SmartCloud

IBM

November 2012

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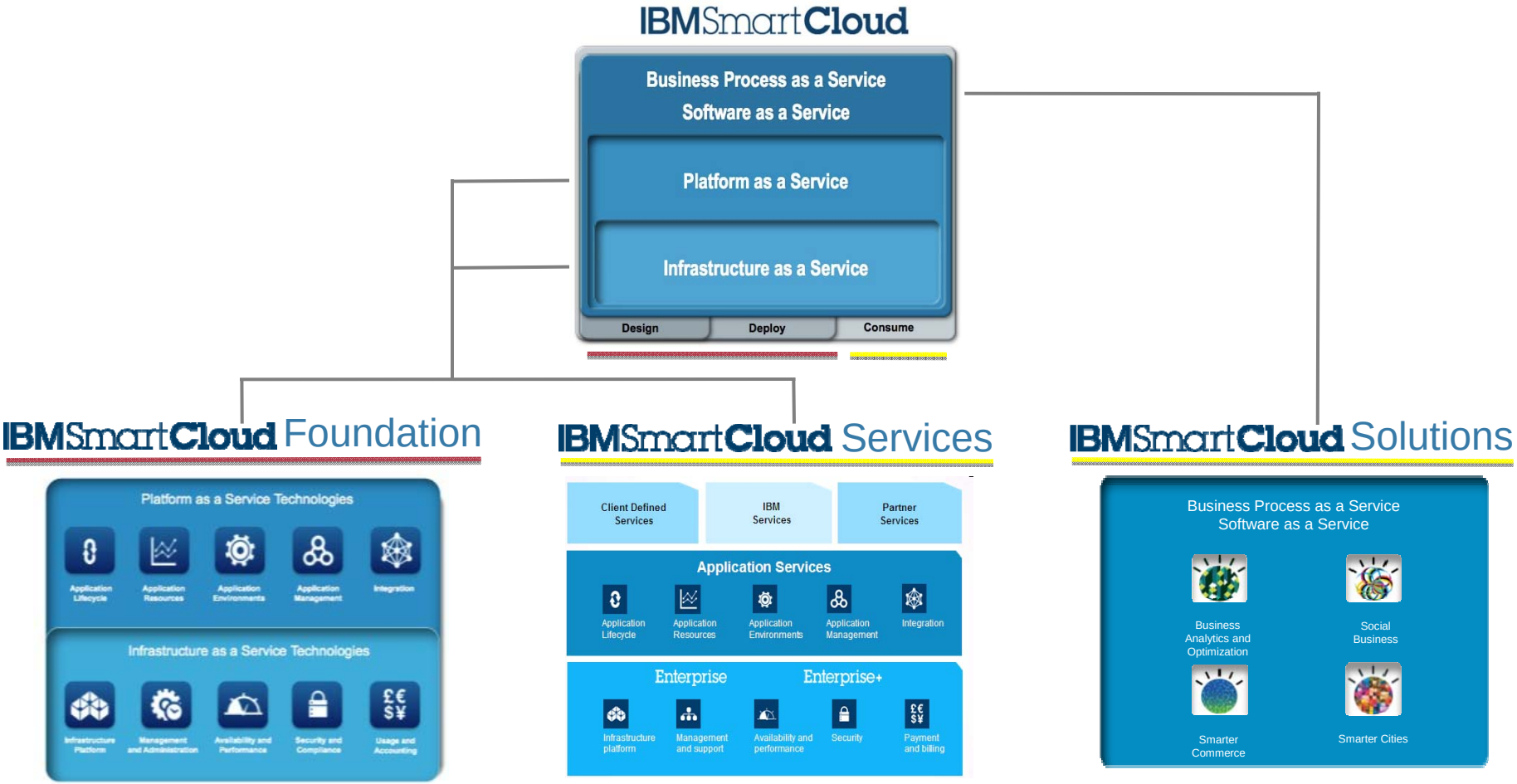
IBM SmartCloud Foundation: Moving beyond Virtualization

Introducing new capabilities built on our common cloud architecture



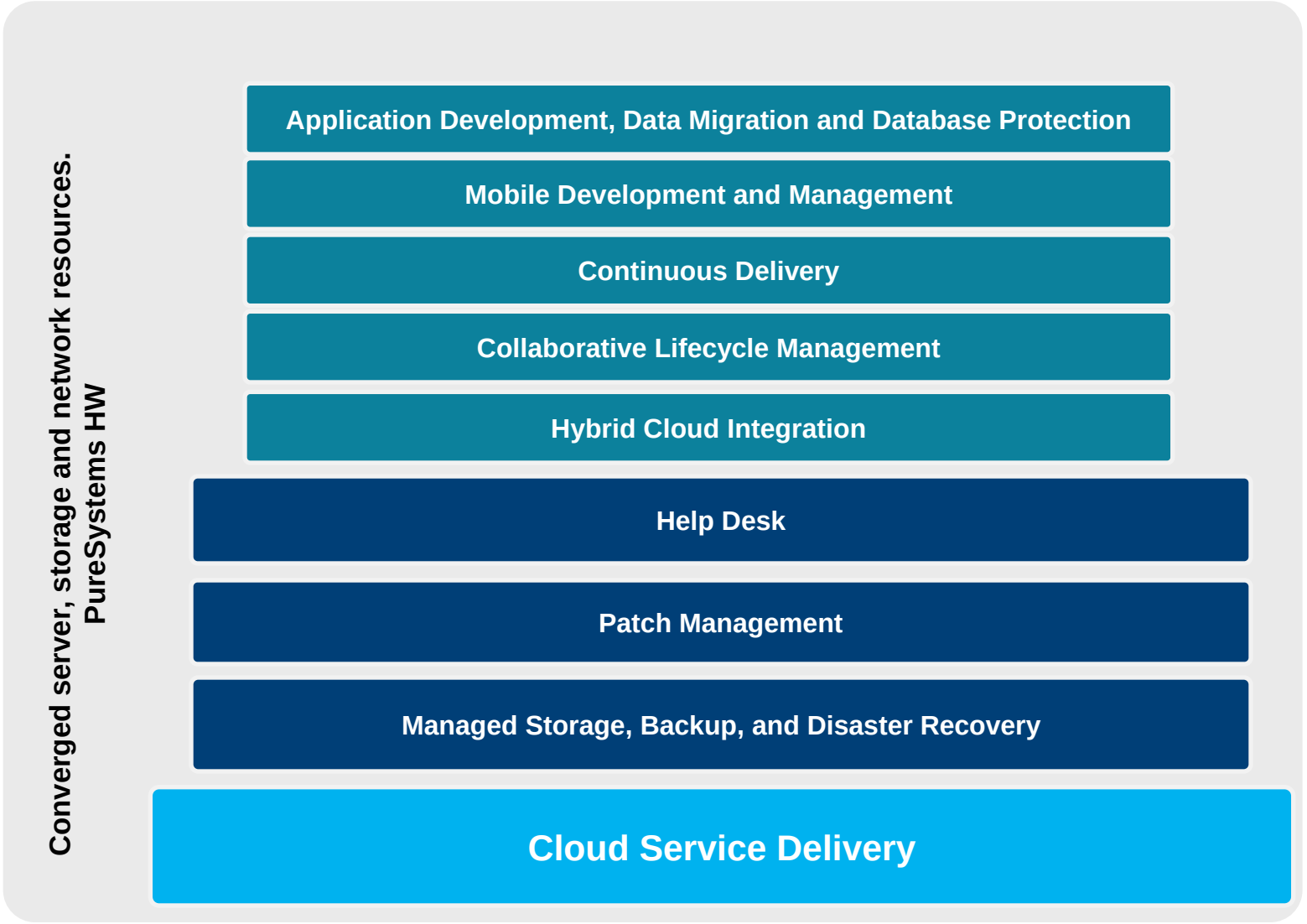
Easily build and rapidly scale **private cloud** environments with unparalleled time-to-market, integration and management

Unprecedented choice, security and portability of applications on **IBM's SmartCloud service delivery platform**

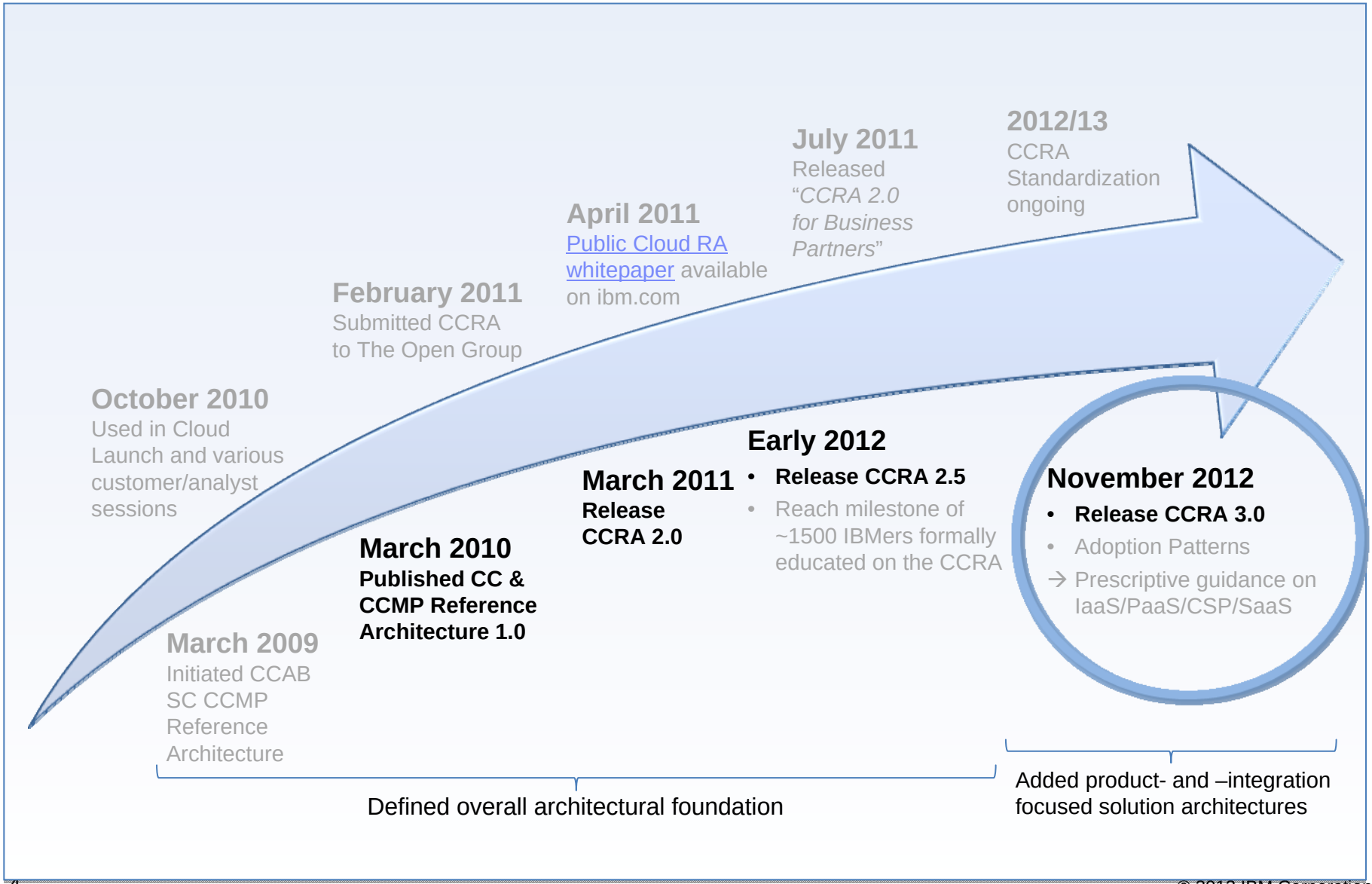
Software as a service coupled with deep industry insights, business process skills and analytics

