

# Business Decisions for Cloud Computing

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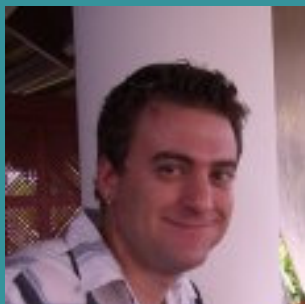


**SHARE** in Boston

## Paperless Upload Version Notice

- **This is Version 1.0 for Boston SHARE Conference 2010**
- **Watch for updates**

# Your Illustrious Speakers

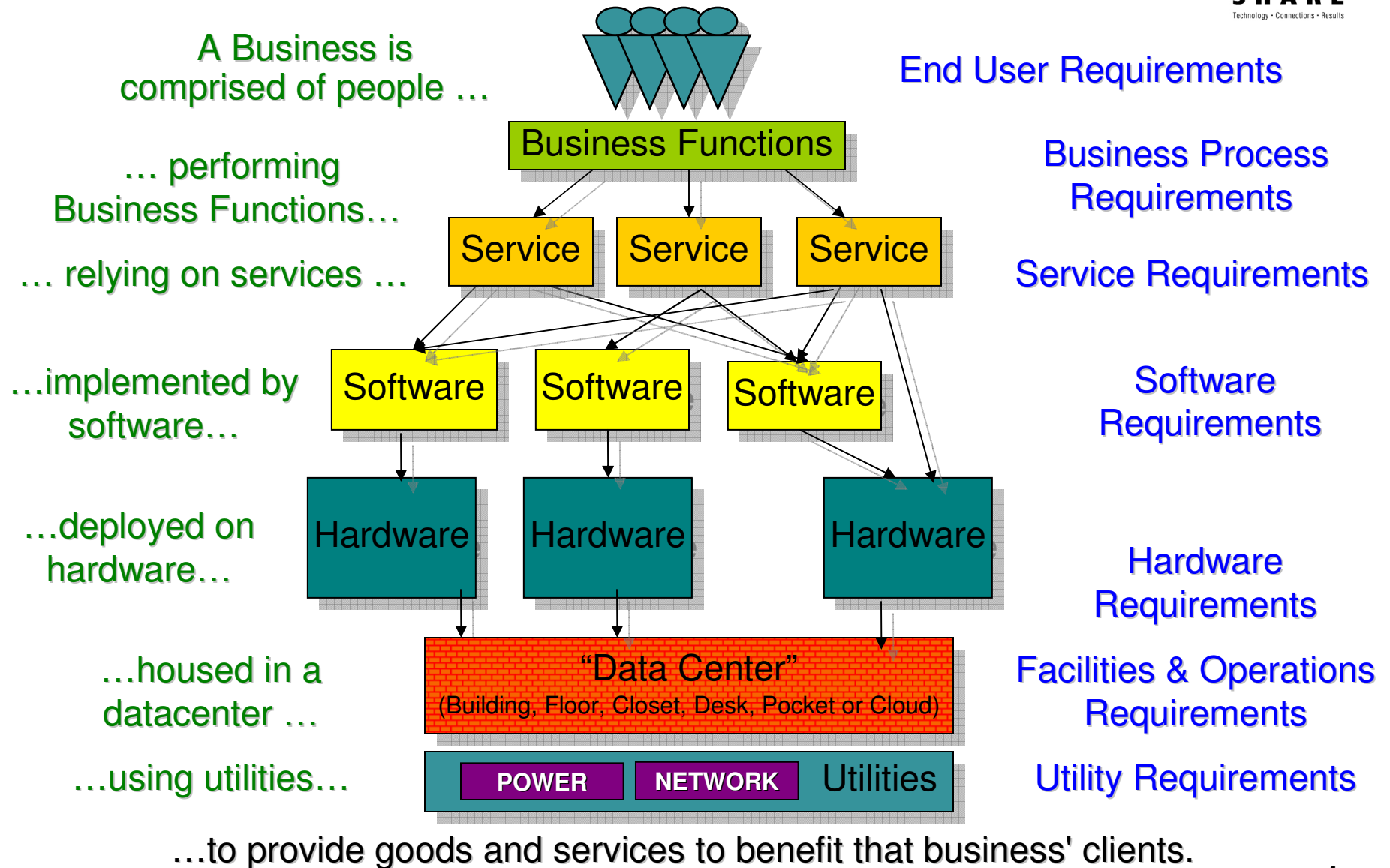


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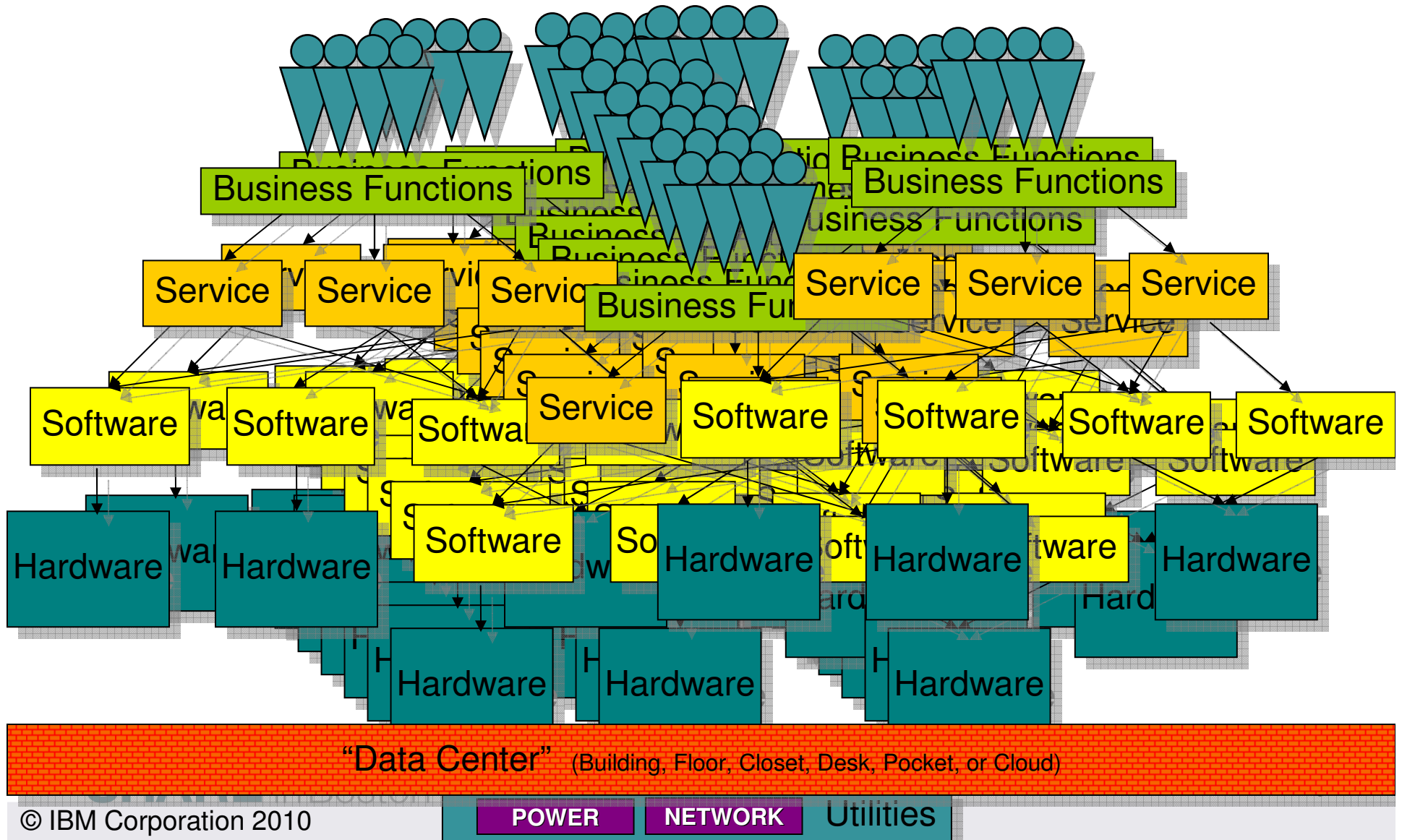


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# Solutions for businesses requires the orchestration of the interplay across a set of layers.



The challenge is that the Business Infrastructure will have to provide **ALL** of the **SERVICES** for **ALL** of the Business Processes, **NOT** just one. Business is Dynamic - the Business Infrastructure needs to reflect this. Cloud marketing focuses on addressing this challenge.



# Cloud marketing resonates because it promises to address business desires for infrastructure without all the messy details.



