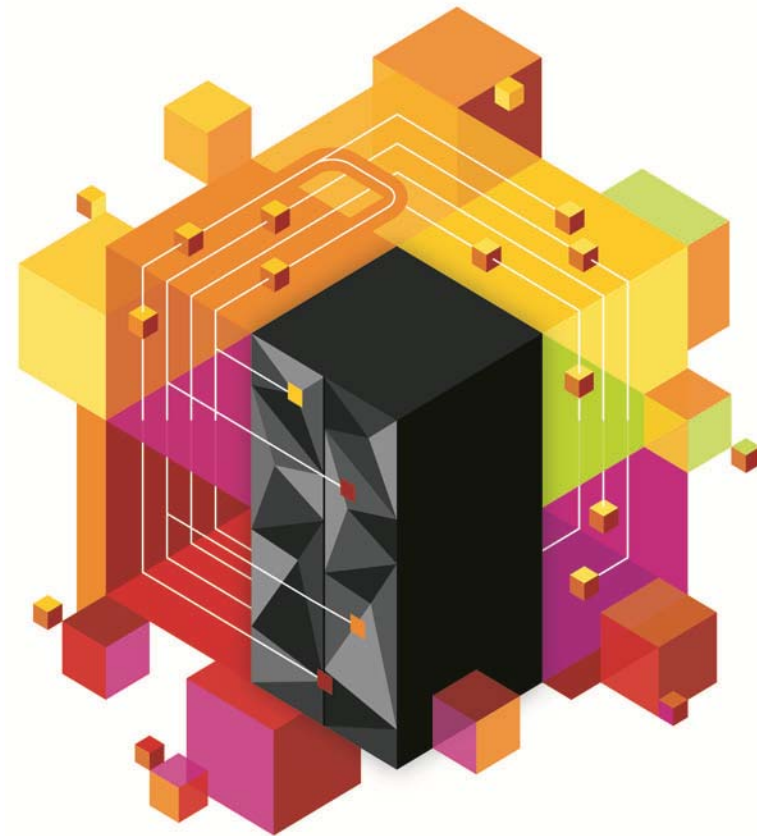# IBM zEnterprise Technology Summit

The Value of zEnterprise for Hybrid Computing

Name / Title

Date

Trademarks

The following are trademarks of the International Business Machines Corporation in the United States and/or other countries.

AIX*	IBM*	POWER7*	System Storage*	WebSphere*
BladeCenter*	IBM (logo)*	PowerVM	System x*	zEnterprise
CICS*	IMS	PureApplications	System z*	z/OS*
DataPower*	Power*	PureFlex	System z10*	z/VM*
DB2*	POWER*	PR/SM	Tivoli*	z/VSE*

* Registered trademarks of IBM Corporation

The following are trademarks or registered trademarks of other companies.

Adobe, the Adobe logo, PostScript, and the PostScript logo are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States, and/or other countries.

IT Infrastructure Library is a registered trademark of the Central Computer and Telecommunications Agency which is now part of the Office of Government Commerce.

Intel, Intel logo, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Celeron, Intel Xeon, Intel SpeedStep, Itanium, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.

Windows Server and the Windows logo are trademarks of the Microsoft group of countries.

ITIL is a registered trademark, and a registered community trademark of the Office of Government Commerce, and is registered in the U.S. Patent and Trademark Office.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Java and all Java based trademarks and logos are trademarks or registered trademarks of Oracle and/or its affiliates.

Cell Broadband Engine is a trademark of Sony Computer Entertainment, Inc. in the United States, other countries, or both and is used under license therefrom.

Linear Tape-Open, LTO, the LTO Logo, Ultrium, and the Ultrium logo are trademarks of HP, IBM Corp. and Quantum in the U.S. and other countries.

* Other product and service names might be trademarks of IBM or other companies.

Notes:

Performance is in Internal Throughput Rate (ITR) ratio based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput improvements equivalent to the performance ratios stated here.

IBM hardware products are manufactured from new parts, or new and serviceable used parts. Regardless, our warranty terms apply.

All customer examples cited or described in this presentation are presented as illustrations of the manner in which some customers have used IBM products and the results they may have achieved. Actual environmental costs and performance characteristics will vary depending on individual customer configurations and conditions.