Commitment to open standards and a broad ecosystem

IBM has "cloud building blocks" solution based on the ***Cloud Computing Reference Architecture*** with a lower entry cost point, more flexibility and scalability.



Evolution of the Cloud Computing Reference Architecture (CCRA 3.0)



The IBM Cloud Computing Reference Architecture (CCRA)

Represents the aggregate experience from hundreds of cloud client engagements and IBM-hosted cloud implementations

- Based on knowledge of IBM's services, software & system experiences, including IBM Research

Provides prescriptive guidance on how to build IaaS, PaaS, SaaS and service provider clouds using IBM technologies

Reflected in the design of

- Clouds IBM implements for clients
- IBM-hosted cloud services
- IBM cloud appliances
- IBM cloud products

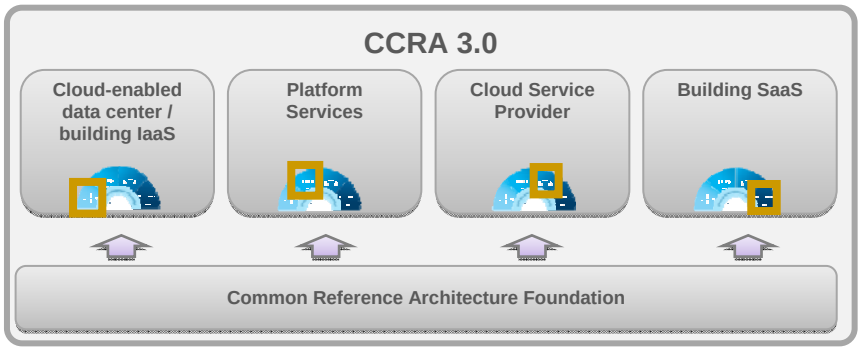
Focuses on cloud specifics

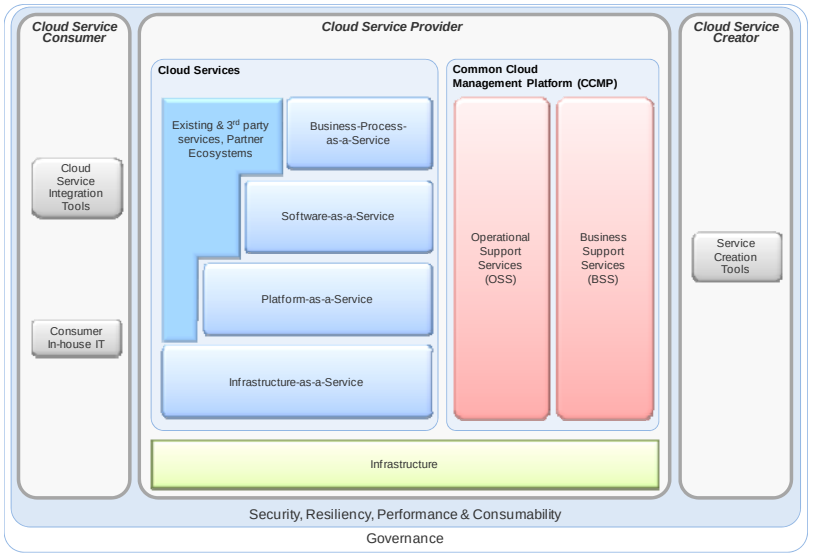
- Radical cost reduction
- Achievement of high degrees of security, reliability, scalability and control

Consists of multiple detailed documents representing best-of-industry knowledge and insight

- How to architect, design and implement clouds

Public Cloud RA whitepaper available on ibm.com:
http://public.dhe.ibm.com/common/ssi/ecm/en/ciw03078usen/CIW03078USEN.PDF
CCRA OpenGroup submission:
http://www.opengroup.org/cloudcomputing/uploads/40/23840/CCRA.IBMSubmission.02282011.doc





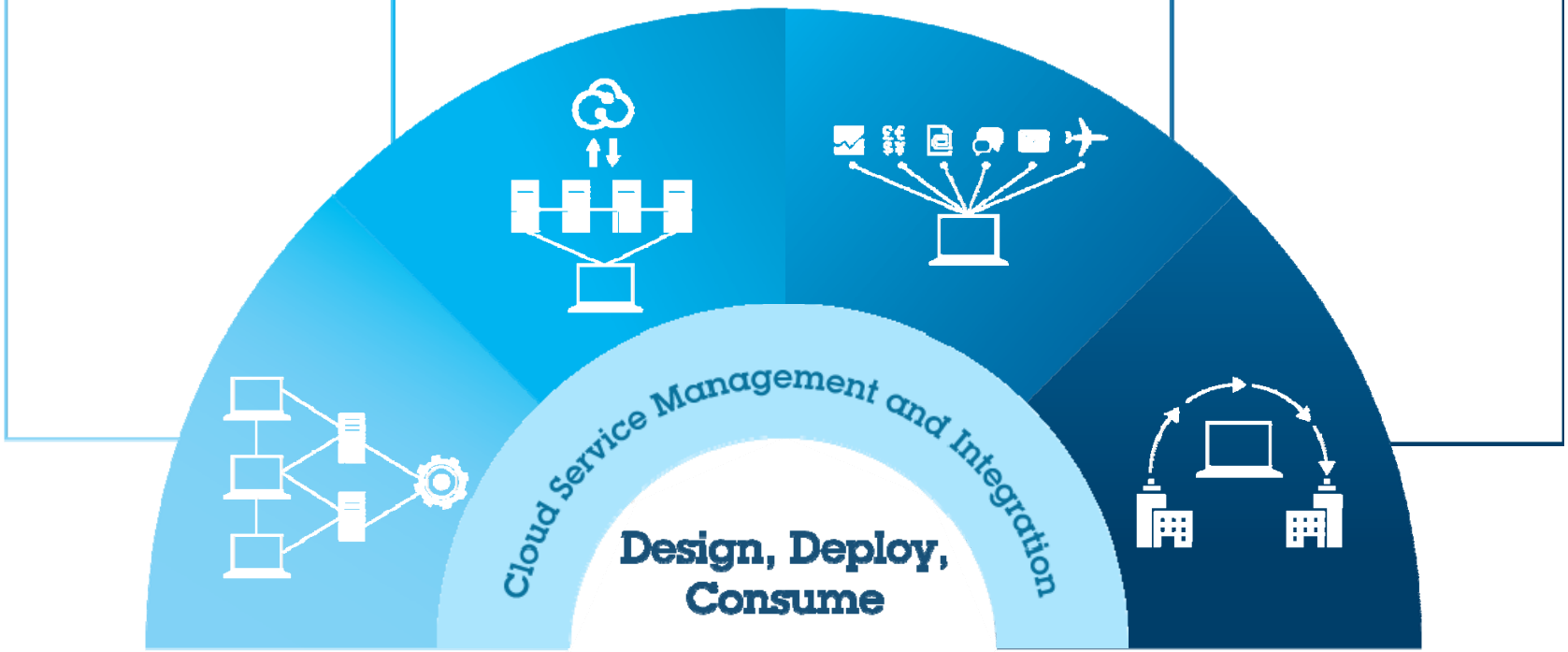
Adoption patterns are emerging for successfully beginning and progressing cloud initiatives.

IaaS: Cut IT expense and complexity through a cloud enabled data center

PaaS: Accelerate time to market with cloud platform services

SaaS: Gain immediate access with business solutions on cloud

Innovate business models by becoming a cloud service provider



SmartCloud logista

IaaS & PaaS MSP Cloud

IBM

Our Customer's Business

- Founded in 1983 as a one store provider of personal computers and printers, Logista has grown to be a nationally recognized leader in technology management solutions.
- Logista is one of the largest technology support providers in the US, providing support solutions that companies need to run their businesses on a daily basis. Trusted by Fortune 1000 corporations and vertical market leaders alike, these organizations rely on Logista for innovative, structured solutions to IT services and systems integration.
- Logista is looking to become a Managed Services Provider building upon its expertise in data centre implementation & design.

The Business Challenges

- Selecting a range of Cloud services for its customers, starting with a range of IaaS offerings, and then building upon them with PaaS capabilities.

Offering a high service availability is important to be able to differentiate from the commodity IaaS cloud providers.

- Moving the business from large implementation deals to recurring revenue streams based on Cloud services.

