Transition & Migration to cloud computing environment

Agenda

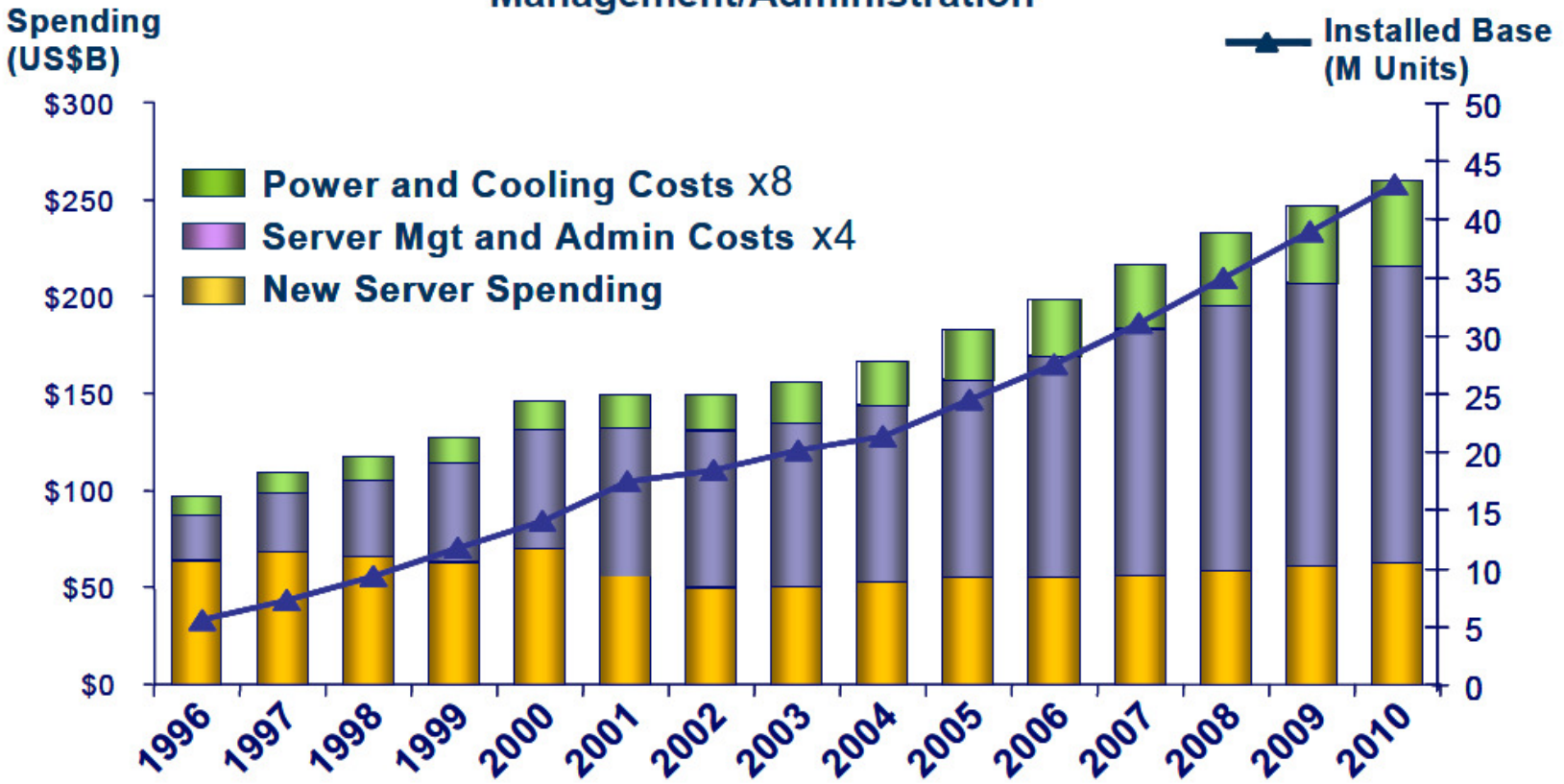
- 6 key steps when moving to cloud environment
- Inhibitors and risks to cloud computing

Why companies may prefer to go for cloud computing?

Installed base is growing…

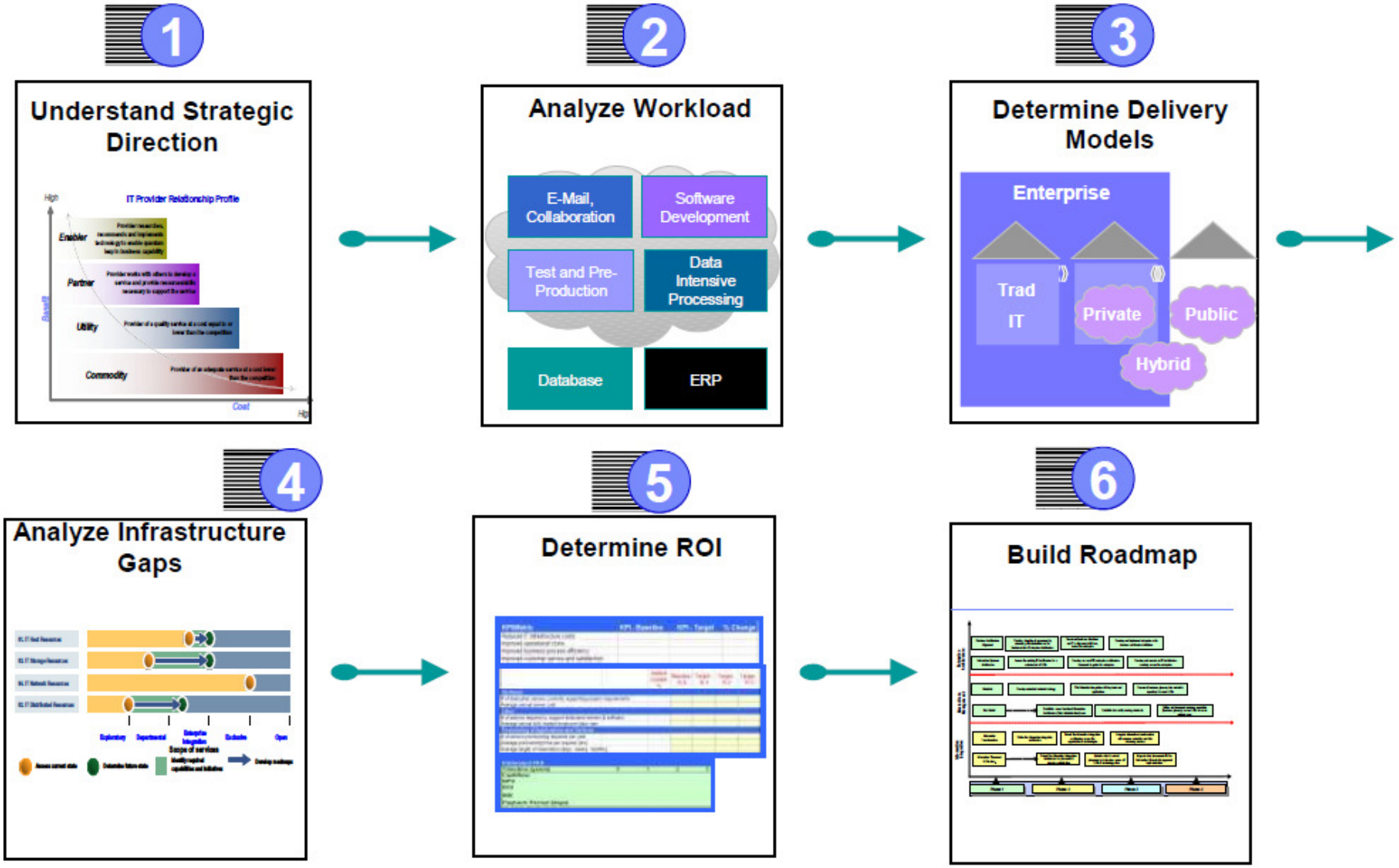
IDC Analyze the Future

Worldwide IT Spending on Servers, Power and Cooling, and Management/Administration

