

Using Predictive Analytics for Cost Optimization Across Cloud Workloads

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Growth of IBM Cloud Services

§ Cloud computing is expected to grow at a robust pace in the next five years. The primary drivers for this growth are the cost benefits of outsourcing the hardware and software required for technology-based services, which in turn depends on the state of the global economy.

- Cloud-based services comprise Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS) and all three are projected to experience healthy demand.
- International Business Machine announced at a recently concluded shareholders meeting that it was investing \$4 billion in key strategic areas, including the cloud, big data analytics, enterprise mobile, and security.
- It also said that these businesses will grow from \$25 billion (27% of total revenues) to over \$40 billion (40% of its expected revenues) by 2018.

<http://www.forbes.com/sites/greatspeculations/2015/03/09/ibm-cloud-services-part-ii/#6d9fcede4e3d>

Agenda

- § What is Cloud Computing?
- § Why Move to the Cloud?
- § Traditional TCO Model For IT
- § How Cloud Changes The TCO Model
- § Key elements of IaaS, PaaS, SaaS
- § Mapping Cloud TCO into an Integrated Framework
- § How Can Predictive Analytics Help?
- § Optimizing Cloud Workloads
- § Conclusions

What Is Cloud Computing

§ Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

§ This cloud model is composed of:

– Five essential characteristics

- *on-demand self-service, broad network access, resource pooling, rapid elasticity, and measured service,*

– Three service models

- *software as a service (SaaS), platform as a service (PaaS), and infrastructure as a service (IaaS)*

– Four deployment models

- *private cloud, community cloud, public cloud, and hybrid cloud*

Peter Mell and Timothy Grance, *The NIST Definition of Cloud Computing* (NIST Special Publication 800-145), September 2011.

Why Move to Cloud?

§ Mitigates Costly Legacy Infrastructure

- Data Center Investment – Keeps running until “dead” not patched or updated
 - *Older hardware presents maintenance issues*
- Increasing vulnerabilities
- Deployment time / time to market is critical
 - *Months vs Hours*

§ Information Assurance Vulnerability Alert (IAVA) Reduced

- Patching moves to the provider in PaaS and SaaS
- Reduced labor spent on patching / upgrades

§ Reduced Total Cost of Ownership

- Eliminates hardware expense and technology refresh
- Eliminates traditional infrastructure expense
- Eliminates skilled labor expense when virtualizing infrastructure

What Is The Traditional TCO Model?

- § Total Cost of Ownership (TCO) is a way of measuring the direct and indirect costs of IT Infrastructure
 - Comprised of direct costs , or Capital Expenditures (CAPEX) related to the purchase and acquisition of IT Infrastructure components
 - Comprised of indirect costs, or Operational Expenditures (OPEX) related to the maintenance of the IT Infrastructure including such items as operations costs, upgrades, updates, patches and replacement costs.
- § In a traditional IT setting, corporations estimate TCO by focusing mainly on CAPEX expenses. This becomes highly domain dependent based on workloads supported by the IT Infrastructure.
- § Where organizations are highly optimized (e.g. virtualization) the traditional TCO model is well understood and calculated based on current workloads.
- § While more “average” organizations can benefit from Cloud, the impact of workloads must be fully understood especially as expenses shift from CAPEX (Infrastructure) to OPEX (Services).
- § As organization shift from domain-dependent to enterprise-dependent, workloads play a critical role in determining TCO costs.