This publication was produced in the United States. IBM may not offer the products, services or features discussed in this document in other countries, and the information may be subject to change without notice. Consult your local IBM business contact for information on the product or services available in your area.

All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

Information about non-IBM products is obtained from the manufacturers of those products or their published announcements. IBM has not tested those products and cannot confirm the performance, compatibility, or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

Prices subject to change without notice. Contact your IBM representative or Business Partner for the most current pricing in your geography.

This information provides only general descriptions of the types and portions of workloads that are eligible for execution on Specialty Engines (e.g, zIIPs, zAAPs, and IFLs) ("SEs"). IBM authorizes customers to use IBM SE only to execute the processing of Eligible Workloads of specific Programs expressly authorized by IBM as specified in the "Authorized Use Table for IBM Machines" provided at www.ibm.com/systems/support/machine_warranties/machine_code/aut.html ("AUT").   No other workload processing is authorized for execution on an SE. IBM offers SE at a lower price than General Processors/Central Processors because customers are authorized to use SEs only to process certain types and/or amounts of workloads as specified by IBM in the AUT.

Session objectives

- **Review IBM's Hybrid Architecture Offerings.**

- **Share the IBM Design Point, Business Value, and cost justification framework for these architectures.**

- **Briefly align the Hybrid Architectures alongside IBM's Fit for Purpose Workload Deployment Model.**

- **Discuss the characteristics of workloads that lend themselves to Hybrid Architecture Deployment.**

- **Provide a forum for questions.**

IBM's Hybrid Architectures

Unified Resource Manager

1 GbE
INMN

10 GbE

10 GbE
IEDN

zBX   zEC12   PureSystems
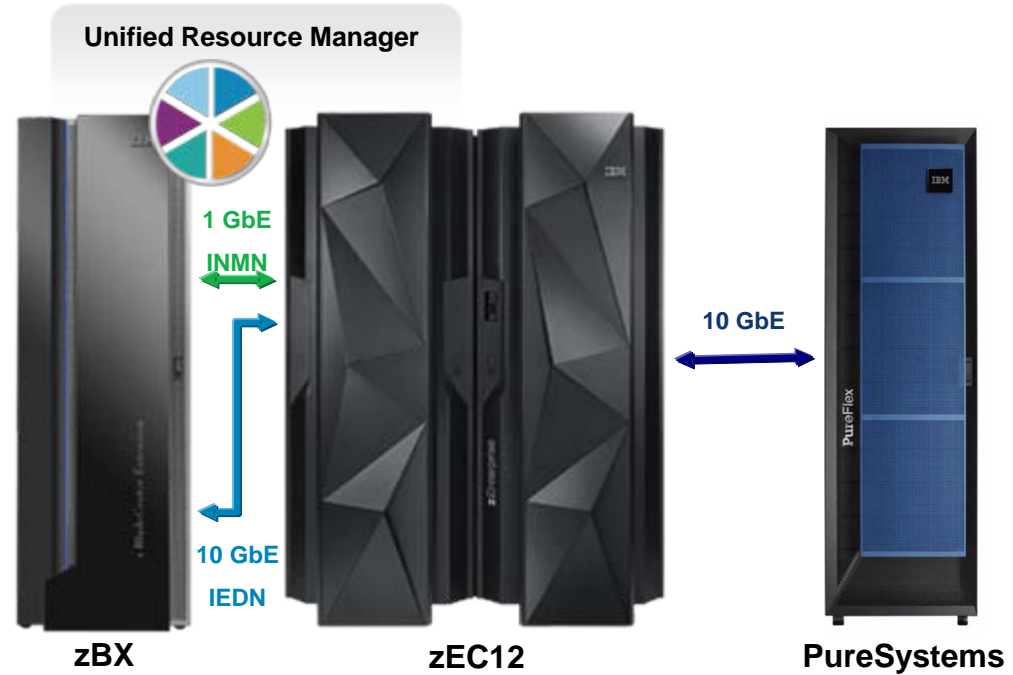
Positioning the *IBM* zEnterprise *BladeCenter*® *Extension* (zBX) *Hybrid* System

IBM zEnterprise®
Workload Optimized Systems

Strengths

- Multiple Mainframe OS Support.

