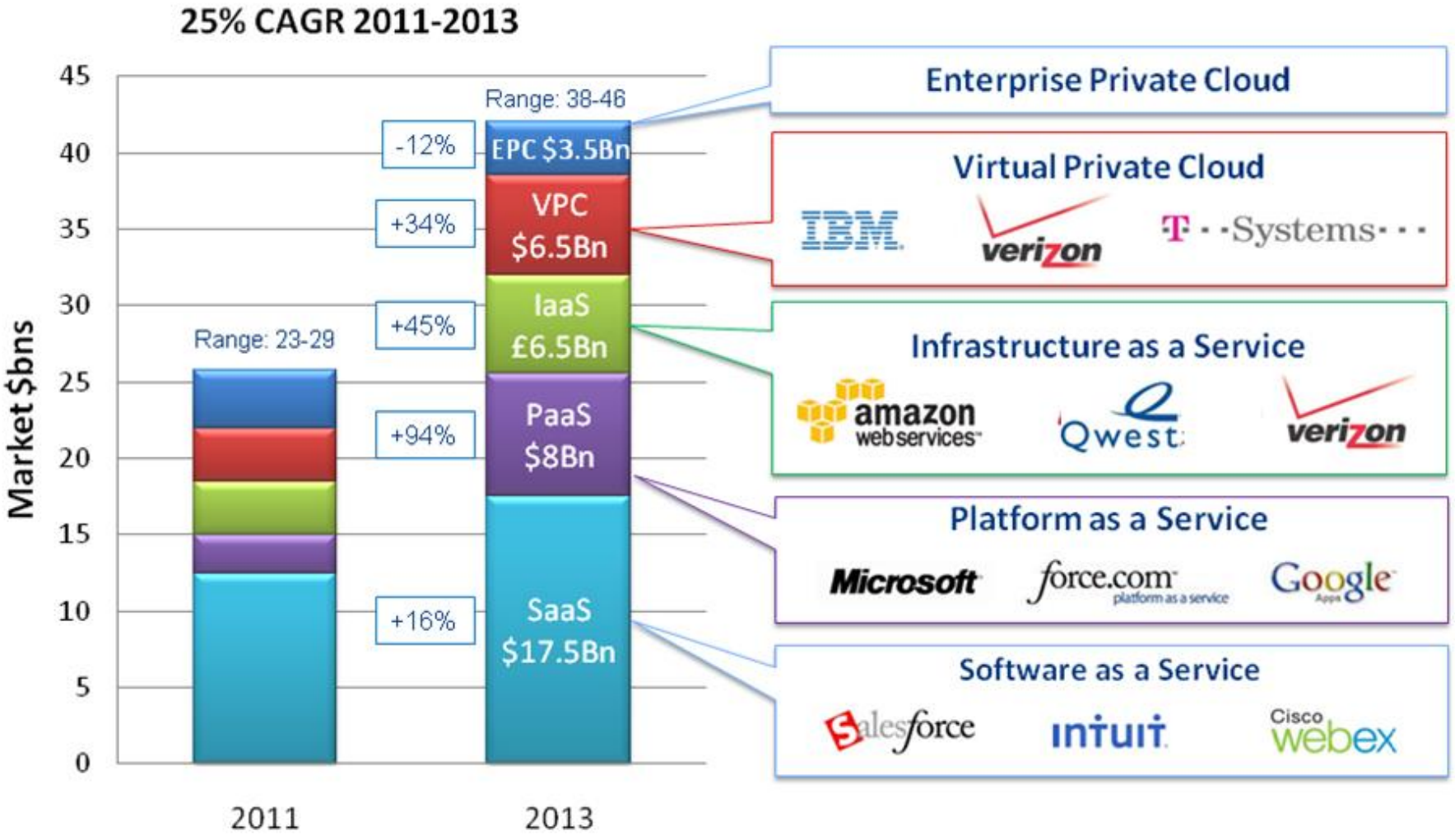


Cloud Computing Layers

www.Telezent

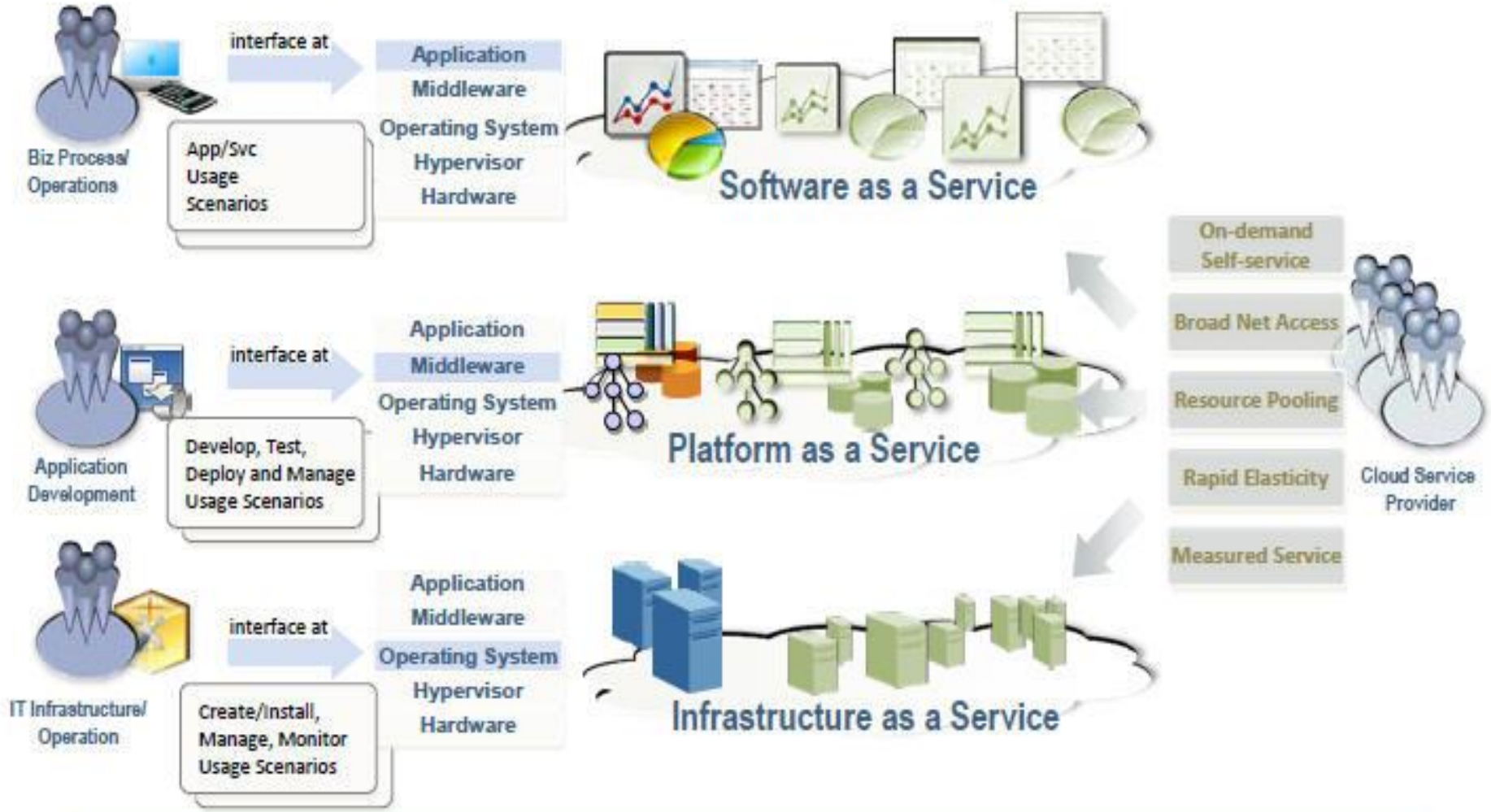
*Assumed to incorporate subordinate layers.

