SmartCloud

Mark VanderWiele
Distinguished Engineer, IBM Cloud Integrated Systems
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Pure Systems Cloud Foundation:
Building, Managing, and Leveraging your Cloud Environment

A New Era of Computing

ACLU’s take on ordering pizza in the future

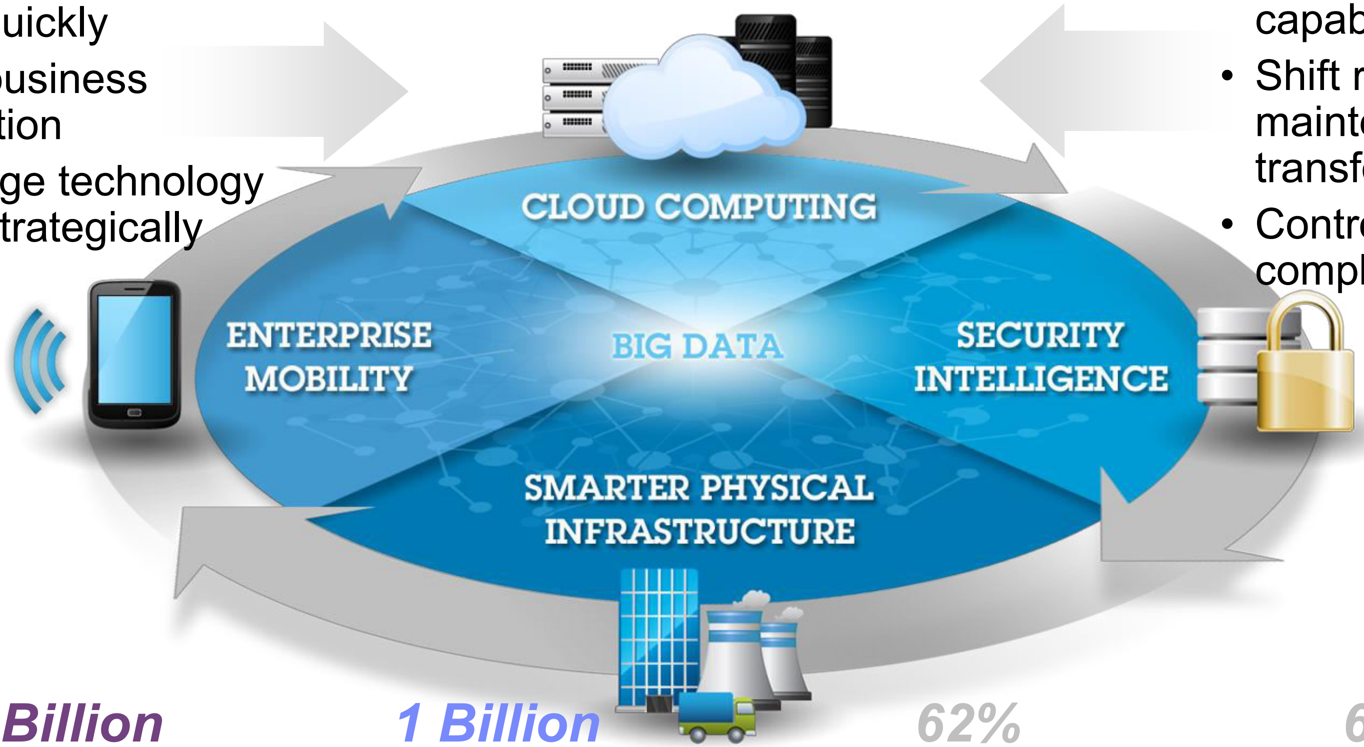
On today's Smarter Planet, businesses globally are challenged to innovate while managing an unprecedented rate of change

Business Demands

- Address opportunities more quickly
- Drive business innovation
- Leverage technology more strategically

IT Needs

- Deliver new capabilities faster
- Shift resources from maintenance to transformation
- Control growing complexity



200 Billion *physical assets with IT intelligence*

1 Billion *consumers will have SmartPhones*

62% *of workloads will be Cloud-based*

60,000 *cyber attacks every day*

Shift in Market Dynamics

Market Opportunity

- Global Managed Services: ~ $210B in 2013
- Top 100 MSPs grew 28% YTY
- Cloud consumption: 2x by 2015
- Analytics: + 30% by 2015
- Mobility: ~10 Billion mobile connected devices by 2020

Why the Shift?

- *Operating Expense model*
- *Focus on core business*
- *Increased Agility*
- *Complexity of technologies*
- *Faster access to broad range of solutions*
- *Lack of resources, skills*
- *Growing, mobile workforce*

Source: IBM Market Opportunity Estimates, MSPmentor, Techaisle Market Research, 2011 Economist.
IBM source data is based on analysis done by the IBM Market Intelligence Department.
IBM Market Intelligence data is provided for illustrative purposes and is not intended to be a guarantee of market opportunity.

