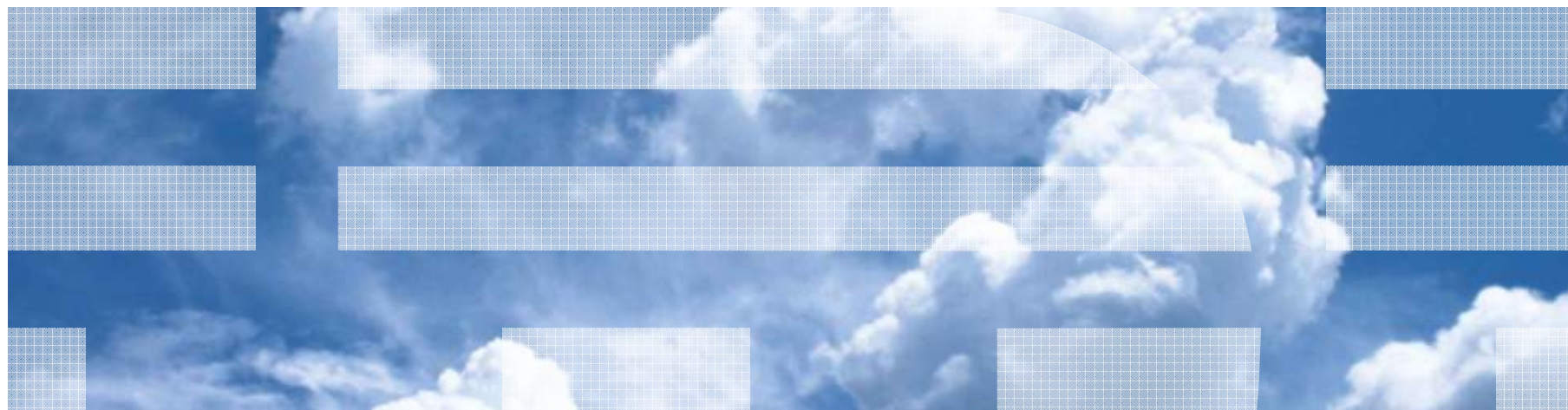

TSAM: Essentials for Cloud Computing on System z

*Roy Duke
Jochen Breh
Reed Mullen
Paul Sutera*

*Technical Professional zSeries Tivoli Software
Senior IT Architect Cloud Computing and Cloud Best Practices
System z Cloud Initiative Leader
Software Developer System z Benchmark Center*



Agenda

1 TSAM and System z - The Answer to Today's Business Challenges

2 Cloud Computing and Service Management

3 Tivoli Service Automation Manager Solution Architecture

4 TSAM Solution Edition

5 TSAM Use Cases

6 Summary

Agenda

1 TSAM and System z – The Answer to Today’s Business Challenges

2 Cloud Computing and Service Management

3 Tivoli Service Automation Manager Solution Architecture

4 TSAM Solution Edition

5 TSAM Use Cases

6 Summary

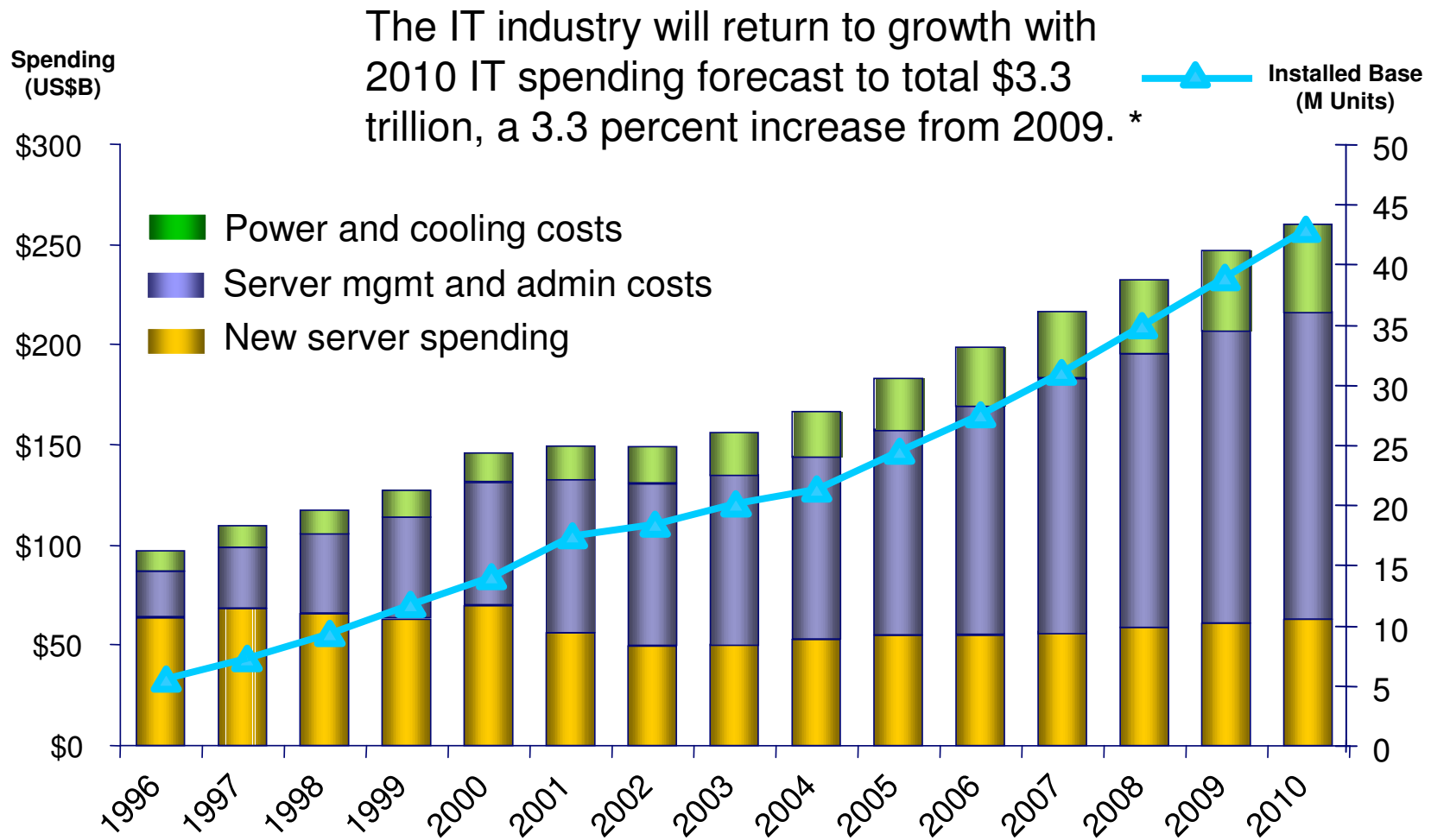
Multiple Forces are Driving Data Center Priorities

Business expectations for IT focus on improving current operations and performance

Business expectations	Ranking of business priorities CIOs selected as one of their top 5 priorities					
Ranking	2009		2008	2007	2006	2012
Improving business processes	1	↔	1	1	1	2
Reducing enterprise costs	2	↑	5	2	2	7
Improving enterprise workforce effectiveness	3	↑	6	4	*	6
Attracting and retaining new customers	4	↓	2	3	3	3
Increasing the use of information/analytics	5	↑	8	7	6	8
Creating new products or services (innovation)	6	↓	3	10	9	1
Targeting customers and markets more effectively	7	↑	9	*	*	9
Managing change initiatives	8	↑	12	*	*	12
Expanding current customer relationships	9	↓	7	*	*	11
Expanding into new markets or geographies	10	↓	4	9	*	4
Consolidating business operations	11	↑	13	14	*	15
Supporting regulation, reporting and compliance	12	↑	14	13	*	16
Creating new sources of competitive advantage	13	↓	11	8	*	5

Gartner 2009

IT Infrastructure Growth



Source: IDC, *Virtualization 2.0: The Next Phase in Customer Adoption*, Doc #204904, Dec 2006

