Cloud Computing – An IT Paradigm Changer

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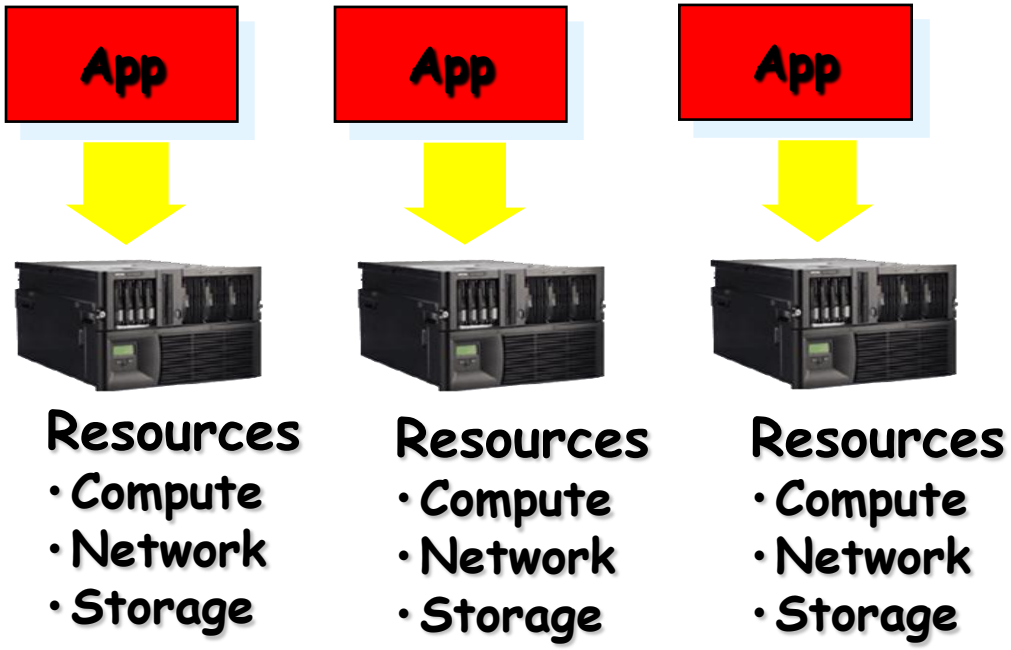
IT infrastructure reached breaking point



IT infrastructure reached breaking point

Up to 85% Capacity remains idle (was)

55¢/$1 ➔ 35c/$1

70% on average is spent on maintaining infrastructures vs. adding new capabilities.

1.4X

Explosion of information driving 54% growth in storage shipments/year.

33%

33% of consumers notified of security breach terminate their relationship with companies they perceive as responsible.

$40B

Consumer industries lose ~$40B/year; 3.5% of sales due to supply chain inefficiencies.

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The Path to Clouds

Virtualization

Manageability

Standardizations

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… So what are Clouds?

- Clouds
  - Virtualized Autonomic Multi-tenant Utility Deployments
  - Provide capabilities as services
  - Services are accessible from anywhere
  - Accessing services is billable through usage
- Cloud Computing
  - A consumption and delivery model
  - End-user focused
  - Clients only see services

Industrialization of Delivery of IT Services

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… Key Clouds Attributes

High-Quality User Experience

- "Best in class" services
- Flexibility & choice
- Lower costs
- Enhanced security/reliability
- Rapidly Provisioned

Cloud Enables

- Self-service
- Sourcing options
- Economies-of-scale

Cloud Delivery Models

- Private, public and hybrid
- Industry sector specific
- Workload and/or programming model specific
- Any_Thing_You_Like_Cloud