Cloud services: market forecast and current players

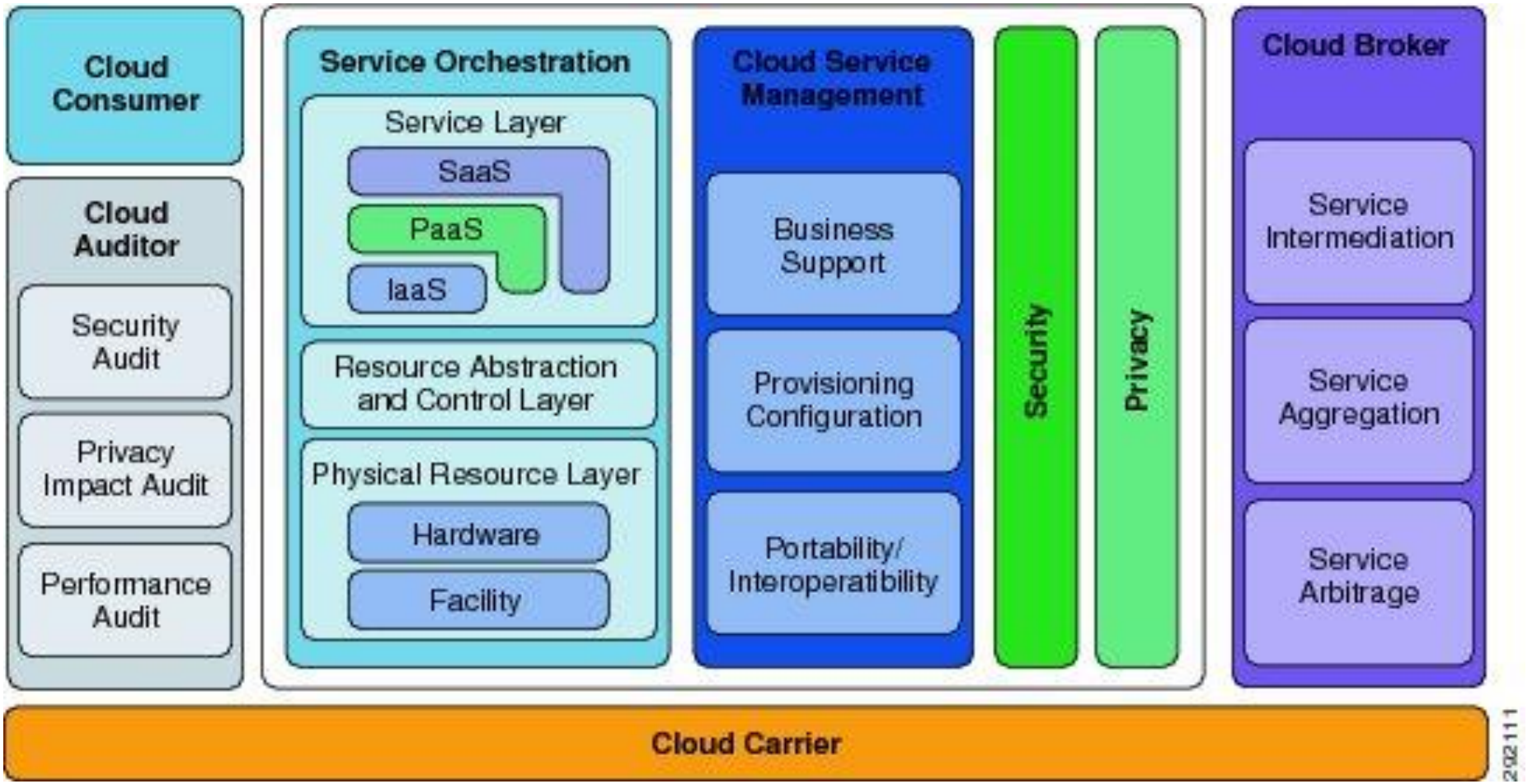


Source: Bain Analysis, Forrester, IDC, Gartner, William Blair & Co.