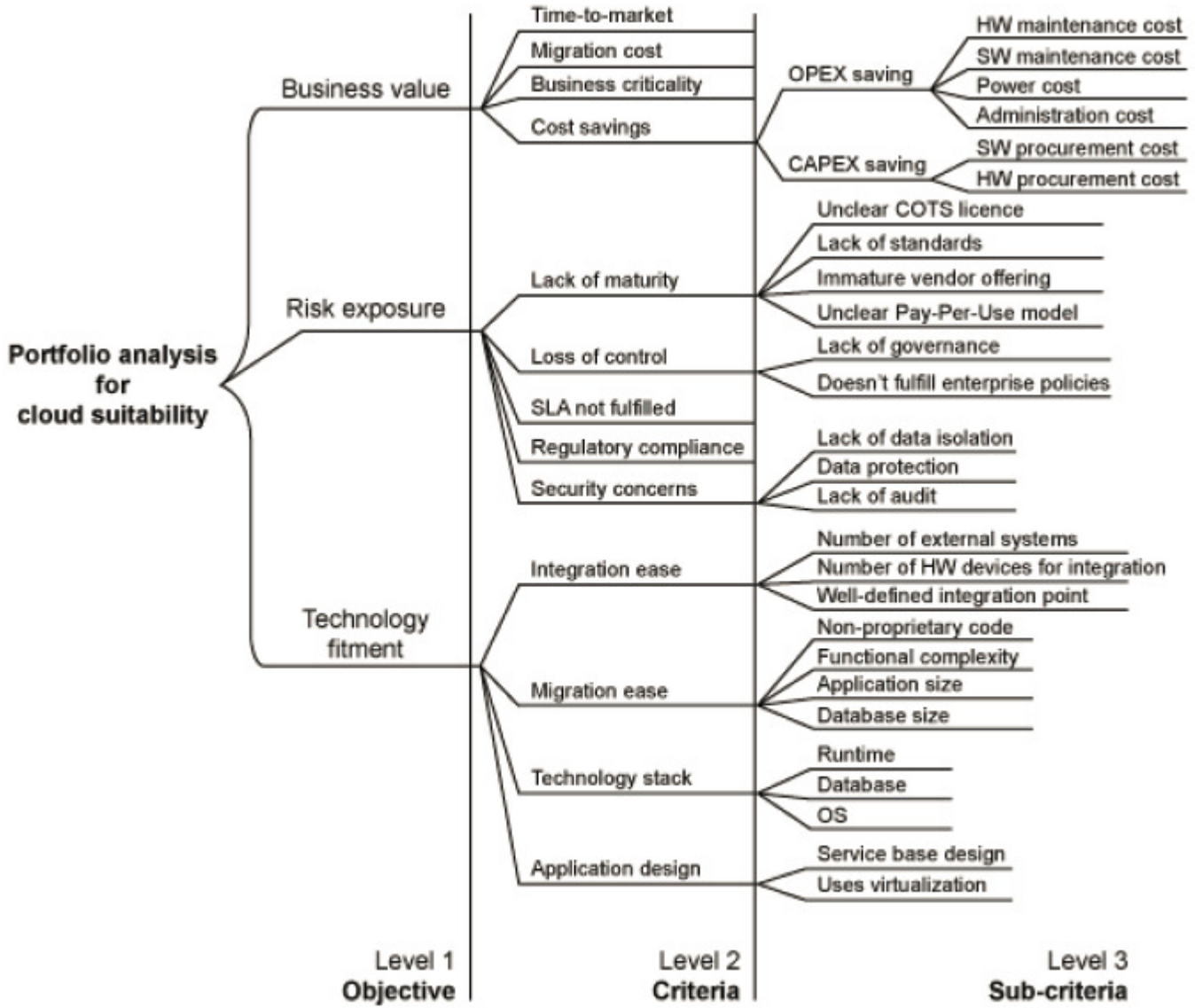


Many Servers, Much Capacity, Low Utilization = $140B unutilized server assets

Six steps for cloud implementation



1 - Criteria examples



1 - Cloud suitability

What questions to ask to determine if Cloud is a good fit?

Key Pain Points

- Lost business opportunity because IT too slow to react. Lack of agility.
- Long deployment timelines for new systems (weeks/months+).
- Many people involved in the process, high cost & complexity.
- Many steps are manual and prone to error.
- Huge up front investment for new infrastructure when I want to start small.
- Server Sprawl
- Low Utilization
- Compliance, auditing, and security patching costly.
- Don't know what compute resources are used or how much they cost?

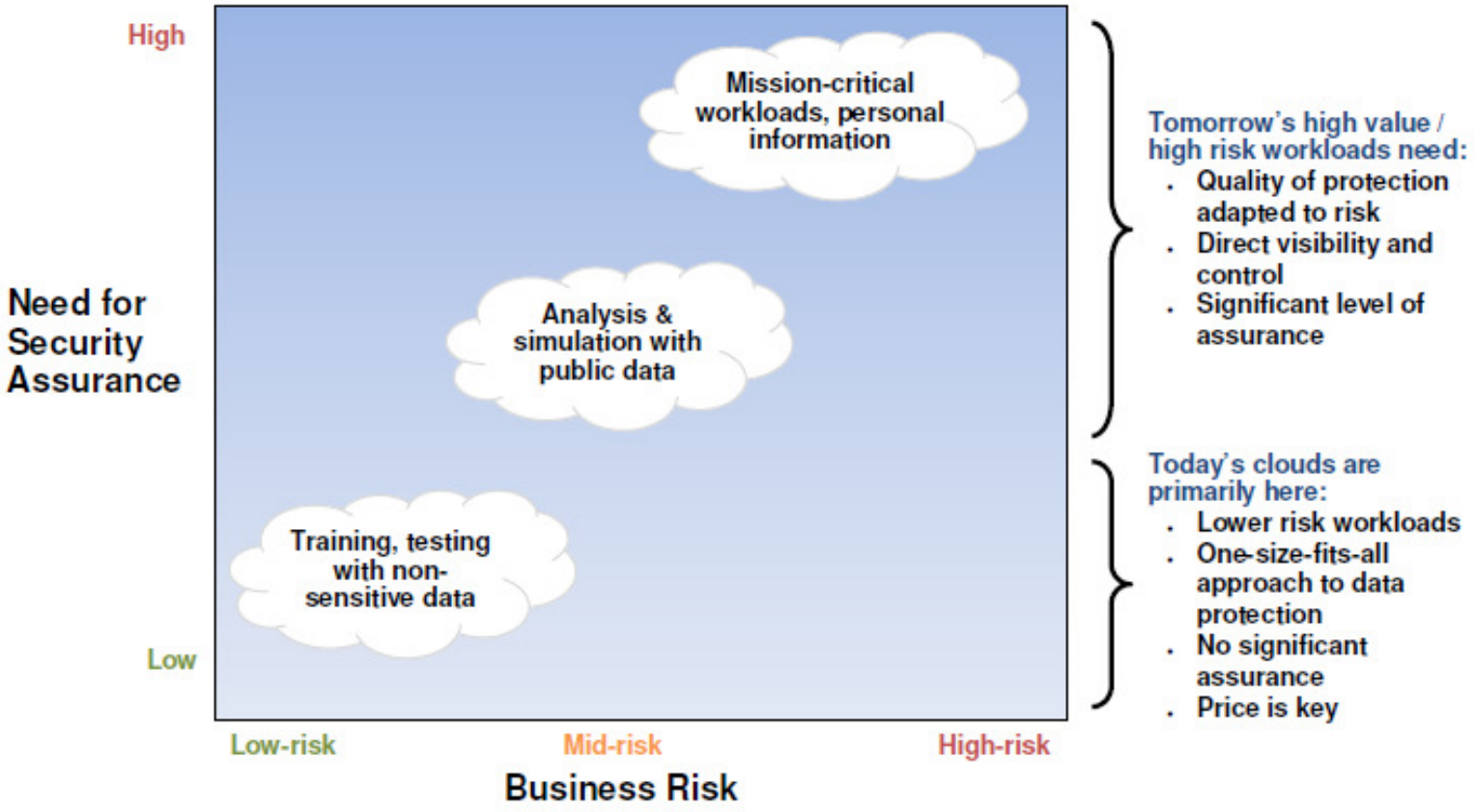
Key Questions to ask?

- How quickly can you react to deliver a new IT service?
- How many steps are in the provisioning process?
- What is the ratio of system admins to servers?
- Have you experienced outages due to human error ?
- How are systems sized and scaled quickly (peak usage, CUOD)?
- How many images per user?
- Am I sized for min, mean, or peak ?
- How many different configurations used?
- What level of metering and method of charging used? How do we manage license compliance ?

2 - Workload migration

One – size does not fit – all

Different cloud workloads have different risk profiles



2 - Workload consideration

A representative sample of typical workload migration factors

Workload considerations	
Environment type	• For which type of environment will the workload be used (for example, development, test or production)? Are there different requirements for each environment?
Technical aspects	• What are the common aspects across all of the components in the workloads? Do your database, application server and web server run on the same type of platform? • If not, what operating systems, databases or application servers are being consumed or provided? • What are the CPU, memory, network and storage in measurable quantities typically used/needed? • What commercial and custom software support the workload? • What are the dependencies or integration touch points with other workloads?
Nonfunctional requirements	• What are the required service levels, performance, capacity, transaction rates and response time? • Are there encryption, isolation or other types of security and regulatory compliance requirements?
Support and costs	• What are the support resources and cost for a given workload? For example, two full-time equivalent employees per server, and how much does this resource cost? • What are the operational costs for space, power, cooling and so on?