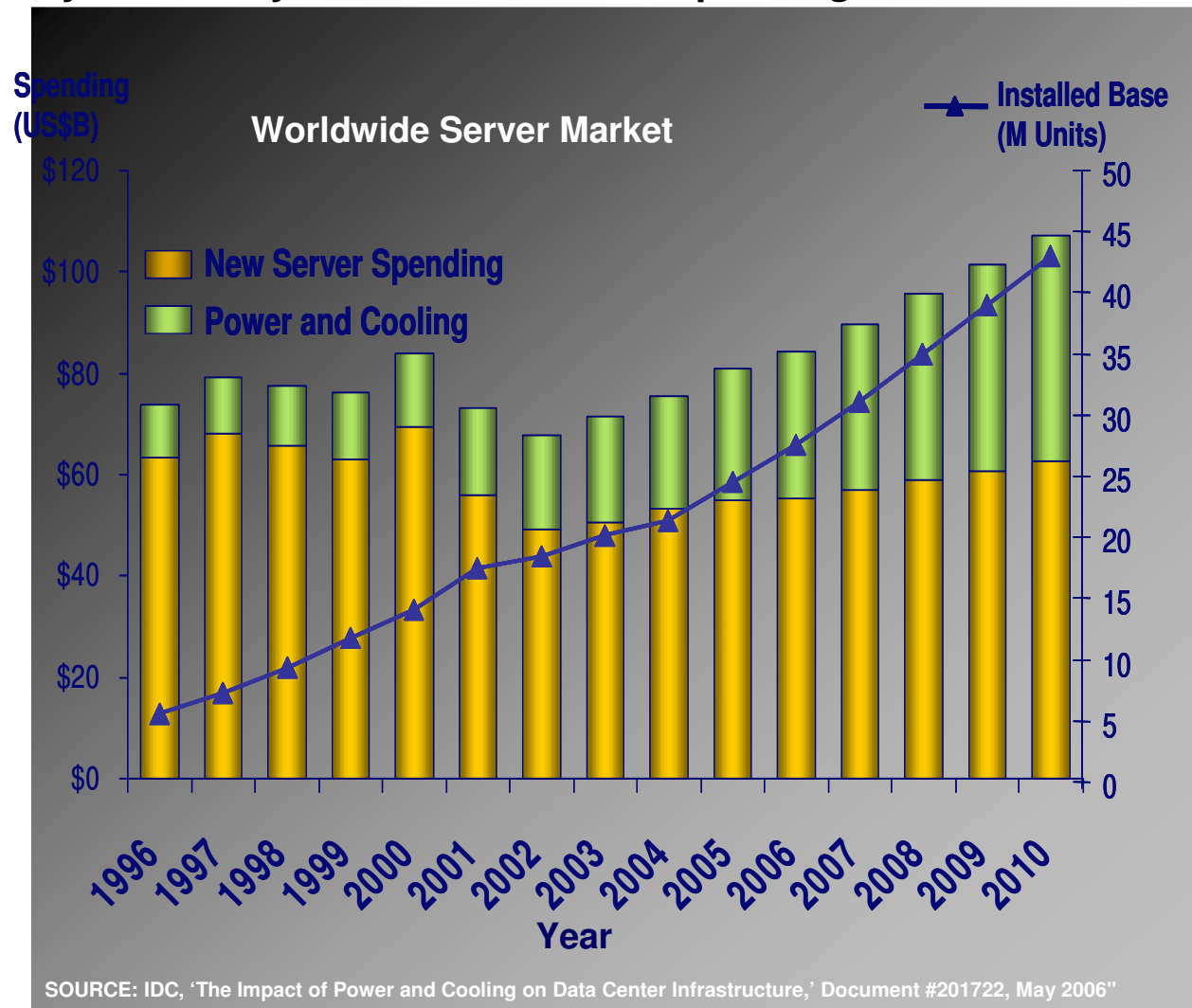
* Gartner November 2009

Energy Costs are Rising

- Power and cooling spend may eventually exceed new server spending

2000 – Raw processing “horsepower” is the primary goal, while the infrastructure to support it is assumed ready

2006 – Raw processing “horsepower” is a given, but the infrastructure to support deployment is a limiting factor



IBM System z the Ideal Cloud Platform

- **Do more with less**
 - Consolidate more servers, more networks, more applications, and more data with Linux® on z/VM®
 - Achieve nearly 100% utilization of system resources nearly 100% of the time
 - Enjoy the highest levels of resource sharing, I/O bandwidth, and system availability
- **Reduce costs on a bigger scale**
 - Consume less power and floor space
 - Save on software license fees
 - Minimize hardware needed for business continuance and disaster recovery
- **Manage growth and complexity**
 - Exploit extensive z/VM facilities for life cycle management: *provisioning, monitoring, workload mgmt, capacity planning, security, charge back, patching, backup, recovery, more...*
 - Add hardware resources to an already-running system without disruption
 - the epitome of dynamic infrastructure
 - Consolidation on a “scale up” machine like System z means fewer cables, fewer components to impede growth



System z ISV Ecosystem








ISVs developing on System z



Linux applications on System z



z/OS remains vibrant operating system
Applications enabled on latest versions of z/OS (1.10 and 1.11): 2140

 <p>“Since deploying SAP applications on System z, our customers have realized significant business benefit.” <i>Bernhard Heining, Development Manager, IBM System z, SAP AG</i></p>  <p>“This is a very important milestone in our strategy to deliver an advanced, next generation platform to large scale retail and commercial banks that are hindered by aging systems to help modernize their architectures and subsequently lower costs, deliver significant operational improvements and provide a real return on investment.” <i>Andreas Andreades, CEO, Temenos</i></p>	    
---	--

Today's Business Challenges

- **Lost Business Opportunity because IT too slow to react, Lack of Agility**
- **Long deployment timelines for new systems (week/months)**
- **High cost and complexity of processes: too many workers involved**
- **Many manual steps, prone to error**
- **Huge up front investment for new infrastructure**
- **Server sprawl**
- **Low utilization**
- **Costly compliance auditing and security patching**

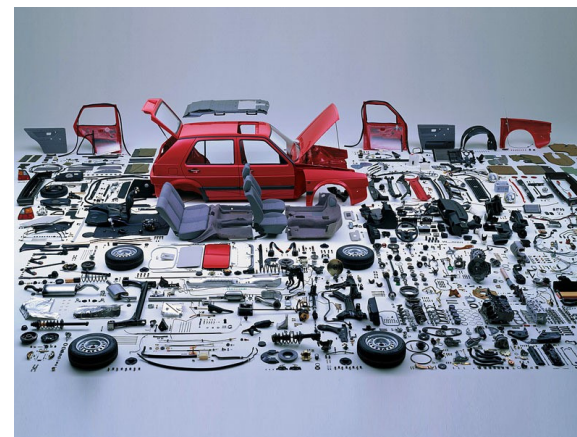
TSAM Helps Reduce Costs and Improve Service by Providing Virtualization, Standardization and Automation

- **Deploying & managing Cloud Services in a datacenter environment**
 - Dynamic instantiation and management of Cloud Services along their entire lifecycle
- **Raises the level of abstraction for Service Management in data centers from single LPARs, storage volumes, SW installations to Cloud Services as the units of management**
- **Integrated Management Solution**
 - Based on strategic Tivoli process automation engine (Tpae)

The holistic view
of a service...



...is more than the sum of its
individual parts



Tivoli Service Automation Manager lowers cost and drives significant ROI for cloud computing

- Three key focus areas of cloud ROI that Tivoli Service Automation Manager supports:
 - Productivity – Automate service requests request driven provisioning
 - Provisioning - Delivers services faster with better quality
 - System administration – Lowers cost of cloud services administration



On average, 81%* of Cloud payback is driven by savings enabled by service management.

Agenda

1 TSAM and System z – The Answer to Today's Business Challenges

2 **Cloud Computing and Service Management**

3 Tivoli Service Automation Manager: Architecture and Concepts

4 TSAM Solution Edition

5 TSAM Use Cases

6 Summary

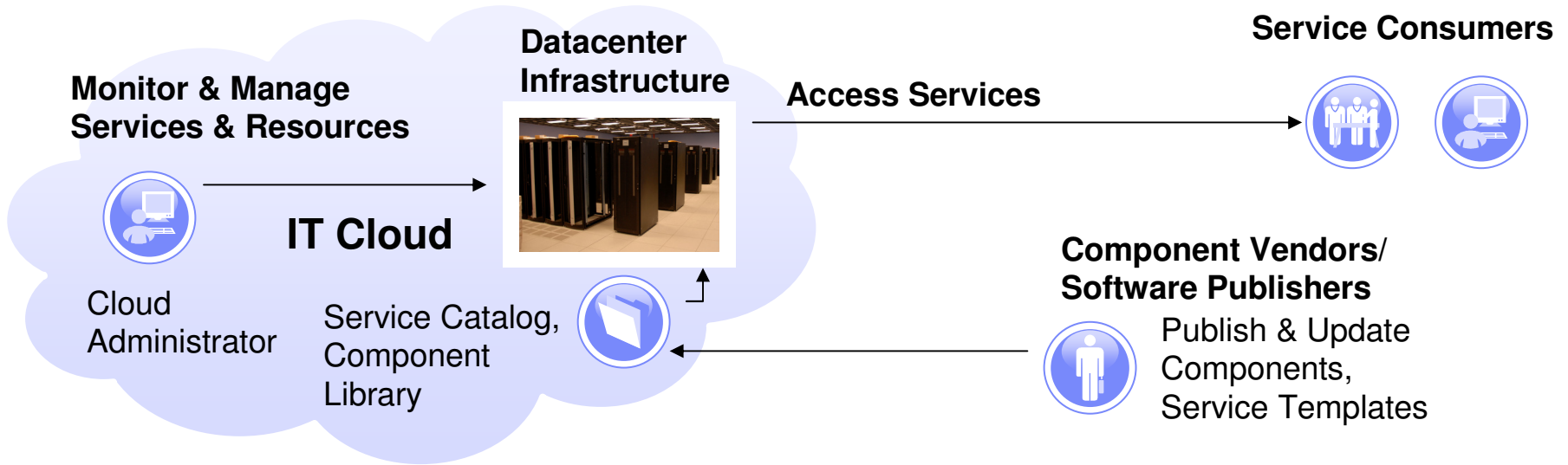
Cloud Computing ...

