

Overcoming Integration Challenges in Cloud Computing - It is Worth the Investment

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Abstract



In this presentation, the speakers describe the integration challenges that are faced when introducing cloud infrastructures to legacy IT environments and workloads. Integrating existing infrastructure and services, with new ones, has always been a challenge in IT. When integrating cloud solutions, these challenges still exist and have some new technology twists. Newer cloud delivery models are offered with different characteristics such as public, private and hybrid profiles.

A mix of workloads and applications, seamlessly running in different environments, has to be transparent in functionality to end users and requires agility on part of solution integrators. Hybrid models not only bring interesting dynamics to a client's existing IT environment but can also outweigh the benefits of cloud if not addressed upfront. In this presentation, the speakers explain useful tactics to overcome integration challenges and address how to quickly realize cloud value.

Why write this paper on the integration challenge with cloud computing?



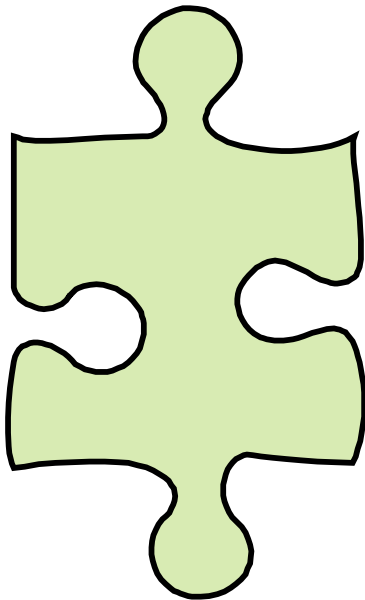
Our motivation—

1. Cloud opens up significant opportunities--cloud also introduces some challenges
2. To get real benefit from cloud computing, organizations should approach this shift thoughtfully and give attention to challenge areas like security, integration, and business process management
3. Integrating traditional IT environments with cloud environments, could result in unrealized benefits, perhaps failure, without the proper focus

Failure? How could that happen?

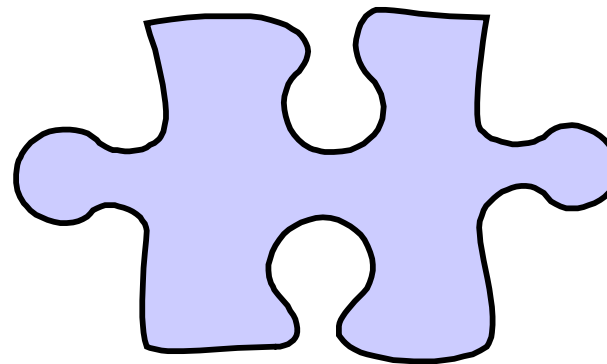
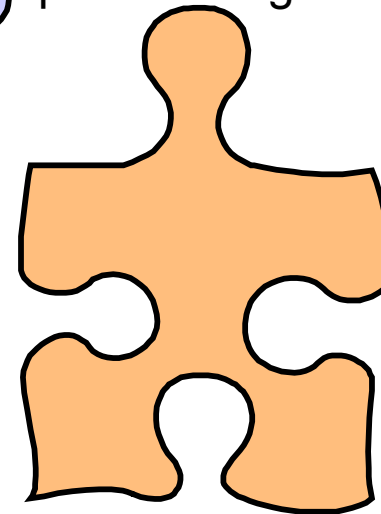
Integration with existing systems

Concern: Independent decisions to deploy services in clouds that are disconnected or cannot interact well



Renewal of process activity

Concern: Not recognizing that image creation through a portal is a significant change from traditional IT provisioning



Attention to security

Concern: Ensuring that data and intellectual property is not leaked

Why Cloud?



Business promise

- Lower cost to get started (low one-time charges)
- Pay as you go (usage-based for some items)
- More rapid access to IT resources (provisioning time)
- Elasticity so you can right-size your resources (scale up/scale down)
- Simpler solutions (standardization)

Technology leveraged

- Cost: Virtualization, shared resources, and willingness to spread costs over time
- Speed: Tools that provision what is already set up
- Scaling: Available resources and business terms to support their use
- Standardization: Tactic to reduce complexity of one-of-a-kind solutions

Reference: The authors have learned and observed this on-the-job over the last few years from many sources.

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What is Cloud? CIS 354 Cloud Computing (3 Credits)



Concepts and principles of cloud architecture, networking, virtualization, storage, and security are presented. The focus of this course is on the design and implementation of cloud infrastructure including middleware for the provisioning of images and other service-automation activities like service request management. Additional topics survey adoption patterns including cloud enabled data centers, cloud-platform services, cloud service provider patterns and business solutions on cloud.

Key challenges focusing on integration, business process, and integrity and security are also important course topics. Discussions include the service delivery catalog, service automation management, and platform and virtualization management. Characteristics of cloud solutions including dedicated, shared, and hybrid are also examined (Gulla, 2012).