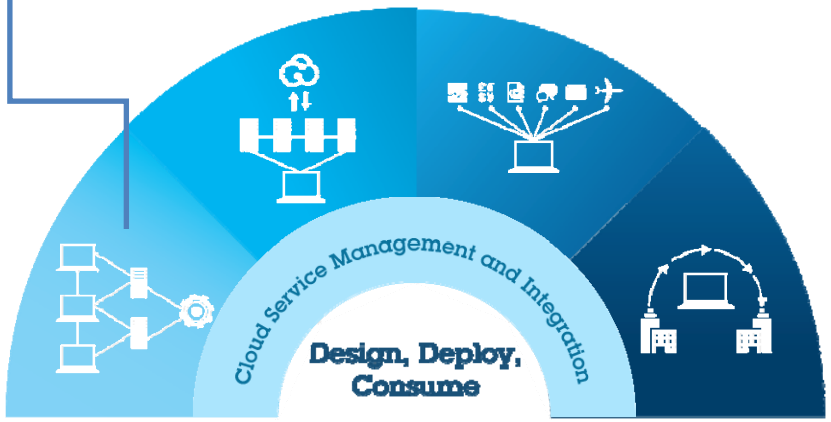
Cloud Business Benefits

- Quick time to market exploiting pre-integrated and pre-built ready to deploy solutions.
- Rapid delivery of rich Cloud services in MSP environment.
- Secure and intelligent SmartCloud systems with high degrees of automation to minimise the administration effort/cost whilst also providing high degrees of service availability.
- Flexible systems that can scale up and down quickly based on existing and new customer business volumes.
- Shifting from individual customer and ad-hoc needs to highly scalable and repeatable patterns of common cloud services.

What Did We Do?

- We helped Logista design a Cloud Enabled Data Centre which exploits the capabilities within SmartCloud Foundation, giving a scalable and progressive Cloud service capability.
- SmartCloud Provisioning was deployed as the automation and provisioning layer for IaaS and PaaS services, integrating with the V7000 storage and integrate network.
- SmartCloud Monitoring implements the service monitoring at the infrastructure, host and cloud service, together with event management, capacity planning and health analytics.
- Smart Cloud Cost Management to provide flexible pricing and detailed reporting
- All built upon IBM's PureFlex system with x86 nodes offering scalable infrastructure with integrated network.

IaaS: Cut IT expense and complexity through a cloud enabled data center



Dutch Cloud

UPMC

NC STATE UNIVERSITY

citi

WAGNER
INFORMATIK DIENSTLEISTUNGEN

SLTN

IRIS
Document to Knowledge
IT INFRASTRUCTURE & EXPERTS

perceptive

NORTHROP GRUMMAN

Advanced IaaS services integrated with ITIL processes
Allows to completely integrated the cloud world with the remaining part of the enterprise by including the cloud infrastructure and services in the enterprise ITIL processes.

4

Advanced IaaS Services (VMs, Storage, Network or their combinations)
Allows creating a more sophisticated cloud infrastructure for the delivery of more complex and critical IaaS services in highly demanding environments.

3

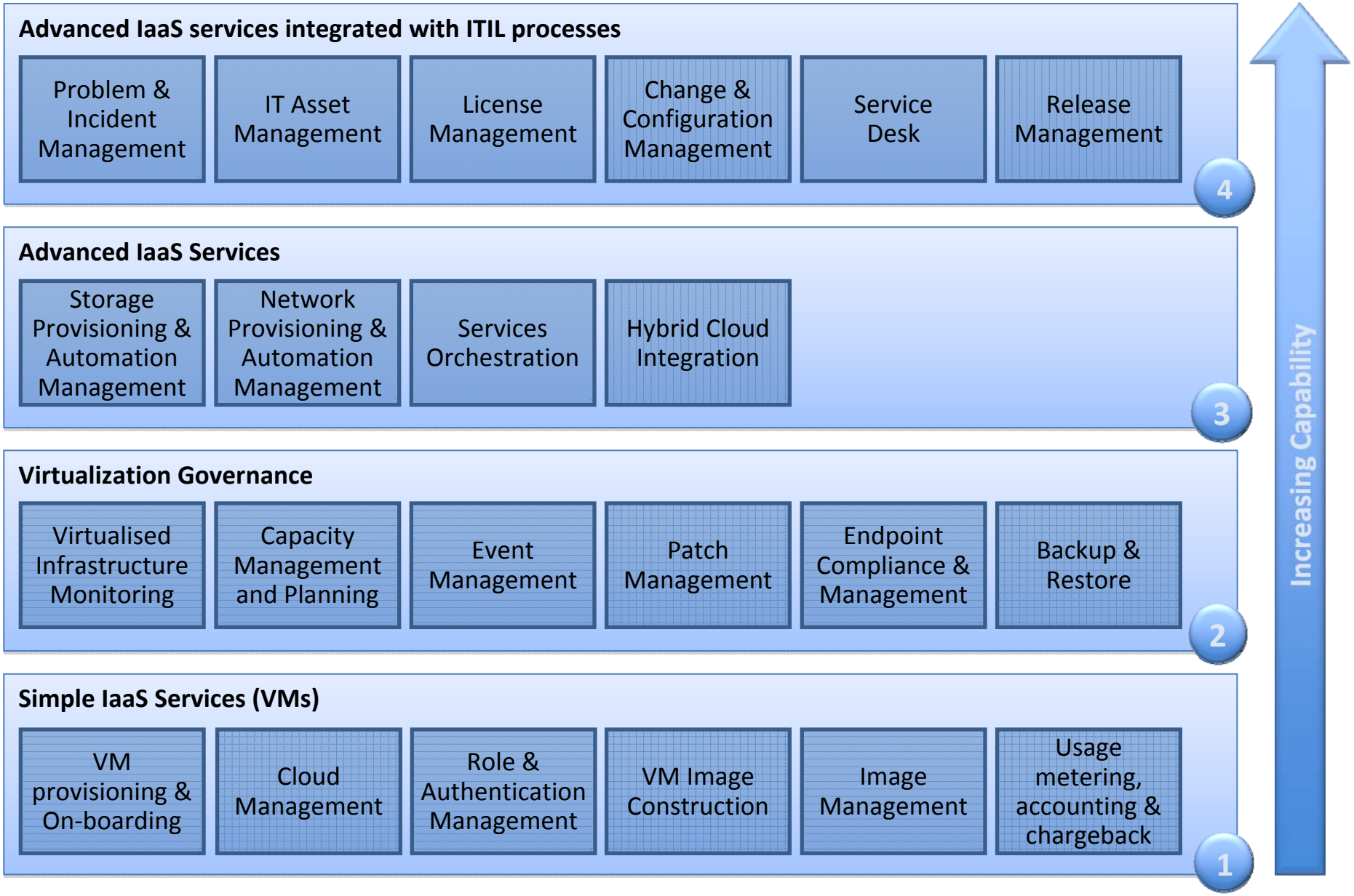
Virtualization Governance
Complements the first macro-pattern by adding governance capabilities that allow to effectively manage aspects like SLAs, security, resiliency, capacity planning, etc… for both the virtualized infrastructure that provides the cloud service as well as the cloud service itself.

2

Simple IaaS Services (VMs)
The entry point in the IaaS cloud space since it allows to start building a multi-tenant cloud infrastructure and model for the delivery of simple VMS (configured with the proper network and storage) that covers the 70 % of the requests coming from the different business lines.