Cloud Services

Changes in Consumption

- User provision
- Self service
- Tiered, flexible pricing

Changes in Delivery

- Standardized offerings
- Virtualized & automated

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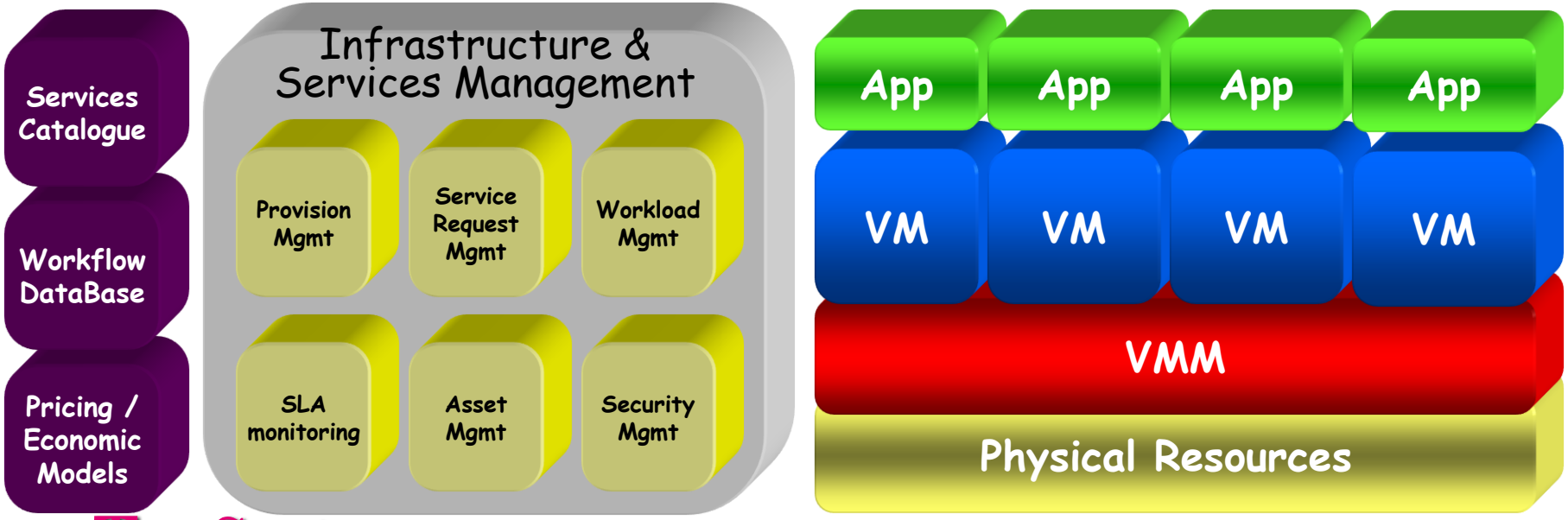
Current Offered Services

Cloud Service Management Services	Examples
Business_Processes-as-a-service (BPaas)	Use provider's business app/services over network **E.g.,** Your CRM package does not manage load effectively
Software-as-a-Service (SaaS)	Use provider's applications over a network **E.g.,** Your email is hosted on exchange server in your office, but is slow ➔ outsource.
Platform-as-a-Service (PaaS)	Tools/Services & Middleware to deliver S/W app.; Deploy customer-created applications cloud. **E.g.,** Host 64GB files, make available to 50K users
Infrastructure-as-a-Service (IaaS)	Rent HW, system software, storage, network in cloud. **E.g.,** Need to run batch jobs, but do not have the infrastructure necessary to run it in timely manner

Architecture Overview

- Virtualized Pool of Compute & I/O resources
  - Applications/services running within virtual machines
- Autonomic services management
- Catalogues: offered services, images, workflows & utility models