Concept? : Cloud Computing Conceptual Model and Requirements



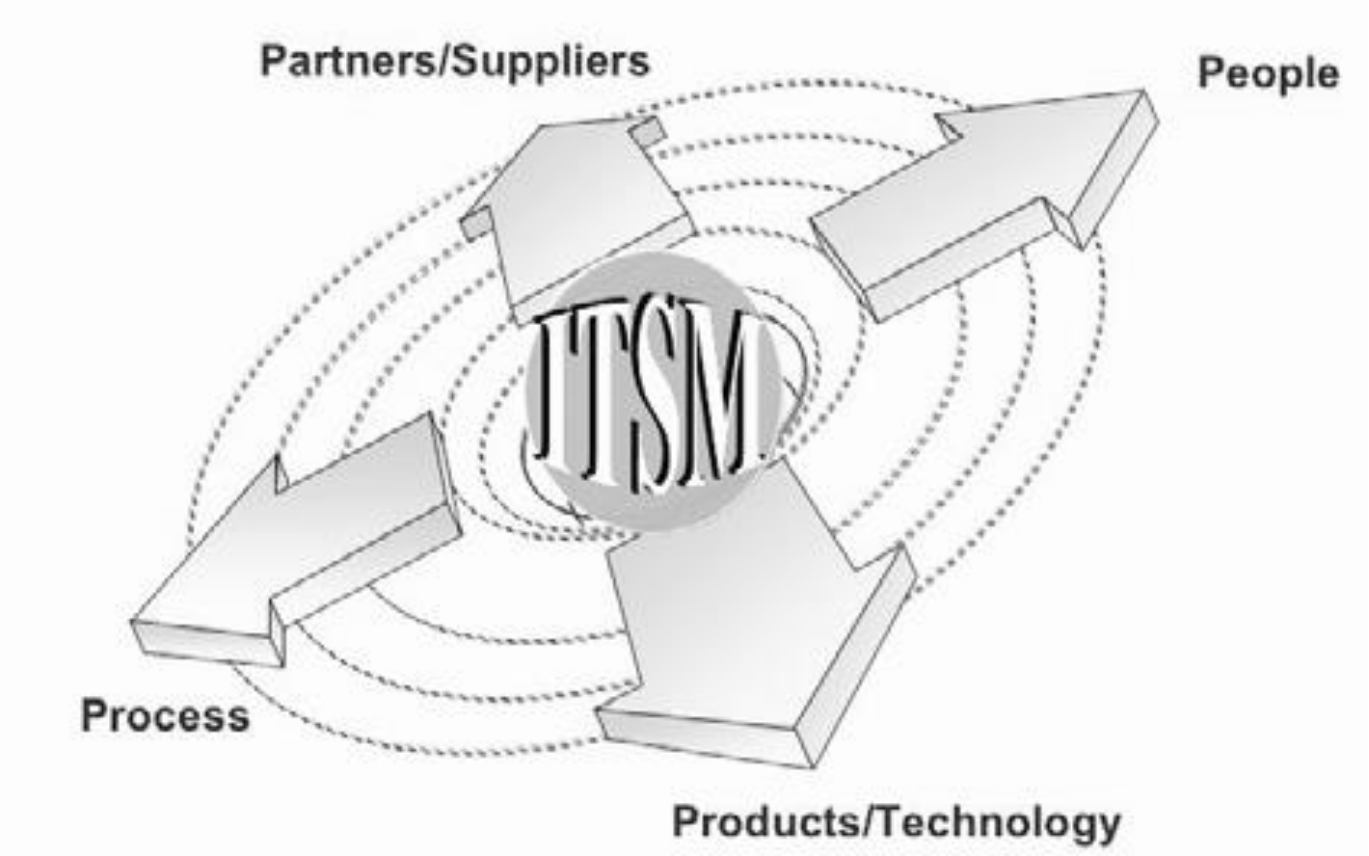
Cloud Model


Cloud Consumer
Cloud Auditor
Security Audit
Privacy Impact Audit
Performance Audit
Service Orchestration
Service Layer
SaaS
PaaS
IaaS
Resource Abstraction and Control Layer
Physical Resource Layer
Hardware
Facility
Cloud Service Management
Business Support
Provisioning Configuration
Portability/ Interoperatibility
Security
Privacy
Cloud Broker
Service Intermediation
Service Aggregation
Service Arbitrage
Cloud Carrier
202111