1

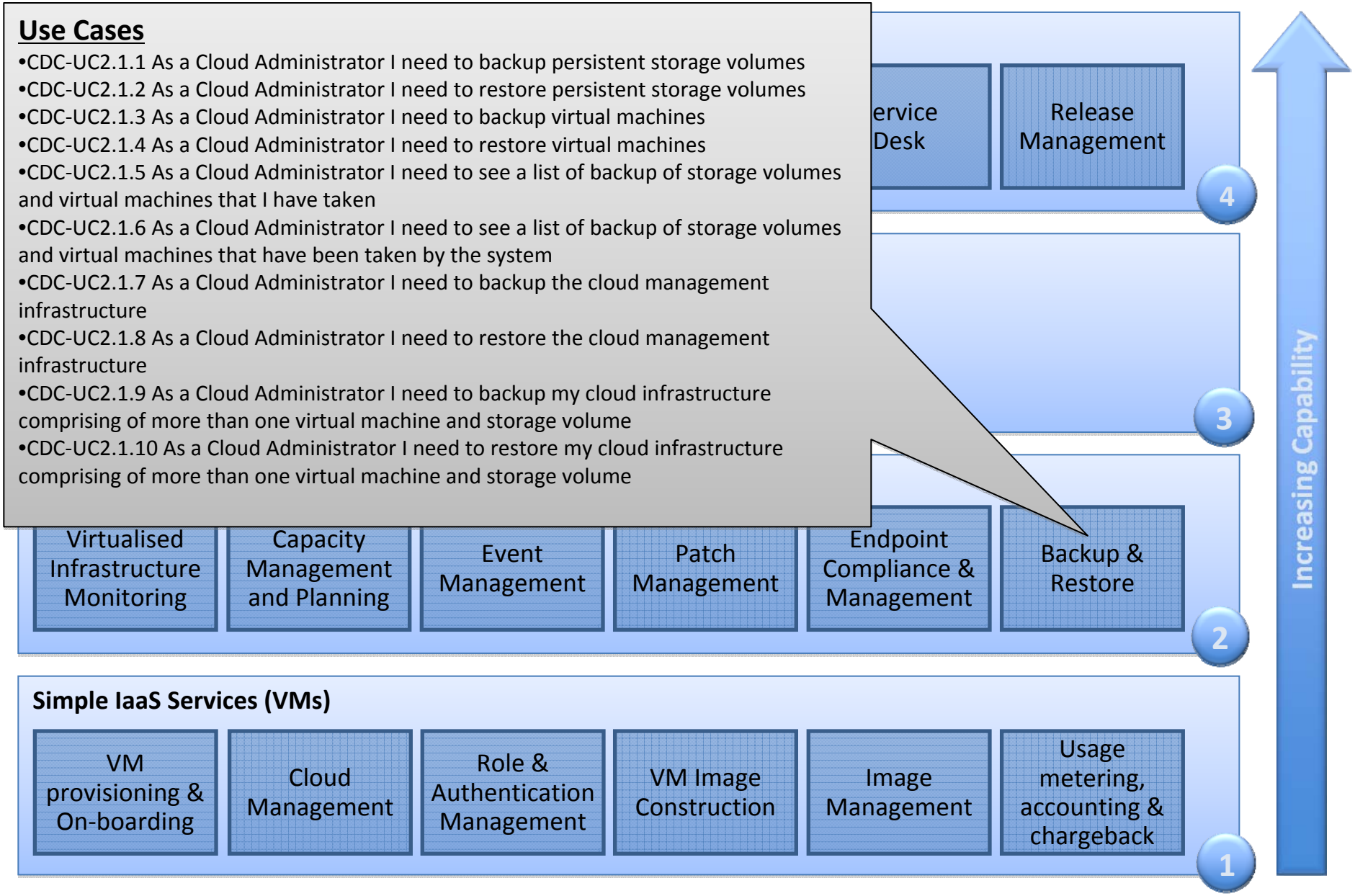
CEDC – Macro & Micro Patterns



CEDC – Macro & Micro Patterns

Use Cases

- CDC-UC2.1.1 As a Cloud Administrator I need to backup persistent storage volumes
- CDC-UC2.1.2 As a Cloud Administrator I need to restore persistent storage volumes
- CDC-UC2.1.3 As a Cloud Administrator I need to backup virtual machines
- CDC-UC2.1.4 As a Cloud Administrator I need to restore virtual machines
- CDC-UC2.1.5 As a Cloud Administrator I need to see a list of backup of storage volumes and virtual machines that I have taken
- CDC-UC2.1.6 As a Cloud Administrator I need to see a list of backup of storage volumes and virtual machines that have been taken by the system
- CDC-UC2.1.7 As a Cloud Administrator I need to backup the cloud management infrastructure
- CDC-UC2.1.8 As a Cloud Administrator I need to restore the cloud management infrastructure
- CDC-UC2.1.9 As a Cloud Administrator I need to backup my cloud infrastructure comprising of more than one virtual machine and storage volume
- CDC-UC2.1.10 As a Cloud Administrator I need to restore my cloud infrastructure comprising of more than one virtual machine and storage volume



CEDC – Macro & Micro Patterns

Use Cases

•CDC-UC4.1.1 Image registry/backup: As an image librarian, I want to register a new image with the image library. As an image librarian, I want to un-register an existing image from the image library because it is no longer needed for deployment. As an image librarian, I want to backup an existing image in order to restore from it in case of errors. As an image librarian, I want to restore from a backup image in order to repair errors. As an image librarian, I want to delete a backed up image.

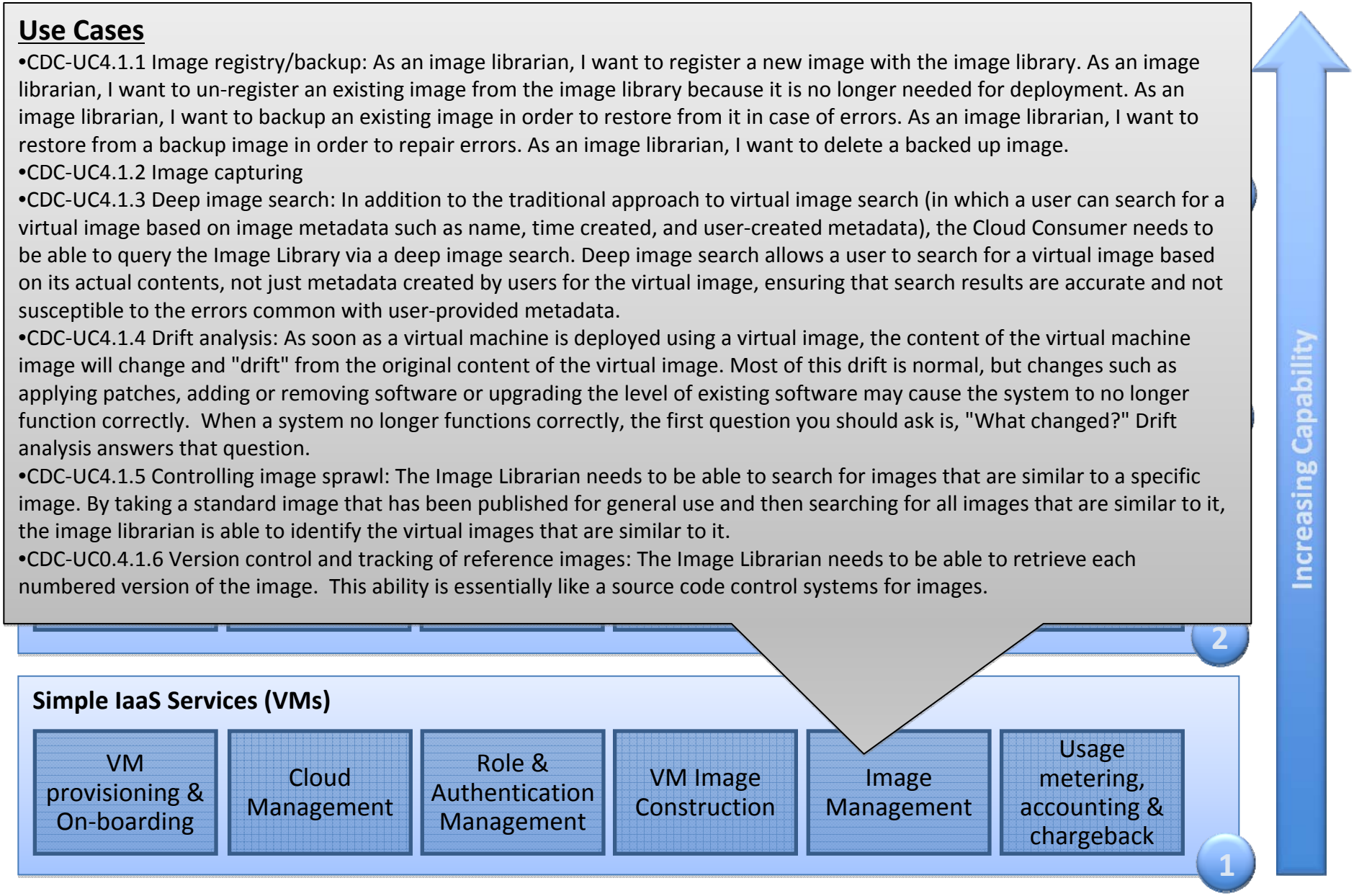
•CDC-UC4.1.2 Image capturing

•CDC-UC4.1.3 Deep image search: In addition to the traditional approach to virtual image search (in which a user can search for a virtual image based on image metadata such as name, time created, and user-created metadata), the Cloud Consumer needs to be able to query the Image Library via a deep image search. Deep image search allows a user to search for a virtual image based on its actual contents, not just metadata created by users for the virtual image, ensuring that search results are accurate and not susceptible to the errors common with user-provided metadata.

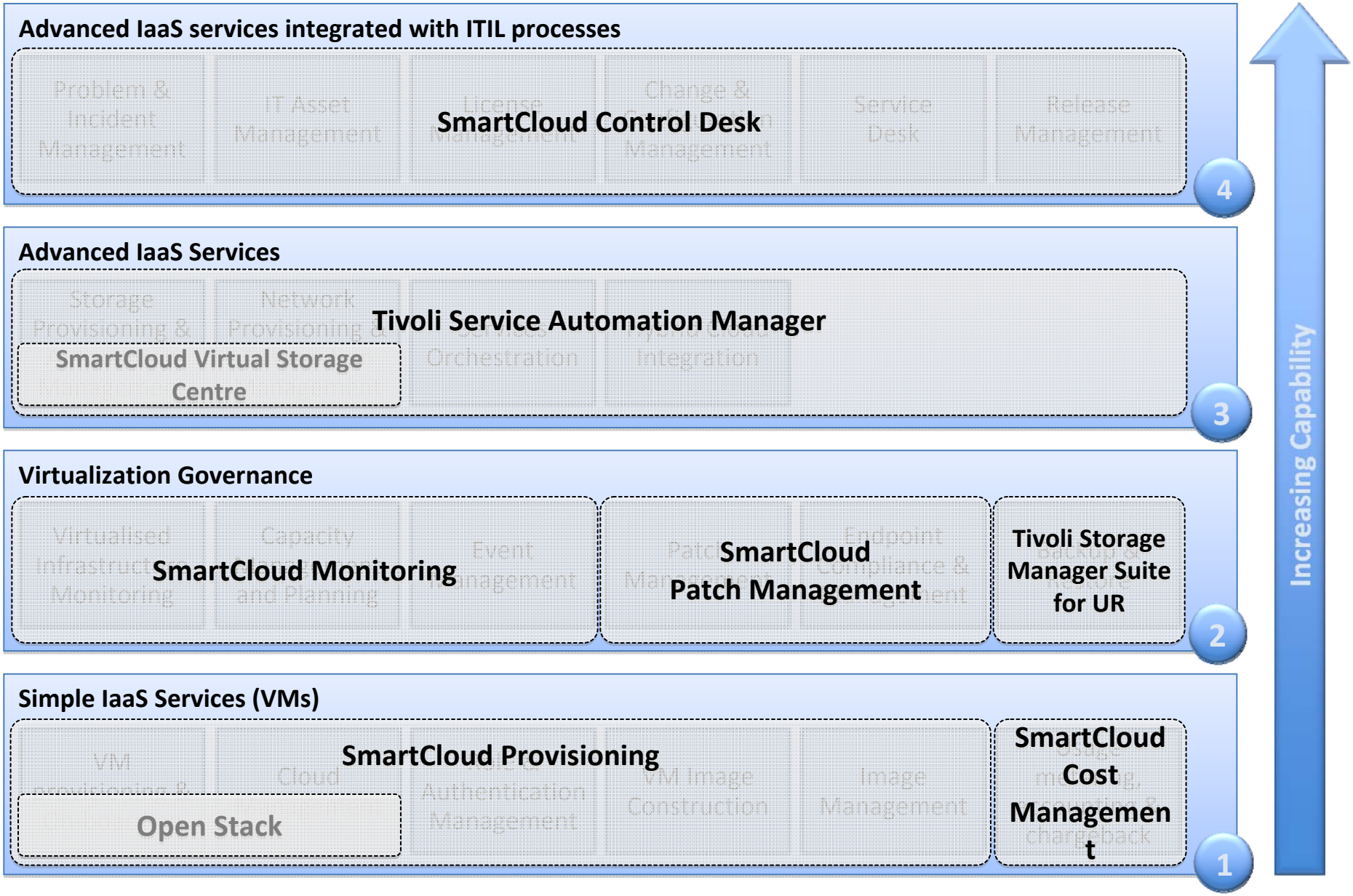
•CDC-UC4.1.4 Drift analysis: As soon as a virtual machine is deployed using a virtual image, the content of the virtual machine image will change and "drift" from the original content of the virtual image. Most of this drift is normal, but changes such as applying patches, adding or removing software or upgrading the level of existing software may cause the system to no longer function correctly. When a system no longer functions correctly, the first question you should ask is, "What changed?" Drift analysis answers that question.