**Functionality** – There will be a service that I can use

**Pay for use** – and that I only pay for what I use

**Bottomless** – and that will grow with my needs

**Disposable** – or I can turn it off

**Service Life-cycle Management** – since I control it.

**Speed to value** – and I can deploy/decommission instantly.

**Service Portability** – I can move it anywhere.

**Service Security** – No one can steal it.

**Service Interoperability** – I can connect to anything

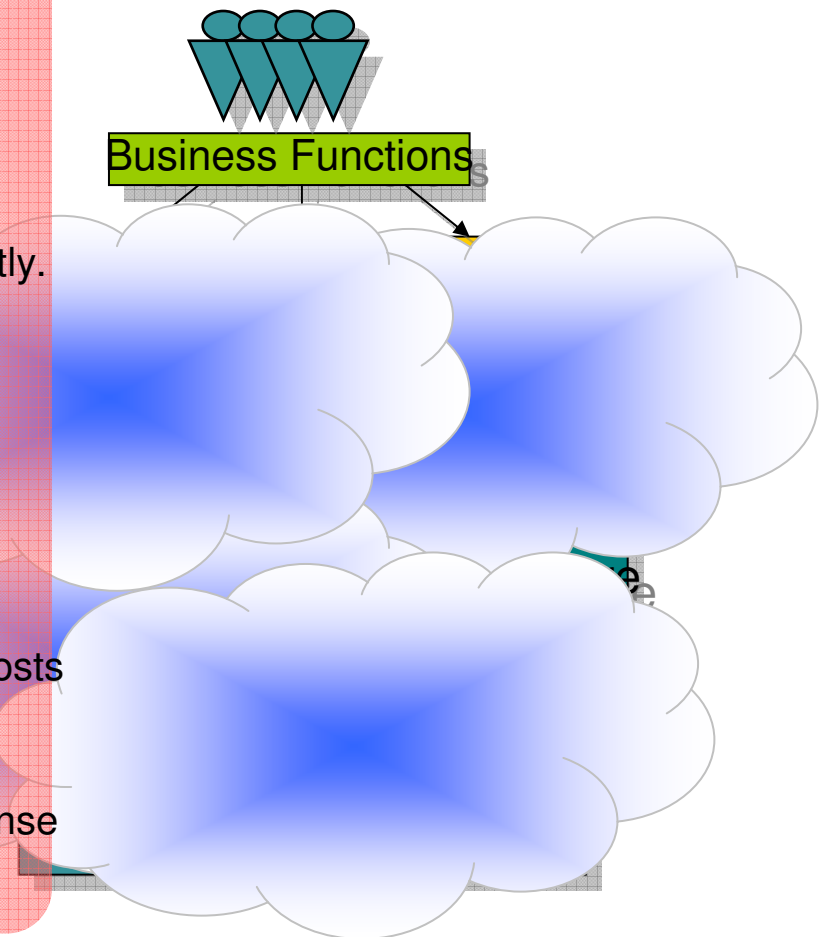
**Service Equivalency** – and mix and match

**Differentiating** – to create new goods or services

**Improve the Revenue Side** – to sell to my clients.

**Improve the Expense Side** – I replace up front capital costs in exchange for increased ongoing variable costs.

**To Improve the Bottom Line** – and convert fixed capital expenditure (CapEx) costs to variable operating expense (OpEx) costs to create cost savings



# Why you as an IT professional should care

You've read the headlines. You've heard the buzzwords.

Cloud Computing just seems like hype, right?

"But it's just another technology getting hyped to the max".

The best case scenario is that your analysis is correct and you can go back to reading Slashdot. You can pride yourself on your ability to recognize web hysteria and laugh at the losers that invested, wrote blog posts, and dared to take it seriously.

- **Unless you work for an IT company, your employer did not go into business to 'do IT'.** They are in business to sell a product or a service - in-house IT may have enabled that up to now but it was out of need rather than desire. Cloud Computing has hit the cover of popular business magazines - its starting to get on the radar of CEO's that ask questions like 'how can I cut my costs?', 'how can I make my business more agile?'. They may not switch overnight, but the clock is ticking.
- **The temptation to contractually outsource IT responsibility.** "Our customer data got stolen from a cloud storage provider - not us - we don't run IT!". Sure the buck stops with the org from a regulatory perspective but media coverage around recent data leakages involving 3rd party providers elicits a mixed reaction and thus diffuses the "reputation issues" to some extent.
- **The skills you need to deal with Cloud IT may be different from the skills you have today.** Your "window" on Cloud IT will be what the Cloud Provider gives you.
- **There's a large cloud forming over the horizon.** The level of investment by providers doesn't bear ignoring. IBM, Google, Amazon, Microsoft and others are ploughing hundreds of millions of dollars building out data centers specifically for Cloud Computing.
- **You may just end up working for the Cloud Provider!**

# Definition of Cloud Computing



## Characteristics

- Self Service
- Network Access
- Rapid Elasticity
- Measured Service

## Delivery Models

- Infrastructure as a Service
- Platform as a Service
- Software as a Service

## Deployment

- Private
- Community
- Public
- Hybrid

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

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# Characteristics: Self Service Provisioning



## • Technical Considerations

- Varied types of resources
  - Server time
  - Network storage
  - Network bandwidth
  - Virtual machines
- No human interaction
- Multiple vendor availability
  - IBM, Amazon, Google
- Micro payment batched into digest bills through:
  - Credit Cards
  - PayPal

## • Business Considerations

- Service Consumer needs to:
  - articulate business value in \$
  - define request services
  - define metrics
  - manage service provider
- Service Provider needs to:
  - service requests
  - administer services
  - monitor services
  - meter services

# Roles in an Enterprise Cloud

## - Offering Manager

- **Responsibilities:** Definition of the service to be offered, to be implemented by the provider
- **Goals:** Definition of a service with focus on:
  - Service Delivery model (Private, Public, Hybrid)
  - Service Deployment style (IaaS, PaaS, SaaS)
  - Service Portability (scaling both up and down)
  - Architecture decisions to support required Service Levels
- **Caveats:**
  - Locality of Service Components (data, compute, network)
  - Architecture choices that will inhibit cloud deployment
    - Platform (Hadoop vs. J2EE)
  - Ability to meter the service