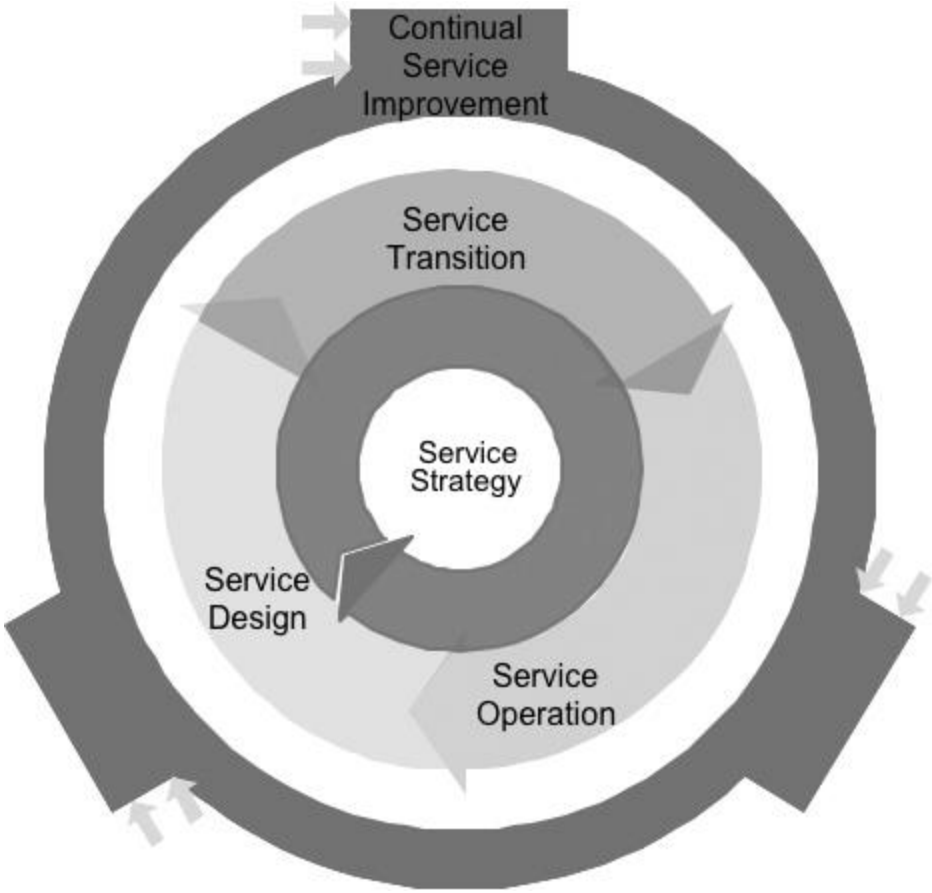
Service Management

IT Service Management

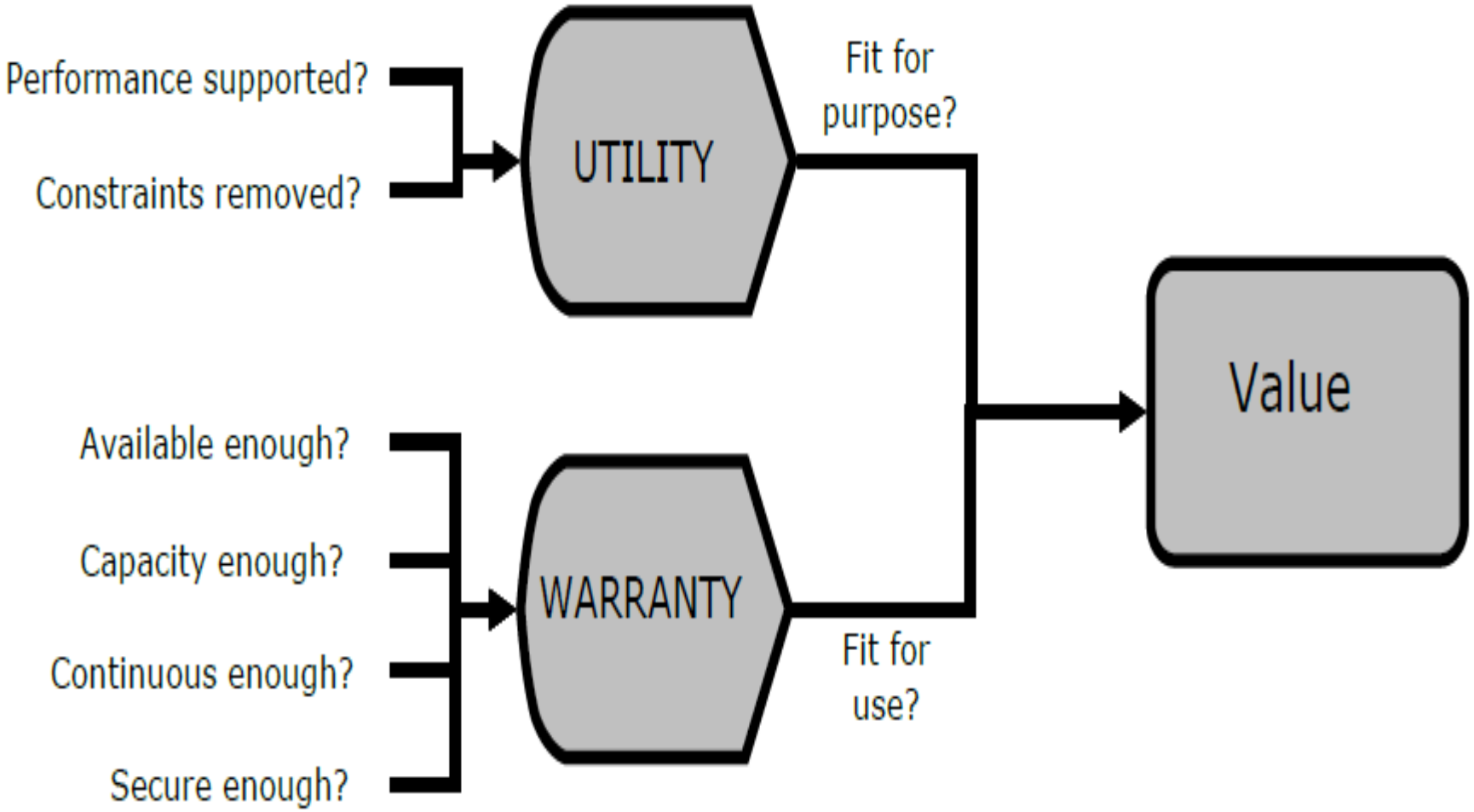
A set of specialized organizational capabilities for providing value to customers in the form of services