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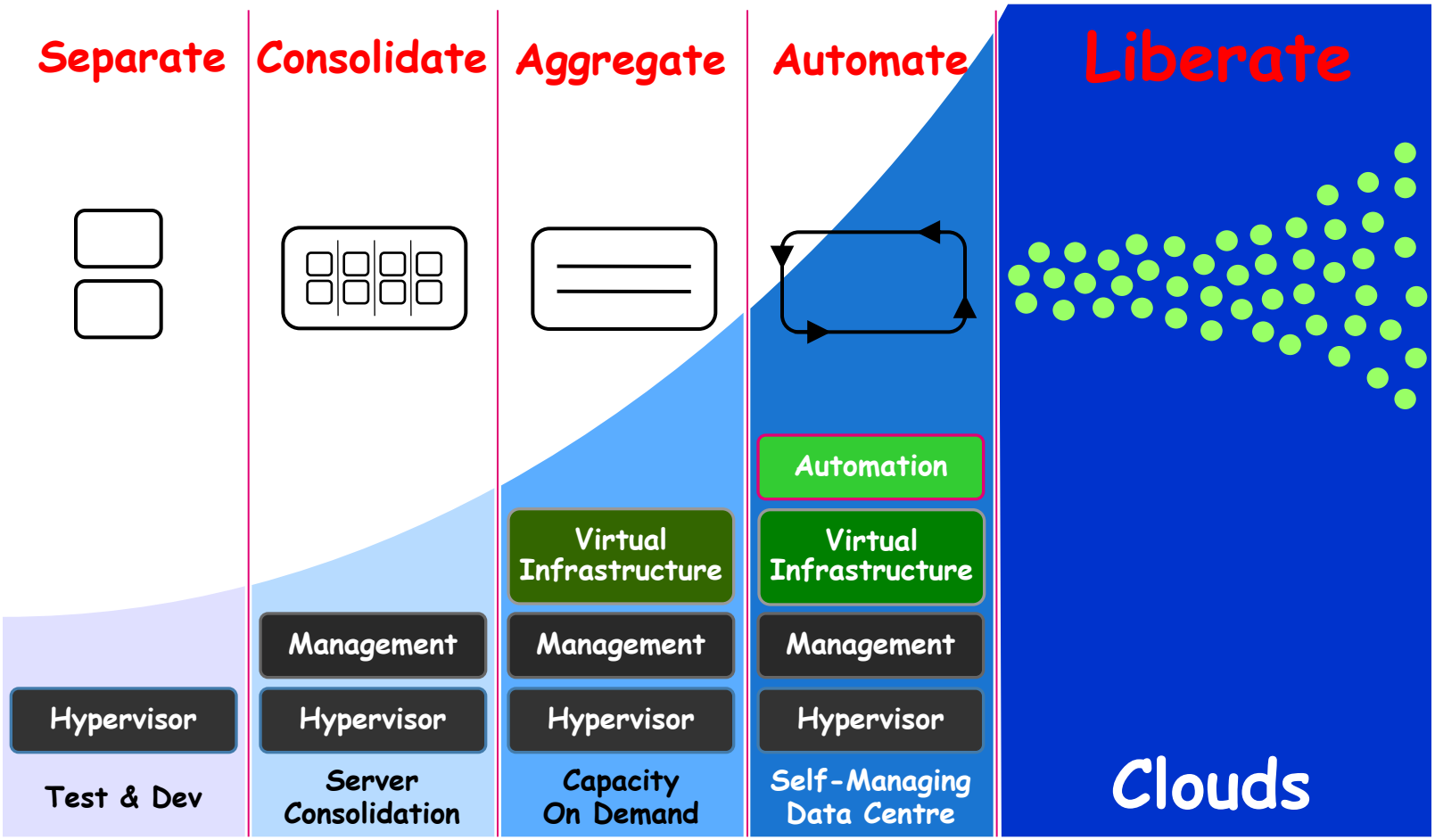
Virtualization - The Foundation of Clouds