# Roles in an Enterprise Cloud

## - Service Provider

- **Responsibilities:** Implement, Provide, Maintain, and Support defined services for consumers
- **Goals:**
  - Provide self service for deployment, monitoring, and support
  - Meter and bill for deployed services
  - Maintain SLA's as dictated by definer and consumer
  - Provide elastic scaling of offered services within reasonable demand (aka there is a finite scale that can be offered)
- **Caveats:**
  - Must conform to Service Definitions
  - Must manage within consumer expectations and internal service offering requirements

# Roles in an Enterprise Cloud

## - Service Consumer

- **Responsibilities:** Subscribe to Cloud Services, Monitor for met Service Level Agreements
- **Goals:**
  - Selection of required services
  - Monitoring that Service Level Agreements are met
- **Caveats:**
  - When deploying cloud services to meet business needs the consumer has to take a proactive stance to maintain services and keep cost under control, especially during peak workload.

# Characteristic: Location Independence

## • Technology Considerations

- Resources are virtualized multi-tenant pools
- New requests can effect locations
- No control or knowledge of exact placement
- No value placed on asset identification

## • Business Considerations

- Currently technology has not kept pace with legal requirements for data management
- Data Movement Laws
  - HIPPA
  - Sarbanes Oxley
  - Organizational Policies
- Service Level Agreements
- Data Location
  - Latency

# Characteristics: Network Access

## • Technology Considerations

- Services exposed through the network
  - Web interfaces
  - Web service APIs
- Accessed through standard mechanisms
  - LDAP, SSH, VNC, etc.
- Multiple entry devices
  - Thick client
  - Thin clients
  - Phones and PDAs

## • Business Considerations

- Should your application be accessed through the public internet?
- Can and should you tightly couple internal and external services ?
- How will you handle Authorization, Authentication, and Audit ?
- What are appropriate device access mechanisms?

# Characteristics: Rapid Elasticity

## • **Technology Considerations**

- Capacity can be increased and decreased through provisioning
- Can be purchased in quantity at any time
- Can be done automatically

## • **Measured Service**

- Storage, Processing Bandwidth, User Accounts
- Exposed to consumer and provider

## • **Business Considerations**

- Is your application designed so you can scale up or scale out?
- What is the projected cost for spiky workloads and can you afford them?
- Do you dare to automate scaling if a DoS attack occurs?
- Does the metering integrate with Lines of Business, are the metrics useful?

# Cloud Characteristics in an Enterprise

## - Rapid Elasticity

- In Pre-Production Environments
  - Elasticity refers to rapid provisioning or **d**eprovisioning of instances.
  - As developers and testers come on/off line their environments do too.
  - Load / Performance testing follow same concepts.
- In Production Environments
  - Elasticity refers to rapid expansion/contraction of capacity (instantiations)
    - How tolerant is your application to “service availability/variability”
  - Constraints can be imposed by architecture choice
    - LAMP - Scales within known constraints, infrastructure cannot make up for poor application design
    - J2EE - Scales within known constraints, infrastructure cannot make up for poor application design
    - Hadoop - Grid like characteristics scales well with increased computation nodes, here the platform choice alleviates elasticity concerns



# Deployment Types

- **Private**

- Operated solely for one organization
- May be on or off premise
- Considered more secure
- May be managed internally or by third party

- **Public**

- Available to the general public
- Owned by an organization selling cloud service
- Public internet access
- Often provides API and management tools

- **Business Considerations**

- Should you build Private?
  - If you struggle with IT now - what does “cloud thinking” change ?
- Should you use Public?
  - If you can’t share within the company why do you think you can share with others ?
  - Do you have trust issues ?
  - Do you have control issues ?

# Deployment Types

- **Community**

- Shared by several organizations
- Supports a specific community with shared goals
- Managed similarly to private clouds

- **Hybrid**

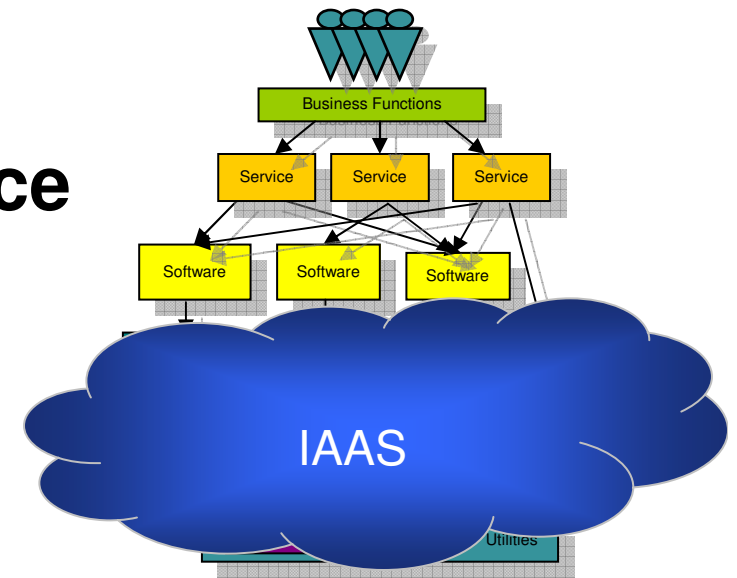
- Composed of two or more of the above models
- Remain unique but are linked by
- Standard or Propriety Tech.
- Enables application and data portability