... is a user experience and a business model

Cloud computing is an emerging style of computing in which applications, data, and IT resources are provided as services to users over the network

... is a infrastructure management methodology

Cloud computing is a way of managing large numbers of highly virtualized resources such that from a management perspective, they can be automatically aggregated to deliver services



Traditional Data Center Management vs. "Cloud-like" Management

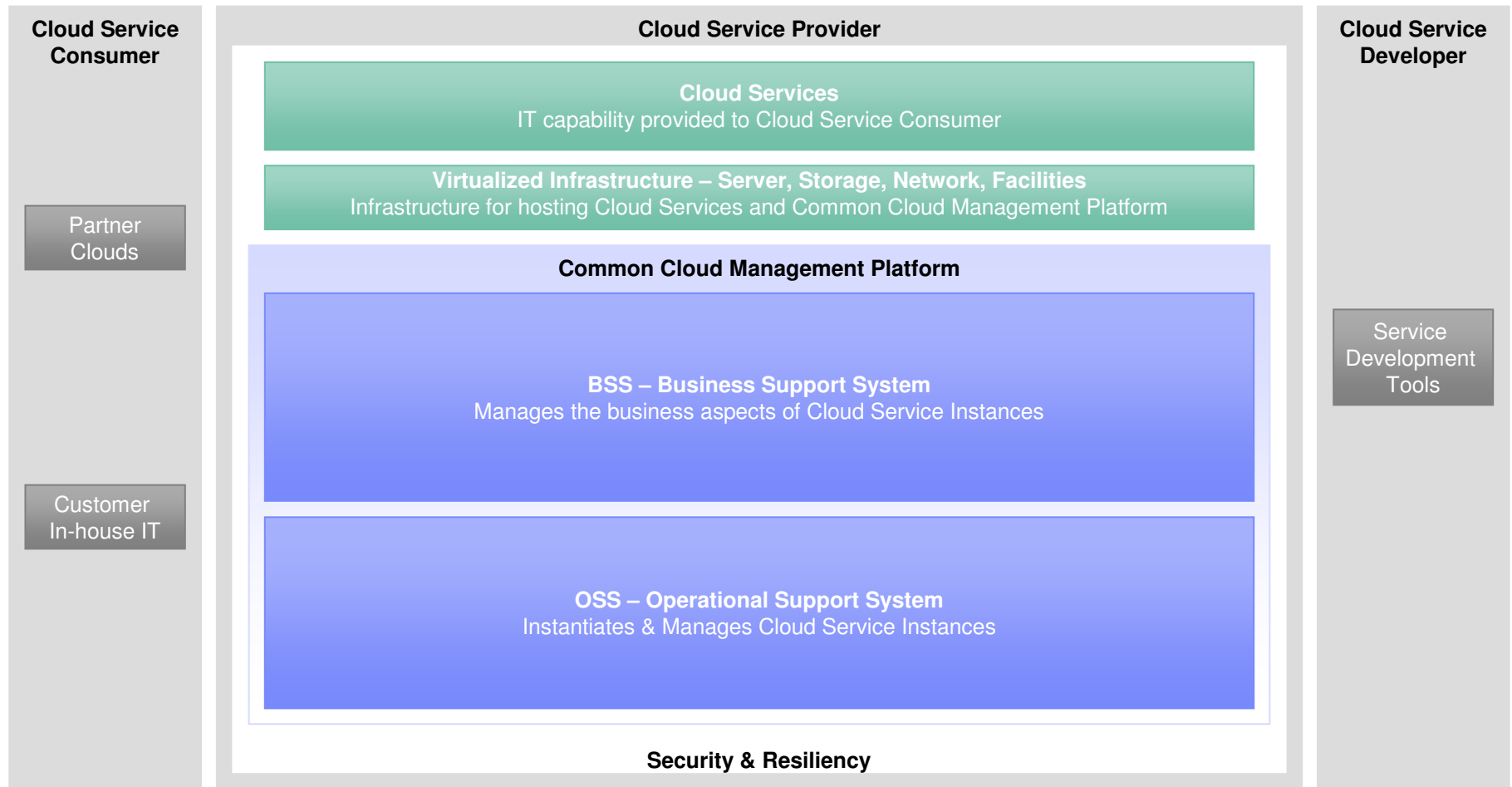
The overall objective of Cloud-managed data centers is **to automate any type of task or situation** (by reducing manual intervention) for **increasing flexibility** and **reducing operational expenses**

Core Metrics	Traditionally managed Data Center	"Cloud-managed" data center
Admin/Server ratio → Costs	1:50 – 1:100	1:100's – 1:1000's
Time to provide new service instances & changing them → Flexibility	Days/weeks	Hours/minutes/seconds

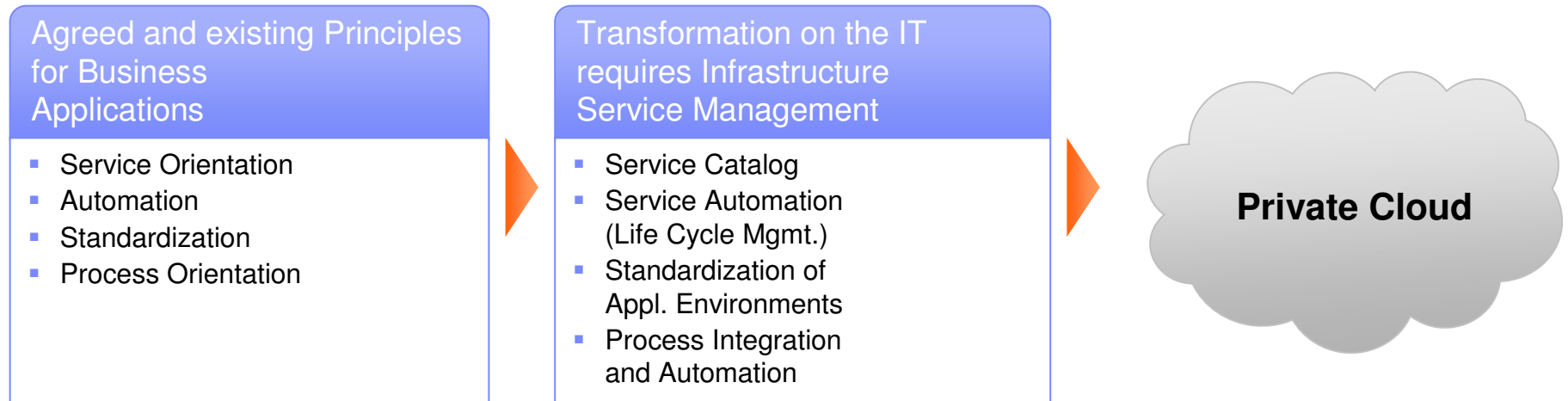
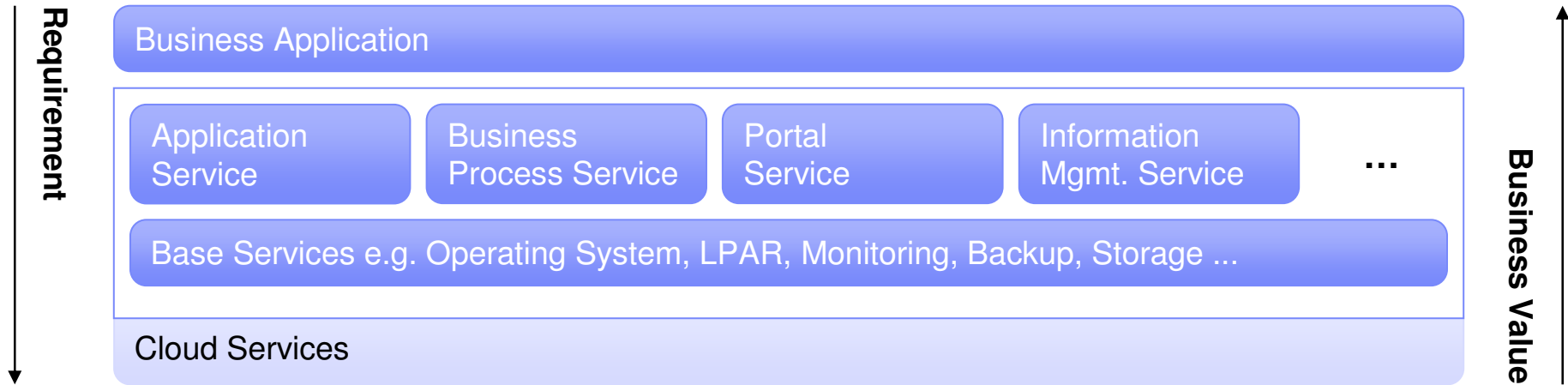
Core Disciplines	
IT Management approach	Problem handling
Administration Tasks	Service Consumer ↔ Service Provider interaction

» For Cloud-like efficiencies and flexibility, it is not sufficient to have the right technology, but to also use it in the right way!