Nine Ideas in Table Form From CIS 354

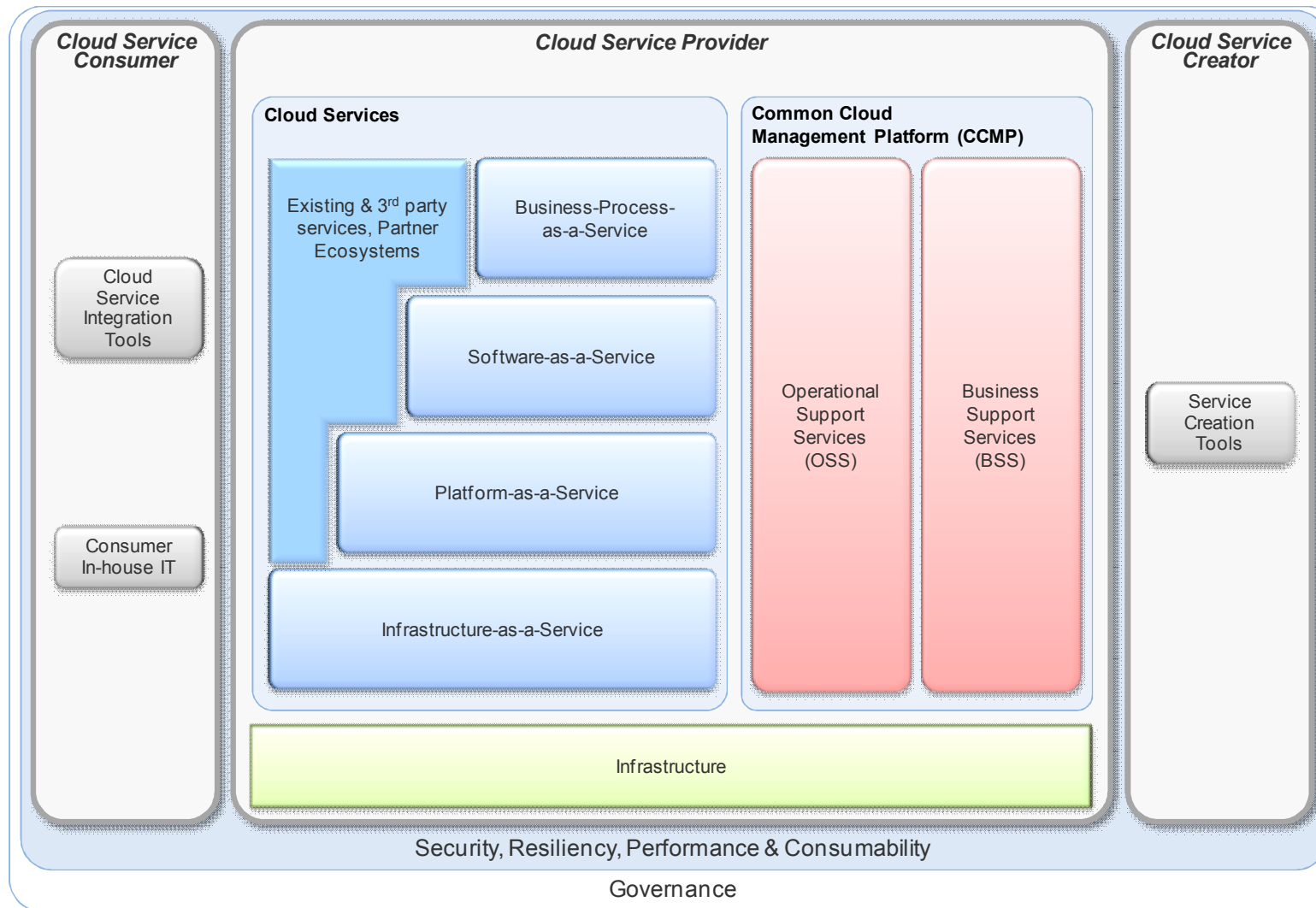


Key Element	Description or Example
1. Architecture	Cloud Reference Architectures like CRA or NIST
2. Networking	Front end, back end, VPN, & MLPS
3. Virtualization	Many elements virtualized for flexibility and cost
4. Storage	Utility approach, for example, by GB stored
5. Security	Models involve activities functioning as a system
6. Integration & processes	Seamless connectivity of cloud and traditional IT including how things get done step-by-step
7. Support Services	Catalog, service-automation management, and virtualization management
8. Adoption patterns	Data centers, platform services, service-provider patterns and business solutions on cloud
9. Characteristics	Dedicated, shared, and hybrid or IaaS, PaaS, and SaaS

Reference: Cloud Computing Architected and Cloud Computing Bible. See "For More Information" later in this presentation.

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IBM Cloud Reference Architecture