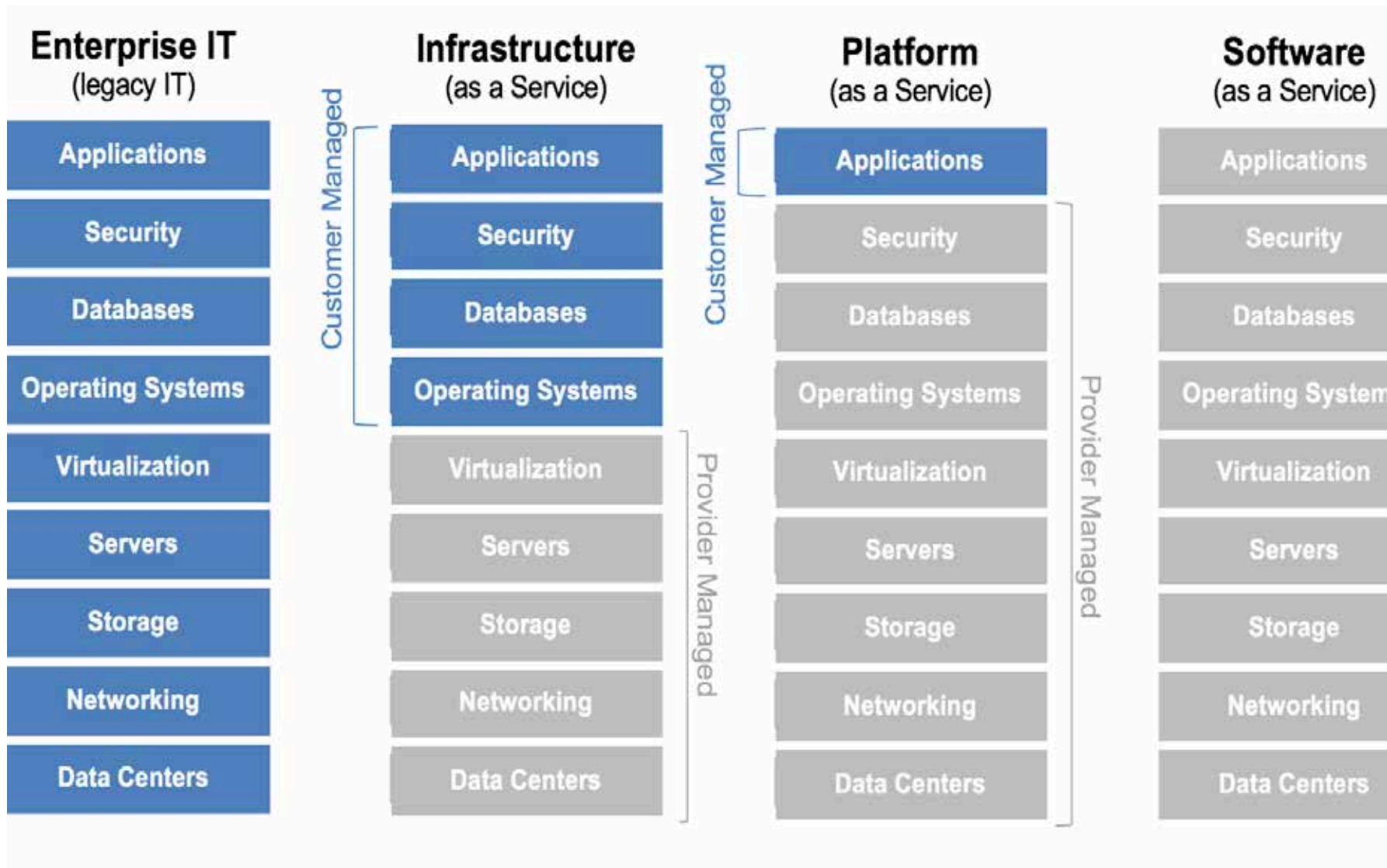
In calculating TCO, organizations must estimate and optimize cost based on an understanding of workload impact.