Service Lifecycle



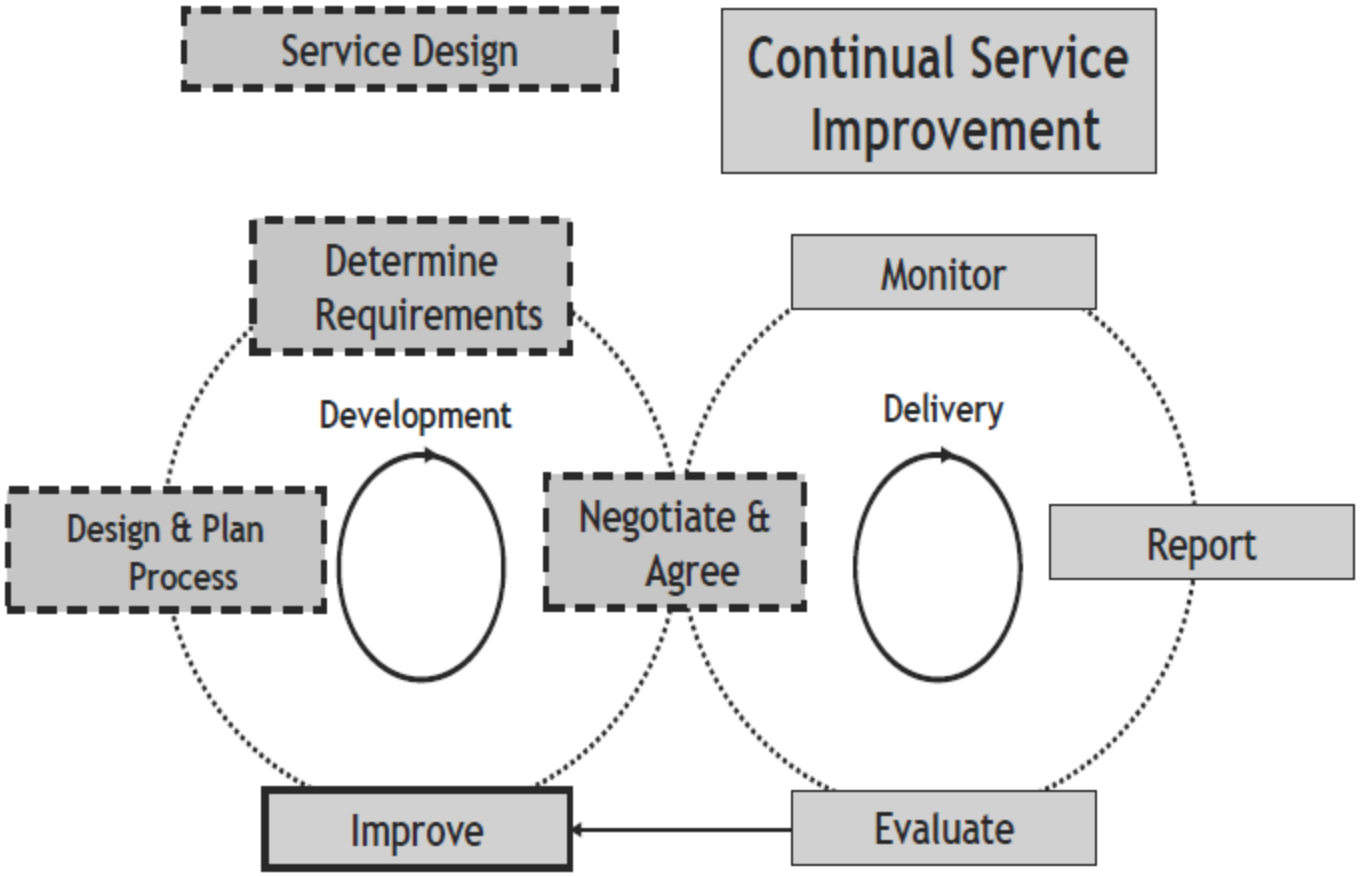
Service Strategy



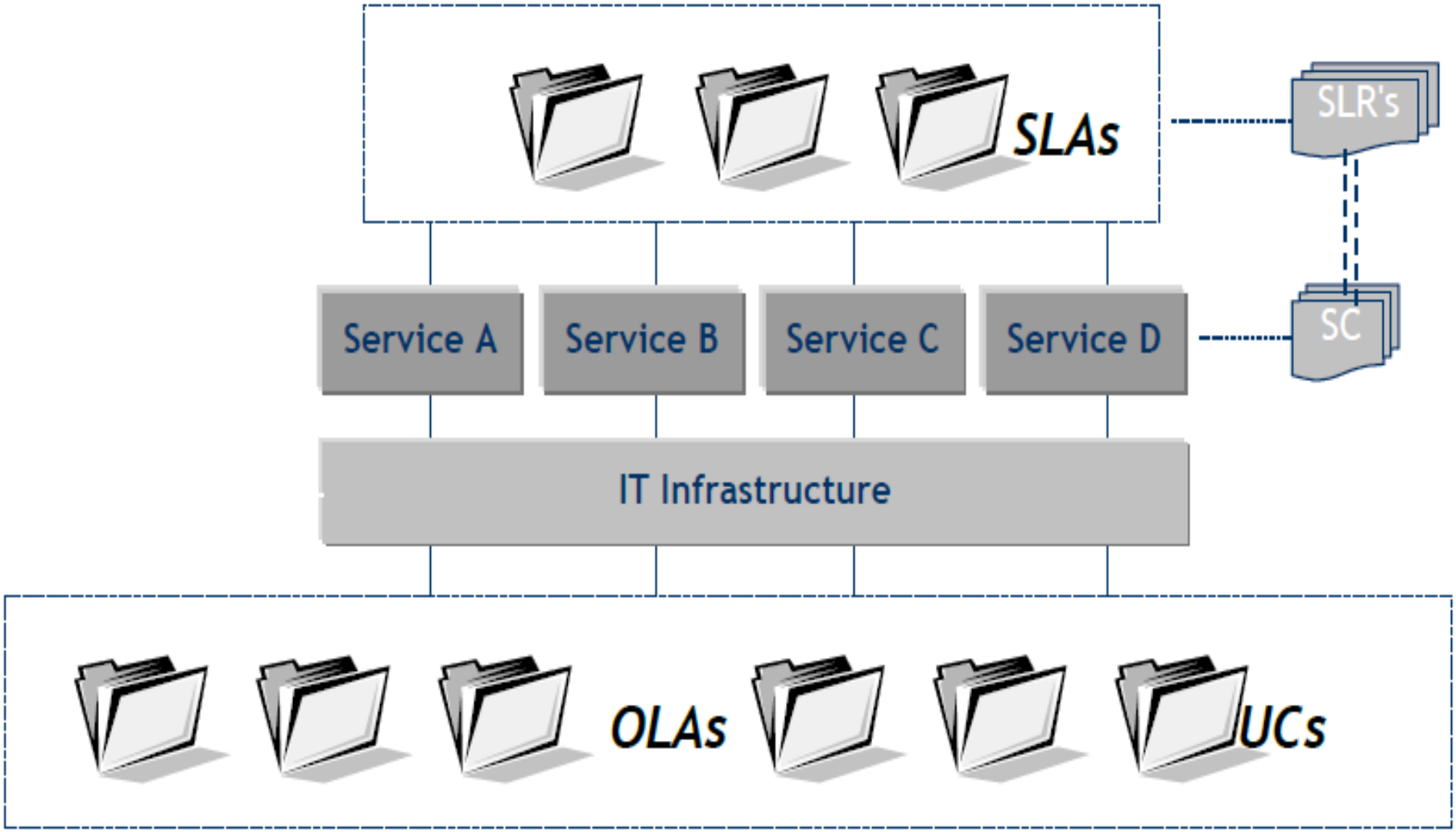
Service Design

- **Service Design's** concern is the design of
  - new or modified services for introduction into a production (live) environment.
  - new and modified processes required to deliver and support these services.
- **Processes:**
  - Service Level Management (Design)
  - Capacity Management
  - Availability Management
  - IT Service Continuity Management
  - Information Security Management
  - Supplier Management
  - Service Catalogue Management