2 - Workload consideration – focus areas

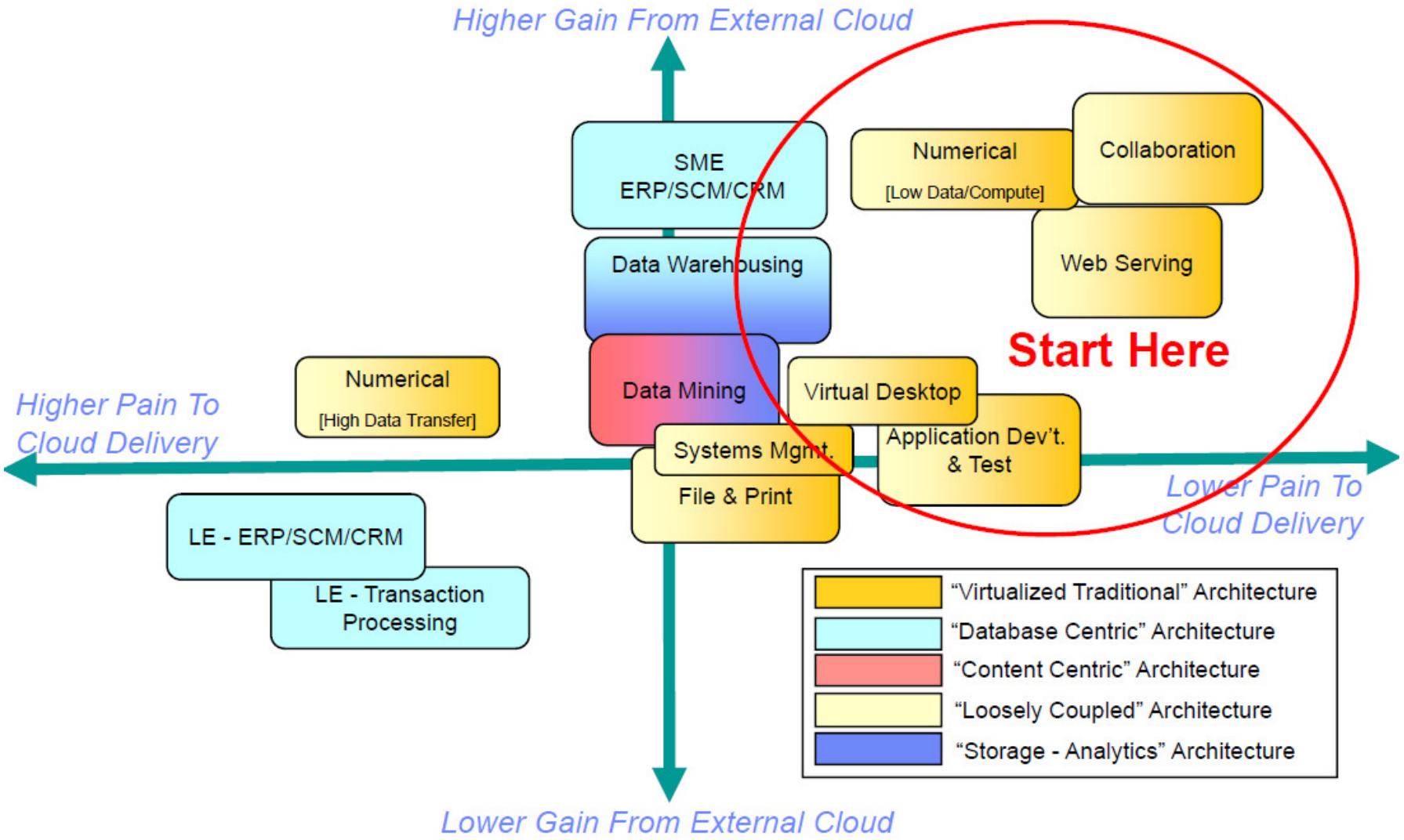
1. Sources of workload – consider:
   - Internal applications, batch processing, Managing customer data like medical records,…
2. Cloud types – consider:
   - Alignment to requirements which drives the level of security needed
   - Mapping cloud requirements to security, availability, accessibility, etc.
3. Regulatory (legal) concerns – consider:
   - HIPAA, SOX, GLBA, Patriot ACT
   - Industry Standards Organizations standards, etc.
   - Location of data aligns with government requirements
4. Cloud uses – consider:
   - Development of new applications
   - Testing of new applications and existing applications
   - Production running of existing applications (consider that migration requires true IaaS; PaaS alone may be insufficient)
5. Availability, reliability – consider:
   - the service level agreements
6. Portability – consider:
   - Portability from the IT environment to the cloud provider
   - Portability from cloud provider A to cloud provider B
   - Portability from the cloud Provider to the IT environment
7. Performance and workload – consider:
   - Understanding the volumes of data to be transferred and accessed, User traffic
   - Workload optimization: How we can dynamically assess and optimize the resourcing and placement of workloads
8. Disaster recovery – consider:
   - Is the cloud an alternative for disaster recovery?
   - If the cloud provider fails, what are the considerations?

2 - Cloud migration topics to consider

9. Migration modes – consider:
    - Accessibility of data (we must consider issues of data synchronization and cross-site trusts)
10. Service dev & test – consider:
    - Using a cloud environment to offload main site workloads
11. Business cases and models – consider:
    - Where is my market?
    - Which aspects are important to my customers?
    - Benefits of cloud computing compared with on-premise installations and other alternatives
    - Do I need to offload work from existing IT environment?
    - Do I need to increase flexibility to handle fluctuating volumes?
    - The cost of doing business in the cloud based on data volumes and risk management (No financial surprises at the end the month or quarter)
12. Authentication, authorization, audit – consider:
    - The question of federated identity: Which is best to follow ... SAML or OpenID?
13. Privacy, Security, SLAs, Identity
14. Data migration – consider:
    - What is the format in which the data will be stored?
    - Will the choice lock the consumer into the provider's format?
    - What is the ability to migrate to another provider?
    - Is there any migration support available should the consumer choose to move their services from one provider to another?