Trends in data center efficiency
Today only 1 in 5 can allocate more than half their IT budget to innovation

Least efficient data centers

Use of new technology:

43% first and fast technology adoption
1% move virtual machines to meet desired outcomes
21% use storage virtualization
3% use a storage service catalog (tiered storage)

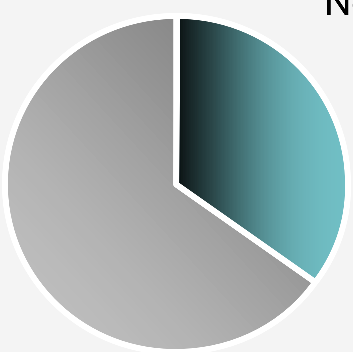
Results:

New projects

35%

Maintaining existing infrastructure

65%



Efficient data centers

Use of new technology:

86% first and fast technology adoption
58% move virtual machines to meet desired outcomes
93% use storage virtualization
87% use a storage service catalog (tiered storage)

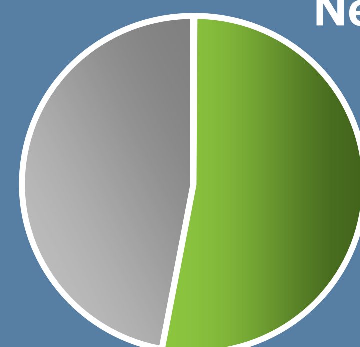
Results:

New projects

53%

Maintaining existing infrastructure

47%



Cloud adds: Self service, Elastic scaling
- **% Disruptable/Restartable workloads**
- **Fault Tolerant programming models and component**
- **Automated recovery, balancing, & Problem analytics**
- **Resource over commitment**

Source: 2012 IBM Data Center Study: www.ibm.com/data-center/study (http://www.ibm.com/data-center/study)

Cloud technology is reinventing business

24x7 global access

Collaboration within and across businesses

Scalability and agility

IT flexibility

Rapid time to value

Rapid Innovation

New business models

New Services

Traditional Systems of Record are being extended and Challenged via New Modes of Engagement

Systems of Record

- Data & Transactions
- App Infrastructure
- Virtualized Resources

Next Generation Architectures

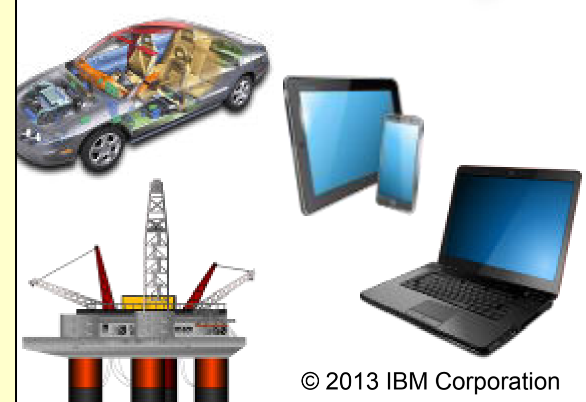
New Modes of Engagement

- Expanding Interface Modes
- Big Data and Analytics
- Social Networking

Data & Transaction Integrity

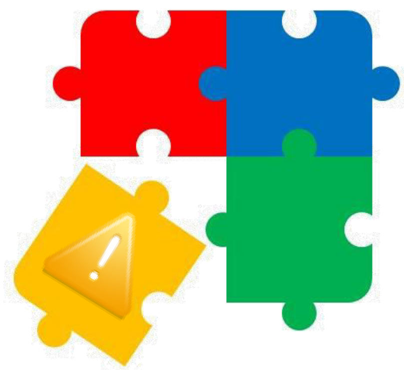
Smarter Devices & Assets

- **Self Service**
- **Rapid Provisioning**
- **Multi-tenant**
- **Metered/Billing/Quotas**
- **Fault Tolerant**
- **Service and API Centric**
- **Intelligent Self Optimized**
- **Dynamically Orchestrated**
- **Software Defined**



Trend: Traditional Product Models Moving to Services Composition, Automated Orchestration, Standard Life Cycle Management

Traditional Product Model



- May require HW/SW replacements
- Costly to scale up or down
- Resources focused on maintenance at the expense of innovation

OSLC Model (Open Service Life Cycle Collaboration)

- Compose new services from other cloud based service
- Scale up or down seamlessly
- Organizations focused on growing the business through innovation