- **Business Considerations**

- Can you work with your competition ?
- How do your business practices need to change ?
- How do you differentiate ?

# Delivery Models

## - Infrastructure as a Service



- **Definition:** IaaS is a pay for use IT delivery and service model. Delivered over the Internet and provisions the resources such as servers, connections, and storage, to build an application environment.
- **Examples of IaaS providers:**
  - **Public Deployment:** Amazon Web Services – Flexible w/ many add-ons
  - **Private Deployment:** VMWare / Xen / KVM / Hyp V - Build your own
- **Environments Prepared for IaaS deployment:**
  - Development and Test – Rapid deployment of short term services with variable capacity, no long term lock it. Platform selections may be an issue. This is a low risk in private and can be managed in the public model.
  - Adoption pattern shadows that of Linux and Virtualization in the Enterprise.
    - Small development teams
    - Test and Quality Assurance Teams
    - Limited Production Deployments
    - General Adoption

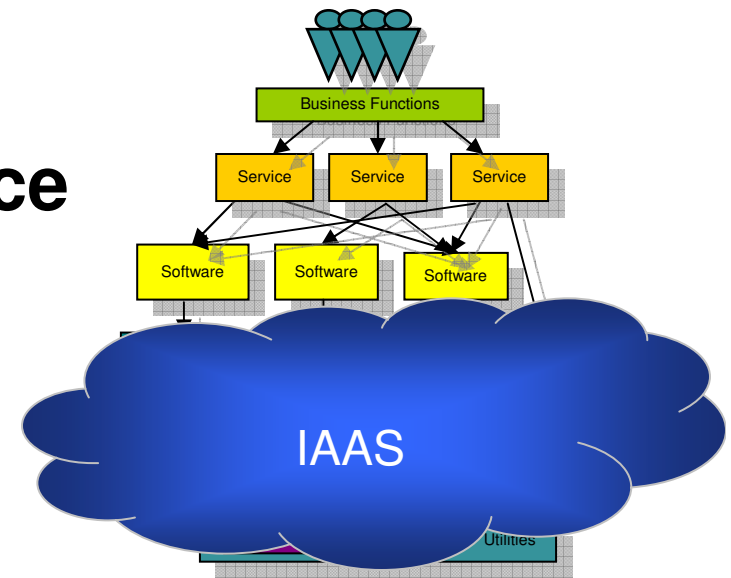
# Delivery Models

## - Infrastructure as a Service

- **Benefit:** Rapid provisioning / deprovisioning of computing resources. Racking, Stacking, Cabling, and Bootup are no longer part of deploying a service

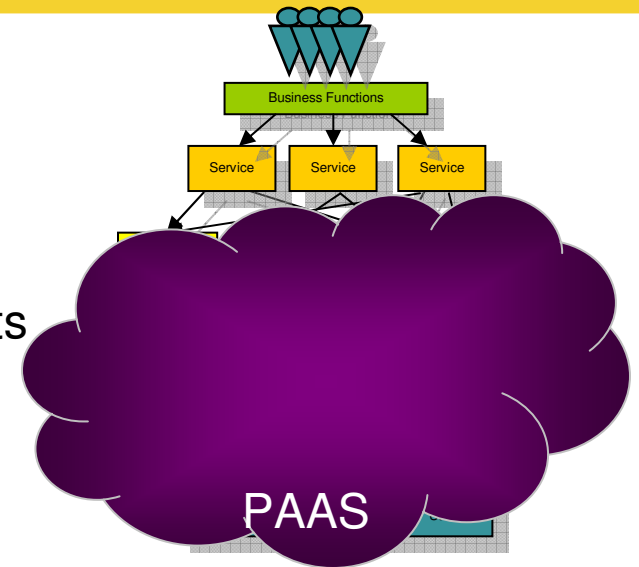
**What if your IT org could do this now ?**

- **Disadvantage:**
  - Difficult to move from one cloud to another in some cases. SLA, Security, Privacy often unresolved.
  - Billing for these services is usually incremental by use and can get complex with tiered on-demand pricing that can be difficult to track in real time.
  - Pricing is usually well defined but can be rather difficult to forecast in some cases. It can vary to the minute depending on levels of use, tiers of service, and other interesting costs.
- **Sound familiar ?** — accounting for IT Services is hard, imagine the benefits to the business if you master it.