2 - Workload migration

Clients will adopt cloud computing based on workload affinity



3 - Cloud migration analyses – selecting cloud subtype delivery model

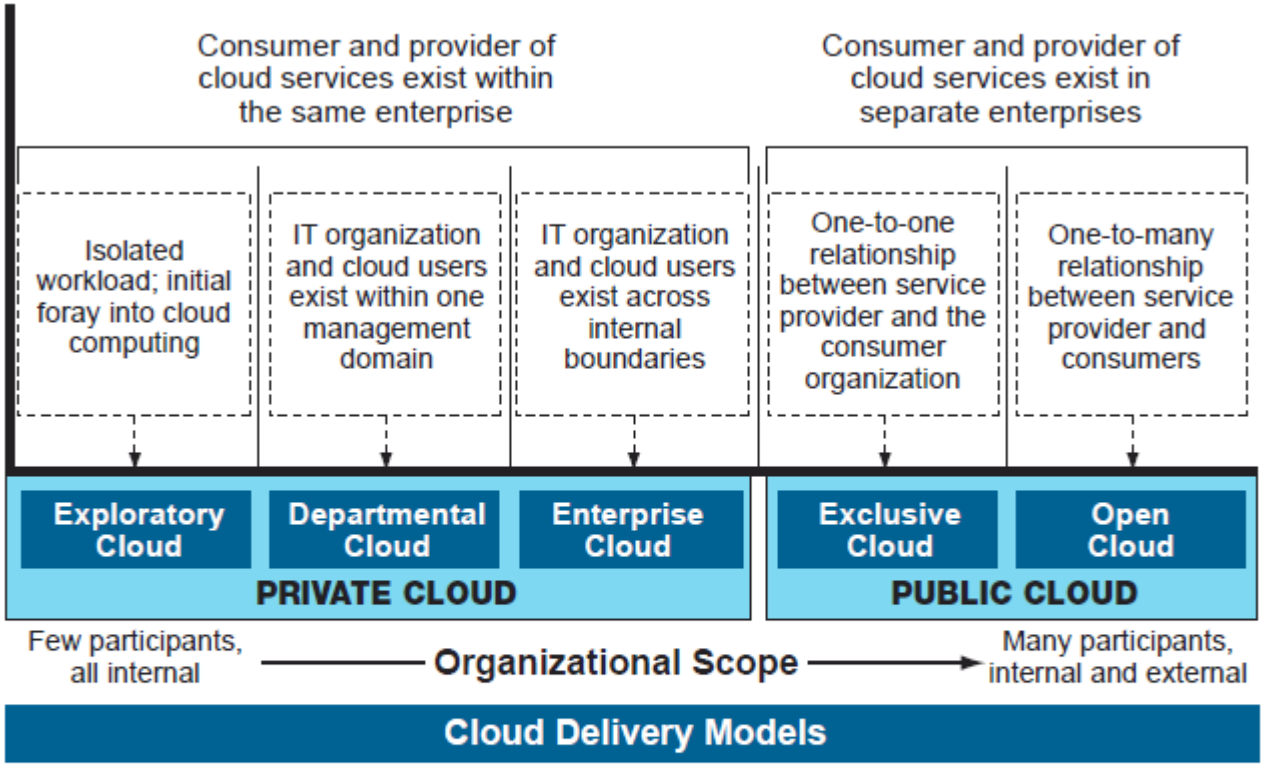
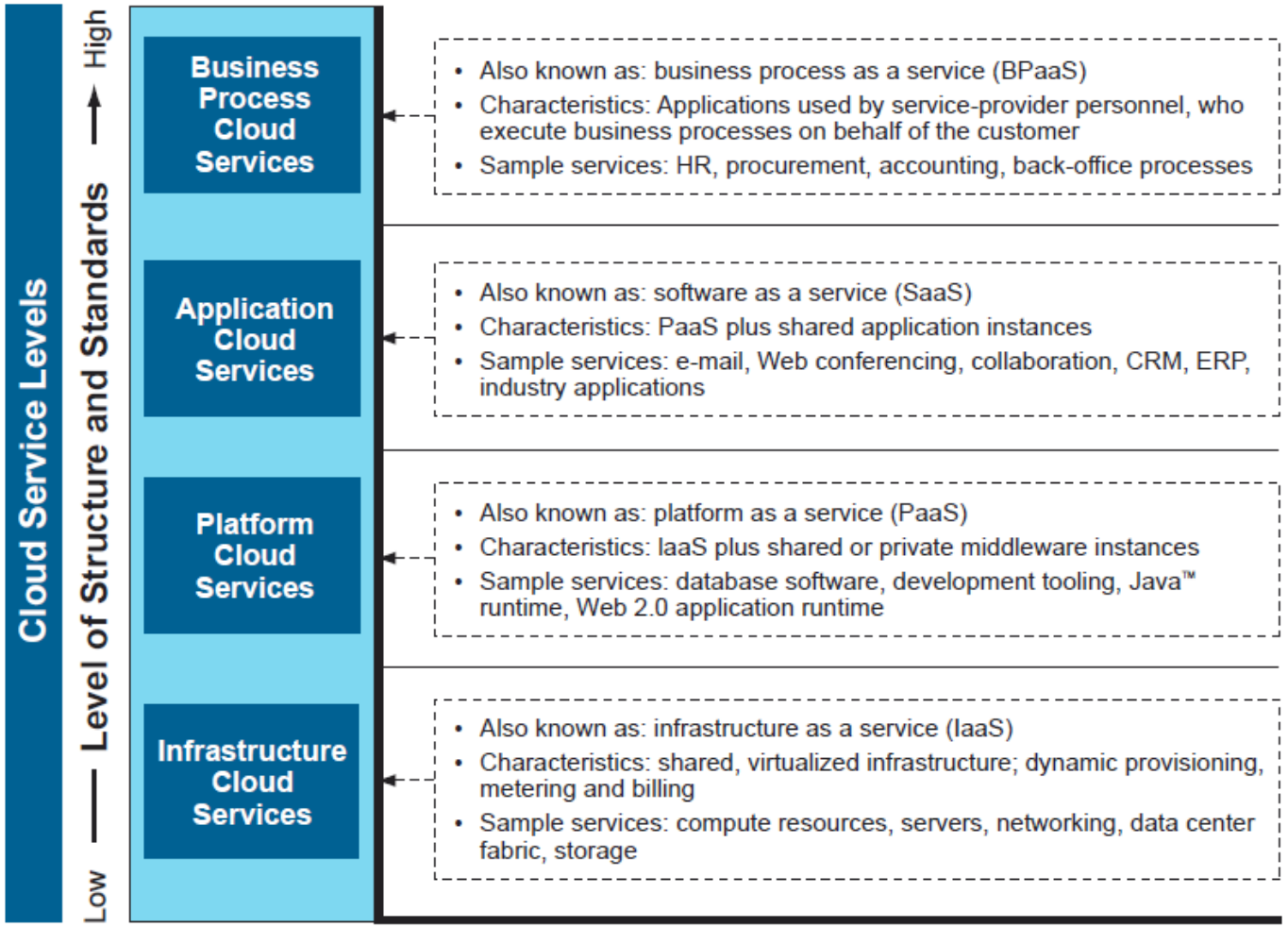


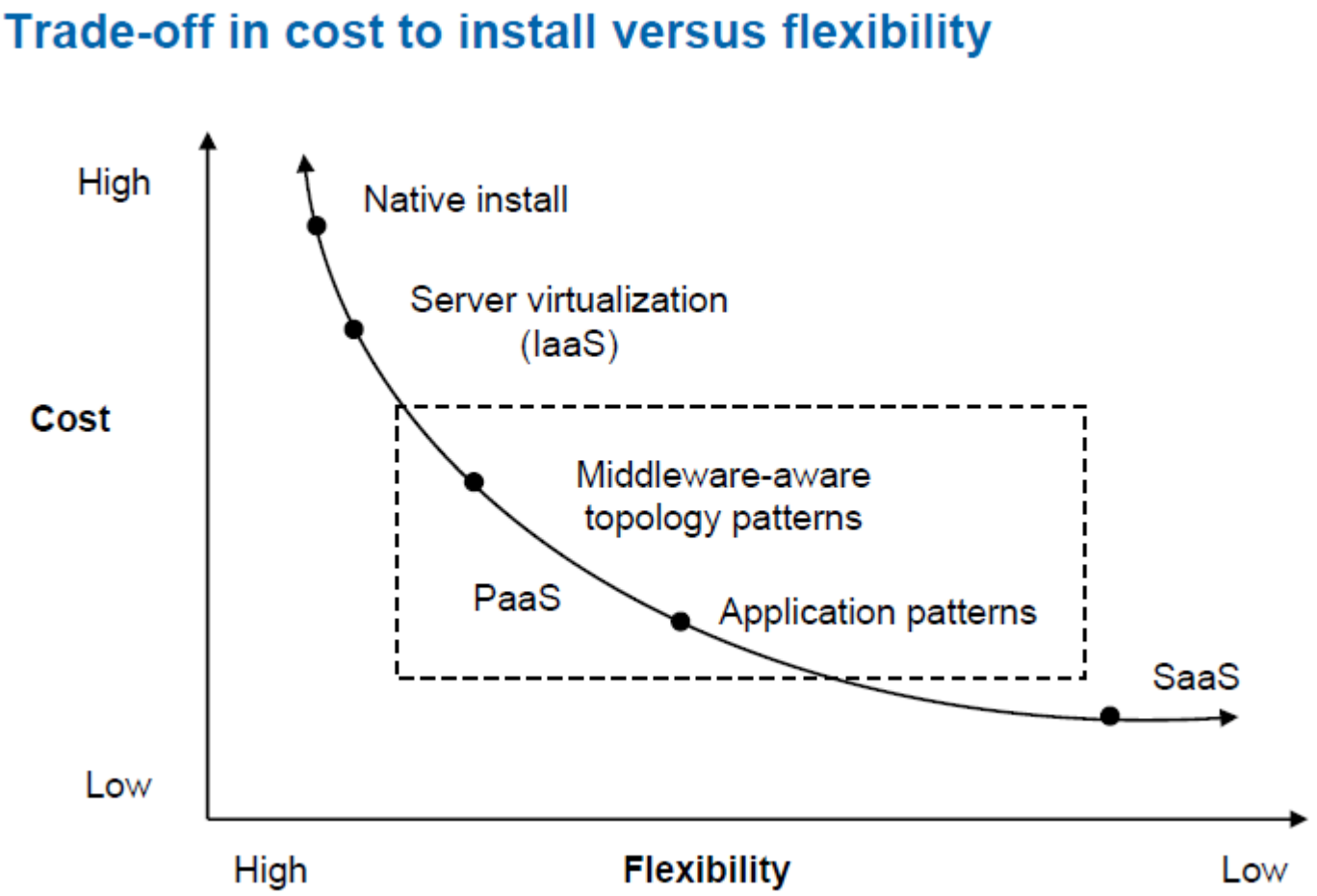
Figure 1: Cloud subtypes. The cloud computing adoption framework defines each delivery model subtype and helps organizations choose the most suitable for successful delivery.