How Cloud changes the TCO Model

- § Cloud is defined by services and traditional IT is defined by assets
- § Change from a CAPEX focus to an OPEX focus
 - Introduces uncertainty since resource consumption is determined by workload.
 - Difficult to estimate cost effective options and cost of bandwidth.
- § Different types of Cloud Offerings:
 - Infrastructure as a Service (IaaS)
 - Platform as a Service (PaaS)
 - Software as a Service (SaaS)
- § Impacts All Aspects of The Organization
 - Changes the acquisition model, infrastructure not procured.
 - Changes the compliance / security model
 - Changes the management model

Cloud TCO is Complex Touching All Aspects of the Organization

Traditional Vs Cloud Comparison



<https://mycloudblog7.wordpress.com/2013/06/19/who-manages-cloud-iaas-paas-and-saas-services/>



Key TCO Elements of IaaS

- § Virtualized delivery of servers, storage, networking infrastructure
 - Most flexibility, but customer responsible for everything up from hypervisor

- § Typically expect to see a reduction in fixed asset costs
 - Organization no longer responsible for managing the fixed asset, becomes the responsibility of the provider

- § Labor, licensing, applications, security
 - Bring your own
 - Requires specially trained staff

Key TCO Elements of PaaS

§ IT Service functionality such as:

- Developer tools
- Utilities
- Computing Platforms – OS level, database, security

§ Consumer is only responsible at the Platform Level

- More outsourcing (everything except the application)
- Shifts to OPEX

Key TCO Elements of SaaS

§ Providing business solutions

- Direct enablement of business units
- Subscription based
- Provider responsible for security of stack

§ Fully shifted to OPEX



Key TCO Cloud Metrics

§ Licensing

- Traditional – Fixed Period of Time
- Cloud – Dynamic scalability

§ Implementation

- How much are you moving into the cloud?

§ Integration

- Hybrid or fully into cloud.

§ User training

- Could require higher degree or retraining depending on shift to cloud

§ IT training

- Initially cloud centric training, may reduce /increase in selected areas.
- Increases could be seen in IT Security, but reduced in general IT operations



How Can Predicative Analytics Help?

§ Predictive Analytics

- Encompasses a variety of statistical techniques from modeling, machine learning, and data mining that analyze current and historical facts to make predictions about future, or otherwise unknown, events (Wikipedia 2015)

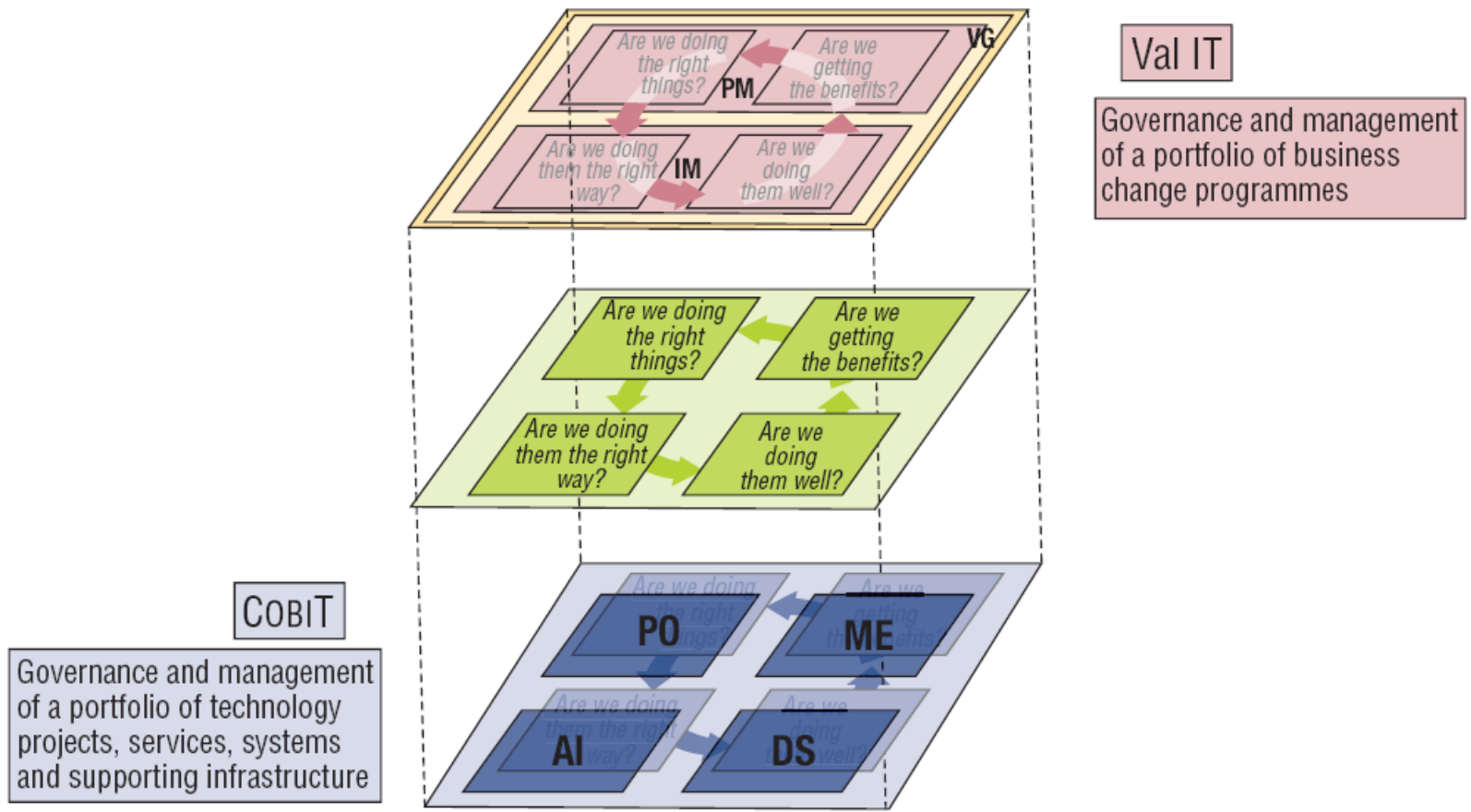
§ Applied to Cloud Workloads – Industry Focus