Cloud Management Platform – Architectural Model overview

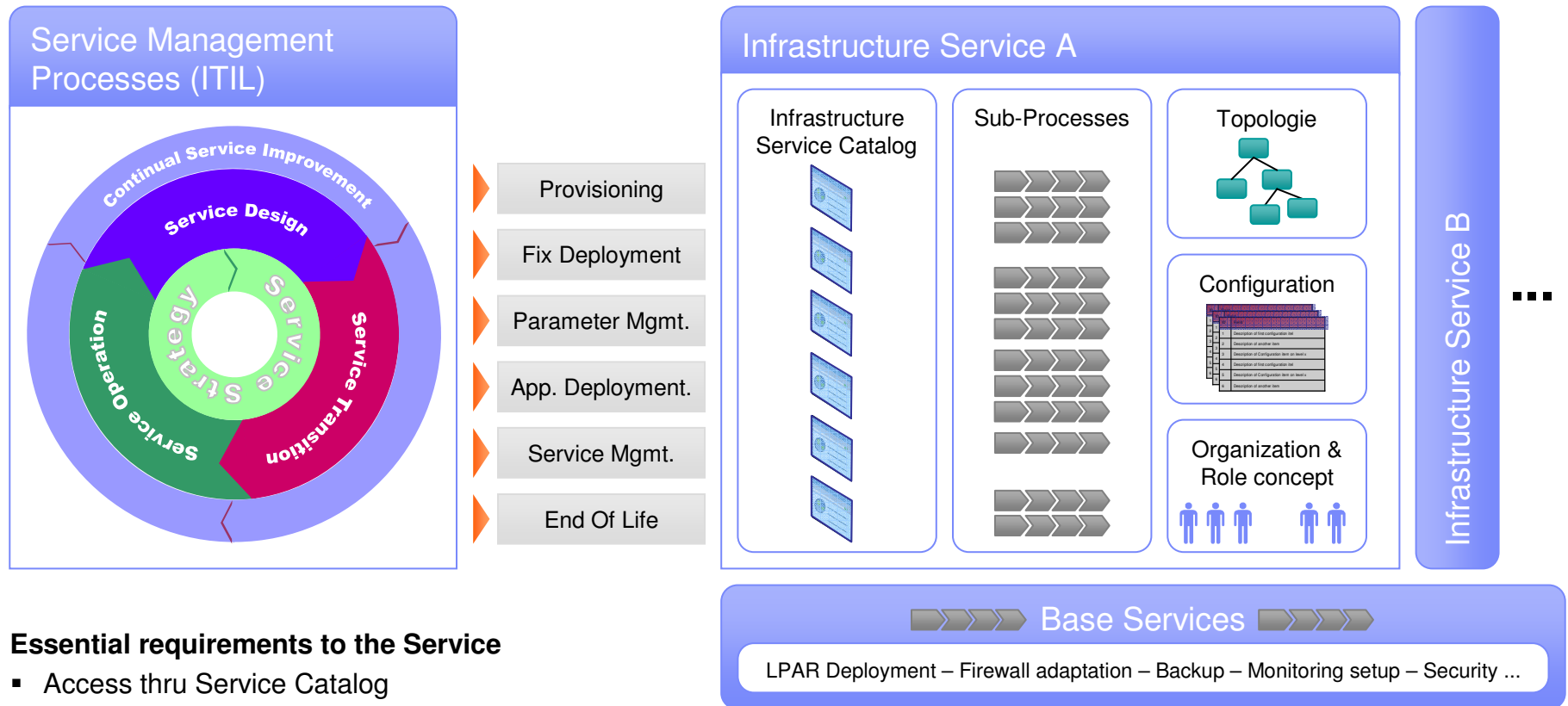


Introduction of Cloud Services



Evolutionary approach to transform to a Cloud Computing data center !

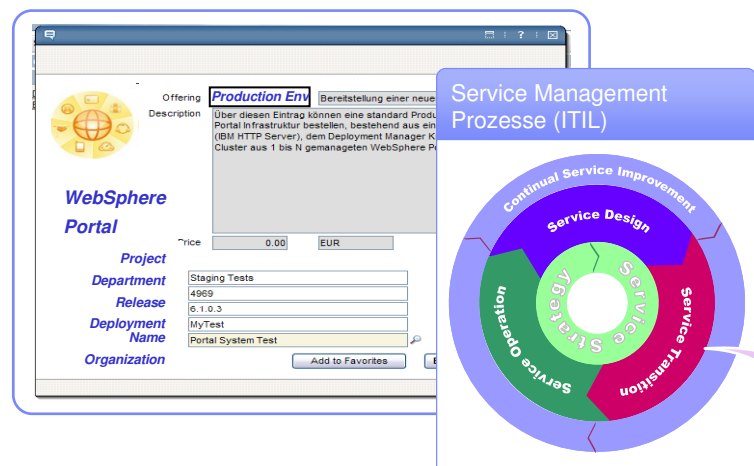
Infrastructure Service Model defines the Components necessary for Service Design and Service Automation and is integrated into ITIL Processes



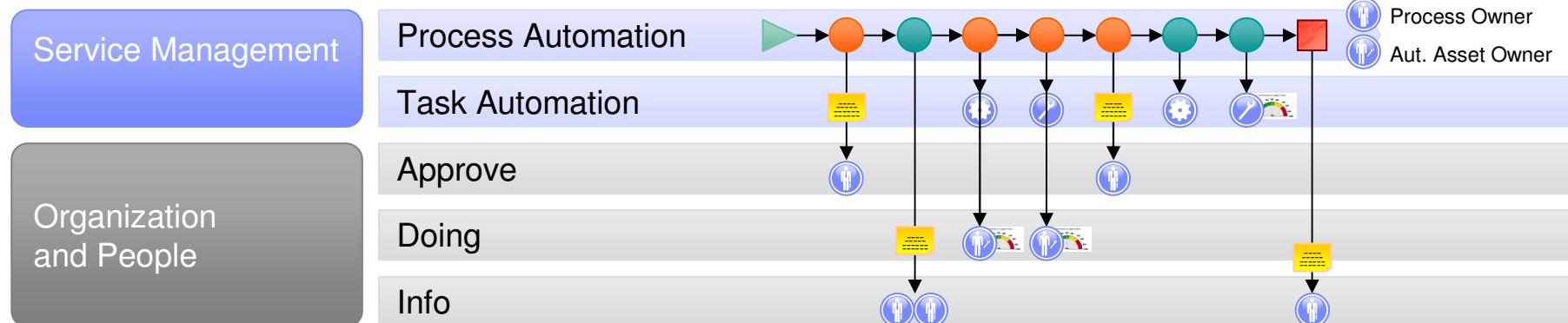
Essential requirements to the Service

- Access thru Service Catalog
- Concept to template a reference architecture (topology)
- Orchestration of people, roles, scripts and tools (automation)
- Integration in configuration DB

Service Management with standardized processes and Task Automation delivers operational efficiency



- A simple request starts the process automation
- The request can be issued by a catalog or higher level process
- The process automation consists of automated and manual tasks and orchestrates them



» Tivoli Service Automation Manager provides flexibility by introducing task automation stepwise.