3 - Cloud computing delivery models

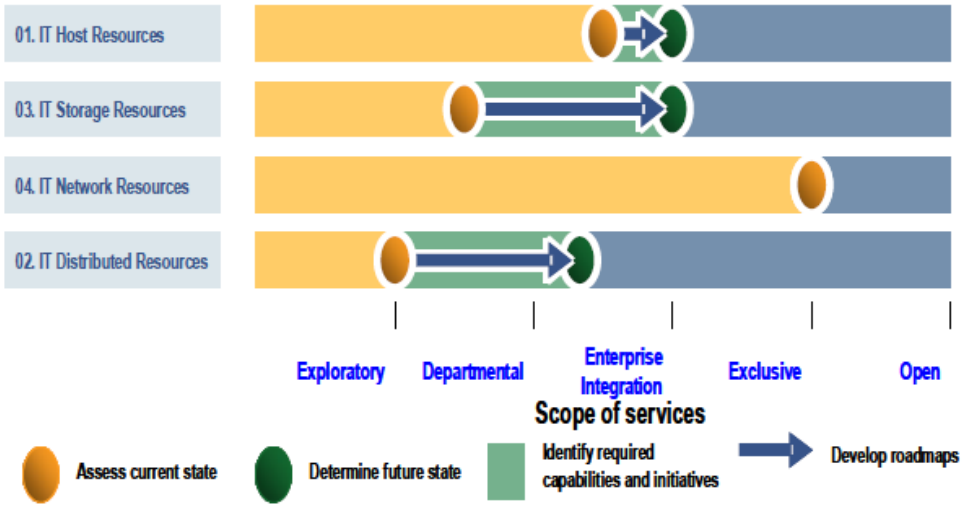


Cloud service types. Each type of service represents an increasing level of structure and standards, with business process cloud services requiring the most.

3 - Cloud computing delivery models



4 – Analyze infrastructure GAPS



- Do you need to alter your existing infrastructure to be ready for a cloud (HW / SW)?
- What elements you can re-use?
- How you can address identified infrastructure gap?
- What are service requirements (SLA, reliability,…) ?

5 - Business consideration – ROI and SWOT for cloud computing environment

a) 5 Key areas when calculating ROI for potential cloud computing environment.

- HW
- SW
- Automated provisioning
- Productivity improvement
- System administration

b) SWOT analyzes

Source and other details : ftp://service.boulder.ibm.com/software/au/downloads/Cloud_Computing_Payback_Explained.pdf

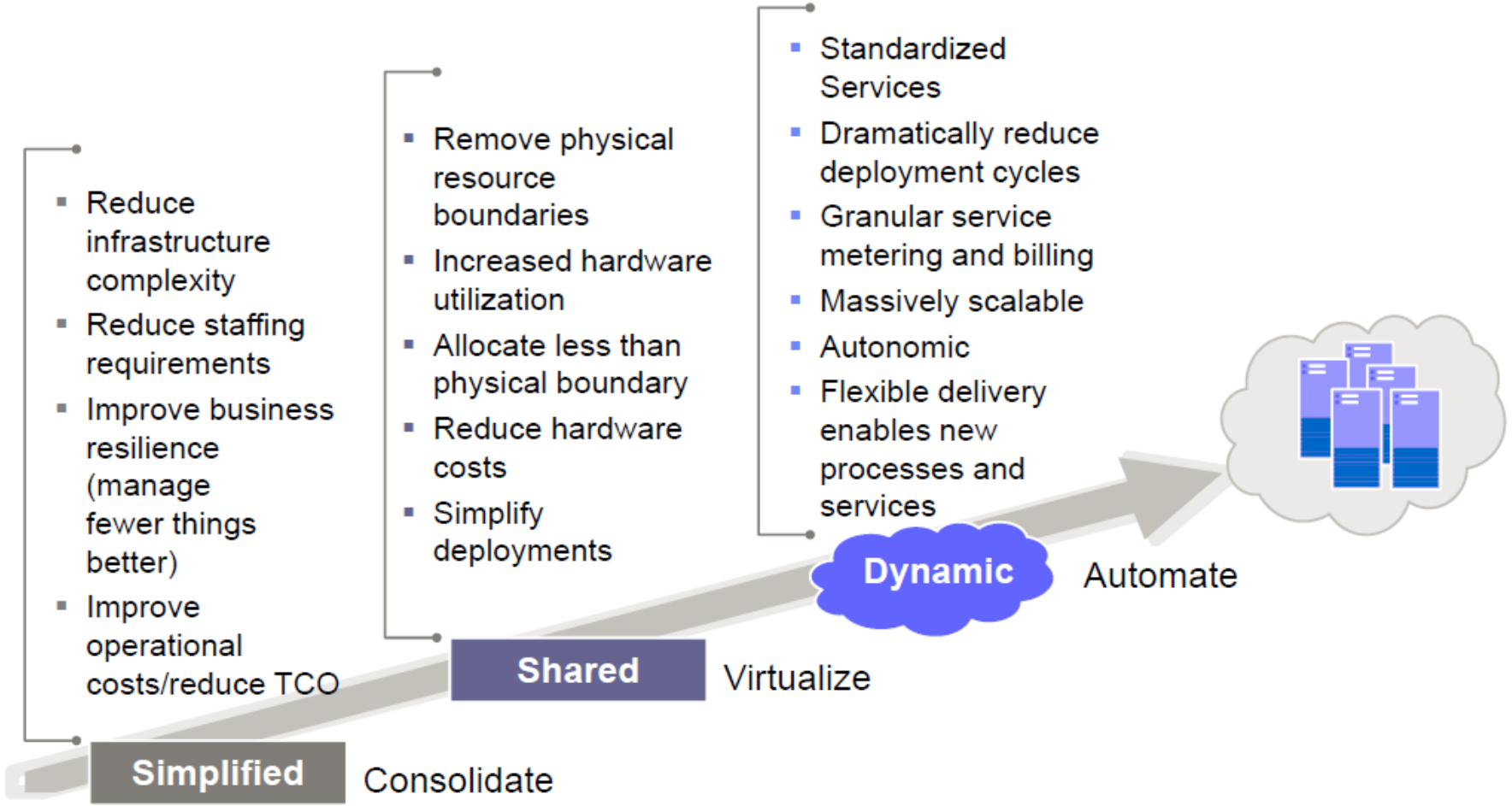
5 - Summary of system savings and costs

The following table provides a summary of the savings in each of the five areas and the associated costs.

Area	Saving Metrics	Cost Metrics
Hardware	○ Reduction in number of servers ○ Drives reduction in server depreciation cost, energy usage and facility costs	
Software	Reduction in the number of OS licenses	○ Cost of virtualization software ○ Cost of cloud management software
Automated Provisioning	Reduction in number of hours per provisioning task	Training, deployment, administration and maintenance cost for automation software
Productivity	Reduction in number of hours waiting for images per project	
System Administration	Improved productivity of administration and support staff (support more systems per administrator)	

Source and other details : ftp://service.boulder.ibm.com/software/au/downloads/Cloud_Computing_Payback_Explained.pdf

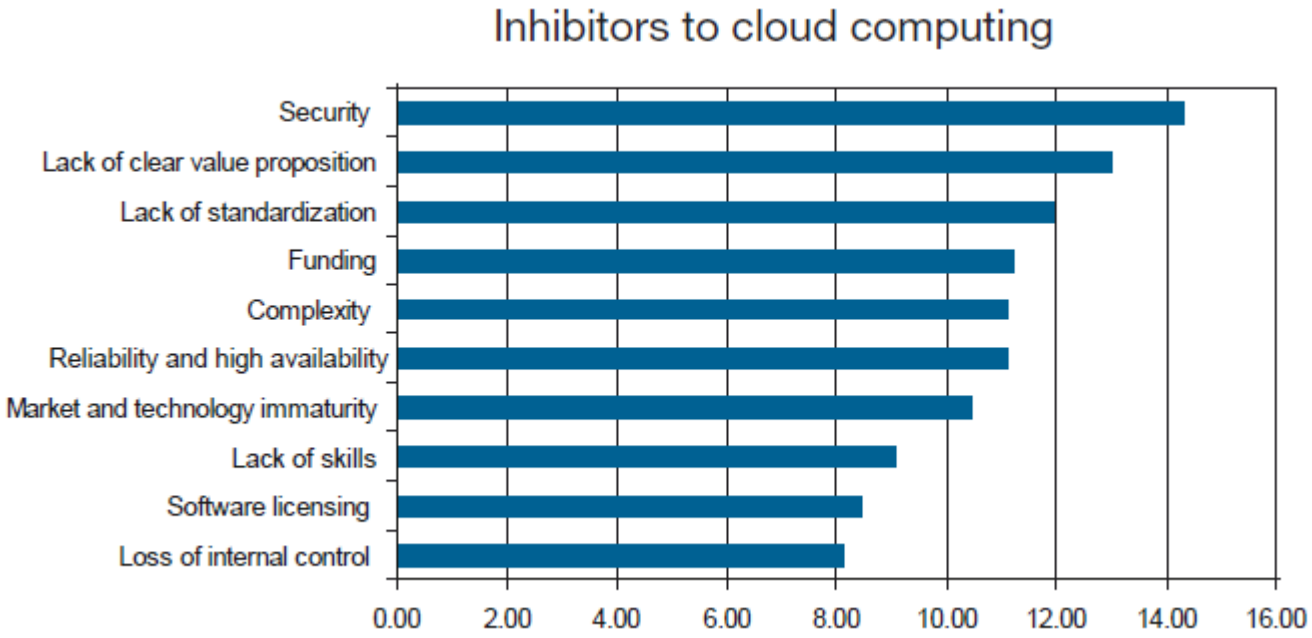
6 - IT Transformation Roadmap towards Cloud