Leveraging the transformational power of Cloud computing

Enable new business models and client relationships

Deliver secure IT without boundaries

Improve the agility and dexterity of business

Speed delivery of product and service innovation

Lowers Complexity & Changes the Economics of IT

Cloud computing choice and flexibility to customers

Private Clouds | Managed Local/Trusted | Hybrid | Public Clouds

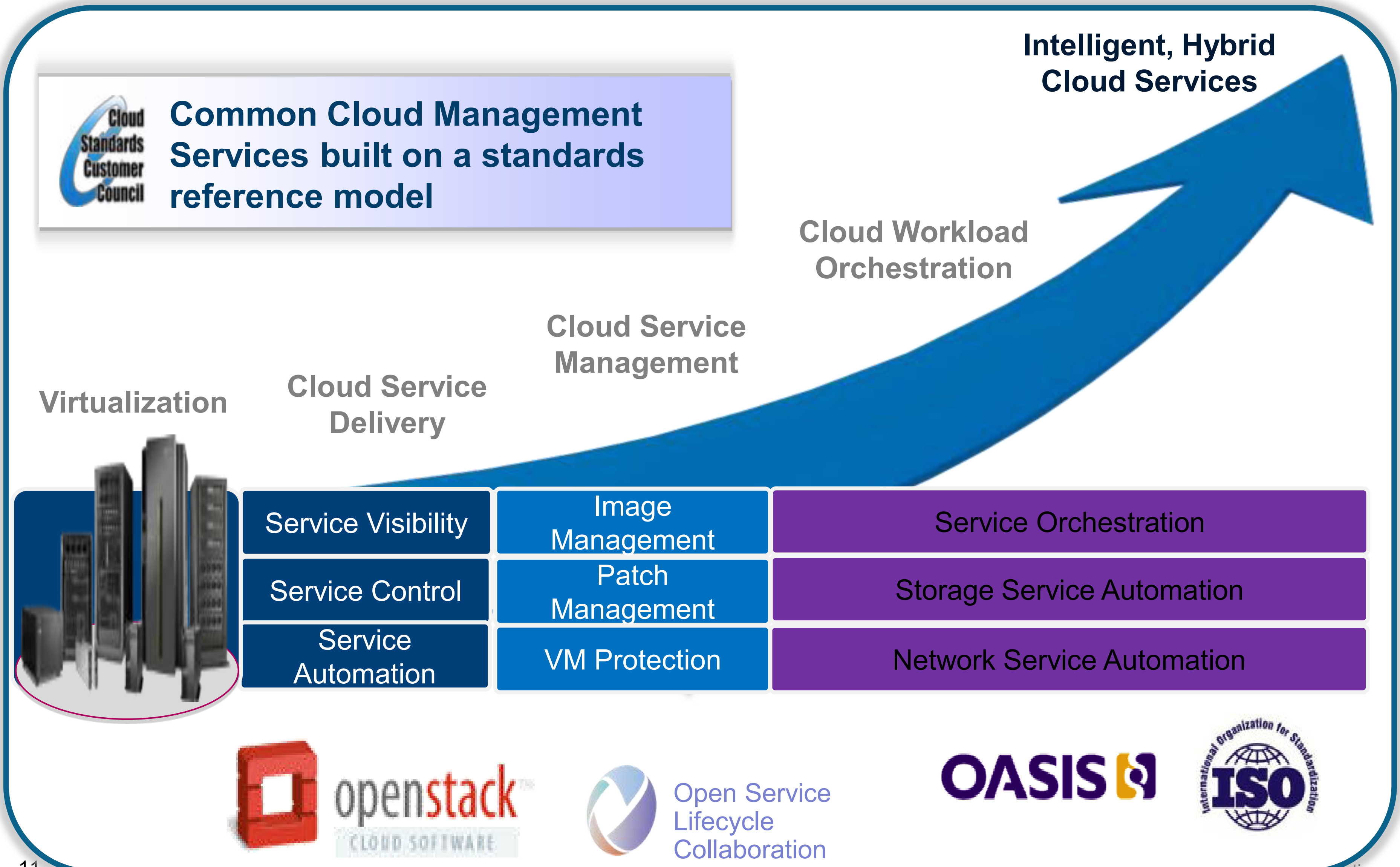
Flexible business service delivery and consumption models

Evolve existing infrastructure to Cloud ⟷ **Accelerate adoption with integrated systems** ⟷ **Immediate access to a managed platform with flexible cost** ⟷ **Selective Access public cloud SaaS solutions**

Cloud Standards Customer Council

Common Cloud platform built on an open standards reference model

An Enterprise Cloud architectural direction driven by standards



How Mature Is Your Cloud?

Level	Category	Description	2013	2016
Level 1	Initial	Ad hoc exploration of cloud technology options. Beginning pilots for specific use cases	49%	7%
Level 2	Managed	Gathering input from across the business. Starting to cloud-enable IT resources. Still reactive	28%	20%
Level 3	Defined	Standardized process for implementation, cost and other technology options across delivery models	16%	27%
Leve 4	Quantitative	Orchestrate cloud services across the business, predictably. Measure and manage cloud success/etc	5%	21%
Level 5	Optimized	Extend IT and cloud capabilities into new product offerings. Continuous process improvement	2%	26%

IDC
Analyze the Future

David Senf
dsenf@idc.com

What’s Your Projection on Resource?

Reduce Staff	•21%
Redeploy Staff	•49%
Not Sure	•30%

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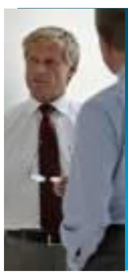
How do I capitalize on this *Shift*?

Infrastructure Services



Application Services

Data Services

MSP/Infrastructure Provider

How do I….

- Mitigate risk?
- Automate Everything: Reduce cost of managing?
- Optimize resources?
- Expand Quickly
- Aggregate data and provide new API services to ISVs?
- Provide SLA's?
- Create & Manage SW Defined Environments?

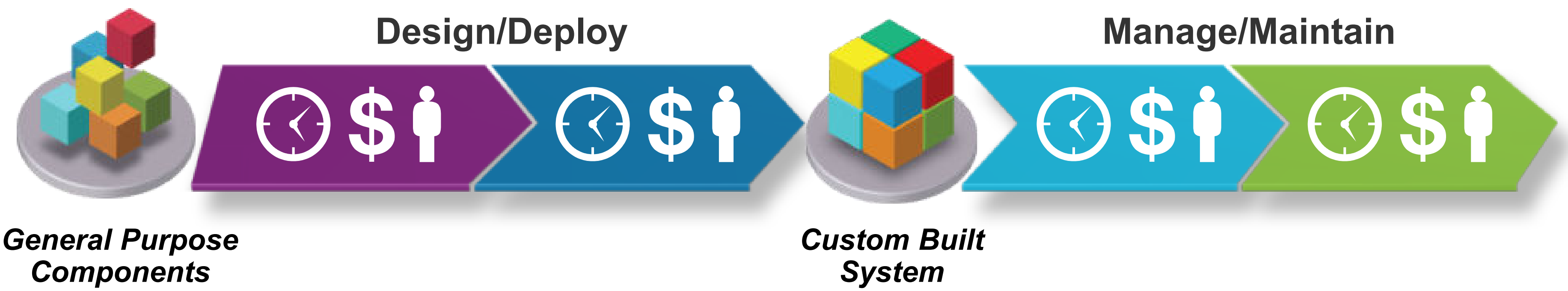
ISV / Solution Provider

How do I….