•CDC-UC4.1.5 Controlling image sprawl: The Image Librarian needs to be able to search for images that are similar to a specific image. By taking a standard image that has been published for general use and then searching for all images that are similar to it, the image librarian is able to identify the virtual images that are similar to it.

•CDC-UC0.4.1.6 Version control and tracking of reference images: The Image Librarian needs to be able to retrieve each numbered version of the image. This ability is essentially like a source code control systems for images.



CEDC – Macro & Micro Patterns



Solutions to address IaaS Service needs and pain points….

IBM SmartCloud

Infrastructure as a Service

IBM SmartCloud Provisioning
IBM SmartCloud Monitoring
SmartCloud Cost Management

Key capabilities include:
- Service automation
- Multi-tenancy (automated)
- Real-time hypervisor monitoring
- Self-service portal
- Cloud management high availability
- Pattern based deployment
- Image management
- Pattern based deployment
- Usage tracking and accounting

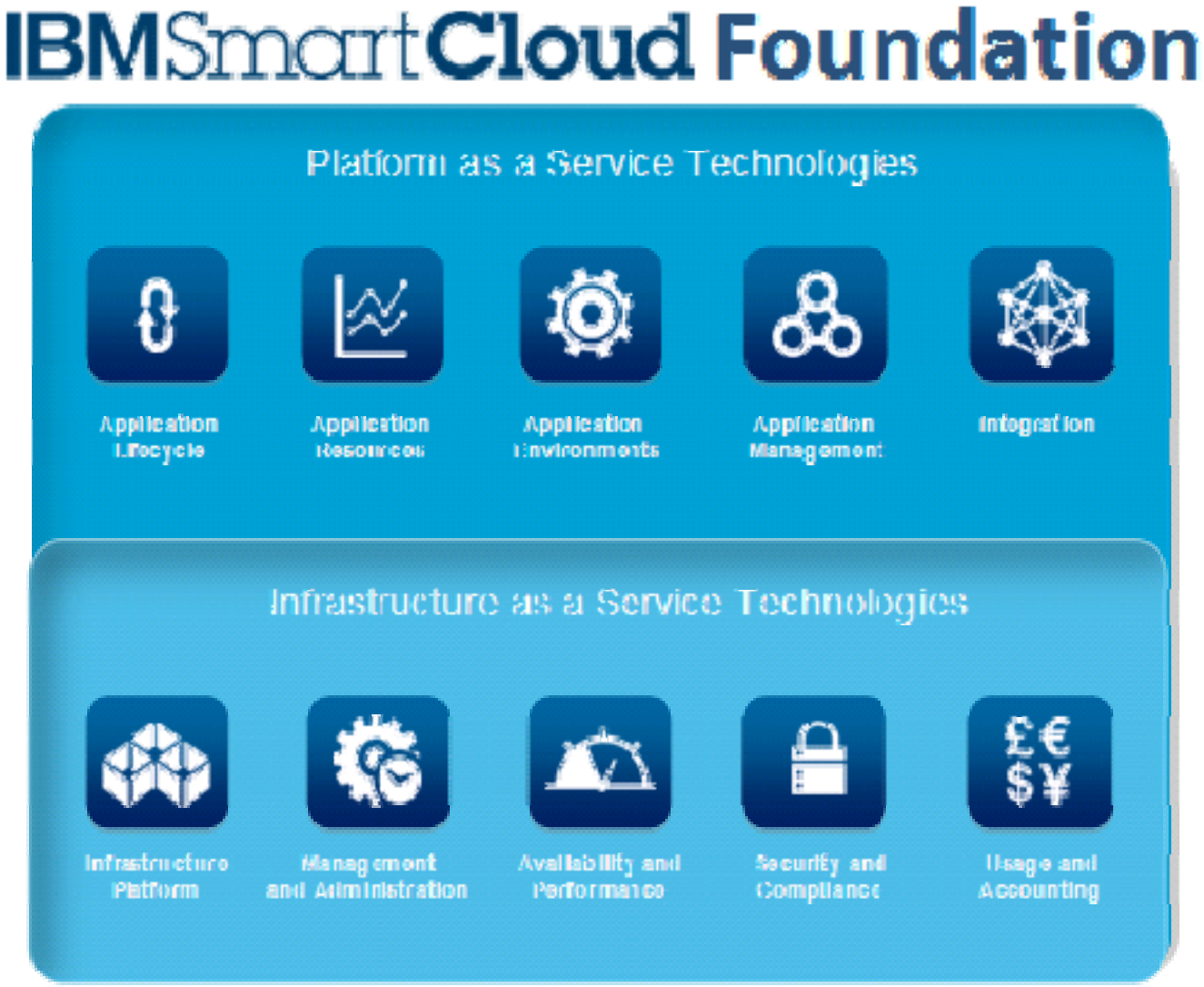
Tivoli Storage Manager Suite for Unified Recovery
SmartCloud Patch Management
SmartCloud Control Desk

Key capabilities include:
- Data Recovery, protection, and back up
- Storage virtualization and automation
- Security and compliance of physical and virtual endpoints
- Patch management
- Change, Configuration, and Release management
- Service Request Management
- Multi-customer support

Small, Mid-sized providers
Basic cloud services

Large IaaS Providers
Advanced cloud service delivery

SmartCloud Foundation Portfolio



SmartCloud

SmartCloud Provisioning

IBM

Competitively Priced

Powerful pattern Deployment (PaaS)

Highly Automated

Multi-tenancy support

Quick to deploy

Advanced Image Lifecycle Management

Hardware Independent

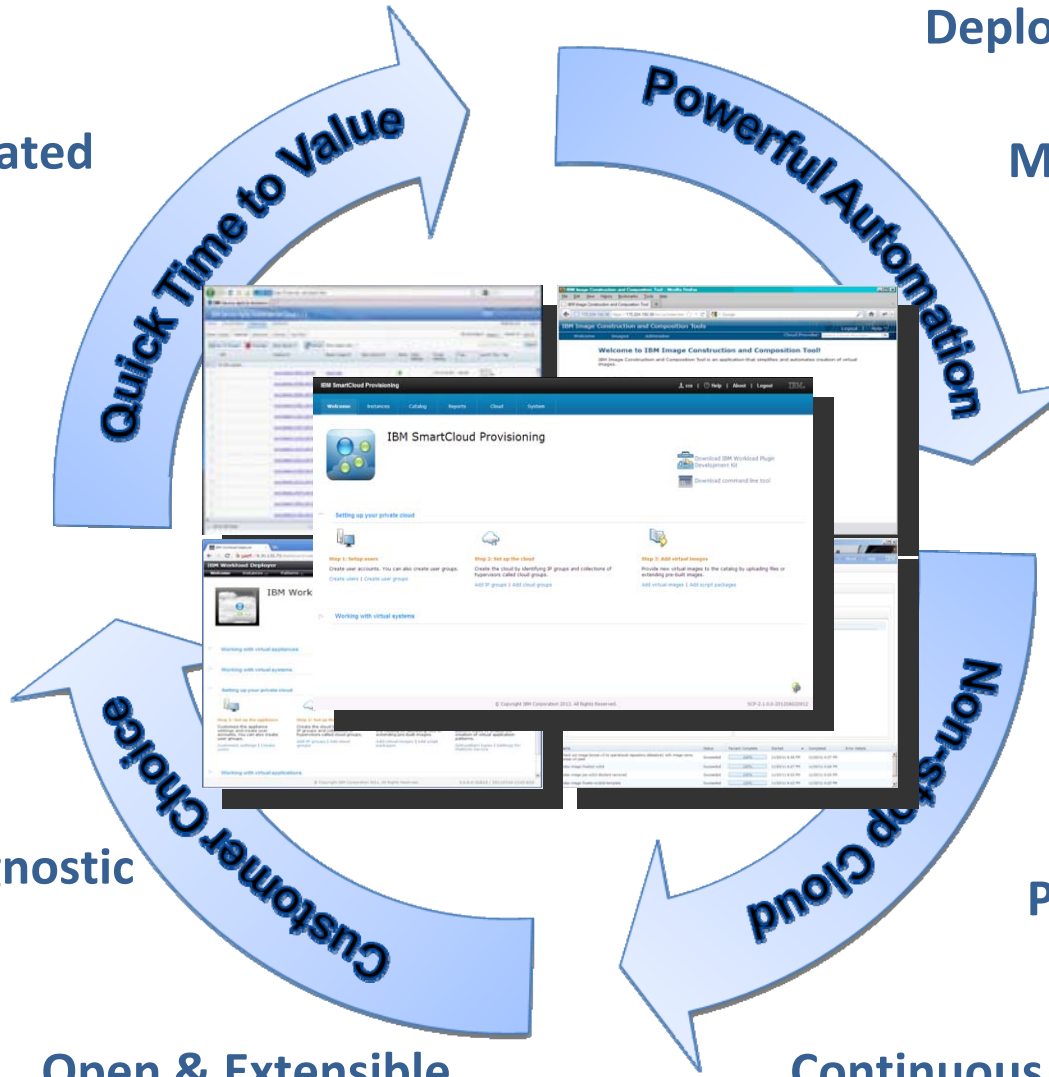
Highly Scalable

Hypervisor Agnostic

Ultrafast Provisioning (IaaS)

Open & Extensible

Continuous Operations



Quick Time to Value

Highly Automated – Optimise your staff costs

Requires less administrators to manage the environment.