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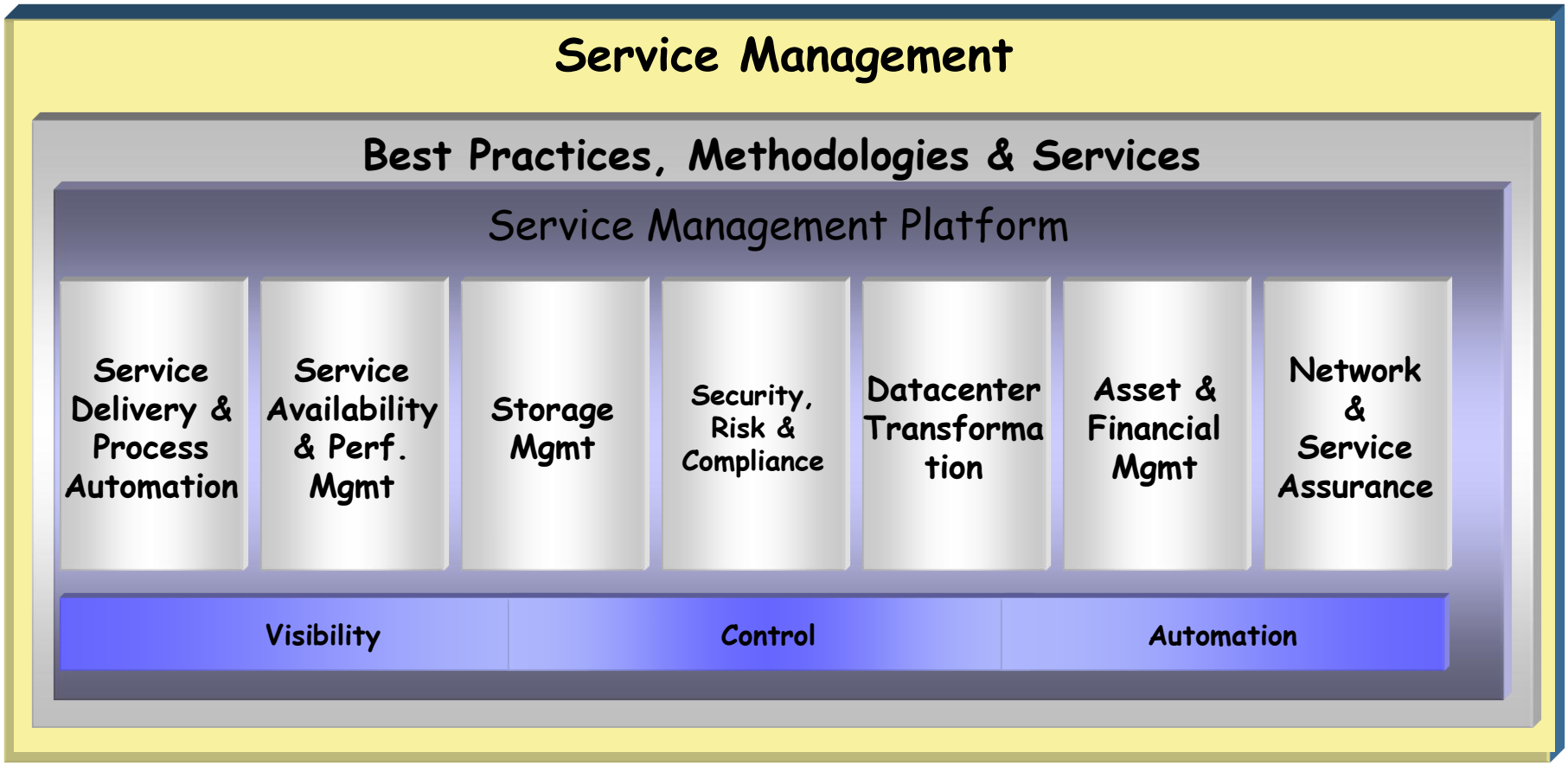
Manageability – Command & Control of Clouds

Service Mgmt provides mechanisms & S/W to assure quality service delivery & reduce infrastructure costs