- SaaS-ify my solution?
- Provide new Innovative service
- Provide new simplified user experience?
- React quick to new business opportunities?
- Provide API Services other can use?
- Provide New Industry Vertical solutions

The PureSystems family was purpose-built to address primary IT pain points…

Today's problem: *Time and effort is spent tuning general purpose components*



The PureSystems solution: *Simplifying the entire IT project lifecycle*

Reduced Time, Cost and Risk

IBM PureSystems accelerates new cloud deployments for managed service providers

Advanced Business Partner IBM
Authorized Managed Service Provider
Infrastructure Services

IaaS

- Virtual Servers
- Managed storage
- Backup/Disaster Recovery
- VDI

PaaS/SaaS/BPaaS

- Dev/test environment
- Mobile and Collaboration Applications
- Analytics/database services

PureFlex

Flex System

Infrastructure

Delivering Cloud Infrastructure Services

PureApplication

Application Platform

Delivering Cloud Application Platform Services

PureData

Data Platform

Delivering Big Data Platform Services

IBM PureFlex System: Integrated Infrastructure, built for cloud

Flexibility to run your choice of applications and middleware

Expert integrated:

- Flexible infrastructure
  - Compute (x86 & POWER)
  - Storage
  - Networking
  - Advanced **Flex System** technology
- Unified infrastructure management
- Built-in expertise - Infrastructure patterns

PureFlex

Infrastructure

Delivering Cloud Infrastructure Services

200% increase
in performance of critical applications[1]

66% faster
setup time[2]

Days to minutes
for virtual machine deployment time[3]

72% lower
systems costs over 3 years[4]

1. Based upon testing of IBM Storwize v7000 "Easy Tier" on previous generation IBM system. IBM Storwize v7000 is includedin IBM PureFlex System
2. Based upon comparisons to previous generation blade servers. Specific client environments and results may vary.
3. Based on IBM Research and Development testing estimating common user environments and manual tasks of selecting server for hosting the vm, allocating storage and networking resources and the virtual machine, compared with PureFlex System achievement of these tasks with existing resource pools. Specific client environments may vary.
4. Estimate based upon the PureFlex System Consolidation Tool leveraging the 3rd party ALINEAN methodology. Specific client environments and results may vary.

IBM

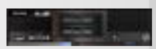
Inside IBM PureSystems

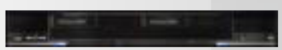
Simplified experience
Reduce time, effort and risk throughout the solution lifecycle
Starts at Acquisition: A continuum of value from building blocks to systems

Flex System

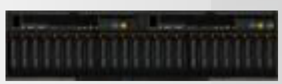
Chassis
14 half-wide bays for nodes

Compute Nodes
Power 2S/4S(1)
x86 2S/4S





Storage Node
V7000
Expansion inside or outside chassis



Management Appliance
Optional

1/10/40GbE, FCoE, IB
8/16Gb FC

Expansion
PCIe
Storage

- One System for Compute storage and System Networking
- 4 Click Virtual Server Deployment

PowerVM
KVM
vmware
Microsoft Hyper-V

- Automated Tiered Storage
- 80Gb of Ethernet bandwidth
- ½ the latency by avoiding most top of the rack traffic

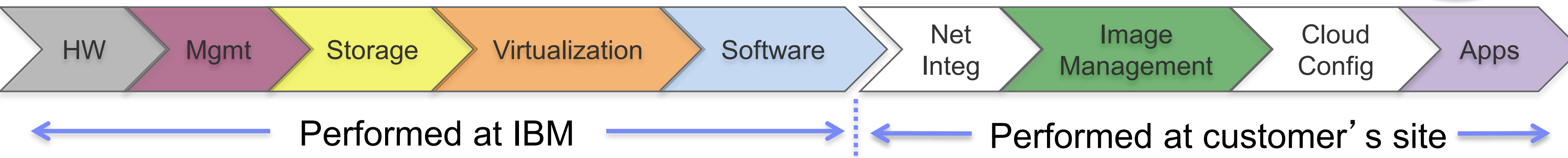
- 10U 14 Node Bays
- Up to 896 cores, 480TB Memory
- 26 Million I/O Operations per sec.
- 1Gbps and 10Gbps iSCSI
- 8/16 Gbps fiber channel

- Up to 4 Chassis per Rack
- Up ro 4 racks

- Integrate Capacity view

IBM PureFlex Systems Integration Vision

Complete infrastructure stack up-and-running in hours



Hardware
- Physical installation of Rack, Chassis, Switches, Storage, etc.
- Cabling of hardware components

Management
- Physical installation Management Node Hardware
- Installation Management Node Software

Storage
- Configure Internal Storage (if ordered) (Power)
- Configure V7000 (RAID, Arrays, Pools, LUNs, etc.) (Power)

FC Switch
- Configure FC Switch Zoning

Virtualization
- Install Virtualization SW (PowerVM (VIOS), VMWare, KVM) (Power)
- Deploy Virtualization Server(s) (Power)