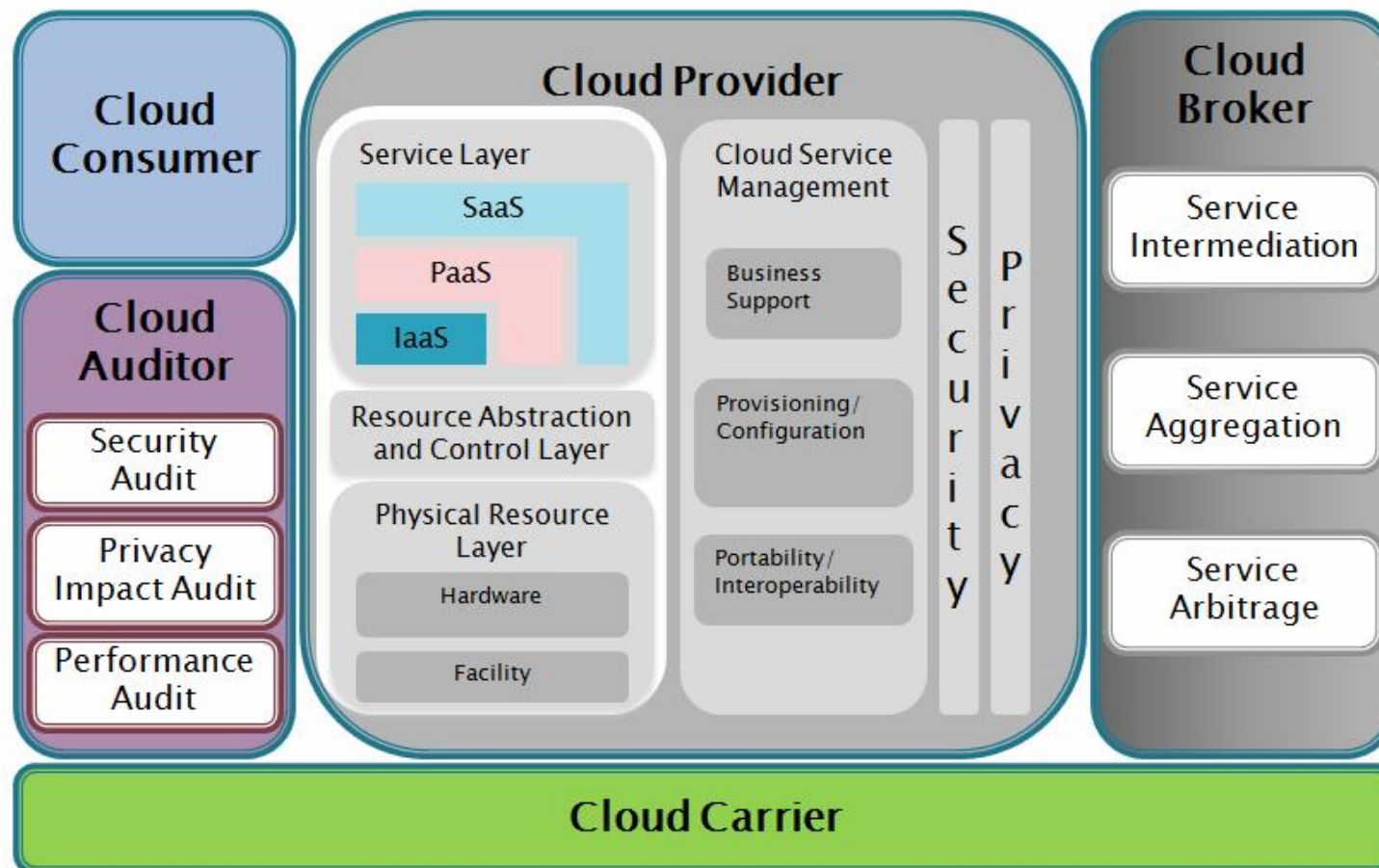


Reference: Getting cloud computing right. (April, 2011) page 5.

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National Institute of Standards and Technology Cloud Model