- Multi-Architecture Distributed OS Support.

- Excellent Platform for workloads that favor mainframe servers and require cross-platform workload optimization.

- Strong Mainframe Governance extended to Hybrid resident workloads.

- *Converged Infrastructure* Architecture providing value for mainframe dependent workloads.

Best Fit: *Workloads that have current or emerging mainframe dependencies.*

Positioning the zEnterprise with the IBM PureFlex *Hybrid* System

zEnterprise
IBM PureFlex™ Systems

PureFlex complements the zEnterprise Server well.

Strengths

- Broad Mainframe OS Support.

- Broad Multi-Architecture Distributed OS Support.

- Traditional *Systems Management*:
  - Ensemble HMC support for zEnterprise.
  - Flex System Manager for IBM PureSystems™.
  - Tailor management to each platform.
  - Minimize perceived risks surrounding cross-architecture firmware loads.

- Strong *Cross-Architecture* Performance

- **Advanced *Converged Infrastructure* Architecture designed to provide value for strategic workloads, such as:** Media Tablets, emerging UI channels such as Voice and Gesture, Enterprise-Hosted App Stores, Hybrid Cloud Computing, Next Generation Analytics, and Big Data.

Best Fit: *A broad variety of distributed workloads, including those that have a current or potential mainframe dependency.*

IBM zEnterprise Hybrid Architecture Alignment
Fit for Purpose (F4P) Hybrid Architecture Alignment

The idea of "one size fits all" is attractive …
But, in reality is unrealistic

A Better Approach is to "_Run each workload on the right technology_"

> **Each platform architecture is different …**
>
> **… and has a natural affinity to different workload characteristics**

> **Match the workload characteristics to the platform characteristics …**
>
> **… to deliver a best fit solution for each workload**

> **Repeat this across the infrastructure …**
>
> **… to optimize service delivery for the entire business**

That's why Heterogeneous Infrastructures are the Norm today and why Hybrid Infrastructures are the Future.

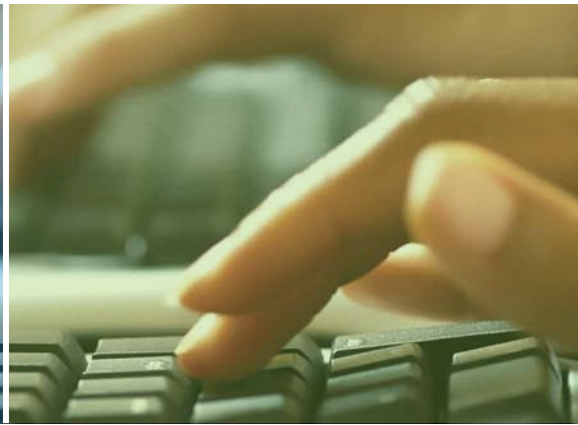# Different application workloads have different characteristics

Large Systems	Power®	Intel®
z/OS® / Linux®	AIX® / Linux / IBM i®	Microsoft® Windows® / Linux

- **Mixed Workloads with SLAs**
- **Huge Transaction Volumes**
- **Massive I/O Bandwidth**
- **Guest/Core Ratio = 50⁺ to 1**
- EAL5+
- **Data Integrity Statement**
- **Gold Standard QoS**

- **Highly Parallel, HPC**
- **High Transaction Volumes**
- **High I/O Bandwidth**
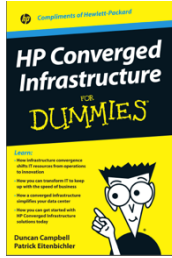- **Guest/Core Ratio = 20 to 1**
- EAL4+
- **Excellent QoS**

- **Discrete, One or Two Threads**
- **Moderate Transaction Volumes**
- **Moderate I/O Bandwidth**
- **Guest/Core Ratio = 8 to 1**
- EAL4+
- **Good to Very Good QoS**

IBM zEnterprise Hybrid Architecture Alignment
Hybrid Architecture Design Points and Value

IBM Hybrid Architecture – *Design principles*

A sound CI offering incorporates five design principles:

1 Virtualization — All infrastructure resources are **virtualized** (server, network, storage).

2 Resilient — The design provides **resiliency** thru integration of fault tolerant technologies and HA packaging techniques.