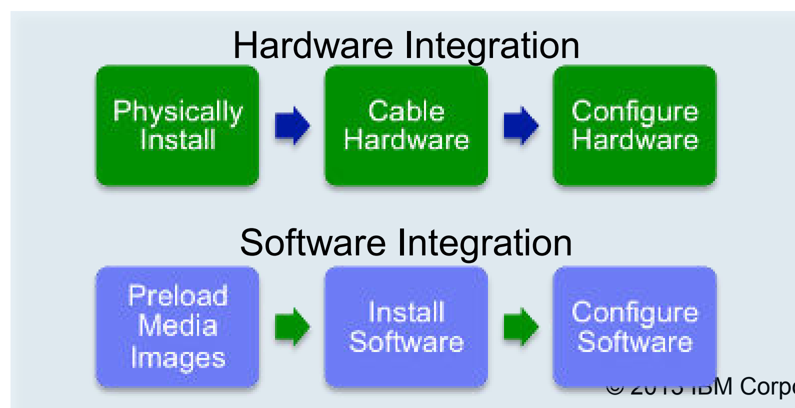
Software
- Load SW Media Images in VIOS repository (Power)
- Install Reference Software Stack (Power)
  - Install OS and System Software
  - Install Additional Software
- Install Smart Cloud Entry Manager and pre-reqs

Network Integration into Client Environment
- Configure solution into client's network

Image Management
- Configure Server and Storage Pools
- Capture Reference Stack & Deploy Virtual Appliances

Cloud Configuration
- Configure Cloud services & environment

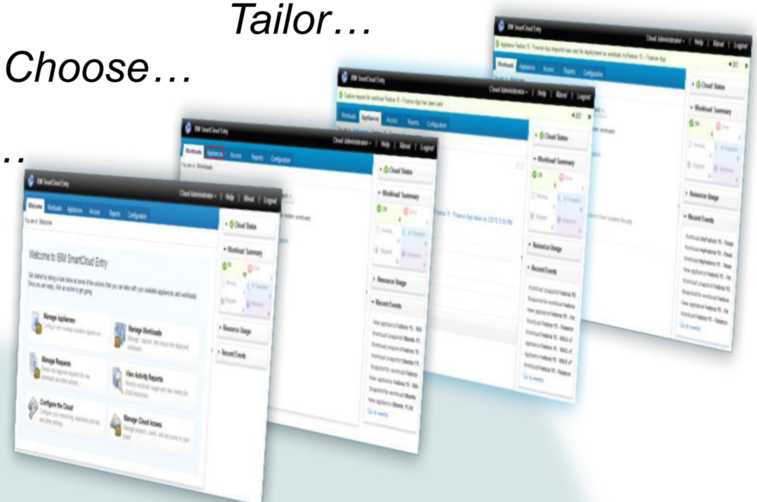
Application Management
- Package application(s) and create virtual appliances
- Deploy application virtual appliances



Leveraging built-in expertise for cloud

Simple, Rapid Deployment

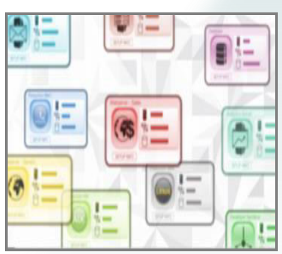
SmartCloud Entry… *Choose…* *Tailor…* *Deploy Workload…*