Agenda

1 TSAM and System z The Answer to Today's Business Challenges

2 Cloud Computing and Service Management

3 Tivoli Service Automation Manager Solution Architecture

4 TSAM Solution Edition

5 TSAM Use Cases

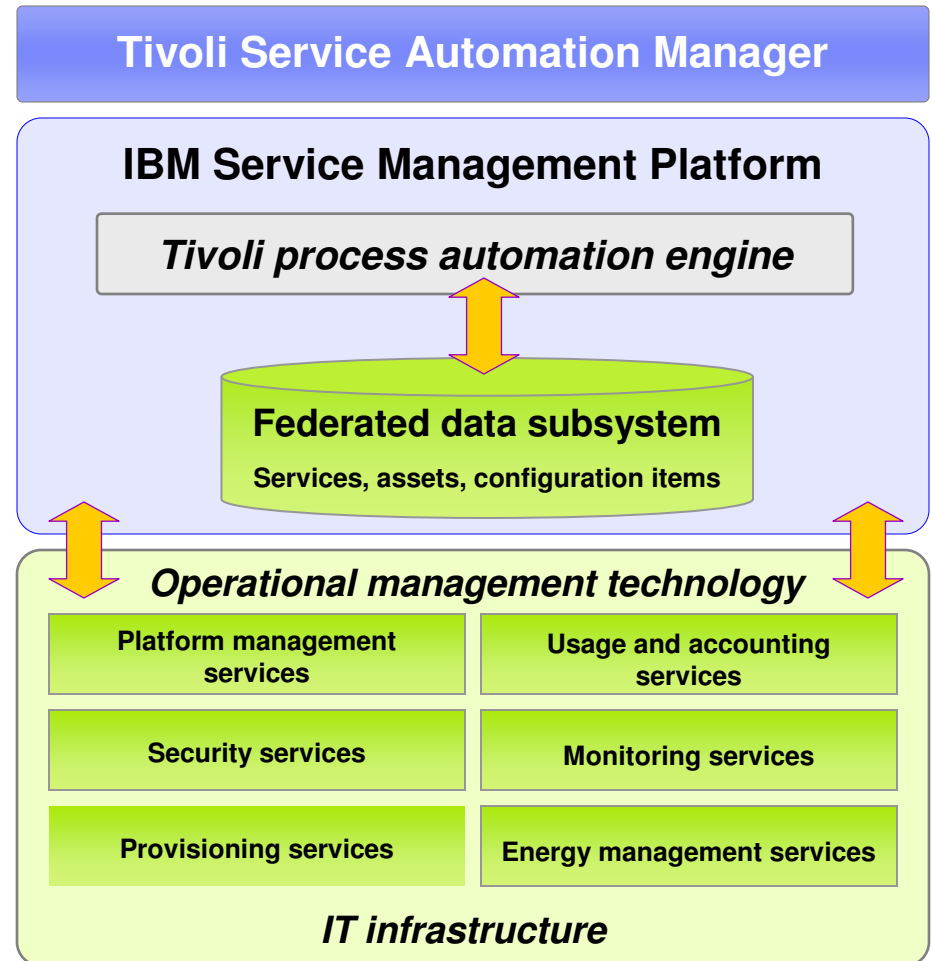
6 Summary

IBM Tivoli Service Automation Manager

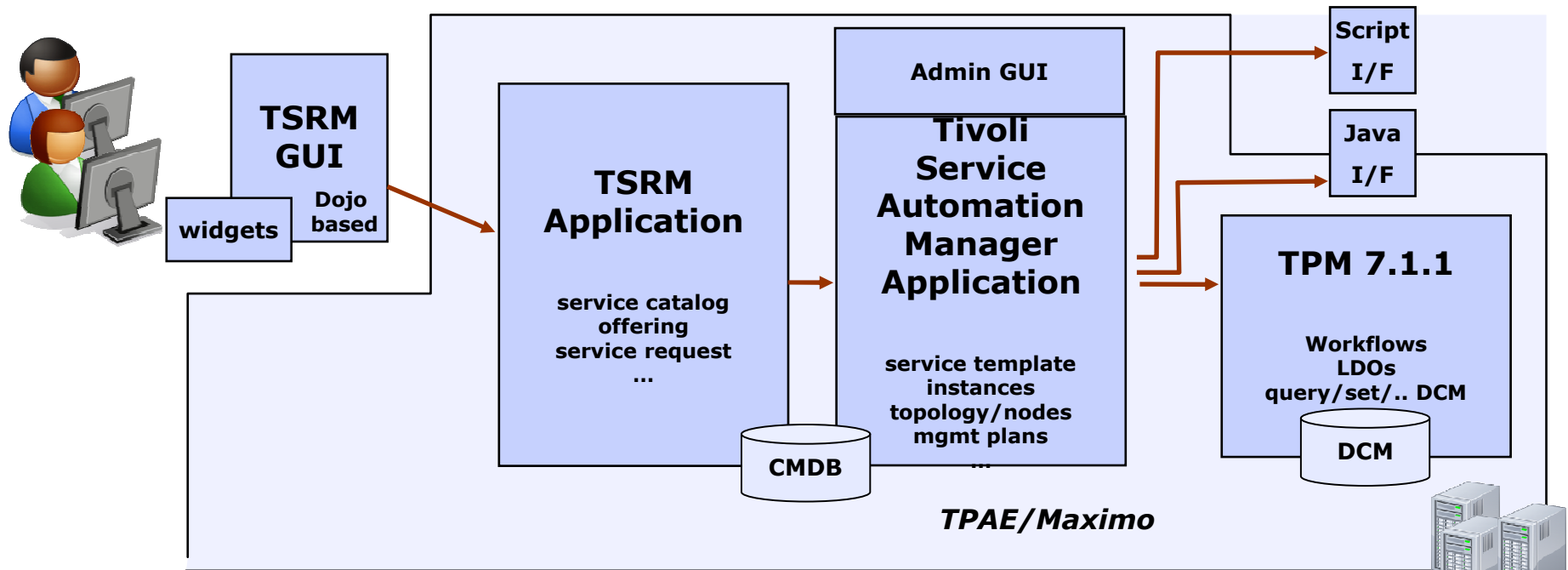
Aggregated capabilities for managing your cloud environment

IBM Tivoli® Service Automation Manager

- Built on top of the IBM Service Management Platform
- Orchestrates technology, processes, people and data to provide cloud computing services and service management of cloud computing
- Provides rapid provisioning of physical and virtual resources



IBM Tivoli Service Automation Manager 7.2 – Components



GUI

- Interaction with end user
- Collect parameters for management plans

SRM

- Prepare service request from given input parameters
- Perform reservation of resources
- Approval and notifications on business level

Tivoli Service Automation Mgr TPM

- Topology definition
- Orchestration by management plans
- Management plan definition
- Management plan execution - push down on eg. TPM (or Script)
- Approval and notifications on technical level (admin)
- Situation governance incl. error handling by admin
- Work assignments on admin level (“inbox”)
- Management plan fulfillment by executing TPM workflows/LDOs ... or native scripts ... or Java based actions ... or manual tasks
- Change resource state

Tivoli Service Automation Manager Concepts

Roles and Responsibilities

- Open concept of user and roles
- Different views on the service based on roles

Service Definition (Template)

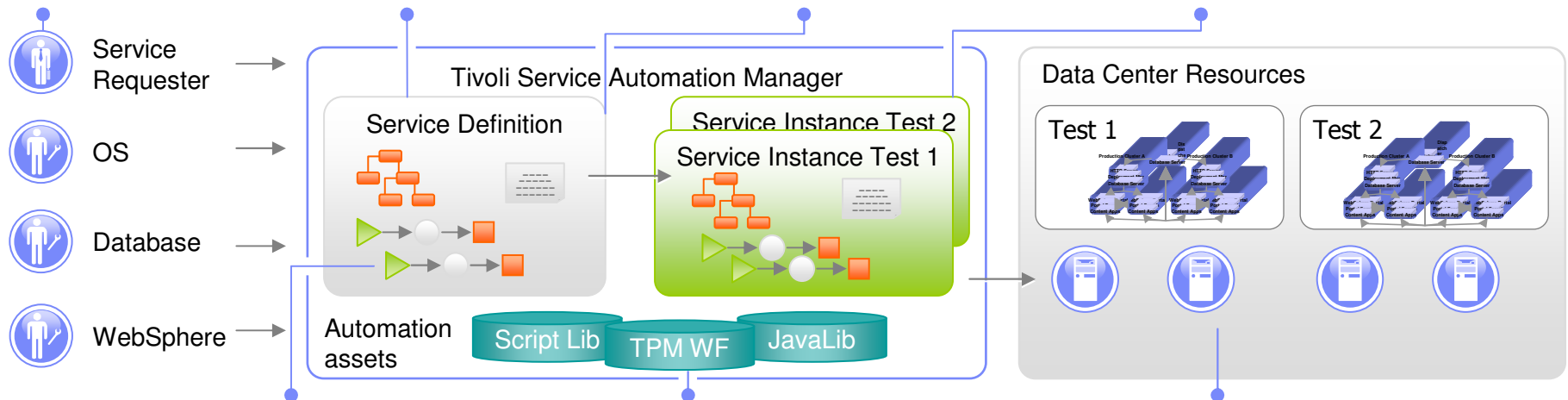
- Open Cardinalities
- Variants
- No assignment of components

Topology

- Template of best practices
- Topology Node represents one or more IT resources which can be provisioned and managed

Service Instance

- Represents concrete instance of an IT service
- Instantiated from a Service Definition
- Parameterized and customized



Management Plans

- Process model for building and operating a service
- Mapping of input and output data for single tasks
- Adapts to variants of service