3 Open — The design is based on **open** architectures. This means it is built to support common architectures, virtual machine platforms, operating systems, and applications.

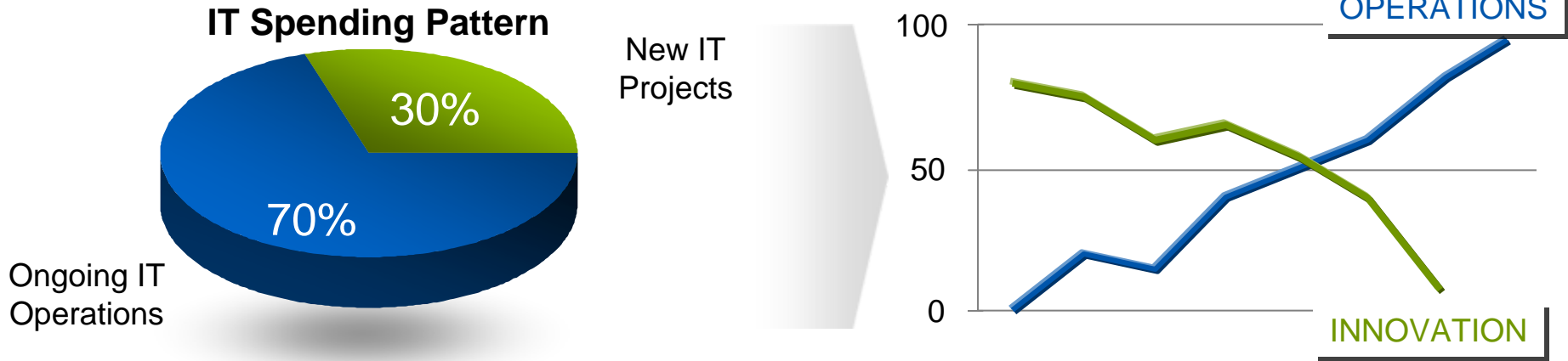**4 Orchestrated** — The design supports workload **orchestration** in the form of automated workflows, provisioning, and change management.

5 Modular — The design is based on **modular** design principles using technologies engineered for convergence.

IBM Hybrid Architecture – *Business Value*

IT Spending Pattern

- 30%
- 70%

Ongoing IT Operations

New IT Projects

OPERATIONS

INNOVATION

100

50

0

Observations:

- **IT spending patterns are *holding back* innovation**
  - IBM's Hybrid Systems recognize this and addressed this challenge by *focusing* on the Management Layer.
  - Our objective is to "*reduce the need for people to touch the system*".
  - Doing so will improve labor efficiencies and promote IT Innovation alignment.

Improved Operational Efficiencies will allow the business to invest the majority of IT resources in Innovation and Strategic Initiatives.

Clients struggle to overcome barriers of time, cost and risk
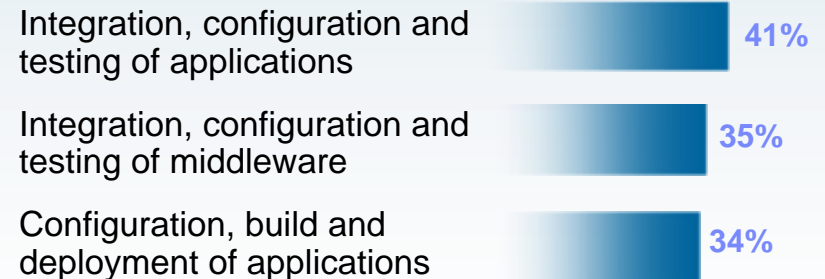
Typical IT Project Time and Budget

Phase	Time (days)	Budget
Specify/design	73 - 96	14% - 16%
Procure	57 - 112	19% - 21%
Implement	74 – 93	12%
Configure/test	74 – 80	10% - 11%
Cluster & HA	66 – 104	11% - 12%
Backup	44 – 108	10%
Tune	89 – 98	9% - 10%
Management	67 – 110	9 – 10%