Leveraging Built-in Expertise

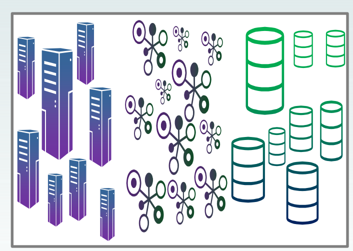
PureFlex

Image Library of Available Workloads



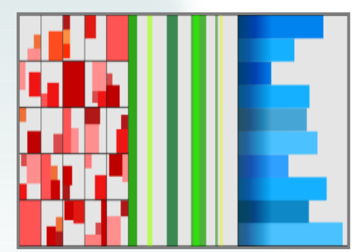
Automatically Captured & Cataloged

System Pools



Compute, Network & Storage Resources Dynamically Discovered

Policy Driven Optimization with Built-in Expertise



Optimized Assets Compute ,Network & Storage

Three ways to get the value of patterns of expertise

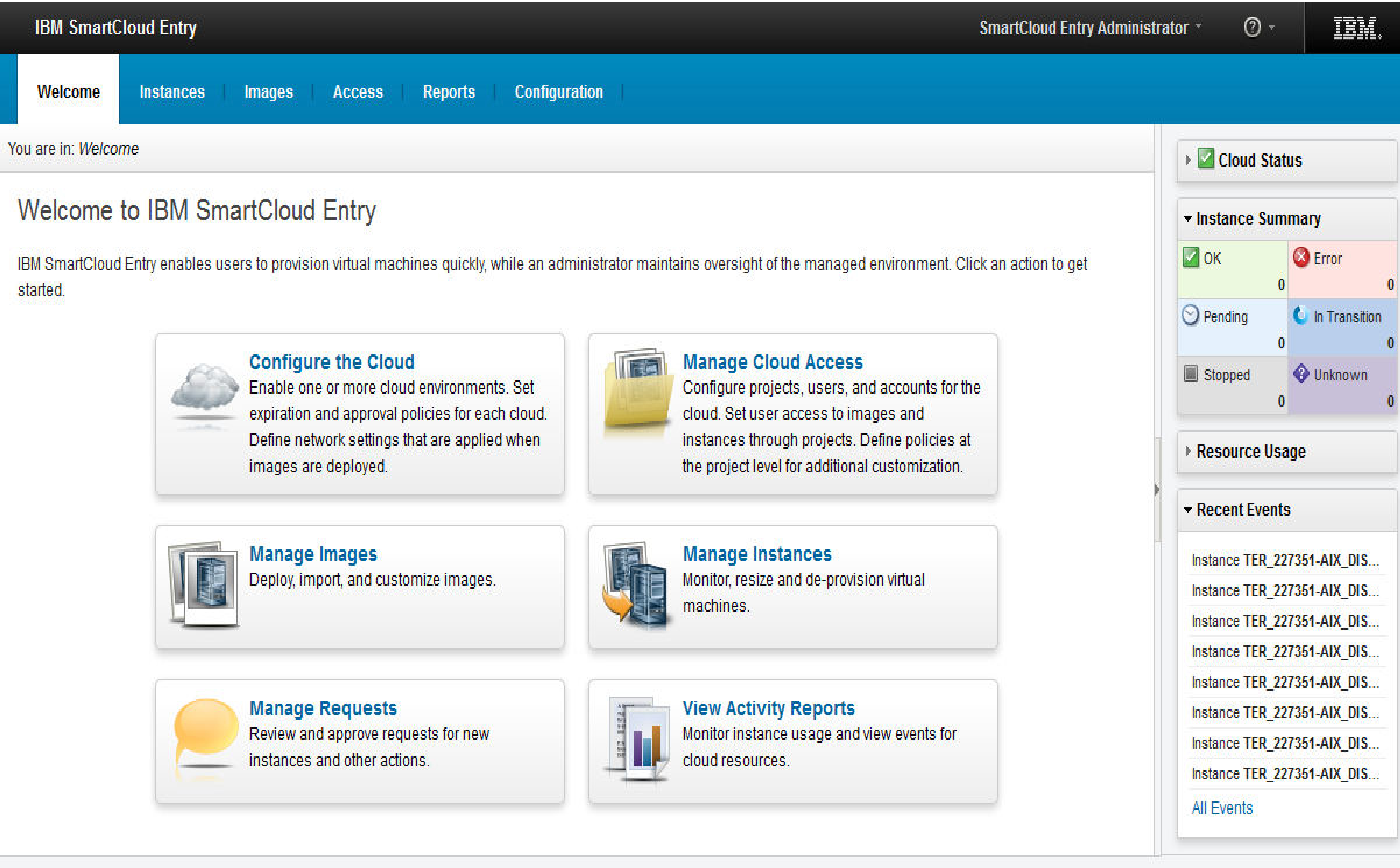
Add **third-party** application patterns of expertise

Use **IBM** patterns of expertise throughout the system

Capture **your own** expertise:

- Image Construction & Composition Tool allows you to create your own custom virtual images
- Pattern Development Kit allows you to create your own virtual application patterns.
- Capture existing expertise for operating system and middleware installation
- Dynamically combine pre-defined components to build new image packages
- Create a standard VM format in Open Virtual Format