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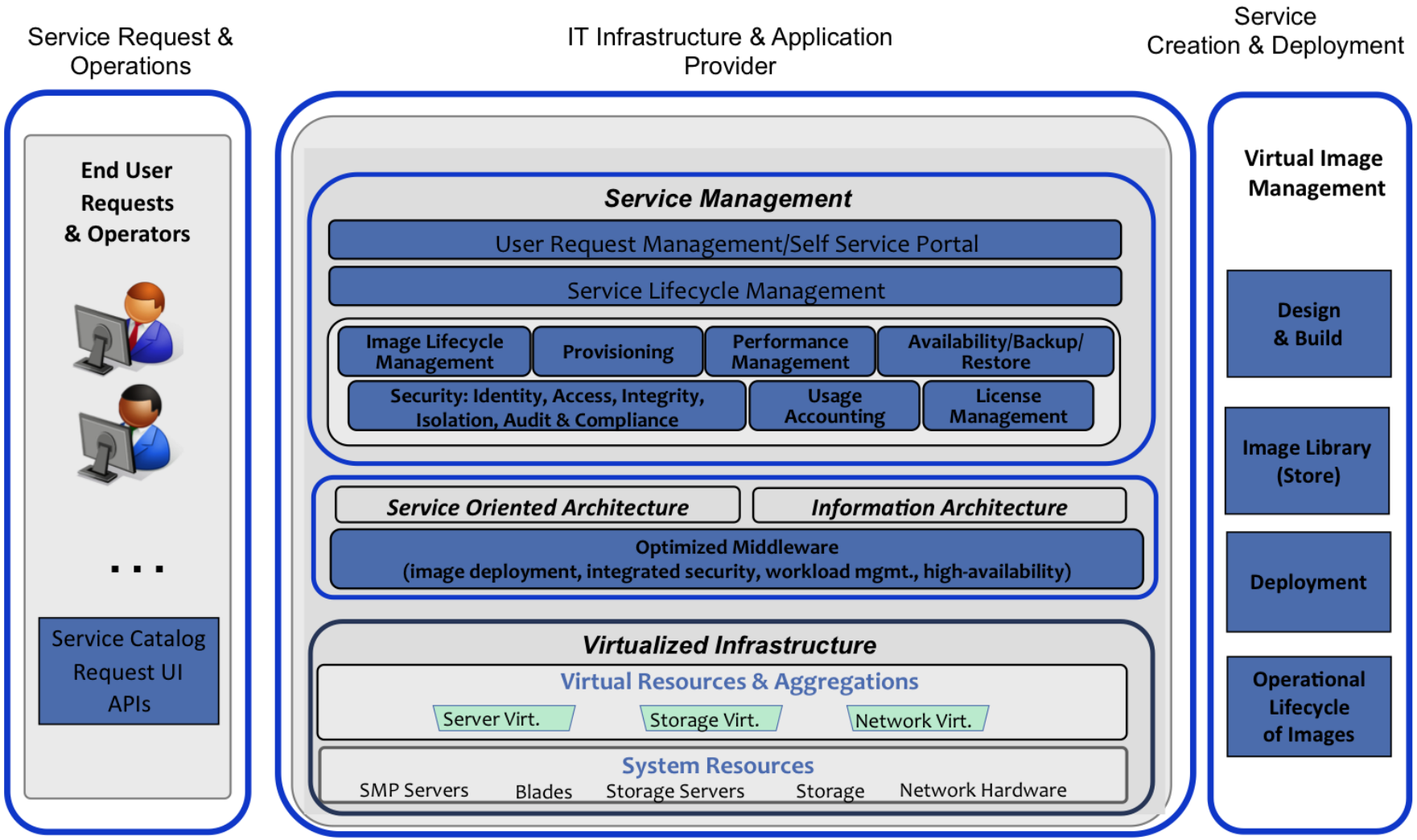
Service Management Model for Cloud Computing