34% *of new IT projects (US)* **deploy late**

Top Causes of Project Delays

Hardware

Troubleshooting and tuning production environment — 45%

Integration, configuration and testing of the infrastructure — 45%

Installation, cabling and network access for the environment — 29%

Software

Integration, configuration and testing of applications — 41%

Integration, configuration and testing of middleware — 35%

Configuration, build and deployment of applications — 34%

From a commissioned study conducted by Forrester Consulting on behalf of IBM

13

© 2013 IBM Corporation

IBM zEnterprise Hybrid Architecture Alignment
The zEC12 zBX Hybrid Offering

IBM zEnterprise System – *Offering Overview*

IBM zEnterprise EC12	**zEnterprise Unified Resource Manager**	**zEnterprise BladeCenter Extension (zBX)**
▪ Optimized to host large-scale mission-critical applications - database, transaction servers	▪ Centralized management extends Mainframe QoS and governance practices to distributed environments	▪ IBM Blades and appliances in dedicated, high performance private network

zEnterprise zBX Hybrid Architecture – *Logical Design*

… Maps each server to an architecture optimized for its requirements

System z Hardware Management Console (HMC)
with Unified Resource Manager

System z

| z/OS | z/TPF z/VSE® | Linux on IBM System z® | Linux on System z |

z/VM®

System z PR/SM™

z HW Resources

Support Element

Select IBM Blades

| Windows and Linux on IBM System x® | Windows 64-bit | AIX on POWER7® |

KVM Hypervisor

KVM Hypervisor

POWER VM EE Hypervisor

Optimizers

DataPower ®XI50z

DataPower XI50z

Blade HW Resources

zBX

zEnterprise Ensemble
Private Layer 2 Data Network (OSA Express 4S)

Customer Network

■ Unified Resource Manager ▬▬ Private Management Network

▬▬ Private High Speed Data Network (Layer 2)

Customer Network

16

zBX – *Compute Nodes*
Closer proximity to centralized servers for key workloads

- **IBM WebSphere® DataPower® Integration Appliance XI50 for zEnterprise**
  - Purpose-built hardware for simplified deployment and hardened security helps businesses quickly react to change and reduce time to market
  - DataPower XI50z can provide connectivity, gateway functions, data transformation, protocol bridging, and intelligent load distribution.

- **Select IBM System x and IBM POWER7 blades**
  - Front end applications capable of benefiting from closer proximity to

    Centralized data servers …
      e.g. DB2, Oracle
    Core transaction processors …
      e.g. WebSphere, WebLogic, CICS®, IMS™