Many challenges ahead – financial and culture challenges

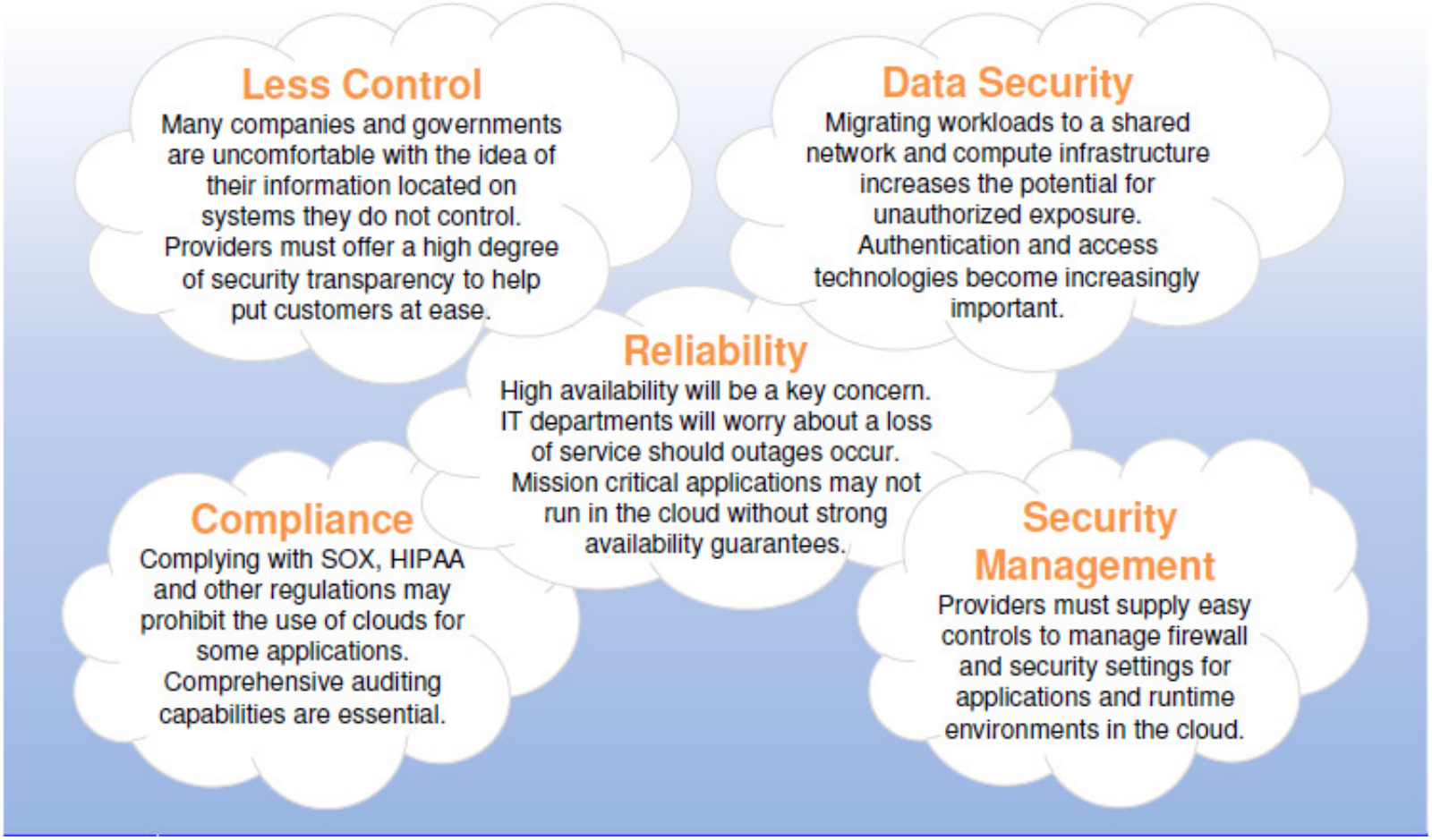
- **Take into account all aspects of virtualization**
  - Environment
  - Standardization
  - Resiliency
- **Be prepared for cultural roadblocks**
  - Who "owns" the applications
  - Claims of "I need a unique environment"
  - Unwillingness to share resources

Inhibitors to cloud computing

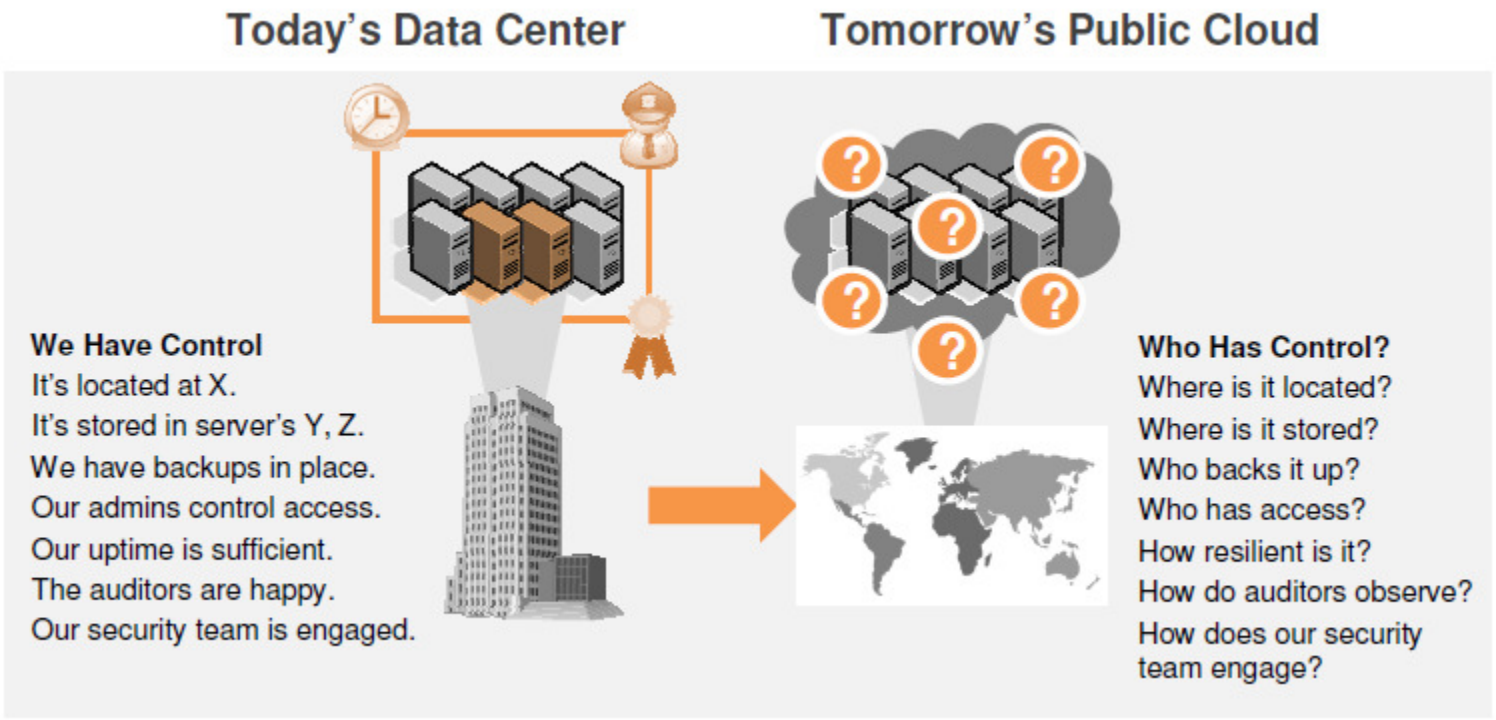


Security - *is a critical issue largely in public or shared environments, where the cloud provider needs to make sure that data privacy and compliance is guaranteed. Secure and efficient data exchange across the enterprise and clouds, as well as secure application connectivity are the major security concerns. Image management is important both in private and public clouds, as images are fast becoming the core object for deployment in data centers as a way to bypass installation problems. In this context, organizations need a way to organize, secure, manage and deploy images to the various virtualized platforms in a scalable manner. Once deployed, organizations need a way to manage the virtual images, which includes monitoring, updating, tracking, change management and auditing.*