Designed for low-touch operations and administration – reduces manual effort.

Highly automated, self-healing, and instant recovery of the cloud management.

Easy to Deploy – Time to Value

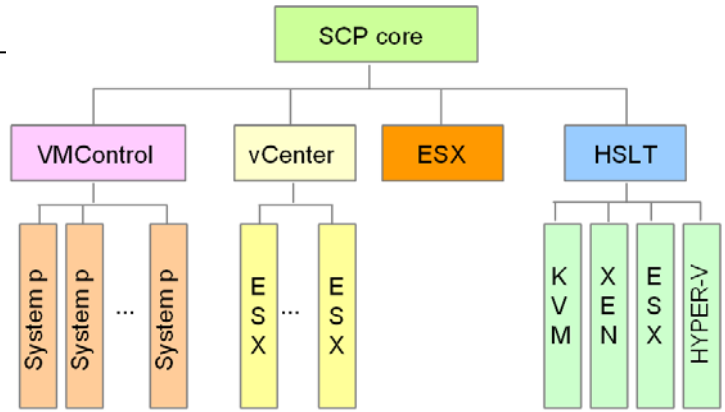
Can be deployed in just a few hours.

New resources added to the Cloud are automatically configured and ready in under 5 mins.

Fast to Learn

Use commodity skills to learn, manage and deploy – get up to speed very quickly.

Customer Choice



Hypervisor Agnostic

YOUR choice of hypervisor – managed or direct to hypervisor.

High scale low touch support for KVM, Xen, ESX, Hyper-V.

Managed hypervisor support for vCenter, VMControl.

No lock in – easy to move between hypervisors.

Hardware Independent

Supports any x86 hardware with VT.

Manage PowerVM systems through VMControl.

Works with IBM's new PureFlex systems.

Simple to integrate with existing storage systems.

Open and Extensible

Open source based (HBase, ZooKeeper), small footprint.

HSLT component being shared with OpenStack community.

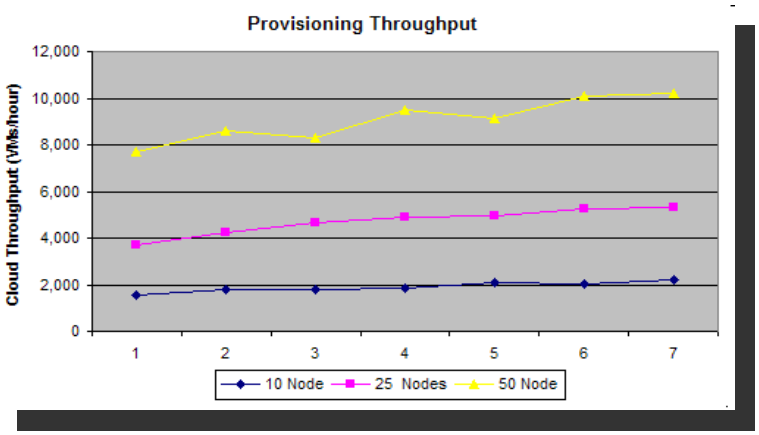
Easy to integrate with Web Services layer.

Extensible : REST APIs, and IaaS API submitted to DMTF

openstack™ CLOUD SOFTWARE

"IBM Joins OpenStack as a Founding Member" - April 2012

Non-stop Cloud



Ultra FAST Provisioning

Can start a single VM and load OS in under 10 seconds.

Can start 100 VMs in under 3 mins.

Can go from a bare metal server to ready for work in under 5 mins.

Can make an entire IBM blade chassis (BCH 14 blades) ready for cloud in less than 6 mins.

Highly Scalable & Efficient

Designed with distributed architecture for extreme scalability and parallel operation.

Can scale up to millions+ of VMs using HSLT architecture “High Scale”.

Efficient use of images, only storing master copies and the delta changes.

Uses “copy-on-write” technology to move data back & forward (moves only the data you change).

Continuous Operations

Designed for reliable cloud operations – “Low touch”.

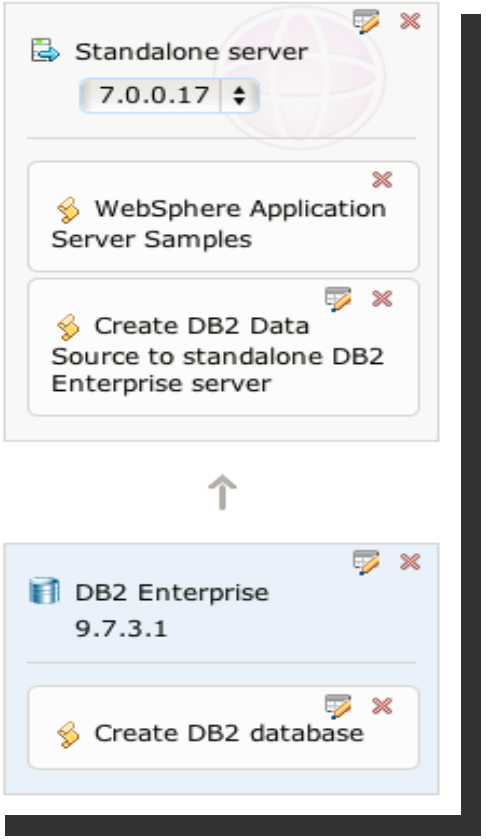
Quickly recover from failures dramatically simplifies patch, image and change management .

Can apply updates without taking the Cloud down.

Servers added, removed, updated without taking the environment off-line.

SmartCloud

Powerful Cloud Automation



Powerful Pattern Deployment

Powerful drag-and-drop UI to design e-business patterns.

Deployment for complex PaaS environments in just a few clicks.

Integrated activation engine image automation.

Multi-Tenancy Support

MSP & CSP ready with network and presentation separation.

Service catalog for IaaS and PaaS offerings.

Quota management for VMs, templates, IP, storage.

Advanced Lifecycle Image Management

Unique set of image management capabilities to design, build and manage image sprawl.

Image conversion capabilities to move between hypervisors and image formats (raw, ovf).

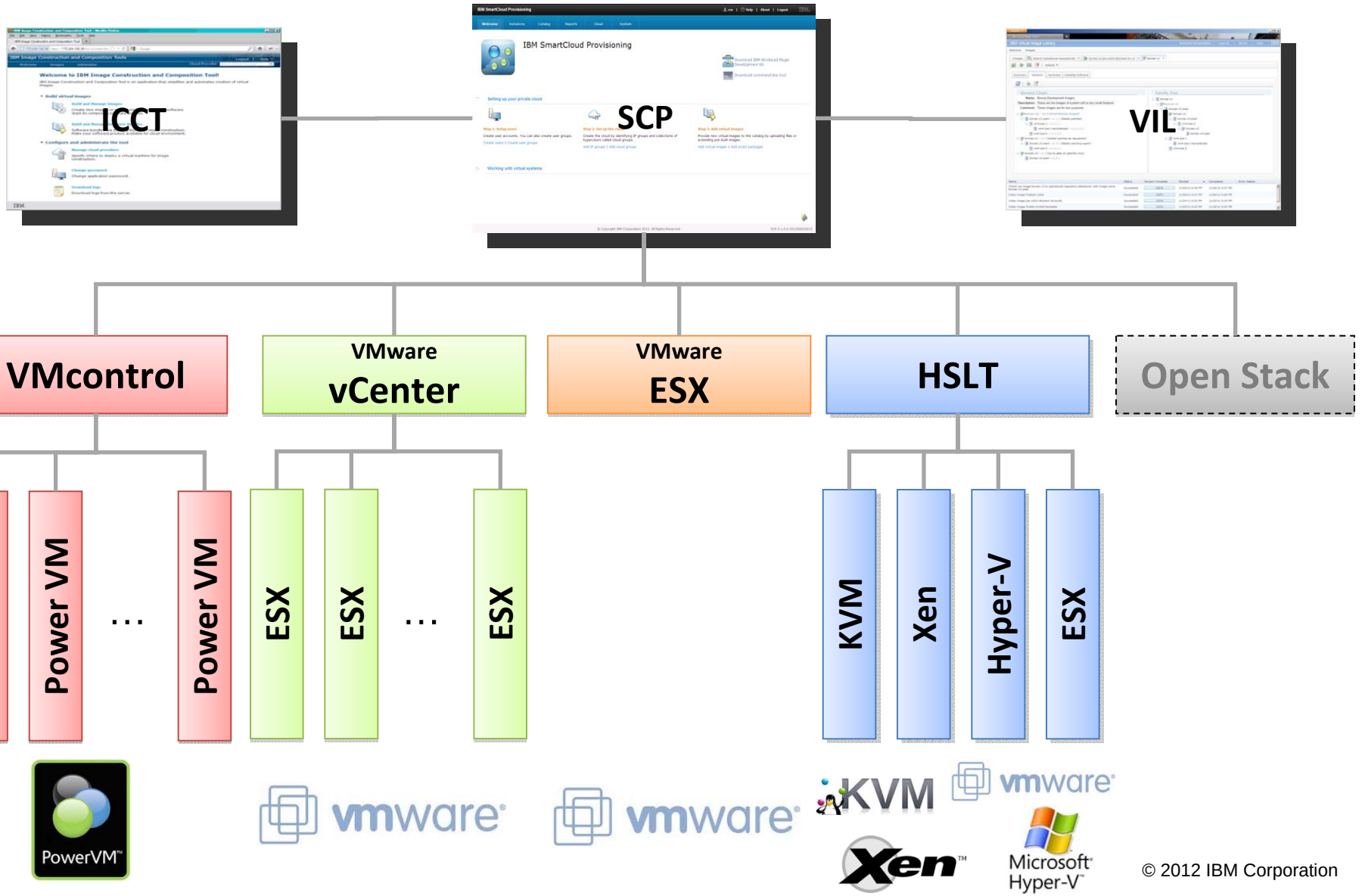
Image construction and composition tool (ICCT) to build standardised images.