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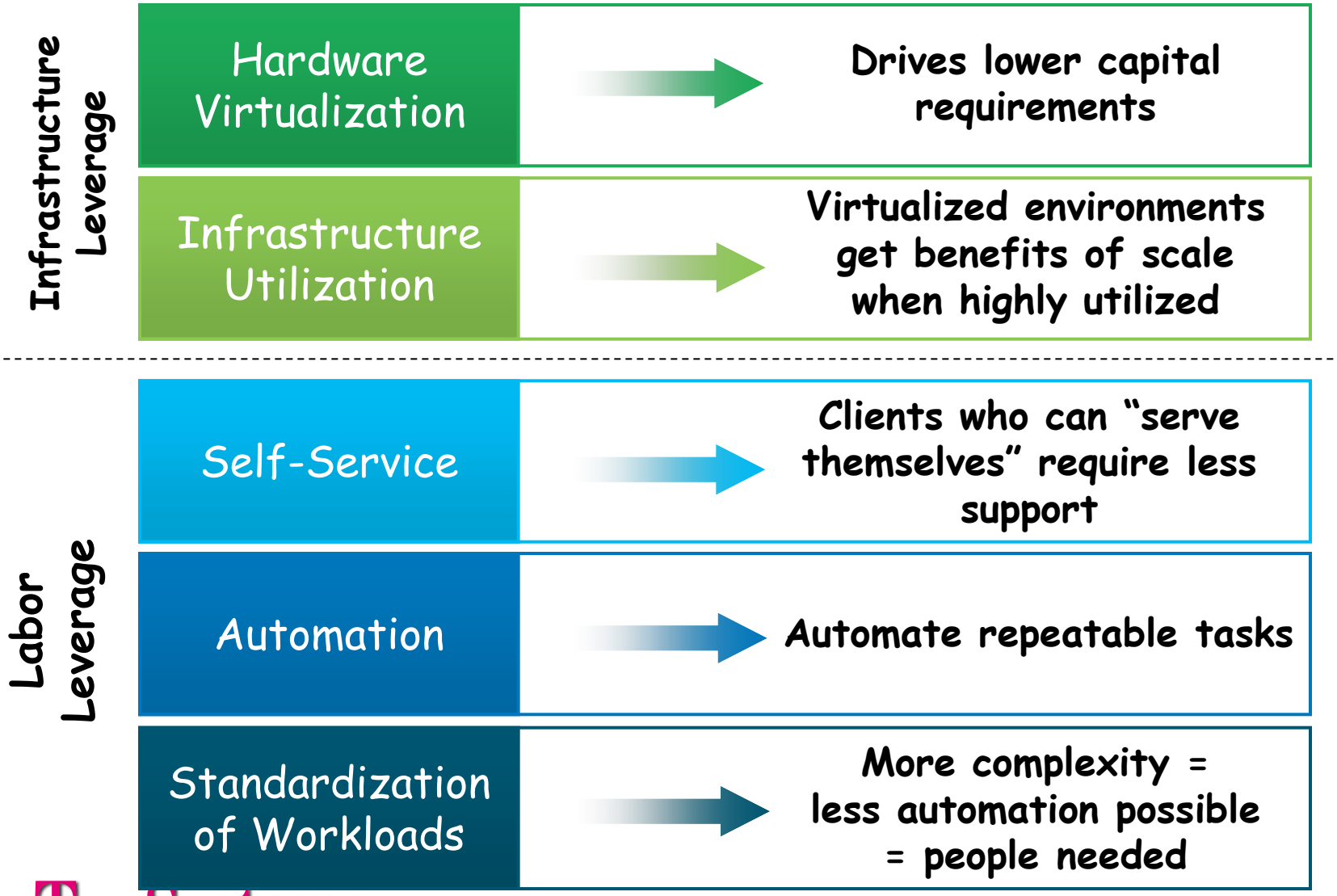
Elements that Drive Cloud Efficiency & Economics



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Differences: Cloud Computing & Traditional IT

	Traditional IT	Cloud Computing
Delivery Model	Buy assets & build delivery architecture	Buy external service
Interface Model	Internal network or intranet	Via Internet using standard Internet Protocols (IP, HTTP, HTML, etc.)
Business Model	Pay for fixed assets and administrative overhead	Pay directly based on usage or indirectly (e.g., subsidized by advertizing)
Technology Model	Single Tenant	Scalable, Elastic, Dynamic, & Multi-tenant