- Must take into account control requirements , technical issues and business risks (*Control Objectives for Information and Related Technology*) (**CobiT**)
- Must take into governance best practices for information technology-enabled business investments. (*value from IT investments*) **VAL IT**

§ Best Practices – Cloud Workload Optimization Framework

- Frameworks such as CobiT 5.0 and Val-IT 2.0 aligns IT Strategy to Business Strategy within a compliance, governance, operational risk management context
- Extending CAIV best practices is a useful framework applied to cloud workloads.
- Takes into account both TCO and Workload Performance Objectives and Threshold

Cloud TCO Framework Considerations



IT GOVERNANCE INSTITUTE

VG Value Governance
 PM Portfolio Management
 IM Investment Management

Considerations using COBIT

In building an cloud workload optimization framework, it is important to select the aspects of CobiT that addresses the key elements of cloud workload optimization

- Minimizing service interruptions / continuous service
- Moving to cloud must insure availability and recoverability

§ CobiT DS4 Ensure Continuous Service

- The need for providing continuous IT services requires developing, maintaining and testing IT continuity plans, utilizing offsite backup storage and providing periodic continuity plan training.
- An effective continuous service process minimizes the probability and impact of a major IT service interruption on key business functions and processes.

Considerations using VAL-IT

In building an cloud workload optimization framework, it is important to select the aspects of VAL-IT that addresses the key elements of cloud workload optimization