Automated image indexing supporting file/byte comparisons within images.

Easy to Migrate & On-board

Can easily manage existing VMware deployments by managing through vCenter.

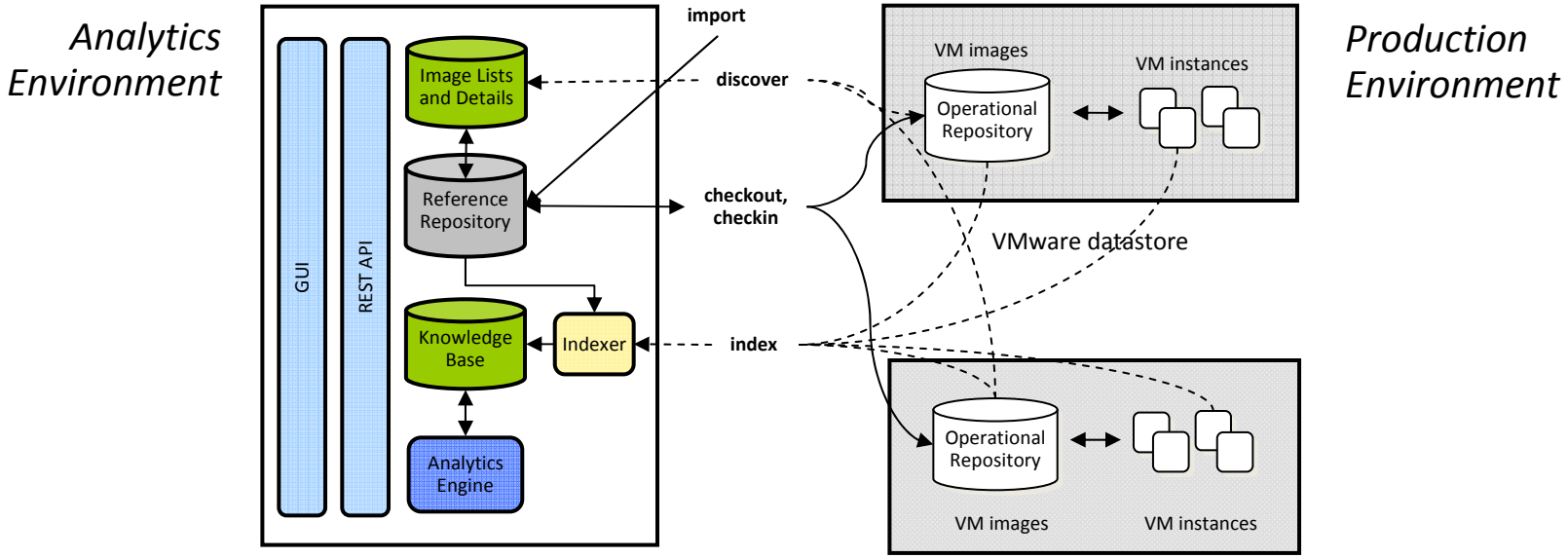
SCP architecture – Supported Hypervisors



Virtual Image Library

- Image analytics technology to index the contents of images to provide a knowledgebase of software products, patches, and files.
- Comparison of images and deployed VMs to detect differences at the software product and file levels.
- Similarity analysis to identify clusters of alike images.
- Reference repository for storing and assigning version numbers to images in chains.

- Powerful search capabilities to find the image you need without the need for agents or for powering on the images.
- Identify "drift" of a virtual machine since its deployment at the product and file levels.
- Helps control image sprawl by finding groups of similar images to be replaced by a standard image.
- A source of standard images identified by version numbers. Deployments are recorded to trace virtual machines back to their origin.



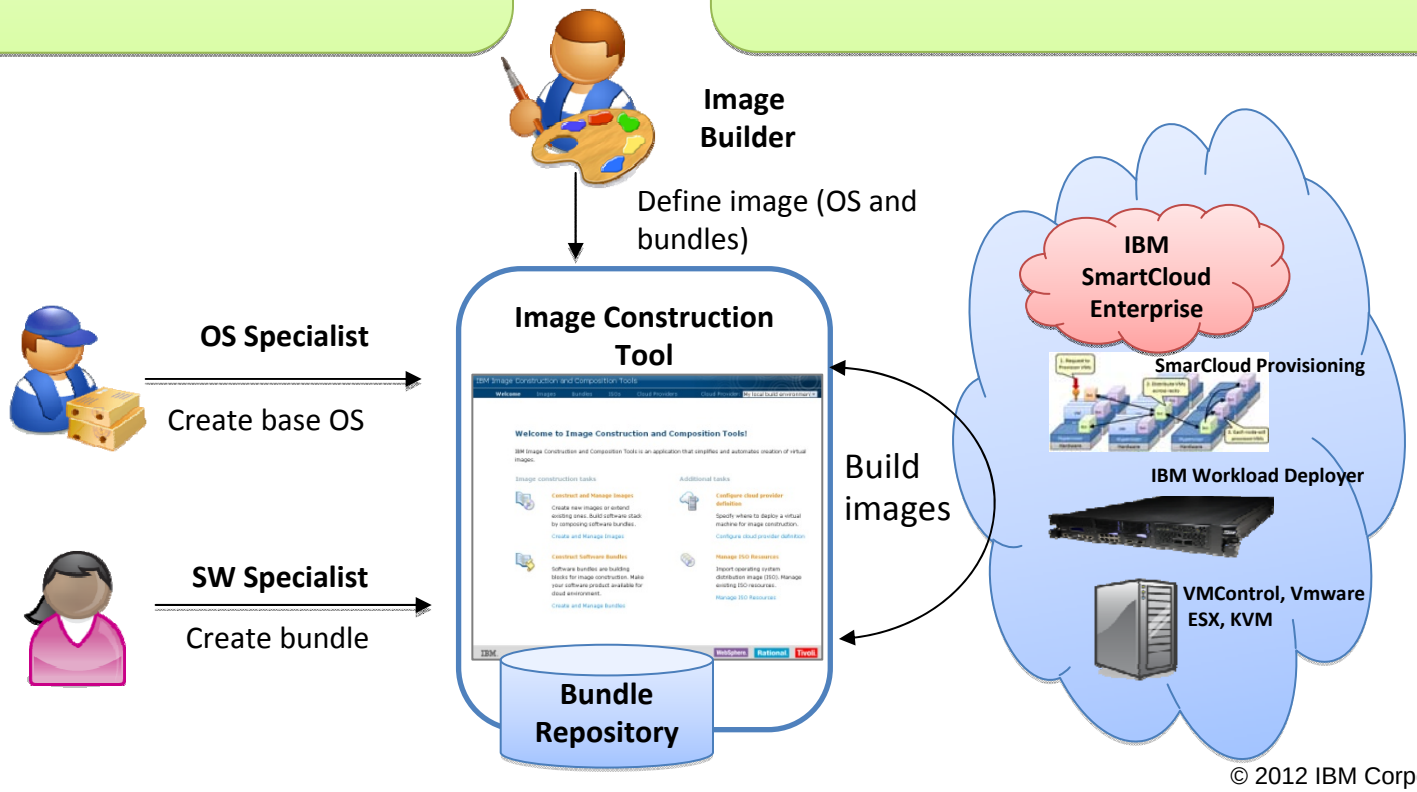
Virtual Image Library

IBM SmartCloud Provisioning Service Region

Image Creation & Composition Tool (ICCT)

- Create parameterized images for your cloud.
- Deploy images as part of multi-image patterns.
- Out of the box software bundles to expedite image construction.
- Build images for private and public cloud deployments.

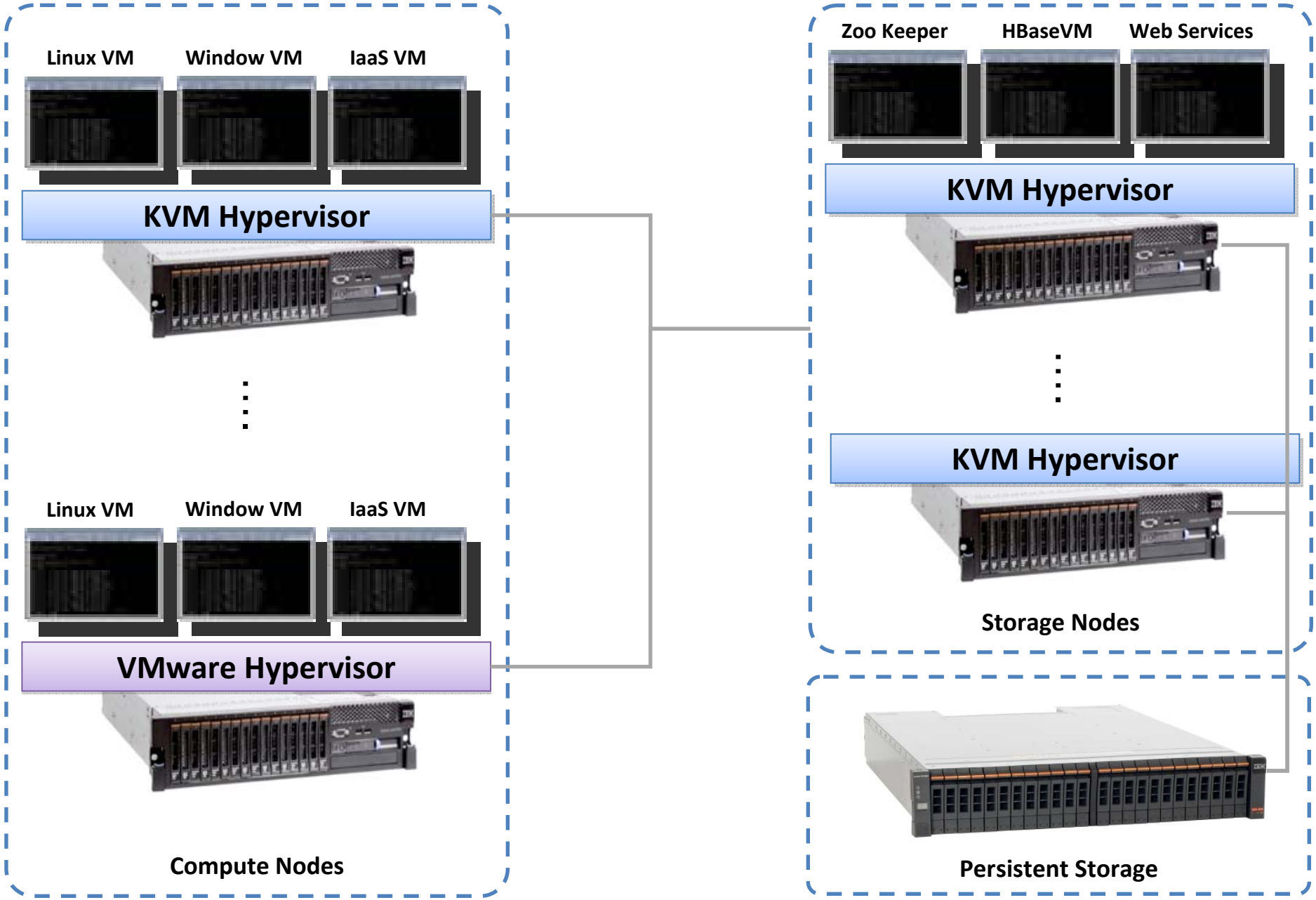
- Ideal for creating a reusable, sharable image catalog.
- Ensure corporate standard content in all your images.
- Allows OS and software specialists to create reusable components for fast image assembly.
- Optimize deployment with pre-built, deploy time customizable images.