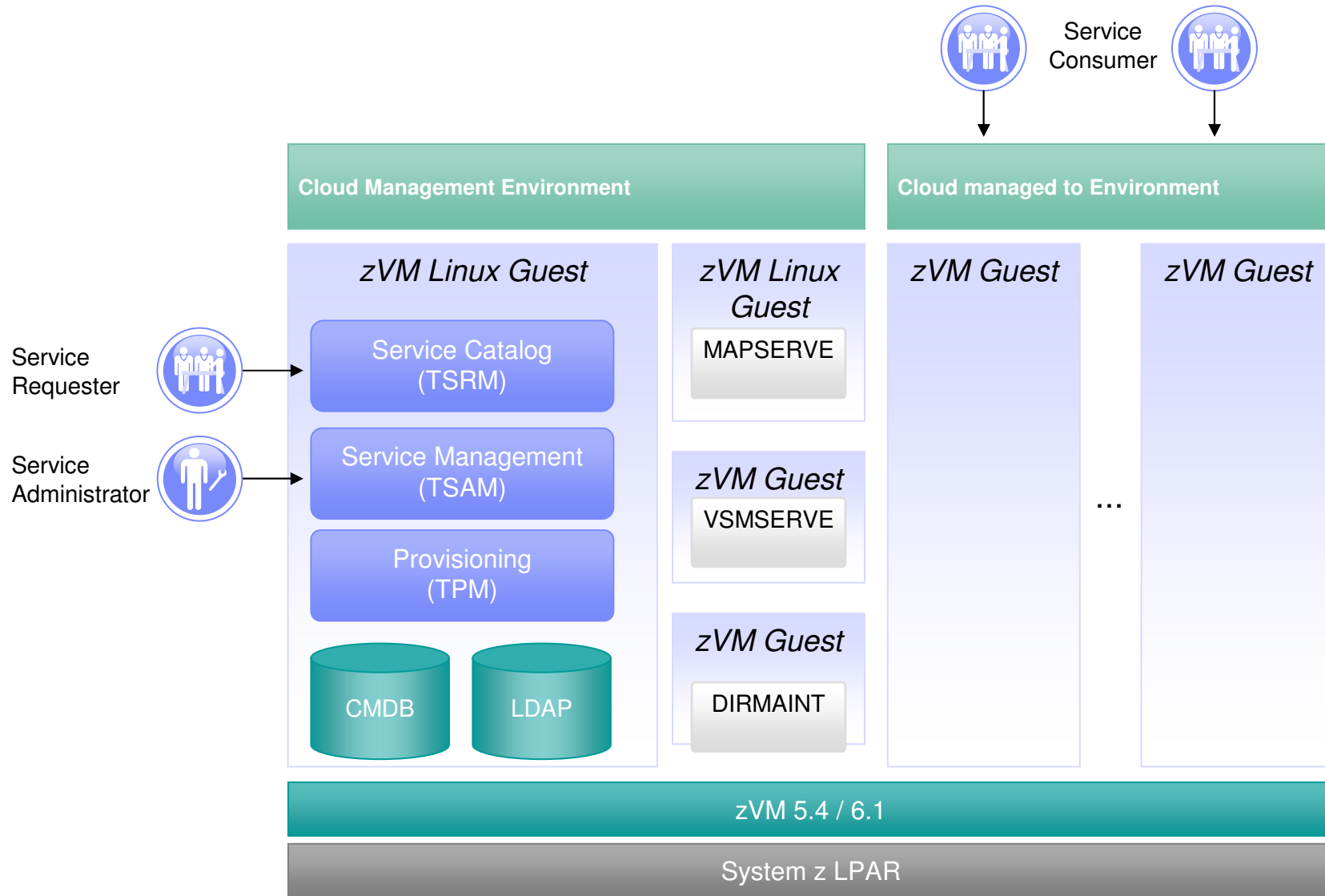
Task Automation Assets

- Automation assets for Mgmt. Plan tasks
- Integration of TPAe internal (e.g. TPM) or external OMPs
- Integration of custom scripts

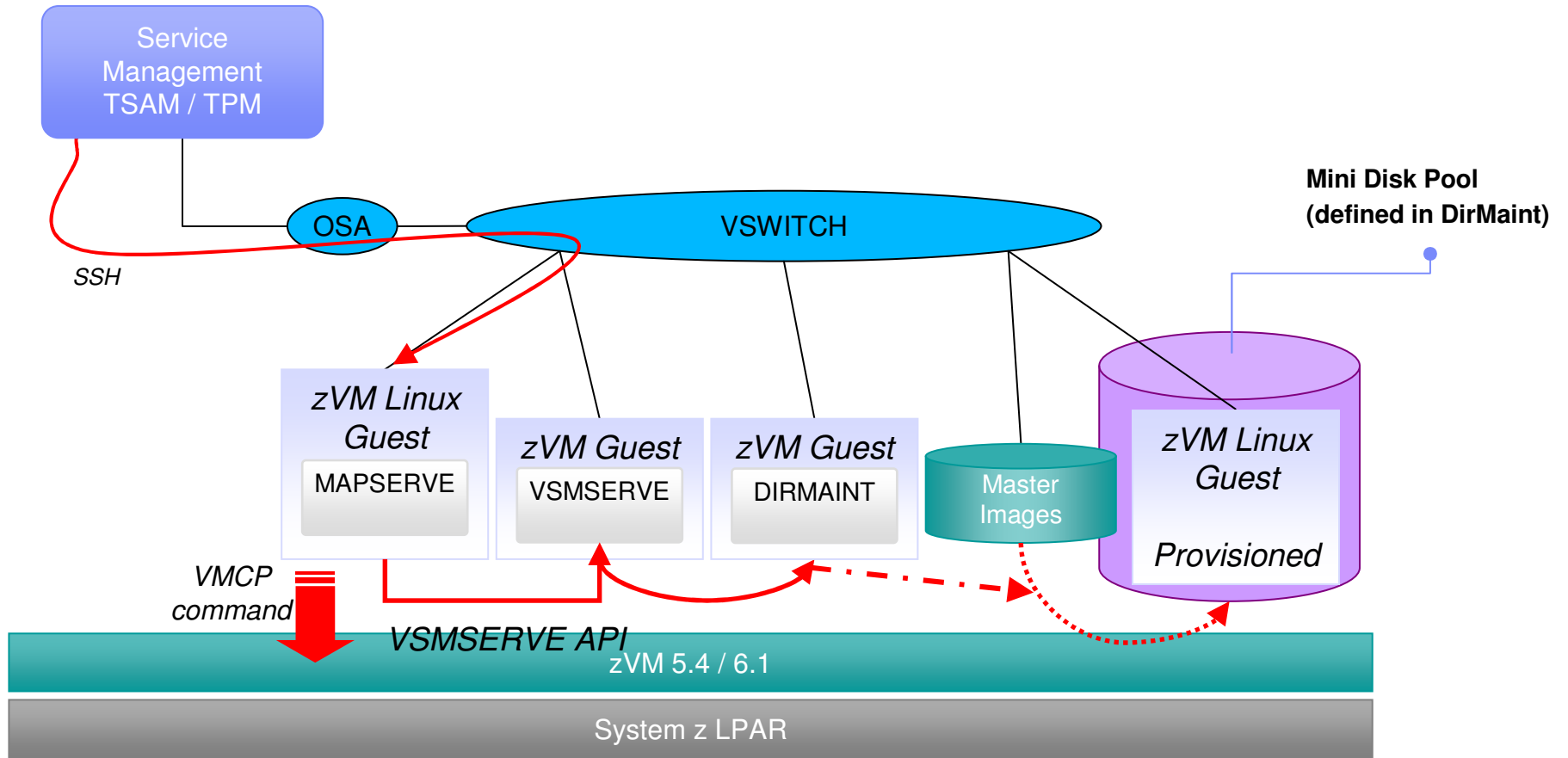
Deployed IT Service Environments

- Automated deployment and operation of IT service environments represented by TSAM Service Instances

Environment Setup - Example



z/VM Configuration Provisioning Details



Agenda

1 TSAM and System z – The Answer to Today’s Business Challenges

2 Cloud Computing and Service Management

3 Tivoli Service Automation Manager Solution Architecture

4 TSAM Solution Edition

5 TSAM Use Cases

6 Summary

IBM System z Offerings for Large Scale Consolidation

The Enterprise Linux Server

A dedicated IBM System z server for large-scale Linux workloads

System z Solution Edition for Enterprise Linux

Additional capacity on an installed IBM System z server for large Linux workloads

▪ Offerings include

- System z IFL specialty processors, memory, and I/O connectivity
- Hardware maintenance for three to five years
- z/VM virtualization software package with three to five years of subscription and support

▪ Supported with new promotions from Linux Development partners Novell and Red Hat

▪ Very competitive pricing

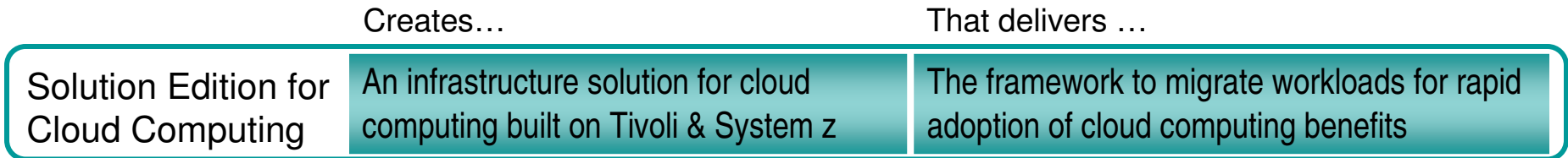
- Competitive TCA with scalable Linux and UNIX alternatives
- Total Cost of Ownership and Qualities of Service that blow away the competition
- Price / performance improves as you grow your environment
- Pricing starting at under \$2,000 per virtual server for 3 years for large-scale consolidations⁽¹⁾

More Solution Editions include: SAP, Business Resiliency, Security, WebSphere, Application Development, Chordiant, ACI, Data Warehousing, Cloud

(1) Calculations based on specific solution offering components using IBM and client experiences. Results can vary.