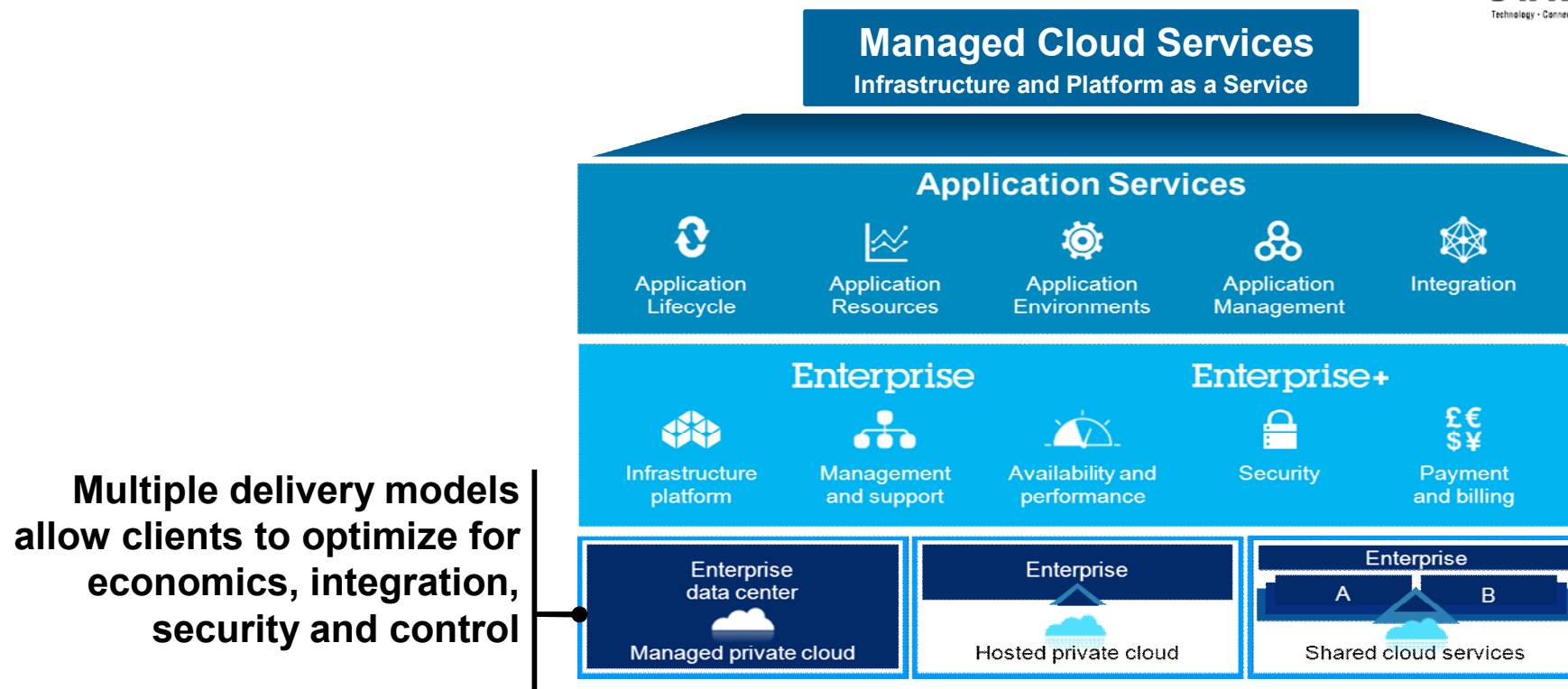
NIST Reference Architecture



Reference: This figure is from: http://cloud-perspectives.com/?page_id=111

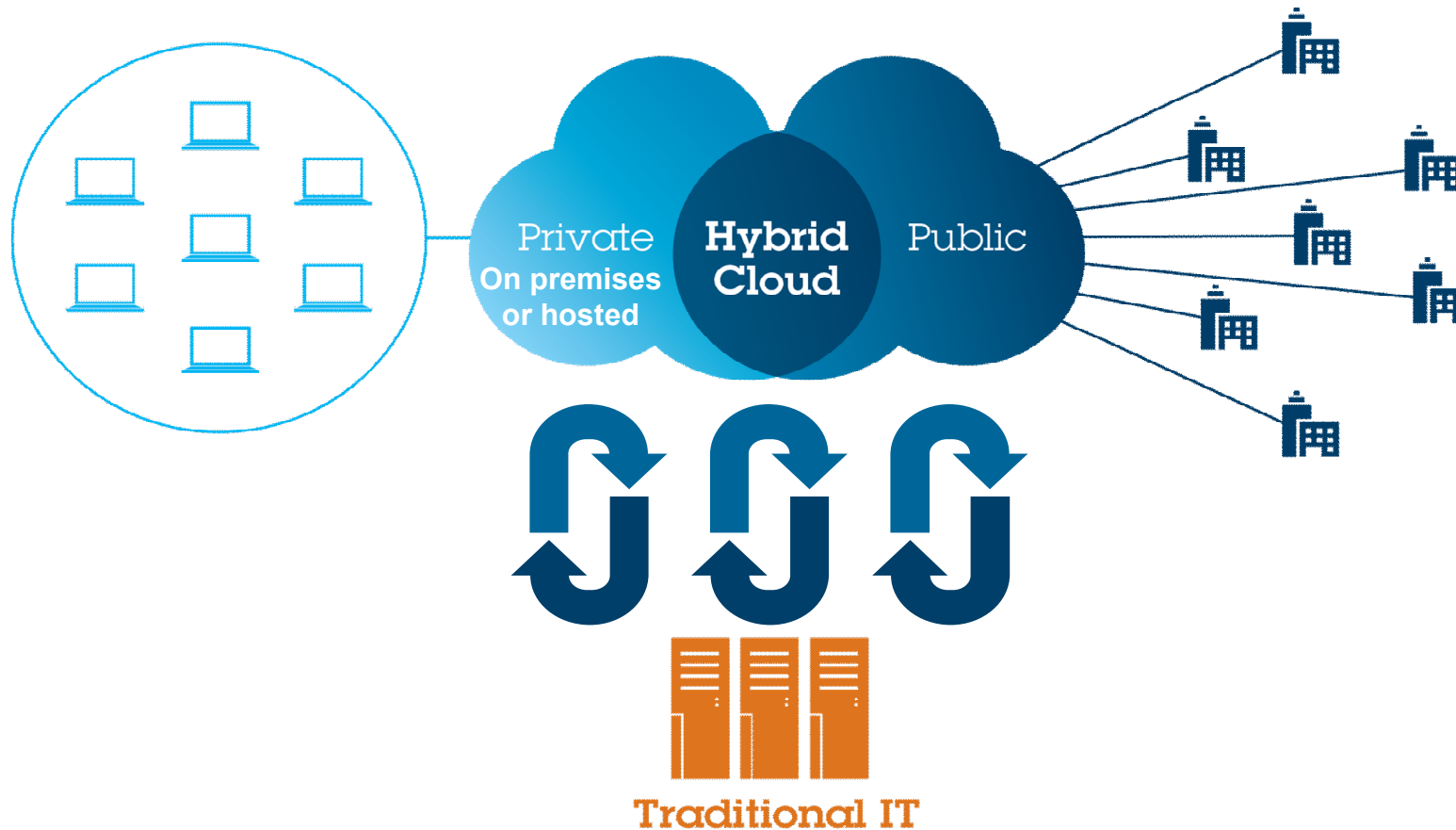
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IBM SmartCloud Services



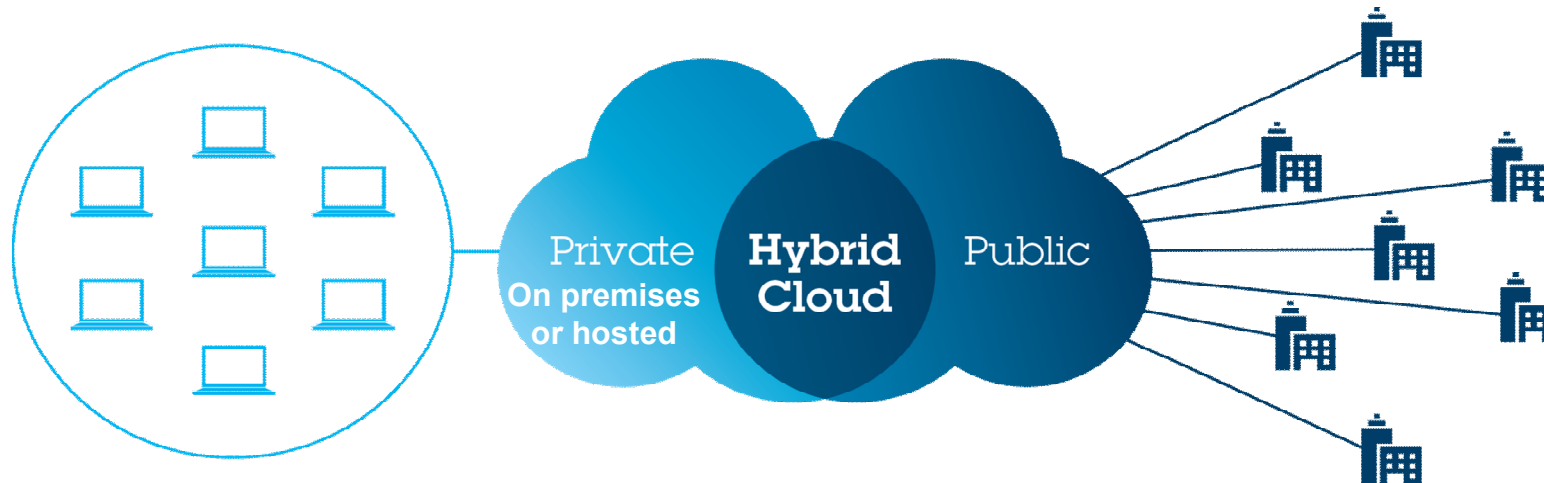
- IBM SmartCloud Family of offerings
- Flexibility of cloud deployment models based on need
- Integration in managed cloud hosted offerings

Integration of Cloud with Other Environments



- Part of workloads from traditional IT are cloud enabled
- Workload dictate suitable delivery model
- Single view of business applications requires integration

Cloud without Integration



- Workloads run de-centralized and scattered around
- Saves integration \$\$
- Governance, operational and financial nightmare?