Self Service



SmartCloud Entry v3.1
Reference Architecture for PureFlex

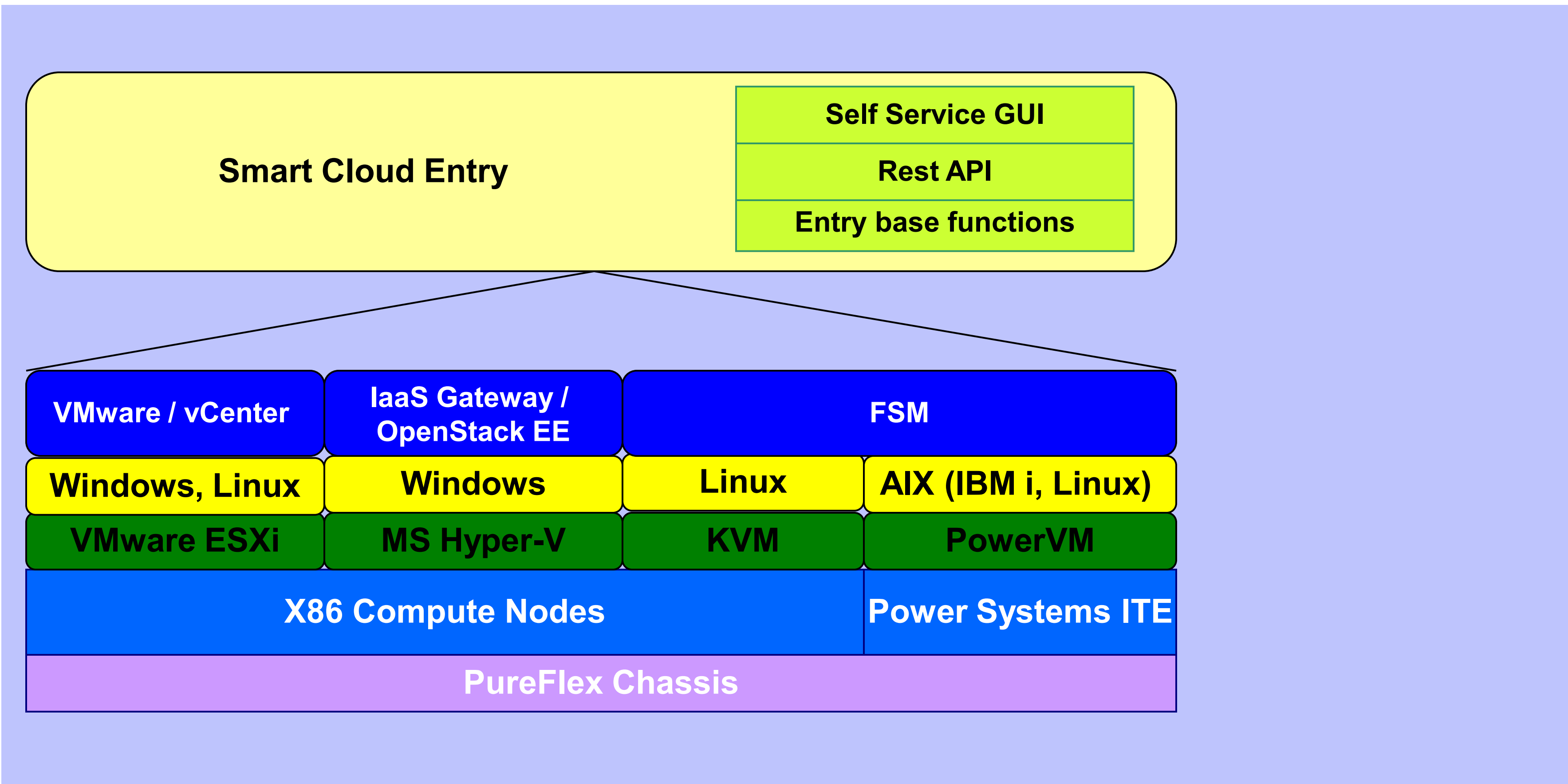
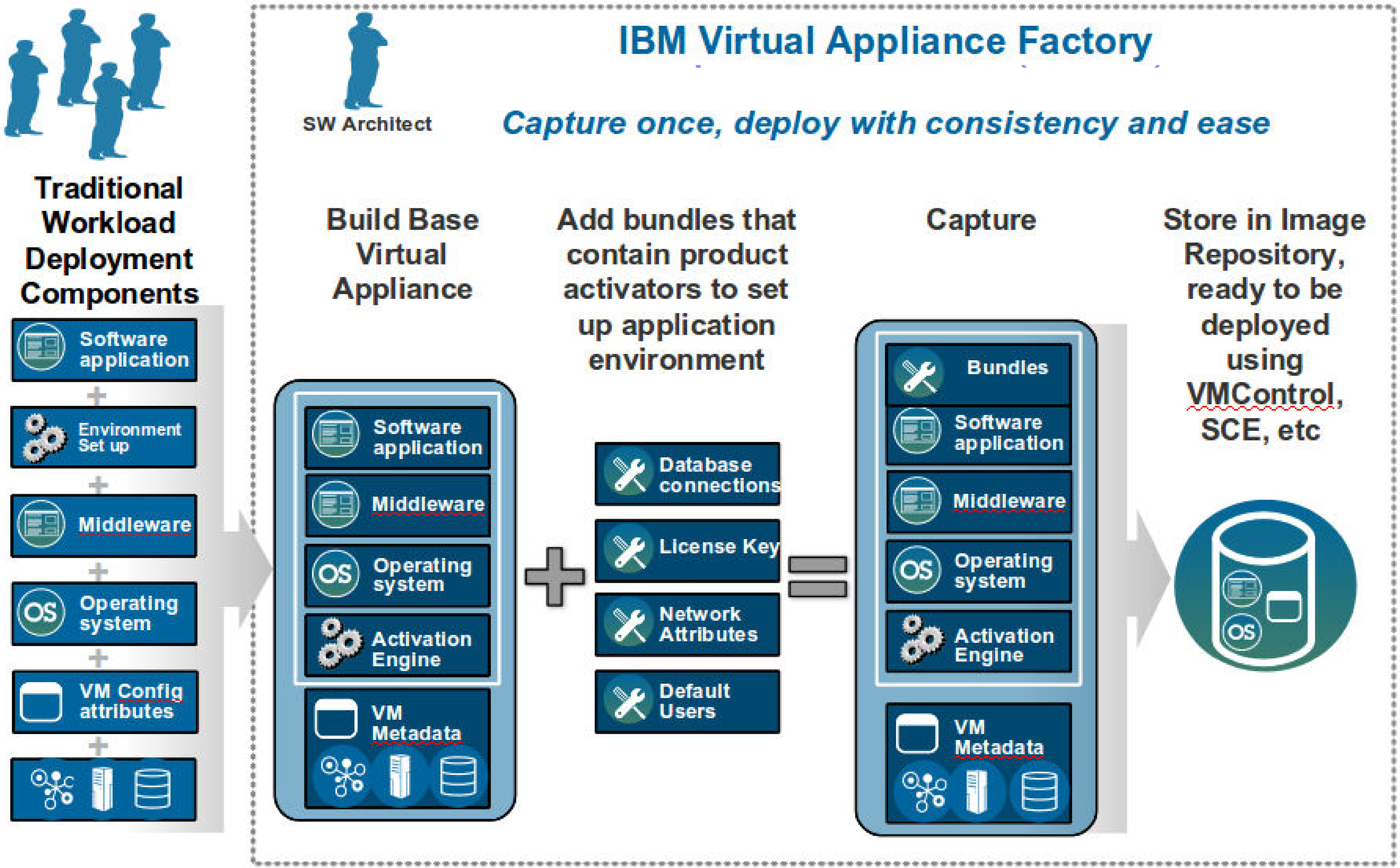


Image Construction and Composition Tool



Desert Research Institute

DRI studies climate change, water and air quality and availability, sustainability of arid lands, and life in extreme environments

DRI Desert Research Institute

DRI's Center for Advanced Computation, Visualization and

- Non-profit research arm - Nevada System of Higher Education
- More than 550 scientists, engineers and technicians
- Campuses in Reno and Las Vegas
- 60 specialized labs and research facilities

  - IBM PureData
  - IBM PureApplication
  - IBM Websphere
  - IBM Global Financing

"It's a pivot point for the state, and it's going to take us somewhere Nevada has never been before."