TCA: hardware, virtualization software, memory, maintenance

IBM System z Solution Edition for Cloud Computing



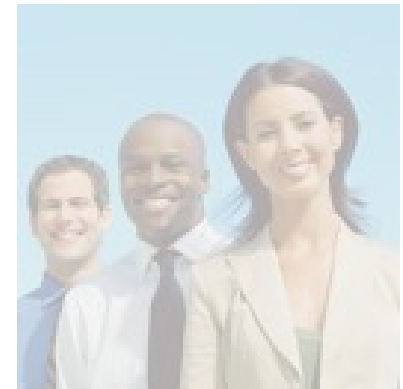
The solution components...

IBM Software



IBM Services

- Phase 1: Create cloud computing use cases within the enterprise
- Phase 2: Implement the service automation and management tooling to support cloud workloads
- Phase 3: Educate the client on cloud computing for on-going success and provide a sample workload

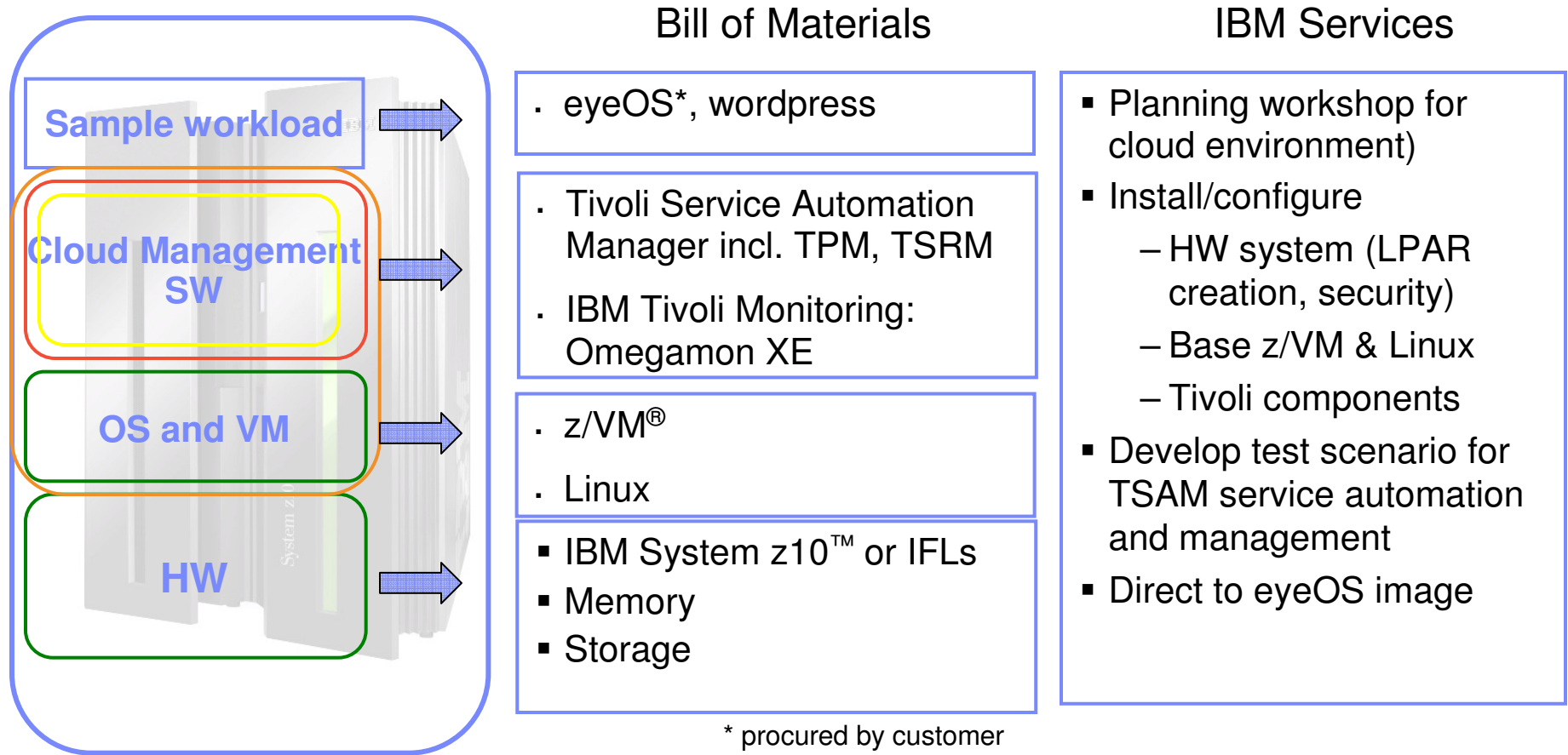


IBM Hardware

Centralize, Virtualize, and Simplify

Learn more at: <http://www.ibm.com/systems/z/solutions/editions/cloud/index.html>

Solution Edition for System z Cloud Computing - Components



STANDARDIZATION

SELF-SERVE PORTAL

VIRTUALIZATION

AUTOMATION

Agenda

1 TSAM and System – The Answer to Today’s Business Challenges

2 Cloud Computing and Service Management

3 Tivoli Service Automation Manager: Architecture and Concepts

4 TSAM Solution Edition

5 TSAM Use Cases

6 Summary

National Business Center Slashes Costs by Creating Strategic Enterprise Cloud Platform on IBM System z

Efficient Data Centers Prove to be a Competitive Advantage

Business challenge:

Despite being part of the Department of the Interior, the National Business Center (NBC) does not receive governmental funding, and relies on competitive bids to operate. It needed to be able to offer the best service while keeping a sharp eye on costs to succeed.

Solution:

Implemented IBM System z mainframes running Linux and IBM WebSphere SOA. A range of IBM Tivoli products help manage mainframe virtualization, provisioning, and balancing workload.

Benefits:

- NBC can experience greater efficiency thanks to higher utilization, better integration, and simplified management than it could realize if using a distributed computing architecture
- System z maximizes ROI by operating at 80-to-100% utilization compared to the 10-to-20% average of distributed servers
- Offers customers solid and secure service, ensuring maximum satisfaction
- Takes advantage of System z virtualization capabilities to optimize resource provisioning and workload balancing

“System z is our enterprise server of choice due to clear advantages in cost-of-acquisition and operation – these savings are vitally important to us as they ensure NBC remains competitive in bidding situations.”

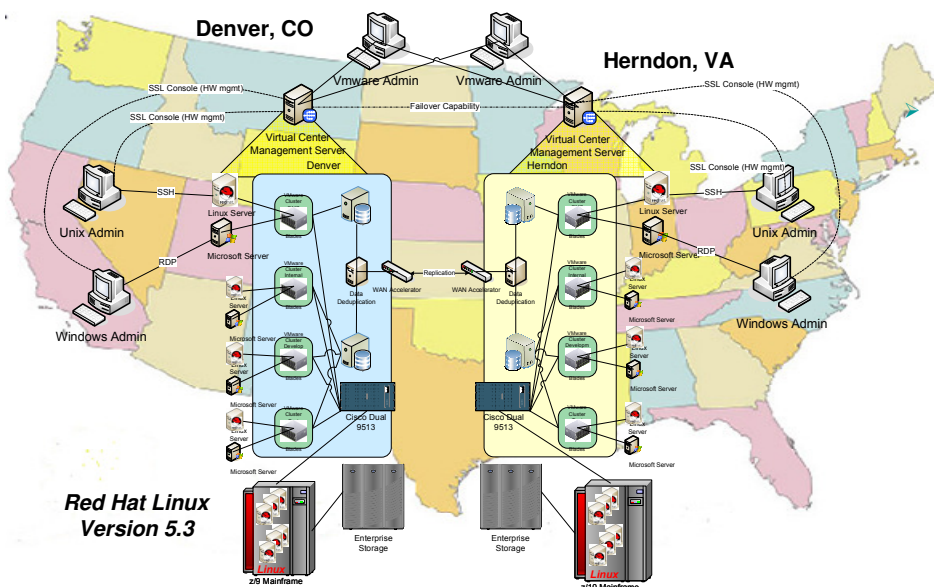
— Doug Bourgeois, Director, National Business Center

Solution components:

- IBM System z and z/VM, WebSphere SOA, Linux, and IBM Tivoli management products