Inhibitors to cloud computing



Cloud Computing risk - example



It is recommended to use a practical approach to cloud computing

Plan and Prepare

Define cloud strategy and roadmap

- Assess cloud deployment models, service options and workloads
- Plan cloud strategy and roadmap
- Choose initial project

Condition the existing infrastructure for cloud

- Virtualize and automate existing systems
- Add service management, service catalog

Pilot and Deploy

Start with an isolated private cloud deployment

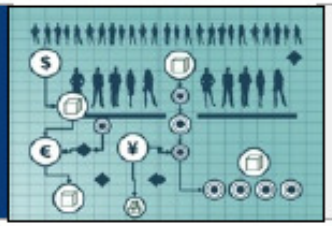
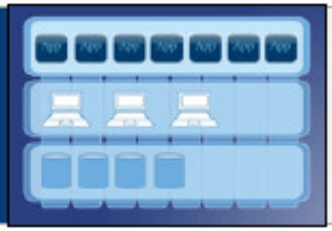
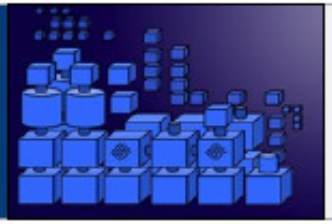
- Choose low-risk workload such as test and development
- Standardize applications and systems
- Deploy self-service portal

Extend and Evolve

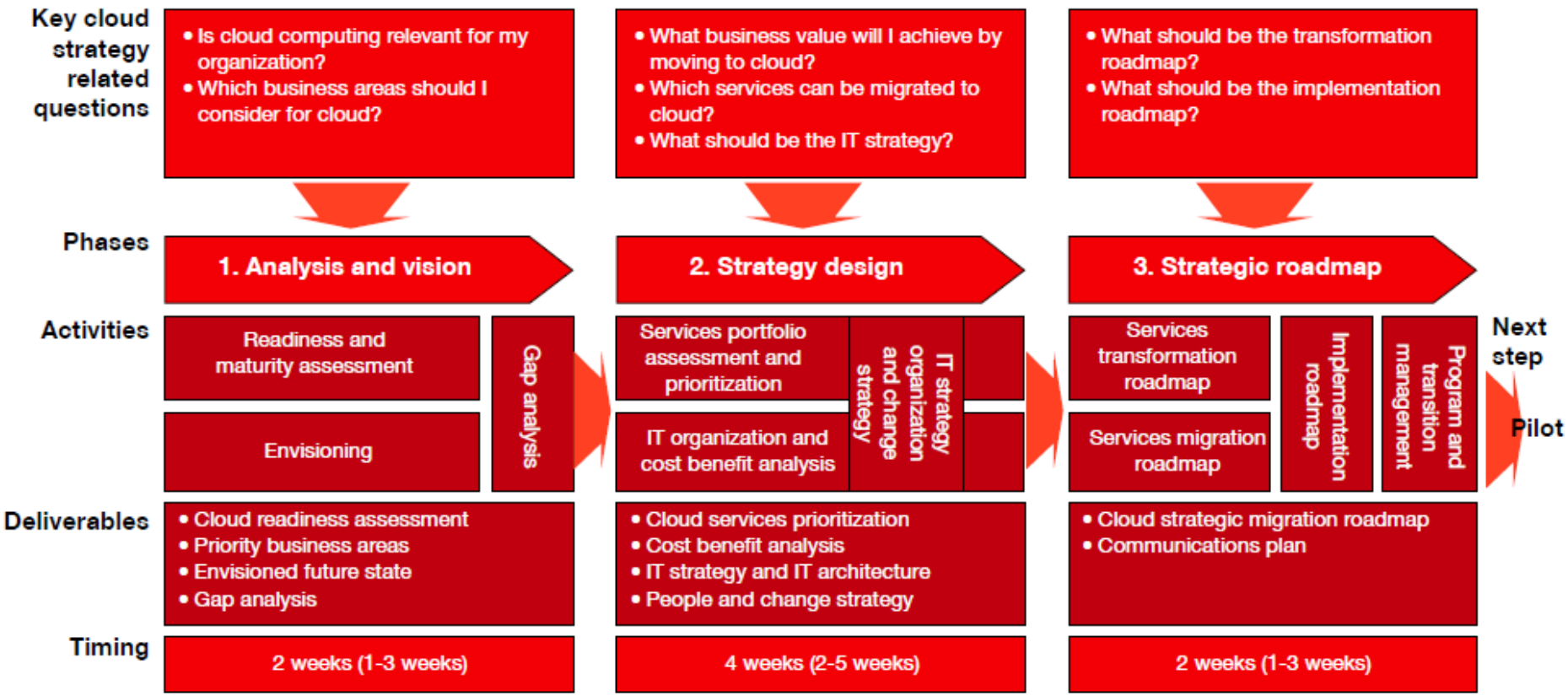
Roll out cloud across the enterprise

- Enable additional workloads on private cloud
- Add new users
- Use trusted public cloud services to supplement data center capabilities

Think about strategy – to be organized around four key dimensions

Business Models		• Enables industry, enterprise and business unit initiatives to drive step-change market performance • Includes front-office and back-office transformation, leveraging cloud ecosystem – drive new revenue, channel and product opportunities • Opportunities range from optimization & innovation to highly disruptive plays
Application and Delivery Platforms		• Leverages variable service models for application software to enhance process agility and economics. • Enhance product and services architecture. Drive extreme innovation • Drives enhanced productivity in IT, improving cycle time execution in software delivery – promotes workforce transformation and APM/PPM
Data Platforms		• Leverages variable service models to align enterprise capabilities in data transformation and management • Drive actions to optimize process through efficient information management, reporting and predictive analytics. • Enhance results through complex event processing of structured and unstructured information sources
Infrastructure Platforms		• Leverages robust, scalable and highly available computing platforms to manage the enterprise and ecosystem • Establish hybrid cloud networks to ensure 'friction free' access to capabilities

Cloud adoption approach – assessment example



Cloud adoption approach – assessment example

Analysis and Vision
In the initial phase, readiness analysis uses business and IT imperatives, gaps and cloud value drivers to show the enterprise which areas are possible for cloud adoption. A business value analysis is performed that prioritizes the cloud adoption areas. The visioning during this stage may result in new business models and opportunities that could result in dramatic changes to operating models. The readiness assessment also enables clients to quickly understand and gain insight into their IT organizational design, including resources and skills, systems and technology, service and IT management.

Strategy Design
This phase designs the cloud IT strategy and the associated change strategy, as well as delivers a cost-benefit analysis that can help with application prioritization.

Strategic Roadmap
This phase builds the strategic roadmap and is focused on getting started with cloud by prioritizing workloads to target for pilots and determining the actions needed to execute them. The strategic roadmap would include the implementation roadmap that has prioritized initiatives including the pilots, required investments and the desired benefits realization.

Cloud migration – typical mistakes to think about

1. **Migrate all applications (company has) to cloud.**
2. **Cloud provider's capabilities, contract and SLAs – not properly understood.**
3. **Not thinking about business need that needs to underpin cloud migration.**
4. **Migrating applications as they are (no adjustments).**
5. **Migrating all applications together (big bang approach).**
6. **Not understanding privacy regulation / needs.**
7. **Not understanding security aspects of cloud (private / public).**
8. **Not having strategy for cloud adoption (for company & individual applications).**
9. **Thinking that cloud is "blue" pill that resolves all issues.**
10. **Utilizing some service that is being offered only by single cloud provider (vendor's lock-in issue).**

Cloud migration – typical mistakes to think about

11. **Thinking about cloud env. only as way how to replace existing infrastructure and not as service that can provide new capabilities (advantages on the market).**

12. **Virtual environment is not the same as stand-alon physical one (testing required).**

13. **Data Model or data are not maintained and cleansed before migration to cloud is started.**