# Delivery Models

## - Platform as a Service



- **Definition:** Includes all the systems and environments comprising the end-to-end life cycle of developing, testing, deploying and hosting web applications delivered as a service over the Internet.
- **Examples include:**
  - **Public:** Facebook, Google App Engine, Salesforce, IBM Amazon WebServices
  - **Private:** In House Middleware (DB2, Oracle, WAS, JBOSS) on VMware
- **Environments Prepared for PaaS deployment:**
  - IBM AWS offerings suggest a strong value for Dev / Test or Overflow
    - Premade Linux guests running DB2, WebSphere, and Lotus products
    - Subscribers can bring their own License
    - Development Licenses are free, server cycles from \$0.10 to \$0.75 an hour
    - Production licenses from \$0.50 to \$25.00 an hour depending on product and instance sizing
  - Development of new applications on Facebook, Salesforce, Google AppEngine etc. is a risky proposition, there are no standards, no clear SLA's, and no migration path if the service changes or leaves.

# Delivery Models

## - Platform as a Service

- **Benefits:** Quickly launch new applications for a relatively low cost. Other benefits include limited scalability and reduced cost of operations.

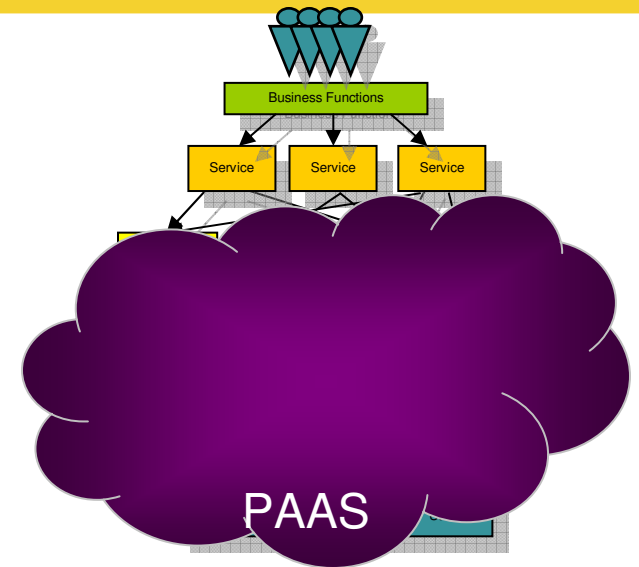
**Does your business use off the shelf applications ?  
(no customization)**

- **Disadvantages:** Can include porting development time costs for existing applications as not all applications come straight over.

**Where do your most important applications come from ? How will they get to the “Cloud” ?**

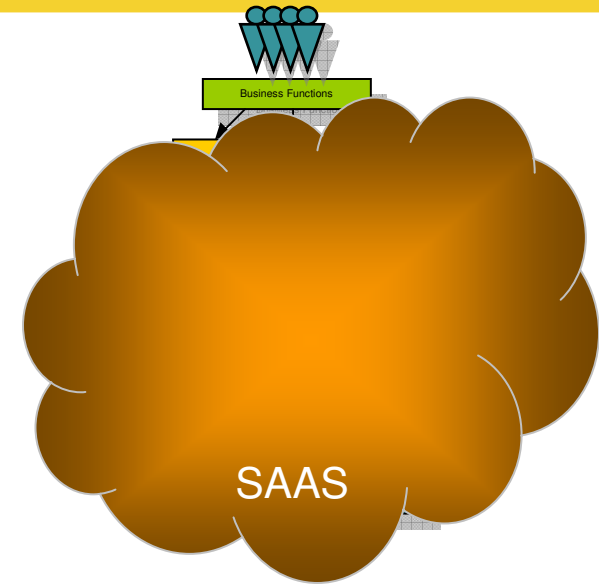
- Billing for these services varies. It can be by the hour, request, CPU cycle, or Seat.

**What makes sense to the business ?**



# Delivery Models

## - Software as a Service



- **Definition:** SaaS is a software application delivery model where the vendor hosts and operates the application for use by its customers over the Internet.
- Delivering software applications is just one capability of cloud computing.
- Not all SaaS offerings can be classified as cloud enabled. If it is "massively scalable," then that SaaS offering could be considered a form of cloud.
- **Examples include:**
  - **Public:** Gmail, Salesforce, Blogger.com / Wordpress.com
  - **Private:** VMware Virtual Machine Marketplace
- **Environments Prepared for SaaS:**
  - **Private:** Any software title can be encapsulated, and made into a fully-featured SaaS offering without too much heavy lifting. Find some functionality you like. Put it in a virtual machine
  - **Public:** Applications for customer, sales, call center, finance, marketing and supply chain needs continue to grow to provide direct value in business and eliminate a lot of overhead and needed resources in IT.
  - **Public / Private:** Business Intelligence