The National Business Center Dual Operating Environments



Linux on z for Business Economic Values

- Simplified policy and management domains across the multi-tier architectures
- Support on highly reliable and highly available platforms
- Leverage current NBC resources and skill sets
- End-to-end management view of distributed application components, Provisioning and Cost by usage.
- Consolidated disaster recovery
- Improved economies of scale and efficiency

➤ Linux on z for NBC Cloud Infrastructure and Scalability

- Dynamic allocation in NBC Cloud environments
- Support for both upward and downward scalability
- Significantly reduce cycle times for provisioning
- Support for dynamic CPU and memory allocation

➤ Linux on z for Increased Security

- Combine with Linux on z Mainframe and Red hat O/S, NBC Cloud infrastructure has increased Controlled Access Protection Profile (CAPP) level 5 and Level 4+ Common Criteria
- Centralize security access control using NBC EACS

Linux on z for Green IT

- Increase in server utilization reduces power consumption
- Reduction in physical servers frees up precious floor space
- Provides additional capacity for continued business growth

TSAMz: Provisioning Customer Benchmark Environments



TSAMz: Provisioning Customer Benchmark Environments

- **Project Setup**
 - Customers seeking large benchmarks of applications that require many Linux on System z guests.
 - Benchmarking environment persists for several weeks and then system resources (disks, CPUs, network) is decommissioned and reassigned to new benchmarks
 - 2+ hour manual install and other manual “disk-copy” methods still too time-consuming and very home-grown
 - Strategic solution required that could facilitate rapid creation of many Linux guests - possibly greater than 50 at one time. Management wanted a Cloud-Computing strategic product for our rapid provisioning environment.

TSAMz: Provisioning Customer Benchmark Environments

- Strategic direction for rapid provisioning
- A TSAM server was already available in-house
- z/VM and TSAM one-time System z configuration and setup completed on extant TSAM server (System x) in 28 days.
- Each new Linux guest was then created and made available in about 4 minutes. 35 Linux guests built in less than 2 days versus a week or more needed with our older methodology.
- Desire to use TSAM for provisioning System z to enable future Cloud Computing capabilities such as:
- Rapid up and down scalability, on-demand self-service, network access, resource pooling, flexible architectures, pay per use, middleware, service definition templates and agreements.

TSAMz: Provisioning Customer Benchmark Environments

- **Current Status**
- IBM Redpaper published captures System z infrastructure configuration as adjunct to existing TSAM documentation. (<http://www.redbooks.ibm.com/abstracts/redp4663.html?Open>)
- Ability to rapidly provision and de-provision up to 100 or more servers for customer benchmarks or short-term feasibility or application code migration engagements.
- Especially suited for many nearly identical guests such as an education environment or large WebSphere or Portal clusters
- Linux masters at various distribution levels are pre-built. TSAM has workflows for middleware installation but for this iteration we used our existing methodology.

TSAMz: Provisioning Customer Benchmark Environments

- Future Plans
- Middleware provisioning: WebSphere/DB2/MQ from TSAM workflows to capitalize on non-System Z Linux similarities
- Follow technology direction – new Cloud products may be added but TSAM and the technologies that we exploit will remain as the centerpiece product.
- Provision and run on provisioning system or move disks to another z/VM system (Dynamic Benchmarking).
- Maintain TSAM fix-levels and z/VM environment. New distributions are incorporated as they become available.

Agenda

1 TSAM and System – The Answer to Today’s Business Challenges

2 Cloud Computing and Service Management

3 Tivoli Service Automation Manager: Architecture and Concepts

4 TSAM Solution Edition

5 TSAM Use Cases

6 **Summary**

Provision systems faster, with lower cost and consistent quality Lowers provisioning cost by an average 51%*

Traditional Infrastructure

- Experts deploy and configure
- Many error prone steps to execute
- Long lead time required



Manually configure systems

Cloud with Service Management

- Automation does the work
- Provisioned consistently every time
- Available when customer needs it

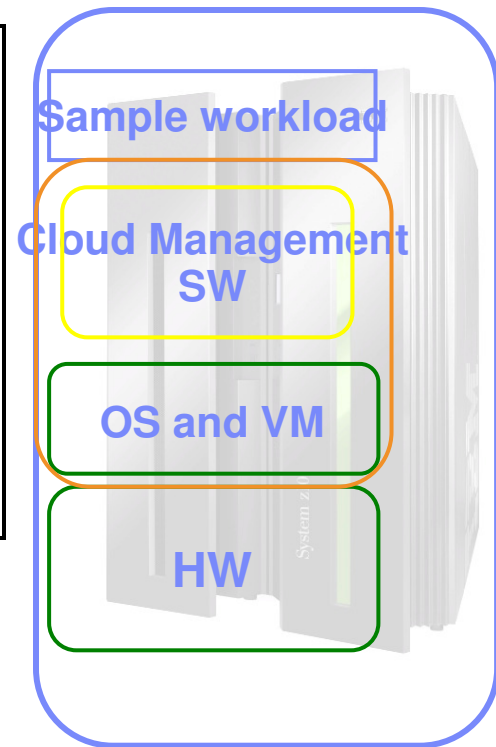


*Based on IBM Research study 2009

Solution Edition for System z Cloud Computing - Demo

High quality demo set-up in IBM Boeblingen TMCC Center

- New scenario 'Cloud Service Automation' for System z cloud environments
- Automated, fast provisioning of new guests demonstrates System z cloud elasticity
- Cloud Management via Tivoli Service Automation Manager running on Linux on System z



- **T**echnical know-how
- **M**arket and channel enablement
- **C**ompetence across the board
- **C**lient value focus

Demonstration Portal



Our extensive set of demos covers the Dynamic Infrastructure solution areas, an evolutionary approach to help clients evolve to an efficient and responsive model for IT Service delivery. Access to live demos on TMCC systems is either locally at the Executive Briefing Center in Boeblingen, or remotely when led by subject matter experts.

Category to get the full list of available demos and detailed information.

Initiatives	Servers and Storage	In the Spotlight
Structure	System z	Cloud Service Automation on System z

Tivoli Service Automation Manager on System z

- Tivoli Service Automation Manager Provides the software capabilities to request, fulfill, and manage cloud services
 - Simplifies user interaction with IT
 - User friendly **self-service interface** accelerates time to value
 - **Service catalog** enables standards to drive consistent service delivery
 - Delivers provisioning to enable automation to lower cost
 - **Automated provisioning** and de-provisioning speeds service delivery
 - Provisioning **policies** allow release and reuse of assets
 - Integrates with key IBM offerings
 - Tivoli Management (Monitoring, Usage Accounting..)
 - Websphere Cloudbust Appliance
- System z provides an ideal platform on which to deliver Linux-based Cloud Services
 - Highly scalable
 - Most Advanced Virtualization Capabilities
 - Highest utilization of Resources
 - Most Secure and Highly Available Architecture
- Solution Edition for System z Cloud Computing packages hardware, software and services to increase your ROI by lowering your initial costs



Additional Resources

- IBM Tivoli Service Automation Manager:
 - <http://www-01.ibm.com/software/tivoli/products/tsam-facts.html>
- Solution Edition for Cloud Computing:
 - <http://www.ibm.com/systems/z/solutions/editions/cloud/index.html>
- Provisioning Linux on System z Redpaper:
 - <http://www.redbooks.ibm.com/abstracts/redp4663.html?Open>
- IBM WebSphere Cloudburst Appliance (WAC):
 - http://www-01.ibm.com/software/webservers/cloudburst/features/?S_CMP=wspace
 - <http://www.youtube.com/websphereclouds#p/search/3/yya-gvCMiwQ>
- Linux Distributions Supported by each System z Platform:
 - http://www-03.ibm.com/systems/z/os/linux/support_testedplatforms.html
- IBM Software available for Linux on System z:
 - <http://www-1.ibm.com/servers/eserver/zseries/os/linux/software.html>
- Destination z
 - <http://www-03.ibm.com/systems/z/destinationz/>

Cloud Computing: What clients are saying

"We'd like to bring IBM's technology and services to our local ISVs, to give them an ecosystem to grow in,"

- Paul Que, Deputy Director, Wuxi iPark

"With IBM CloudBurst and the technical expertise from IBM Cloud Labs in China, we will be able to pool and maximize our resources to run our global business..."

- Peng Jin Song, General Manager, Information Technology, Sinochem

"We want to solve some of those problems with cloud computing so we don't have to build another \$20 million data center,"

- Doug Bourgeois, CIO, Dept of Interior National Business Center

"IBM cloud technology has proved to us that we can shorten the provisioning time significantly, reduce our cost and also increase the agility with which we can respond to business demands,"

- Nicholas Parry, Group Software Services Executive, Nedbank

"IBM's cloud services add the security and regulatory compliance needed to satisfy the pharmaceutical industry,"

- Randall K Julian, Jr. Ph.D., President, Indigo BioSystems, Inc.



For more information, please visit

ibm.com/cloud

Thank you

System z Cloud Computing - Heaven Awaits!