Seven Reasons to Consider Integration



1. Only a certain percent of traditional IT is cloud enabled instead of replacing entire IT
2. Customers often require a centralized IT view
3. Business units speed to market by directly provisioning infrastructure and deploying apps on cloud but still require management from traditional IT
4. IT complexity increases from manageability perspective with hybrid environments
5. Security and overall control are important from compliance and quality perspective
6. Hybrid cloud environment in Managed Services context may be even trickier
7. IT should support/extend business processes--not complicate them

Five Integration Challenges

1. Cost and ROI

Business case and ROI justification

2. Technologies and Standards

Compatibility of technologies and adhering to industry standards

3. Skills

4. Process Impediments

Extending existing business processes and best practices into cloud

5. Vendor differences

Cross vendor cultural differences and end to end governance

Four Main Integration Domains and Patterns



Service Management

- Incident, problem, change, asset, configuration, and service requests
- Service desk, licensing, and release management

Systems Management

- Application monitoring and backup/restore
- E2E application performance
- Disaster recovery
- Service level and operational management

Security

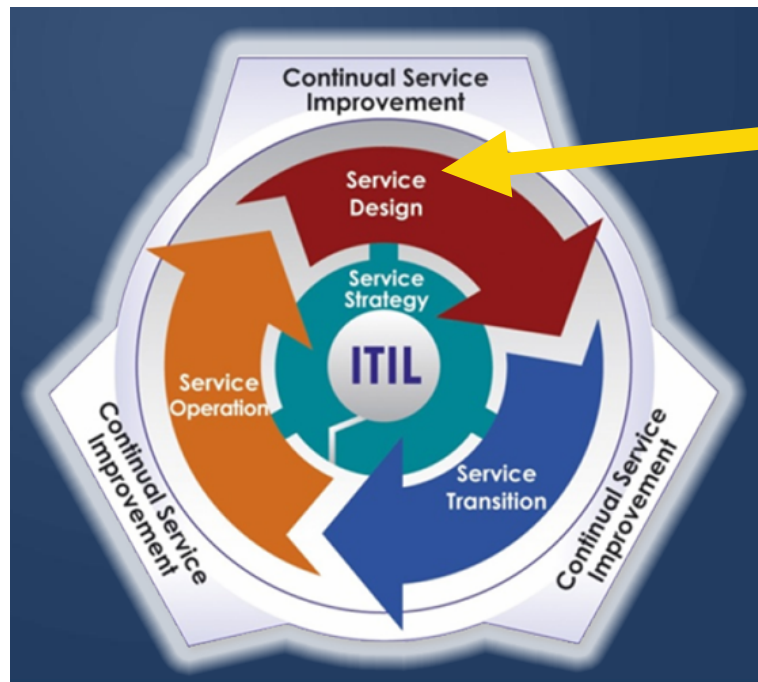
- Security policies and control
- Health checking, vulnerability scanning, and intrusion detection & prevention
- ID federation, single sign-on, and active directory integration

Business Support

- Governance
- Financial management
- Process integration

Steps to Design an Integration Pattern

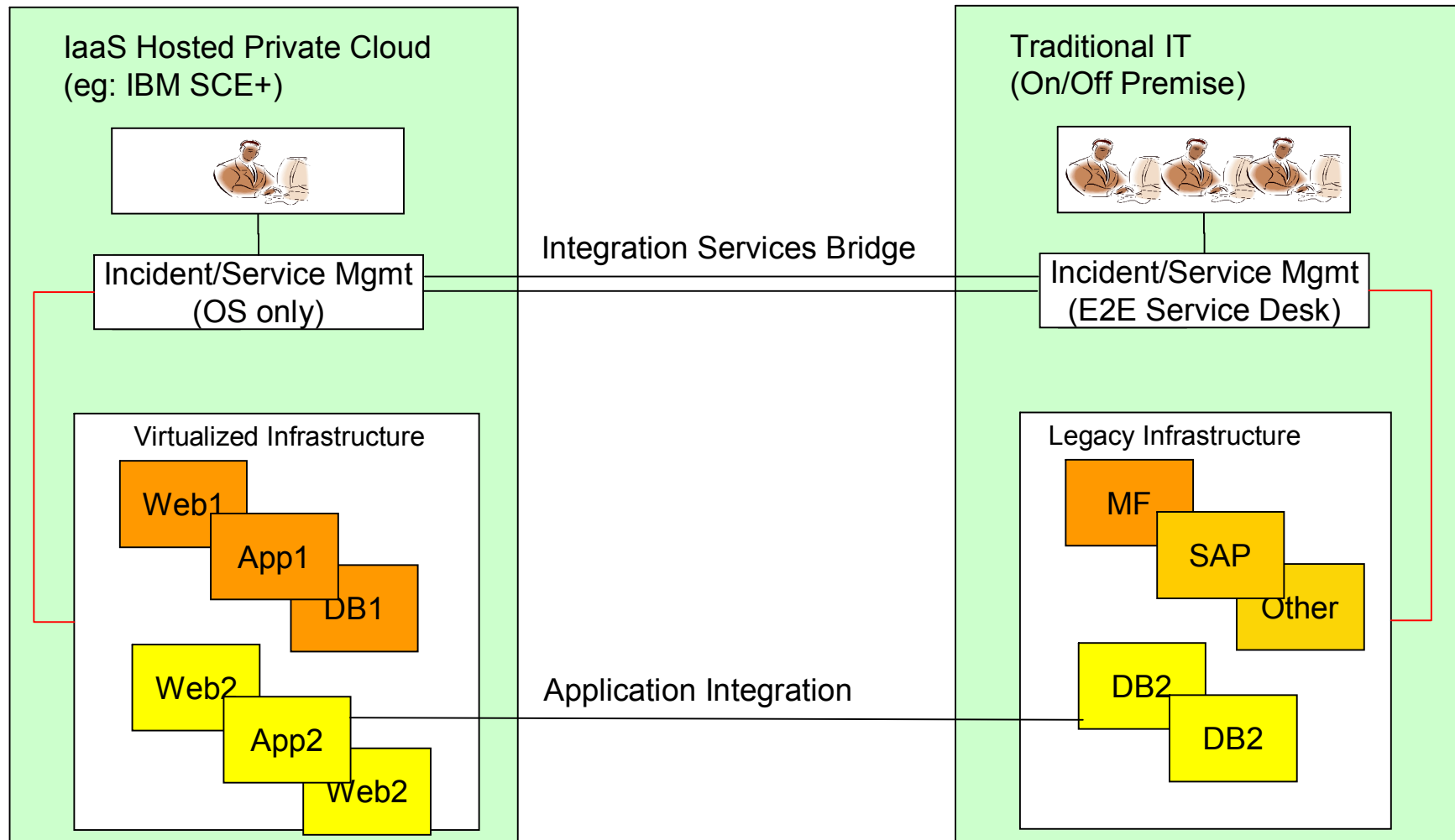
When a specific integration pattern is needed, like one supporting systems management or service management processes, five elements need to be thought through and documented for use during service transition and service operation