SmartCloud

SCP – HSLT Deployment Model

IBM



SmartCloud Monitoring : A single tool for all (physical – Hypervisor – VM)

Physical Resources

ITM Agent

Compute Hardware (x86)

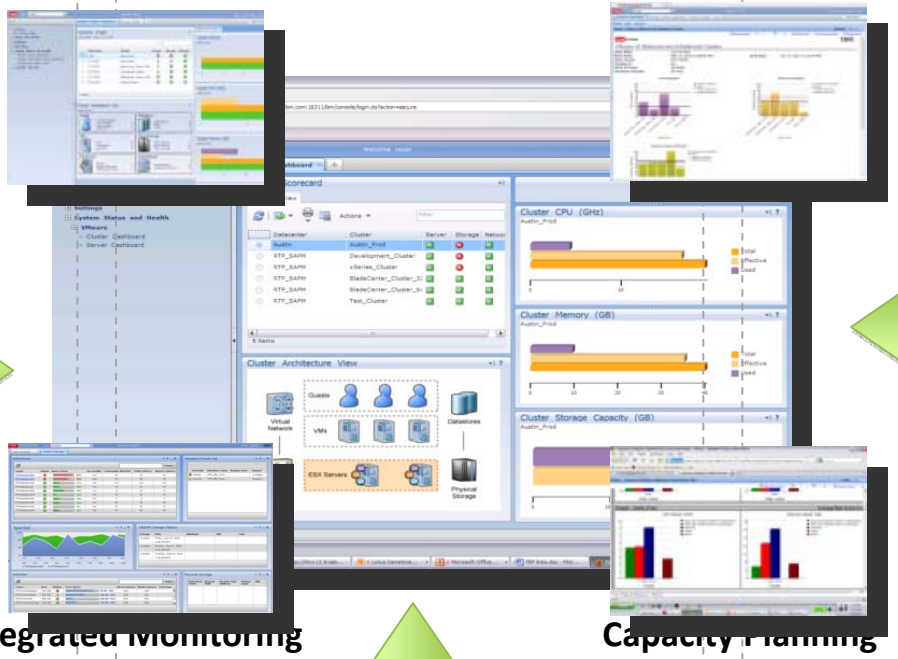
Unix Hardware

Storage

Management Systems

Health Dashboards

Capacity Assessments



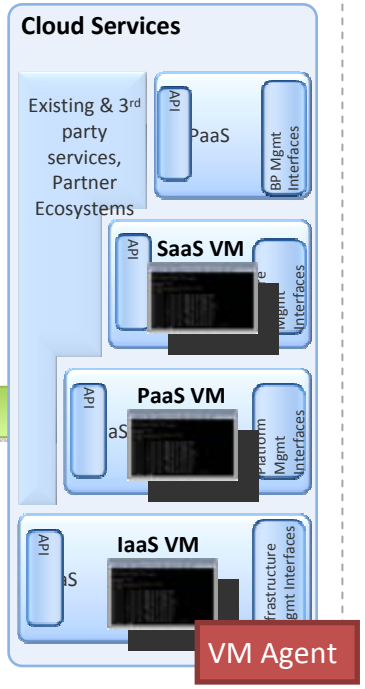
Integrated Monitoring

Capacity Planning

SmartCloud Provisioning

Virtual Resources

Virtual Guests



Hypervisor Hosts

SmartCloud Monitoring + Application Performance Management

PaaS

Service
Composite application views

Transactions
Response times, availability

Application
SAP, ERP, Siebel, Email, WebSphere, DB2…

Middleware
Databases, Applications, Web Servers

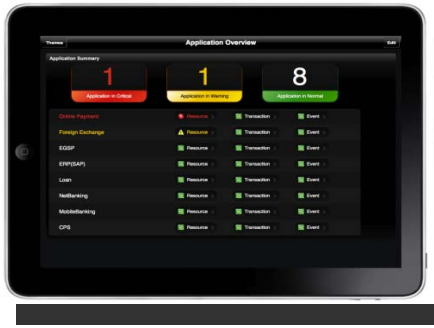
IaaS

Virtual Guest & OS

Hypervisor
Vmware, KVM, Xen, HyperV, PowerVM

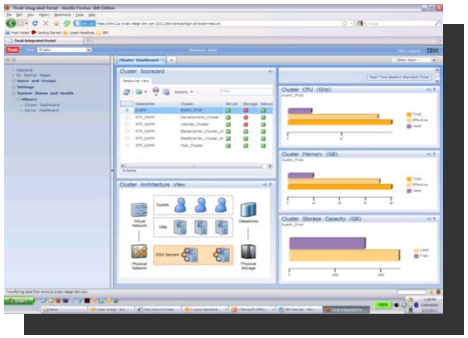
Physical Infrastructure
CPU, Memory, Disk, Network, Power

SmartCloud APM (inc. SCM)



- Service Availability
- Health Analytics
- Application Monitoring
- Middleware Monitoring
- Transaction Tracking

SmartCloud Monitoring



- Health Analytics
- Host & VM Monitoring
- Event Response & Mgt
- Capacity Planning
- What-if Scenarios?

SmartCloud Cost Management (SCCM) rating metrics

PaaS

Storage Services
TSM, Symantec Netbackup, EMC, LVM

Network Flow
Traffic flow, thruput

Application
SAP, ERP, Siebel, Email, WebSphere, DB2…

Middleware
Databases, Applications, Web Servers

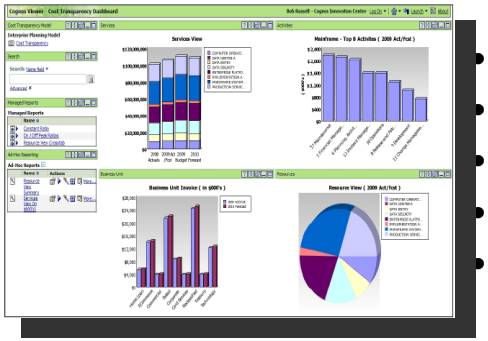
IaaS

Virtual Guest & OS

Hypervisor
VMware, KVM, Xen, HyperV, PowerVM

Physical Infrastructure
CPU, Memory, Disk

SCCM Enterprise



- App specific collectors
- Application usage
- Middleware usage
- Storage collectors
- Network flow collector

SCCM

- Universal collectors
- Infrastructure collectors
- Virtualisation collectors

Sample KVM Report…data collected from SCP implementation

Work with reports

Viewer - Invoice By Account Level

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Date Range	Last month		
Start Date	July 1, 2012	**End Date**	July 31, 2012

Cloud Center

GEMINI ADMINGROUP ADMIN ADMIN I-24324-17393-ADMIN

	Units	Rate	Charge
Host CPU clock speed (MHz)	2,930.00	0.00000000	0.00
Host number of physical CPUs	2.00	0.00000000	0.00
Host number of CPU cores	12.00	0.00000000	0.00
Host number of CPU threads	12.00	0.00000000	0.00
Host Memory (MB)	129,156.00	0.00000000	0.00
Host CPU idle time (Seconds)	983,798.78	0.00000000	0.00
Host CPU other time (Seconds)	25,436.45	0.00000000	0.00
Host CPU system time (Seconds)	38,726.27	0.00000000	0.00
Host CPU user time (Seconds)	30,733.86	0.00000000	0.00
Number of virtual CPUs assigned to the VM	1.00	0.00000000	0.00
Virtual CPU time used by the VM (Seconds)	2,988.77	1.40000000	4,184.28
Maximum memory available to VM (MB)	1,000.00	0.14000000	140.00
Memory assigned to VM (MB)	1,000.00	1.40000000	1,400.00
Received Bytes (GB)	676.10	0.15000000	101.41
Packets Received	1,730,532.15	0.00000000	0.00
Bytes Transferred (GB)	21.08	0.15000000	3.16
Packets Transferred	161,531.00	0.00000000	0.00
Size of VM Log File (KB)	4.00	0.00000000	0.00
Size of VM Image on Disk (KB)	47,828,772.00	0.00000000	0.00
KVM			**5,828.85**
Total For: GEMINI ADMINGROUP ADMIN ADMIN I-24324-17393-ADMIN			**5,828.85**

(Technical)
Account Structure:
Service Region
Cloud Group
Username
Access Id
VM Name

Account Code Conversion can be used to map at any level to business context e.g.

By business service
By application
By department

धन्यवाद
Hindi

多謝
Traditional Chinese

ขอบคุณ
Thai

Спасибо
Russian

Thank You

Gracias
Spanish

شكرا
Arabic

Obrigado
Brazilian Portuguese

多谢
Simplified Chinese

Danke
German

Grazie
Italian

Merci
French

நன்றி
Tamil

ありがとうございました
Japanese

감사합니다
Korean