Migration to Enterprise Cloud Computing

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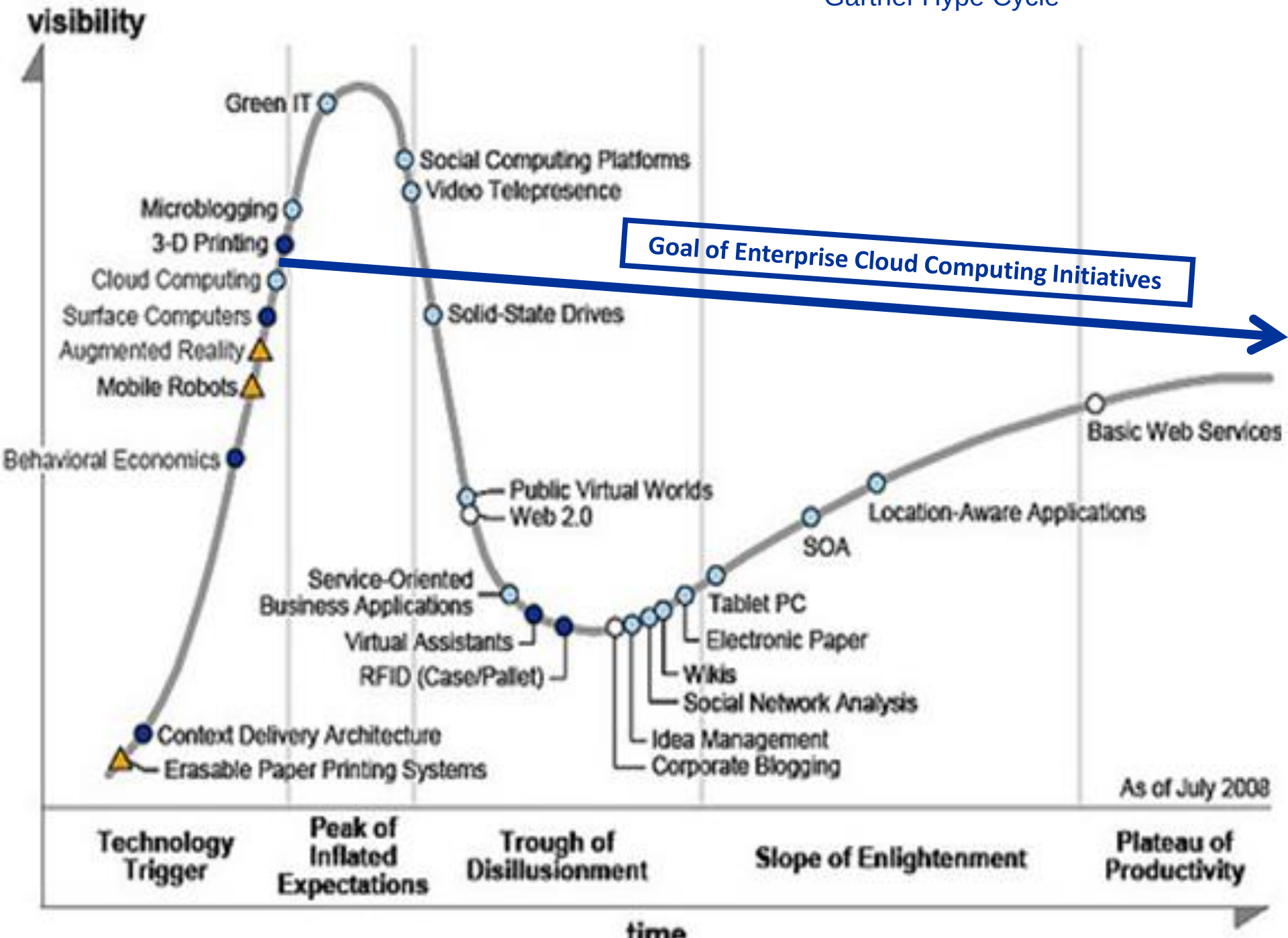
One Definition of Cloud Computing

- Cloud Computing describes information technology (IT) resources with these properties:
  - *Hosted on a remote virtualized infrastructure*
  - *Scalable deployment possible*
  - *Accessed as services*
  - *Support Internet protocols and interfaces*
  - *Payments based on actual use of resources*
- Enterprise Cloud Computing is the incorporation of Cloud Computing resources into Enterprise IT

Enterprise Cloud Computing Challenge

- Cloud Computing has the potential to provide major benefits to enterprises
- Cloud deployments are now following the traditional life cycle for emerging technologies e.g. over-hyped, push-back, ultimate use
- In the past, this life-cycle has produced mixed results (e.g. SOA)
- In the current economic climate, it will be very valuable to speed up successful deployments
- **Challenge: Develop a new process for migration to Enterprise Cloud Computing**