- 1. Service description**
- 2. Solution design**
- 3. Service responsibility matrix**
- 4. Cost model guidance**
- 5. Review and approvals**

Reference: This figure is from: <http://www.itservicemanagement-ital.com/category/it-service-management-cat/itil-v3-life-cycle/>
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Use Case 1 - Incident Management

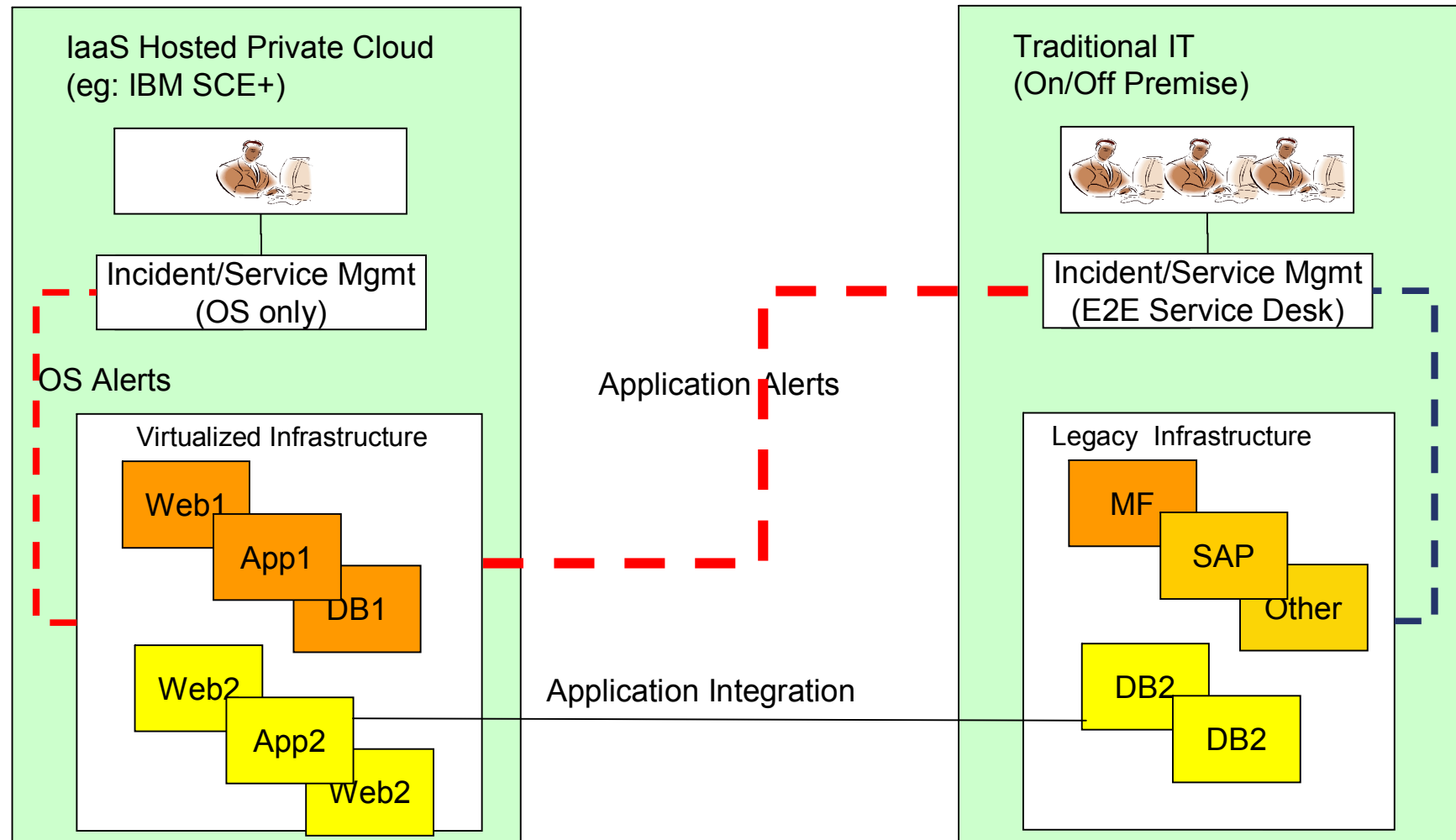


Use Case 1 – Service Design Elements



- **Service Description:** ITIL based service desk (SD) providing end to end service management function to manage incidents transparently across all delivery environments
- **Solution Design:** Customer calls main SD on traditional IT to report an application down. SD troubleshoots to identify issue with cloud infra and transfers it to cloud support. Issue resolved, incident closed on cloud automatically closed on main SD seamlessly using integration services bridge.
- **Service Responsibility Matrix:** SD on traditional IT raises all incidents, owns escalations/governance. Application support part of traditional IT as IaaS cloud supports OS level only.
- **Cost Guidance:** Integration services bridge=\$xx/one time and \$xx/monthly, labor to implement=\$yy/one time, NW costs for number of incidents/month=\$zz