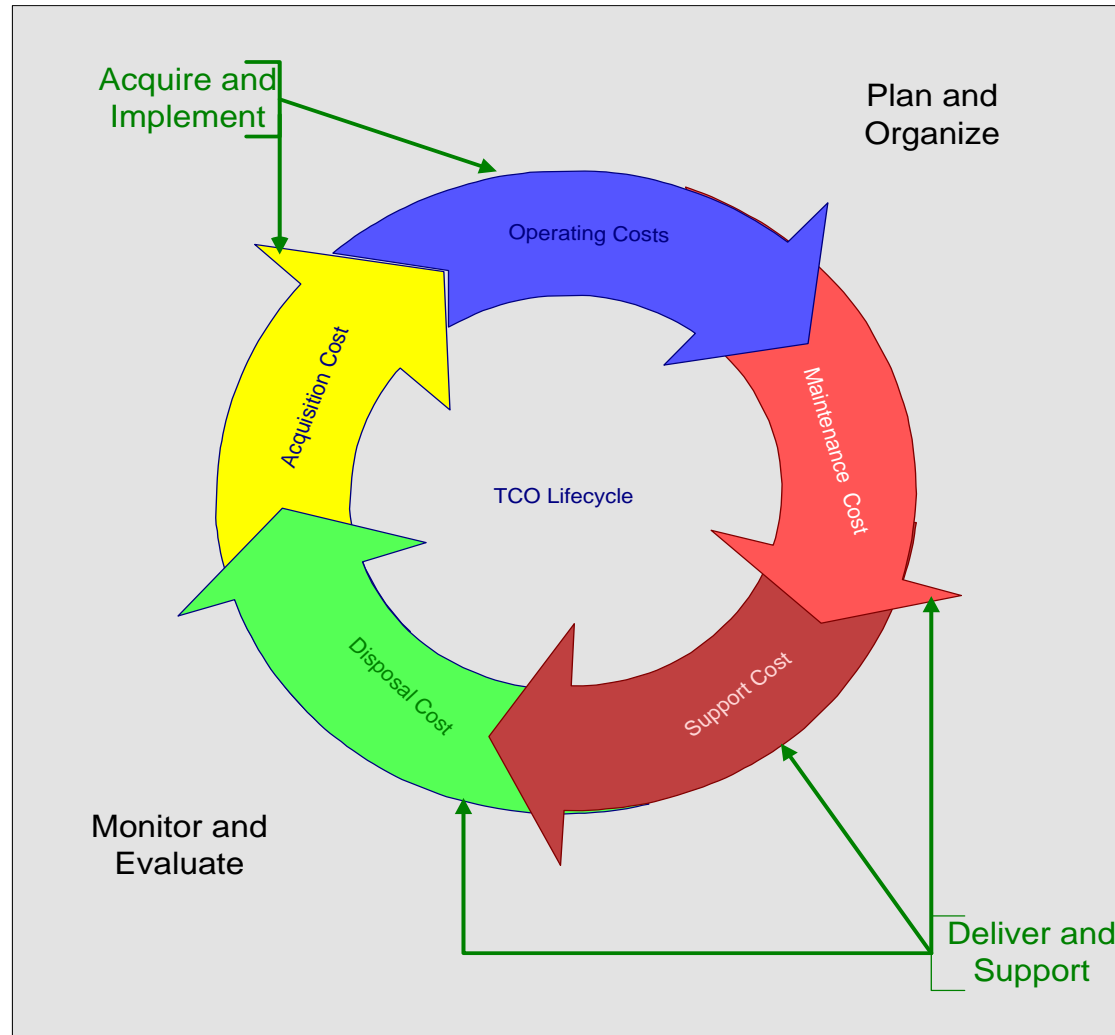
- Evaluate TCO over the full life cycle

§ IM4 Develop full life-cycle costs and benefits.

- Prepare a program budget based on full economic life-cycle costs. List all intermediate and business benefits in a benefits
- Register, and plan how they will be realized. Identify and document targets for key outcomes to be achieved, including the
- Method for measuring and the approach for mitigating non-achievement. Submit budgets, costs, benefits and associated plans for review, refinement and sign-off.