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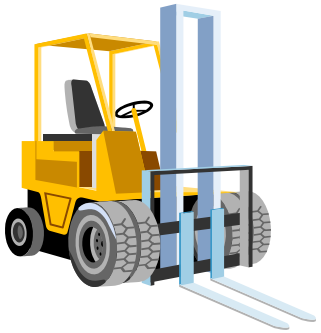
Challenges/Risks



- Availability of guaranteed service levels
- Security & regulatory compliance
  - … Data security, recovery, segregation, location; Investigative support; etc.
- Auditing Cloud to verify providers' claims
- Network connectivity – both performance & reliability
- Workload selection; effective exploitation of cloud capabilities
- Applications Scalability
- Integration of services between cloud offerings
- Interoperability among clouds, especially public clouds

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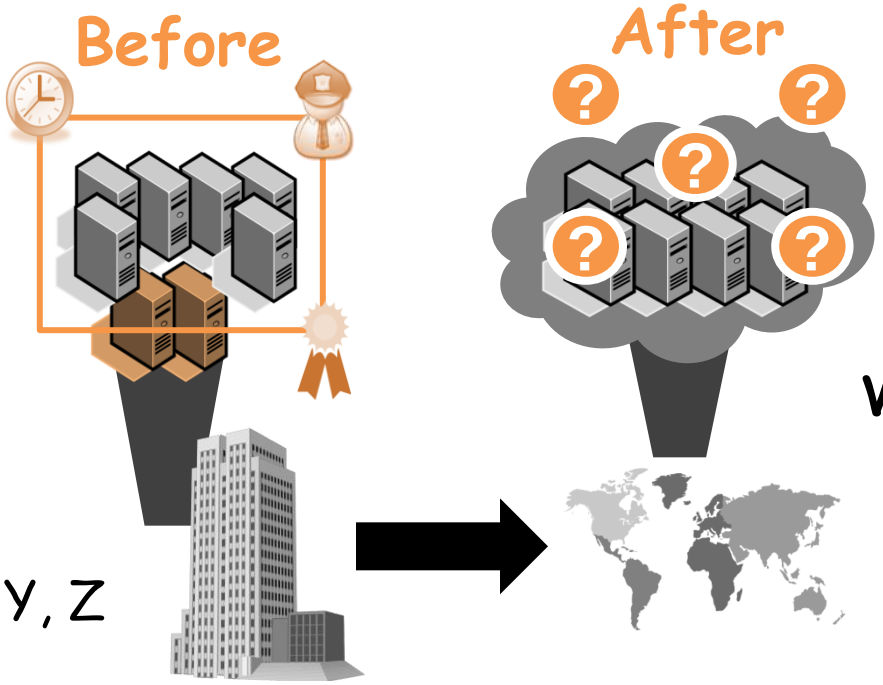
Challenges/Risks - Security



We Have Control

Located at X

Stored in servers Y, Z

Backups in place

Sufficient ACL & Uptime

Happy Auditors

Engaged security team

Who Has Control?

Located where?

Stored where?

Who backs it up?

Who has access?

How resilient?

How do auditors observe?

How does security team engage?

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Likely Evolution of Clouds

Current

1. Vendor offerings adopted primarily in single service nature;
2. Challenges will remain such as regulatory, security and performance to be gradually filled to broader acceptance.
3. Adoption by enterprises measured, focusing on non-core applications

Intermediate

1. Offerings increasingly appeal to specific industries;
2. Regulatory, security & SLA gaps in early offerings will be filled;
3. Vendors offering solutions to increase penetration of the cloud within enterprises.

Vision

1. Collection of offerings from multiple vendors;
2. Custom applications to be composites of off-the-shelf offerings integrated, mashed up to create new solutions;
3. Enterprises dynamically decide on resources to use based on current pricing & required SLAs.

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Conclusions

- Cloud Computing is happening
  - … Still evolving requiring R&D
  - Considerable market growth & maturity over next 5 years
- Challenges exist
  - e.g., security, compliance, network availability, SLA guarantees, …
- Interoperability among public clouds
  - Standards & open source key for wide cloud adoption

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Q&A
Thank You
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