Use Case 2 - Application Monitoring

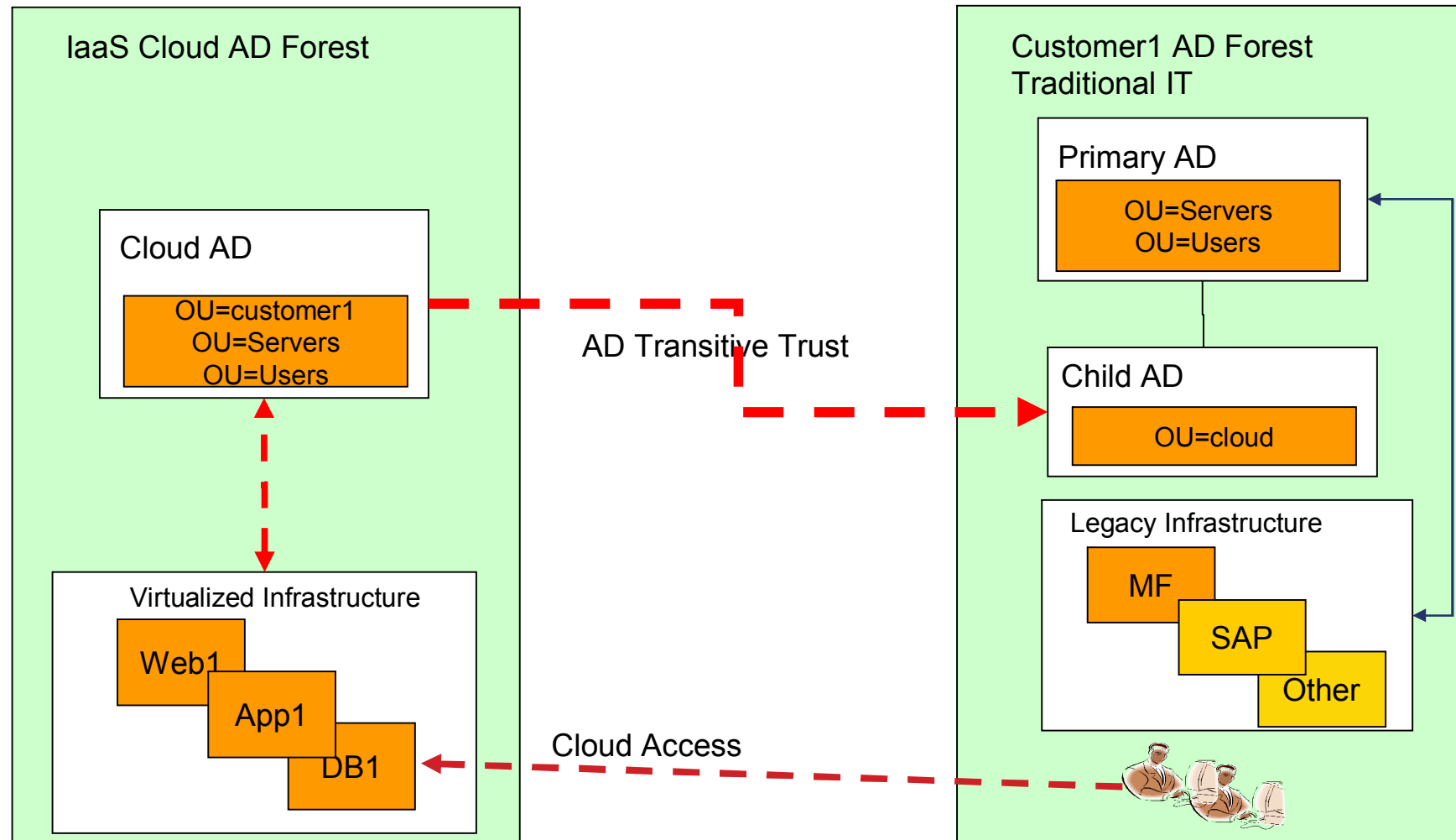


Use Case 2 – Service Design Elements



- **Service Description:** End to end application monitoring with components in mixed environments
- **Solution Design:** Application performance on cloud slows due to database running out of tablespace. OS monitoring alert triggered on IaaS cloud, DB monitoring alert triggered on traditional IT. DBA resolves issue working with OS support on cloud and using integration bridge to dup detect and correlate tickets.
- **Service Responsibility Matrix:** Cloud support teams only sees OS alerts. DBA team can only access DB alerts created on traditional IT side. End to end SD on traditional IT responsible for overall application level correlation. Account Management and customer views alerts/status on E2E Service Desk.
- **Cost Guidance:** Integrations=\$ww/one time, monthly labor to implement=\$xx/one time, NW costs for number of incidents /month=\$yy, and application correlation code dev=\$zz.