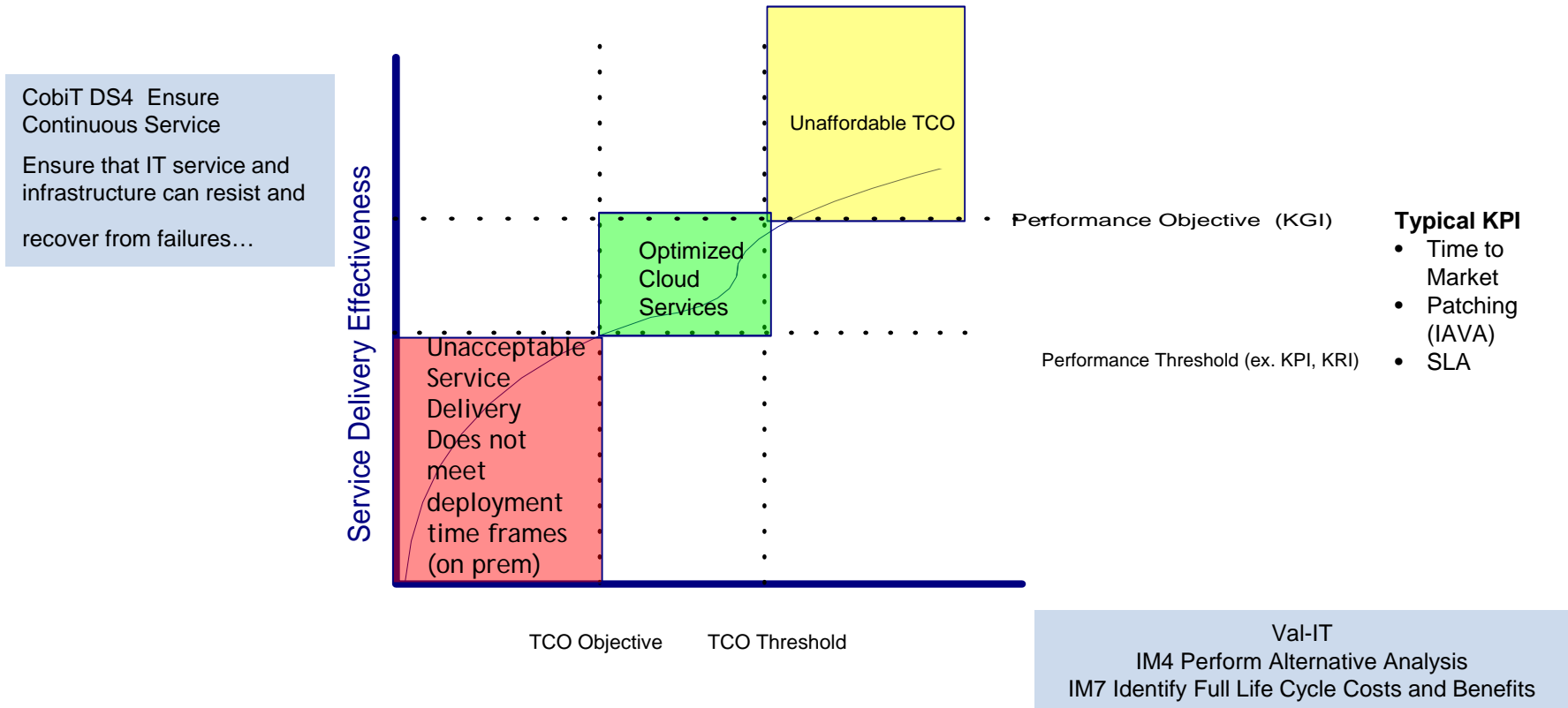
Importance of Understanding Difference between life cycle costs between Cloud and Traditional Approaches

Domain Issues In Cloud vs. Traditional TCO Lifecycle



Optimized Cloud TCO Analysis Model

Extending CobiT and Val-IT into a CAIV Framework



The Optimized TCO provides the essential “best value” framework for the strategic decision process

Conclusions / Wrap Up

- § Optimization of Cloud Workloads Best Practices requires close linkages between IT Infrastructure, Governance/Compliance the entire Lifecycle.
- § Use of predictive analytics and combined with CobiT and VAL-IT provides a consistent framework to holistically and consistently calculate TCO on a lifecycle basis
- § TCO provides a means of evaluating IT investment decisions across traditional and cloud models
- § There is a minimum cost required to achieve a level of service delivery, however want optimize delivery effectiveness for each dollar spent.
- § In evaluating cloud vs. traditional infrastructure estimation of lifecycle cost scenarios must also include Licensing, Implementation, Integration, User training, IT training