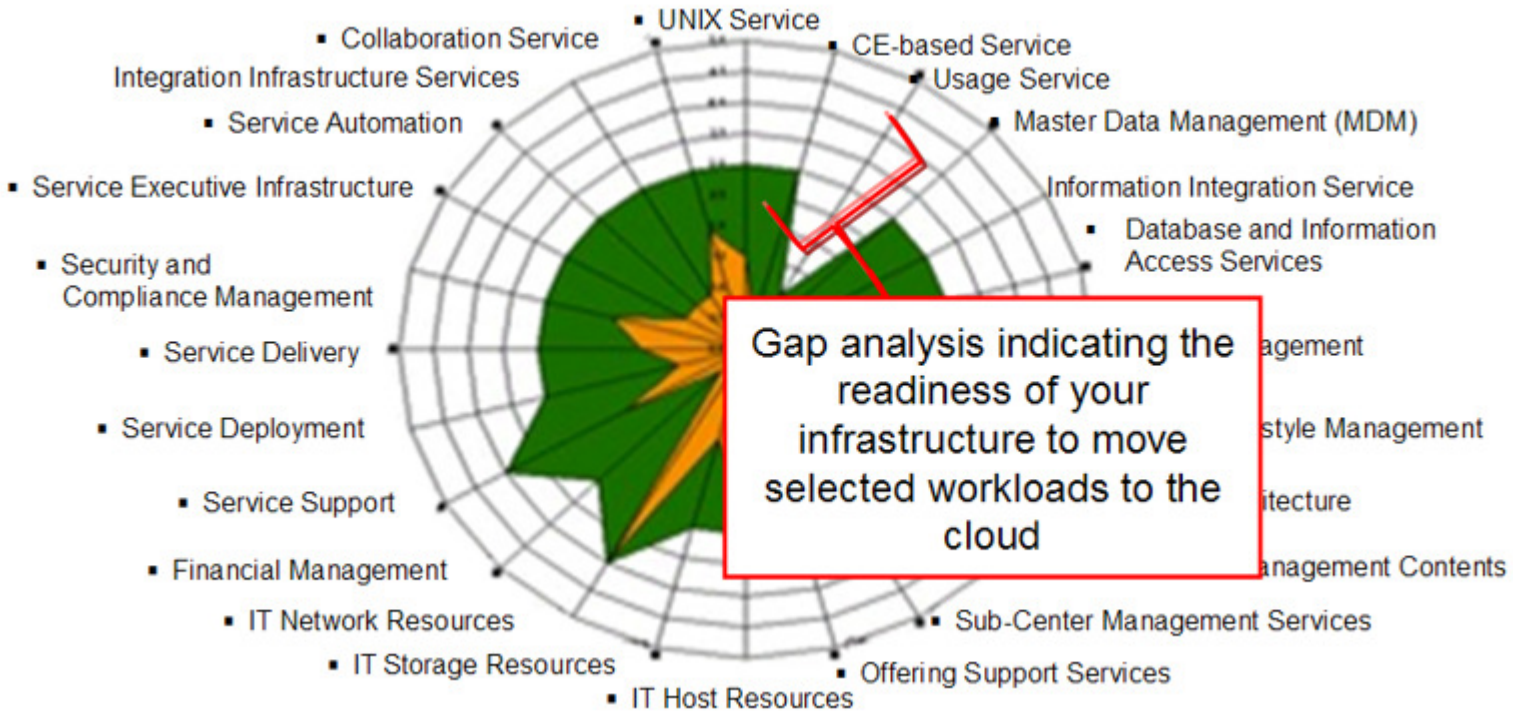
14. **Encryption – just because data in traditional infrastructure were not encrypted does not mean you should keep the same setup in cloud.**

15. **Assume that any application and any technology can / should be hosted on cloud.**

16. **No or limited management of client's expectation in regards to cloud computing technology, cost or cloud benefits.**

Cloud migration analyses - examples

1) Assessment of internal environments



2) Basic analyzes of migration selected solution to cloud

Follow link below for example of study (simplified)

University of St Andrews, UK, https://arxiv.org/pdf/1002.3492

Quiz – question 1

Quiz: Could / should you move workloads below to cloud? (why yes, why no)

a. Performance sensitive application
   I. Private cloud
   II. Public cloud

b. Internal highly customized applications that utilized old technology (from 1990)
   I. Private cloud
   II. Public cloud

c. Statistical application that work's with all client's data (Social security number, name, address)
   I. Private cloud
   II. Public cloud

d. Data archive – confidential data
   I. Private cloud
   II. Public cloud

Quiz – question 2

Quiz: Which of following may be driver to use cloud / cloud providers?
a. A need to optimize IT cost for labor
b. A need to do what is best practices on the market (if it's cloud – then adopt cloud)
c. Limited knowledge on IT security and need to take advantage of new marketing opportunites enabled by cloud computing
d. A need to optimize cost for hardware

Quiz – question 3

Quiz: I'd like to go for a cloud – says client, what should be your preferable answer (why?)

a. Let's analyze your infrastructure environment to understand if you are ready.

b. What applications do you need to move to cloud?

c. What is your business need that you believe takes you to cloud?

d. What virtualization technology are you preferring?

PROJECT description

Based on provided inputs (attached file below) prepare analyzes of client's environment and assess what, how, when could be migrated to the cloud world. Provide comments why selected systems are / are not recommended for a migration.

Microsoft Excel
97-2003 Workshee

You may use Lecturer as representative of a client and you can ask additional Qs in case you require more details or clarification. Provided questions and answers should become part of the work.

Links and related study material

• Cloud Migration Benefits and Its Challenges Issue
www.iosrjournals.org/iosr-jce/papers/sicete-volume1/8.pdf

•Security for cloud computing
http://www.cloudstandardscustomercouncil.org/security-d.htm

• Cloud Computing and Service Management (CLD01) - Cloud_Computing_CustExp_CloudSvcImpl_20100309

• Cloud Computing Payback -
ftp://service.boulder.ibm.com/software/au/downloads/Cloud_Computing_Payback_Explained.pdf

• Defining a framework for cloud adoption
http://www-935.ibm.com/services/us/cio/itxpo/4_defining-a-framework-for-cloud-adoptionciw03067usen.pdf

• Assess enterprise applications for cloud migration
http://www.ibm.com/developerworks/cloud/library/cl-assessport/cl-assessport-pdf.pdf

• Developing a Cloud Roadmap with a Workload Oriented Approach
https://www-950.ibm.com/events/wwe/ca/canada.nsf/vLookupPDFs/developing_a_cloud_roadmap_with_a_workload_oriented_approach_-_micheal_daniels_-_montreal/$file/Developing%20a%20Cloud%20Roadmap%20with%20a%20Workload%20Oriented%20Approach%20-%20Micheal%20Daniels%20-%20Montreal.pdf

• Cloud computing insights from 110 implementation projects
https://www-304.ibm.com/easyaccess3/fileserve?contentid=215289

• Demystifying the cloud: The new economics of cloud computing
https://www-304.ibm.com/events/wwe/grp/grp004.nsf/vLookupPDFs/FINAL--Demystifying%20Cloud--Defining%20a%20Path%20Forward/$file/FINAL--Demystifying%20Cloud--Defining%20a%20Path%20Forward.pdf

• Migration to Cloud
•https://www-950.ibm.com/events/wwe/grp/grp011.nsf/vLookupPDFs/Migration%20to%20Cloud%20-%20Tomlinson/$file/Migration%20to%20Cloud%20-%20Tomlinson.pdf

• Weather report: Considerations for migrating to the cloud
https://www.ibm.com/developerworks/cloud/library/cl-wr1migrateappstocloud/

• Choosing a partner for enterprise cloud production workloads
http://www-01.ibm.com/common/ssi/cgi-bin/ssialias?subtype=WH&infotype=SA&appname=GTSE_SS_UF_USEN&htmlfid=SSW03009USEN&attachment=SSW03009USEN.PDF

• Considerations for migrating to the cloud
http://www.ibm.com/developerworks/cloud/library/cl-wr1migrateappstocloud/

Links and related study material

- Capturing the Potential of Cloud
https://www.ibm.com/ibm/files/K640311W72867H78/12Capturing_the_Potential_of_Cloud_1_5MB.pdf

- Practical guide to cloud computing
http://www.cloudstandardscustomercouncil.org/2011_Practical_Guide_to_Cloud%20Computing.pdf

- Migrating Applications to Public Cloud Services: Roadmap for Success
http://www.cloudstandardscustomercouncil.org/Migrating-Apps-to-the-Cloud-Final.pdf

- Moving to Cloud
http://www.cloudstandardscustomercouncil.org/whitepaper-movingtothecloud.htm

- Cloud Strategy
http://www-935.ibm.com/services/us/its/flash/cloud-strategy_wat.swf

- The Impact of Power and Cooling on Data Center Infrastructure
www.ibm.com/kr/event/download/200706_245_biggreen/s245_biggreen01.pdf

- The Great Cloud Migration: Your Roadmap to Cloud Computing, Big Data and Linked Data, Michael C. Daconta (ISBN:147872255X 9781478722557)

- University of Stuttgart. A Collection of Patterns for Cloud Types, Cloud Service Models, and Cloud-based Application Architectures.
www.iaas.uni-stuttgart.de/institut/mitarbeiter/fehling/TR-2011-05%20Patterns_for_Cloud_Computing.pdf