Use Case 3 – Security Integration



Use Case 3 – Service Design Elements



- **Service Description:** User access management with Active Directory (AD) integration
- **Solution Design:** Customer users part of customer AD access cloud infrastructure registered on customer domain. AD to AD transitive trust relationship routes customer id's to be authenticated to customer's AD.
- **Service Responsibility Matrix:** Customer sub domains registered by cloud admin on cloud provider's forest. Customer administrators manage customer's AD forest and child domains for cloud.
- **Cost Guidance:** Integrations=\$xx/one time, labor to implement=\$yy/one time, NW bandwidth costs/month=\$zz

Integration Tactics—Six Main Considerations



1. Align the right workload to the right cloud delivery model
2. Define overall cloud strategy including technical value
3. Identify integrations considering cloud thinking vs. traditional IT
4. Use integration technology based on delivery model (IBM Hybrid Cloud Integrator or custom integrations)
5. Rely on existing solutions and architecture with reusable patterns
6. Select a vendor that provides an end-to-end view of managing IT with right integration adaptors

Summary and Recommendations



It is worth the investment in integration because of cloud benefits on lower cost, fast provisioning, ability to scale, and simpler solutions

Consider this--

1. Plan just enough in systems strategy phase to get going and imbed solution planning into project phases to get a fast start
2. Pilot to learn; phase or parallel to production; avoid the plunge
3. Identify the integration patterns ahead of time but consider developing them as needed and plan for reuse
4. Plan for reuse with templates and conduct walkthroughs of artifacts before they become generally available

Additional Materials and Backup

For More Information



1. Cloud computing insights from 110 implementation projects (October, 2010). Accessed April 17, 2012 from <http://www.ibm.com/cloud-computing/us/en/>
2. Cloud Computing on a Smarter Planet (October, 2010). Accessed April 17, 2012 from <http://www.ibm.com/cloud-computing/us/en/>
3. Get more out of cloud with a structured workload analysis. (October, 2011). Accessed April 17, 2012 from <http://www.ibm.com/cloud-computing/us/en/>
4. Get started with cloud through the right business-based IT strategy. (2011). Accessed April 17, 2012 from <http://www.ibm.com/cloud-computing/us/en/>
5. Getting cloud computing right. (April, 2011). Accessed April 17, 2012 from <http://www.ibm.com/cloud-computing/us/en/>
6. Introduction and Architecture Overview. IBM Cloud Computing Reference Architecture 2.0. (February, 2011). Accessed May 10, 2012 from http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=10&ved=0CO8BEBYwCQ&url=http%3A%2F%2Fwww.opengroup.org%2Fcloudcomputing%2Fuploads%2F40%2F23840%2FCCRA.IBMSubmission.02282011.doc&ei=PhesT9DZCsmi2gWfs7GmAg&usg=AFQjCNGg28D5PicKZ15So06qg4_fTq2-_Q&sig2=V2VqHdO5FQ7VPv9vQz4Scg
7. Sosinsky, B. (2011). Cloud Computing Bible. Wiley Publishing, Inc. Indianapolis, IN
8. Rhotan, J. & Haukioja, E. (2011). Cloud Computing Architected. Recursive Limited. US and UK.

About the Authors



Biographical Sketch: Prabhakar Attaluri is a Global Cloud Technology Leader and Senior Technical Staff Member in IBM Global Technology Services. He has more than 16 years experience in systems integration, solution architecture, service management and business process re-engineering. In his current role, he is responsible for developing technical strategy for SmartCloud offerings, establishing service definitions and ensuring IBM's cloud offerings meet market place needs. He is a certified IT Architect and frequently meets with customer CxO's presenting and providing early engagement guidance.

Biographical Sketch: Joseph Gulla is an Executive IT Specialist for IBM Global Technologies Services. Joe is currently managing a program to assist customers with migrations to SmartCloud Enterprise and SmartCloud Enterprise+ cloud offerings from IBM. Previously, Joe worked on managed hosting service offerings in the Europe and Asia. Joe has spoken at a number of technology forums including SHARE, IDC's Outsourcing and Managed Services Conference, Technical Leadership Exchange (TLE), the High Availability "Best Practices" Topical Conference, Internet Society Conference, Professional Leadership Technical Exchange (PLTE), Planet Tivoli, Enterprise Systems Management Share Net, IBM Security Seminars, and the Northeast Information Systems Users Group (NEISUG).

Integration Framework – Two Examples



Function and Integration Framework

1. New functionality add-on to enhance a vendors standard solution
2. Integration tool or system to link together cloud with non-cloud

ITIL-Based Framework

1. Service Strategy - Describe the strategic need for integration of cloud and non-cloud environments
2. Service Design - Design integrated services involving service catalog, service level, capacity, availability, IT service continuity, information security, and supplier management
3. Service Transition - Use management processes during transition including change management and release and deployment management (example)
4. Service Operation - Integrated Event, Incident, Request, Problem, and Access Management
5. Continual Service Improvement - Use integrated processes for service measurement and reporting to improve the overall service

Integration Patterns Service Design Elements



1. Service description

An external description of the interface should be developed. In commercial settings this might be called a statement of work. Internally, it might be called a service description.

2. Solution design

Every integration pattern needs to be designed in a thoughtful and flexible way. The architecture should be developed including a description of key processes, dependencies, and interfaces. Writing in ITIL terms, what is needed is a service solution, service management system, architecture, process, roles, and capabilities, and measurement methods and metrics.

3. Service responsibility matrix

A detailed service responsibility matrix (SRM) is typically needed. Without a clear indication of who does what, it would be difficult to use and reuse the integration pattern in different contexts. The SRM should include both the service transformation and service operation lifecycle phases.

Integration Patterns Service Design Elements



4. Cost model guidance

In situations where costing is needed, a model with activities, skill levels, and labor costs should be developed. Even when existing labor will be utilized to support a new integration pattern, it is important to understand the impact of the pattern on the existing labor pool. The SRM should be used to inform the cost model.

5. Review and approvals

After developing an integration pattern, approvals should be sought from the architecture, delivery, and application communities. The steps to achieve an approval are useful in educating teams and in getting them to buy in and to support a solution.