Service Level management



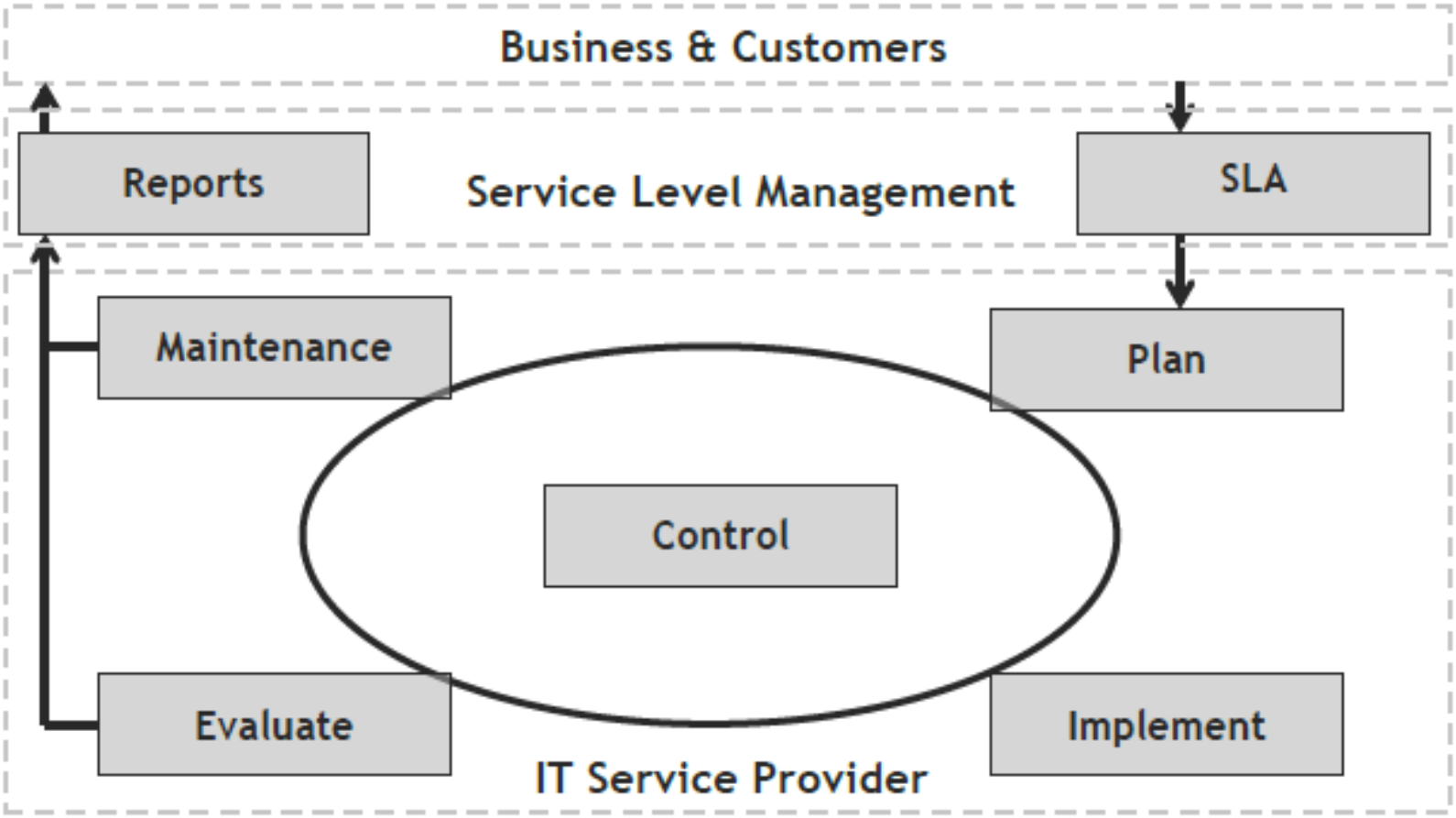
SLAs, OLAs and UCs



Contents of SLA

- **The Contents of Service Level Agreements:**
  - Introduction
  - Service hours
  - Availability targets
  - Reliability
  - Support arrangements
  - Transaction response times
  - Disaster Recovery
  - Reporting requirements
  - Incentives and Penalties