Gartner Hype Cycle



Key Enterprise Cloud Computing Issues

- Standardizations Needed
  - APIs between Cloud layers (e.g. PaaS and IaaS)
  - Interoperability across Clouds
  - Interoperability between public Clouds and enterprise systems
- Robust Cloud Operations
  - Security of applications and data in public Clouds
  - Availability, risk management, and SLAs for public Clouds
  - Governance of services across public Clouds and the enterprise
- Implementation Guidelines
  - Best practices for migrating appropriate applications to Cloud environments
  - Use cases and patterns for enterprise Cloud deployments
  - Organizational support with the Enterprise for Cloud Computing
- Maturity of Enterprise Cloud Software and Services

Possible Enterprise Cloud Efforts

- Cloud Computing Industry Associations
  (collaboration by suppliers and system integrators)
- Enterprise Cloud Computing User Groups
  (interaction of suppliers, customers, standards groups)
- A Federal Open Cloud Initiative
  (government initiative with industry and academia)
- **InterCloud Interoperability coordination**
  (industry, multiple governments, standards groups)

Standardizations

Cloud Computing Layers

Environments and Interfaces (e.g. Desktops as a Service)
Downloadable Apps (e.g. Office Apps as a Service)
Composite Applications(e.g. Workflow as a Service)
Applications (e.g. Software as a Service = SaaS)
Develop, Deploy, and Run Services (e.g. Platform as a Service = PaaS)
Middleware and Data Services (e.g. Database as a Service)
Resource Services (e.g. Infrastructure as a Service = IaaS)
Distributed Virtualization Services
Computing Hardware and Physical Storage

APIs Between Cloud Layers

- What API standardizations are really needed for portability in the near future e.g. API for IaaS (CPUs, storage)?
- Are there existing deployed APIs that should be the starting point of future standardization activities?
- What should be the industry process for defining and implementing these standards?

Interoperability across Clouds

- What are the requirements for Cloud to Cloud interoperability at each level (e.g IaaS, PaaS, and SaaS) in the next few years?
- What are the technical and non-technical (e.g. business, legal) standardizations needed to provide the required interoperability?
- What should be the process for defining and implementing international InterCloud standards?
- Reference: new Cloud Interoperability Magazine http://cloudinterop.ulitzer.com/

Interoperability across Clouds and Enterprise

- How can public Clouds be used to extend enterprise systems (e.g. to handle spikes in resource requirements)?
- How can enterprise applications be incrementally migrated to Cloud platforms?
- How can enterprise policies and governance be extended to include Cloud deployments?

Robust Cloud Operations

Security of Applications and Data

- How can the security of application and data be guaranteed in Cloud deployments?
- Which current enterprise applications and data can be safely deployed on public Clouds?
- Can virtual private Clouds become an equally secure alternative to internal Clouds?

Availability, Risk, and SLAs

- What are the past problems with public Clouds and how can customers be sure that these problems won't occur in the future?
- What sort of SLAs should user expect for Cloud deployments?
- Are there documented ways to mitigate the risk of Cloud deployments?

Governance and Management for Clouds

- How can enterprises provide policy enforcement on Cloud deployments?
- Are there system management tools that work across Clouds and enterprise systems?
- How are costs allocated for shared resources across enterprise organizations?

Implementation Guidelines

Best Practices for Migration

- How can an enterprise determine which applications should remain internal?
- How should an enterprise decide whether to use SaaS leasing, PaaS tools, or IaaS foundation to deploy applications?
- Are there documented methods for SaaS, PaaS, and IaaS deployments?

Use Cases and Patterns

- Which enterprise applications and processes are most suitable for Cloud deployments?
- What are the success stories for Cloud deployments by enterprises?
- Are there documented design patterns for PaaS and IaaS deployments?

Organizational Support for Cloud Computing

- What new enterprise organizational structure and roles (if any) are needed to handle Cloud Computing?
- What is the relationship to SOA organizations (e.g. Centers of Excellence?
- What should be the role of an Enterprise Cloud Computing Group with members from multiple enterprises, industry, government, and standards groups?

Cloud Software and Services

Enterprise Cloud Software and Services

- What software and/or services are available for enterprise Cloud Computing?
- What are the benefits of these software/services to enterprises?
- Are there referencible examples of successful deployments using these software/services?
- What are the key lessons learned from past efforts that can improve future deployments?
- What are the goals and direction for Cloud software/services providers in the future?

Topics from an Enterprise RFI

- Financial aspects of the cloud computing model
- Relative maturity, projected trends and risks
- Typical suite of hardware and software necessary
- Core Requirements
  - Virtualization
  - API and User Interface
  - Application Layer Interoperability *(IaaS)*
  - Data Layer Interoperability
  - Basic or Core Services *(PaaS)*
  - Security
  - Scalability Requirements *(Distributed Virtualization)*
  - Storage Requirements
  - Identity Access Management
  - Chargeback and Billing