# Delivery Models

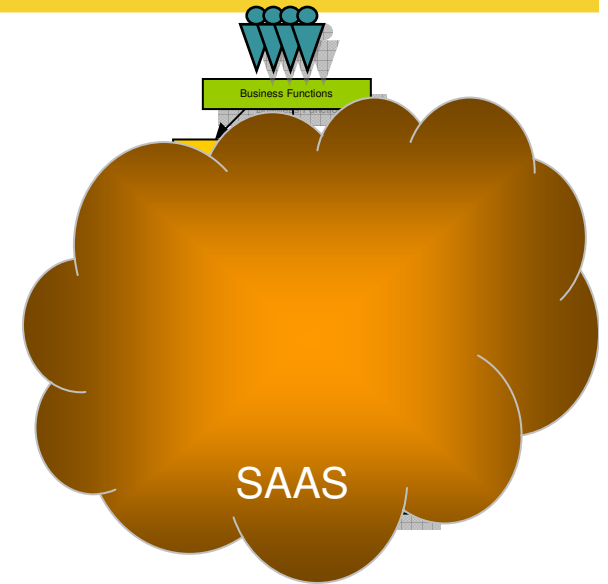
## - Software as a Service

- **Benefits:** Leveraging IAAS or PAAS, and melding SAAS offers the opportunity to reduce the costs associated with using, producing and delivering a SaaS application.

**Inch by Inch:** Incremental and iterative approaches provide value.

- **Disadvantages:** Limited or no control over application or customization. Unclear relation to SLA's, Upgrades, and maintenance.

**Just say no !** Good governance provides value clouds or not.





# Top Concerns of the Enterprise with Clouds: Bandwidth

- **Moving the data around**
  - **Volume:** Typical data warehouse stores many terabytes and sometimes many petabytes of enterprise data. There are scaling challenges to moving large data warehouses to/from the cloud.
  - **Workload Suitability:** Email, web analytics and search do not require daily transfer of massive data to these systems and thus are more fit for transition to cloud services. Typically, enterprise and customer data constantly trickles into these applications; therefore, they do not require significant network bandwidth (well, until you need to migrate, see Volume problem).
  - **Data Management:** These challenges include data security issues, daily data cleansing and refresh of the warehouse with hundreds of terabytes of operational data from enterprise resource planning (ERP), customer resource management (CRM) and web applications.

Laws of physics still govern the movement of electrons.

# Top Concerns of the Enterprise with Clouds: Security Control

- **Centralized Data**
  - **Reduced Data Leakage:** Central storage and enforcement point if data lives in the cloud and not locally. How many laptops do we need to lose before we get this?
  - **Monitoring benefits:** central storage is easier to control and monitor. The flipside is the nightmare scenario of comprehensive data theft.
- **Incident Response / Forensics**
  - **Decrease evidence acquisition and transfer time:** If compromised, clone the disks and make them available to your Cloud Forensics server in the same Cloud.
  - **Eliminate or reduce service downtime:** Abstracting the hardware removes a barrier to repairing a service. Clone, rollback, provide service, and investigate incident on the original.
- **Secure Build**
  - **Pre-hardened, change control builds:** this is primarily a benefit of virtualization based Cloud Computing. Now you get a chance to start 'secure' (by your own definition) - you create your Gold Image VM and clone away.
  - **Reduce exposure through patching offline:** Gold images can be kept up securely kept up to date. Offline VMs can be conveniently patched "off" the network.
  - **Easier to test impact of security changes:** this is a big one. Spin up a copy of your production environment, implement a security change and test the impact at low cost, with minimal startup time.

Rethinking policies does not need cloud technology.

# Top Concerns of the Enterprise with Clouds: Security Visibility

- **Privileged user access:** Cloud services bypass the "physical, logical and personnel controls" IT shops exert over in-house programs. Ask providers to supply specific information on the hiring and oversight of privileged administrators, and the controls over their access
- **Regulatory compliance:** Customers are ultimately responsible for the security and integrity of their own data, even when it is held by a service provider
- **Data location:** Require providers to store and process data in specific jurisdictions. Then Audit.
- **Data segregation:** Data in the cloud is typically in a shared environment alongside data from other customers. The cloud provider should provide evidence that encryption schemes were designed and tested by experienced specialists.
- **Recovery:** A cloud provider should tell you what will happen to your data and service in case of a disaster. Any offering that does not replicate the data and application infrastructure across multiple sites is vulnerable to a total failure.
- **Investigative support:** If you cannot get a contractual commitment to support specific forms of investigation, along with evidence that the vendor has already successfully supported such activities, then your only safe assumption is that investigation and discovery requests will be impossible.
- **Long-term viability:** Ask potential providers how you would get your data back and if it would be in a format that you could import into a replacement application

You have these issues today...you may not talk about them.  
Your lawyers will want you to.