Information security management



Service Transition

- The Service Transition lifecycle phase focuses on the vulnerable transition between the Design phase and the Operation phase of a service.
- It is particularly critical as functional and technical errors not found during this phase will result in significantly higher impact levels to the business and/or IT infrastructure and will usually cost much more to fix once the Service is in operation.
- **Processes:**
  - Knowledge Management
  - Service Asset & Configuration Management
  - Change Management
  - Release & Deployment Management
  - Validation and Testing

Service Operation

- From a customer viewpoint, Service Operation (SO) is where actual value is seen.
- This is because it is the execution of strategies, designs and plans and improvements from the Service Lifecycle phases.
- **Functions**
  - Service Desk
  - Technical Management
  - Application Management
  - IT Operations Management
- **Processes**
  - Incident Management
  - Problem Management
  - Event Management
  - Request Fulfillment
  - Access Management

Continual Service Improvement

- Continual Service Improvement is the phase that binds all the other elements of the Service Lifecycle together and ensures that both the service and the IT Service Provider continually improves and matures.
- **Processes:**
  - Service Level Management
  - Service Measurement & Reporting
  - CSI Improvement Process

PLATFORM INTEGRATION AND DEPLOYMENT

Software Platform Management Services

- Software Platform Management Services
  - *designing, building, distributing and maintaining the customer's software platform*
  - reduce the time, costs and complexity associated with managing such a software platform

Platform Integration and Deployment

- Most organizations try to keep up with the technology that helps boost employee productivity and enhance collaboration
- Helps optimize productivity throughout the lifecycle of customer's end-user devices.
  - refreshing or replacing existing PCs, mobile devices, tablets or kiosks in one location or across the globe.
  - acquire, assemble, configure, test, stage and ship the devices.

Platform integration

- Platform integration
  - Cloud-based Integration
  - integration platform as a service or IPaaS
    - systems integration delivered as a cloud service
- Integration could be categorized as either internal or business to business (B2B).
  - Internal: serviced through an on-premises middleware platform and typically utilized a service bus to manage exchange of data between systems.
  - B2B: serviced through Electronic Data Interchange EDI gateways or value-added network (VAN).
- The advent of SaaS applications created a new kind of demand which was met through cloud-based integration
- 30-40 significant industry players

Example PID Components

Software Platform Management, Design & Maintenance

Platform Build & Test, Installation, Backup, etc

Asset Tagging, Labelling, Inventory Update & Report, Refurbishment.

Application Scripting, Discovery, Portfolio Management

Other Services: Health Check, Compliance, Logistics, Delivery, Customization, Replacement

Other Management: Order, Extended Project , Antivirus, Patch,

WHY PEOPLE MOVE TO CLOUD?

Top services or applications moving to the cloud:*

Small business

1. Storage (40%)
2. Conferencing & collaboration (37%)
3. Messaging (36%)

Medium business

1. Storage (35%)
2. Messaging (33%)
3. Office & productivity suites (32%)

Large business

1. Conferencing & collaboration (40%)
2. Storage/business process apps (35%)
3. Messaging/ compute power (34%)

Federal govt.

1. Conferencing & collaboration (39%)
2. Messaging (37%)
3. Business process apps (31%)

State/local govt.

1. Storage (19%)
2. Conferencing & collaboration (17%)
3. Messaging/business process apps/ compute power (15%)

Healthcare

1. Conferencing & collaboration (29%)
2. Compute power (26%)
3. Office & productivity suites (22%)

Higher education

1. Storage (31%)
2. Messaging/ conferencing & collaboration (29%)
3. Compute power (25%)

K-12

1. Storage (40%)
2. Conferencing & collaboration (36%)
3. Office & productivity suites (33%)

*Those who are migrating or have migrated

5 Reasons Businesses Use the Cloud

Every year, more and more businesses are adopting cloud. While traditionally thought of as an IT decision, cloud is increasingly being considered a business decision to enable company functions. Take a look at five reasons why more businesses are adding the cloud to their technology arsenals.

1 It offers better insight and visibility

Businesses are using cloud technology to support their analytics efforts. Of leading organizations:

54% use analytics extensively to derive insights from big data

59% use cloud to share data seamlessly across applications

59% intend to use cloud to access and manage big data in the future

2 It makes collaboration easy

Cloud allows work to be accessed from anywhere on multiple devices, making cross-functional collaboration much easier. Here's what leading organizations—those that are gaining competitive advantage through cloud—cited as popular uses:

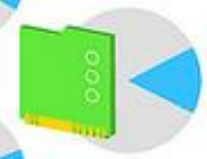
58% collaborate across the organization and ecosystem

59% improve integration between development and operations

3 It can support a variety of business needs

Companies are forging a tighter link between technology and business outcomes. Take a look at the business functions companies have migrated to the cloud.

18% messaging



15% storage

13% office/productivity suites

4 It allows for rapid development of new products and services

The cloud offers businesses valuable capabilities. Here's what leading organizations say it enables them to do:

52% use it to innovate products & services rapidly

24% are able to offer additional products & services

5 The results are proven

From business growth to increased efficiency, businesses using cloud are realizing benefits across the company.

25% of businesses saw a reduction in IT costs

55% saw an increase in efficiency

49% saw improvement in employee mobility

Sources: CDW, IBM Center for Applied Insights