– Governor Brian Sandoval, State of Nevada

- The "cloud in a box" solution provides a single, highly automated, simple-to-use system with unified management.
- Will enhance the management of big data across the State while accelerating advanced job training and environmental research in a number of critical areas.
- Reduced resources required to manage an entire operation through the "single pane of glass" flexible System Manager console
- Improved performance of data and computing intensive analytics while moving to a relational database infrastructure
- The PureSystems offerings deliver a comprehensive approach to managing resources, applications and big data that also supports intensive analytics and improves the performance of all the organization's data.

Today’s challenges are creating new requirements for clients

Increasing **mobility** of work… it is no longer a place for a lot of people

Ownership of end point devices is changing with **BYOD** programs

Data security and **compliance** concerns

Complexity and costs of managing existing desktop environments

Need for **high availability solution**, and **rapid recovery** from theft, failure and natural disasters

Clients need to access data & applications

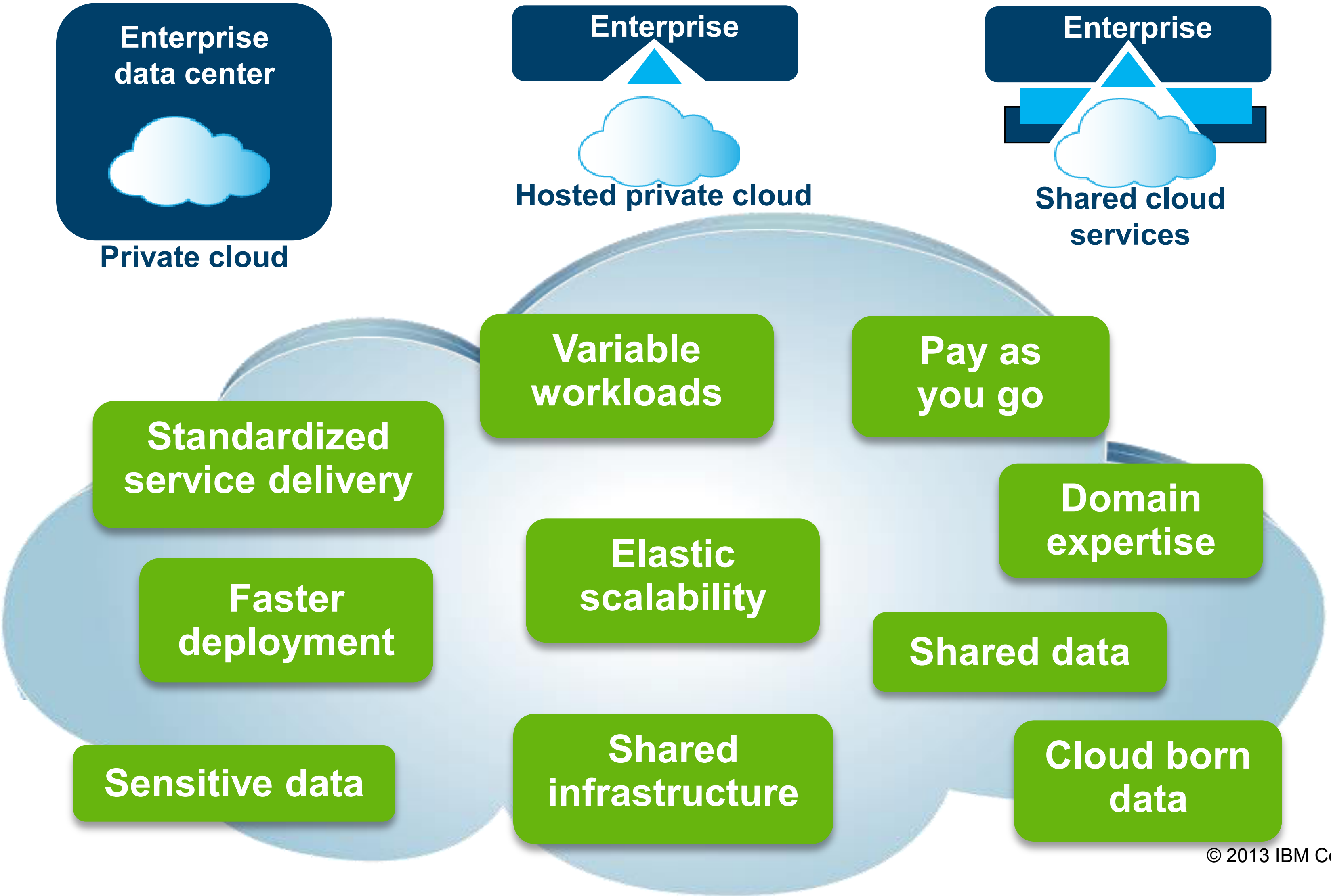
Anywhere

Any time

Any device

26

Only those who evolve their Cloud business models are handling these new demands



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