# Top Concerns of the Enterprise with Clouds: Security Access

- **User Accounts**

- IT staff can require secure passwords for their own networks and email systems. They can't control the password requirements for web-based email accounts or cloud computing apps.
- IT staff can require employees to change their network passwords regularly. They can't do that for cloud apps.
- IT staff can test the security of passwords on their own networks. Do they do that with their employees' Google Doc passwords?
- IT can disable email and network accounts for former employees. Does anyone think to disable those employees' access to docs in the cloud?

- **Data Tracking and Ownership**

- Know where all of your data lives. Keep this inventory up to date.
- Do everything you can to keep your data secure and private.
- Make sure your vendor(s) privacy and security standards are at least as good as yours.
- Understand the limits of free services.
- Ask up front: if you need to change vendors some day, will your data be portable?

Admit it - These hurt business guys heads...this stuff can be hard  
– period. “Clouds” makes it more obvious to non-techies.

# Top Concerns of the Enterprise with Clouds: Portability vs. Interoperability vs. Equivalency

- Three different but related problems
  - Portability – can I move my stuff from one provider to another
  - Interoperability – can I have different stuff work together
  - Equivalency – implied in 1 & 2
- Standards help but not guarantee
- Devil is in the detail, the more you can explicitly define, measure and validate, the more you will be able to understand your constraints in moving between or using multiple providers.
- Always a Challenge even without clouds.
  - Java – portable maybe
  - VMware Image – better portability – so long as you don't need special external stuff.

Simple – right ?

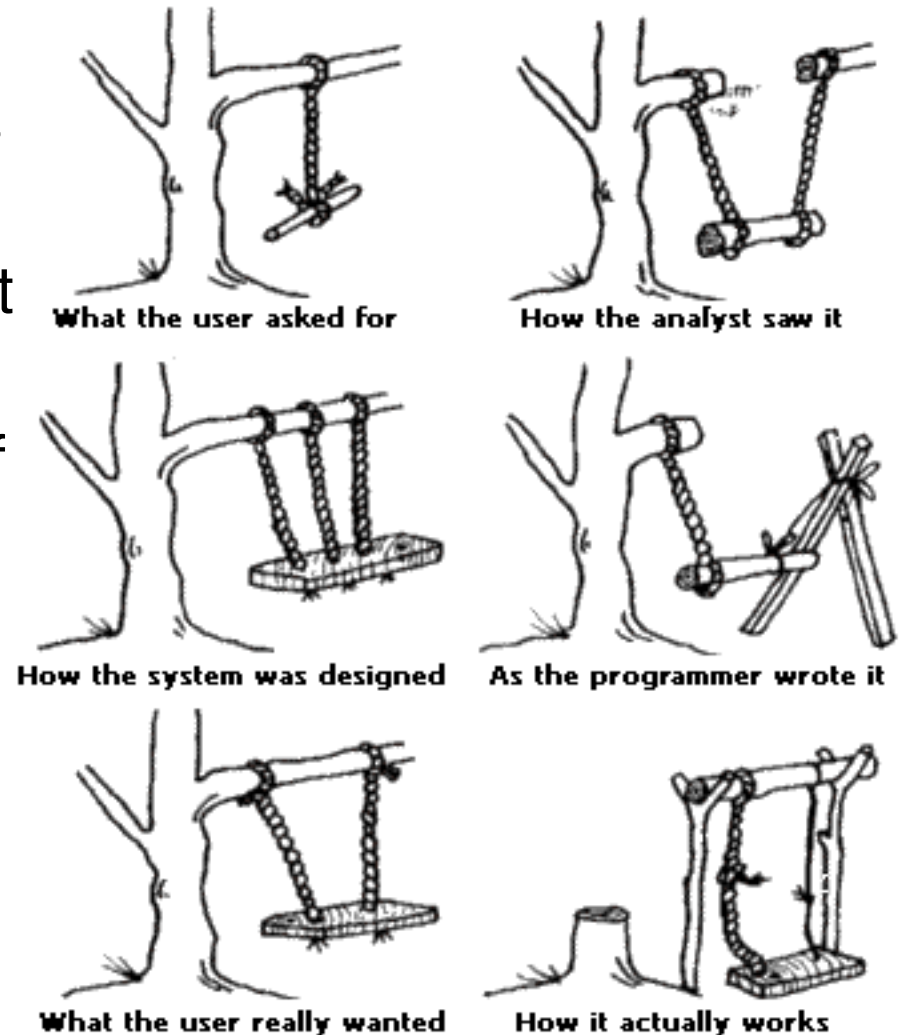
# Top Concerns of the Enterprise with Clouds: Service Life-cycle Management

- Change Control
- Setup / Maintain / Shutdown
- Disaster Recovery
- Availability
- Patching
- Standby & Archive or New Deployment

In a word – Governance.

# Clouds – its all about the business requirements

- Business will want to use technology to make business “better”.
- Technologist will always want to make technology “better”.
- The trick is in the definition of “better”.



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