  - Applications certified to run on zBX supported blades outside the zBX will run on them when installed in the zBX – no recertification required
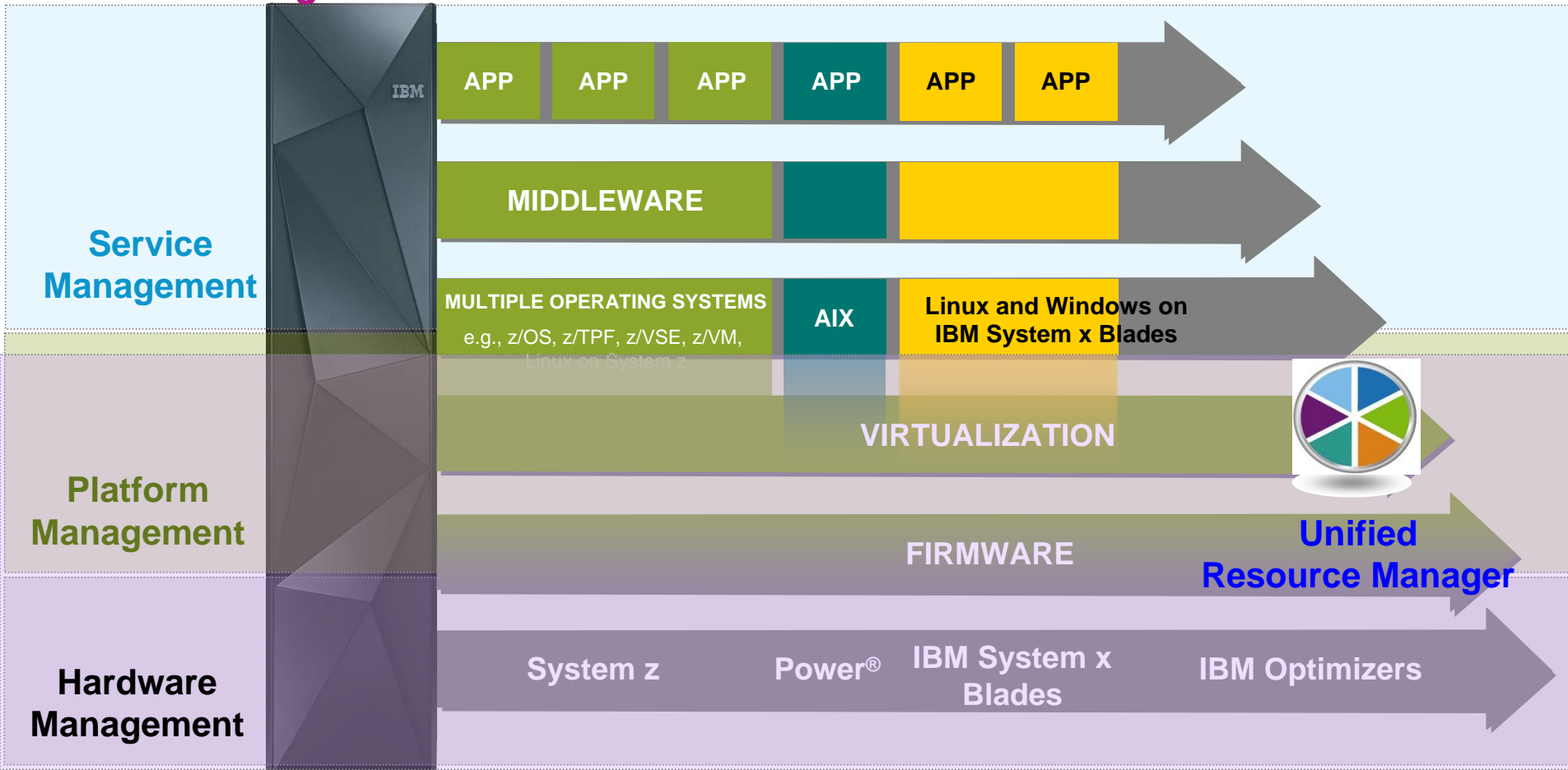
XI50z

HX5

PS701

Management Interface
Building an architectural construct of hardware, software, and Enterprise Service Management

APP	APP	APP	APP	APP	APP	

Service Management

MIDDLEWARE

MULTIPLE OPERATING SYSTEMS e.g., z/OS, z/TPF, z/VSE, z/VM, Linux on System z | **AIX** | **Linux and Windows on IBM System x Blades**

VIRTUALIZATION

Platform Management

FIRMWARE

Unified Resource Manager

Hardware Management

System z   Power®   **IBM System x Blades**   IBM Optimizers

Focused, collaborative innovation A "complete systems" approach

Cloud Intersect for the zEnterprise zBX Hybrid System

- **Setup** the cloud management environment
  - Understand the environment - TADDM , zEnterprise Discovery Sensor (GA 1Q/2013)
  - Insure security – Tivoli® Data and Application Security , Tivoli Identity and Access Assurance
  - Create a service catalog – Tivoli Service Automation Manager
  - Set up billing – Tivoli Usage and Accounting Manager
- **Automate** service provisioning and enable self service
  - Self serve portal for service requests – Tivoli Service Automation Manager
  - Obtain or automate approvals - Tivoli Service Automation Manager
  - Provision resources – Tivoli Provisioning Manager (GA 4Q/2012)
- **Manage** the services to maintain service levels
  - Monitor systems/services – ITCAM family , ITM zEnterprise Monitoring Agents
  - Automated Operations, HA, DR – Tivoli Service Automation (Application Manager & z/OS)
  - Track changes to the service - TADDM
  - Root cause analysis of problems – ITCAM family
  - Managing workloads – Tivoli Workload Scheduler
  - Predictive analytics to improve service – ITCAM family

zEnterprise Cloud – the *Broadest architectural support for private cloud*

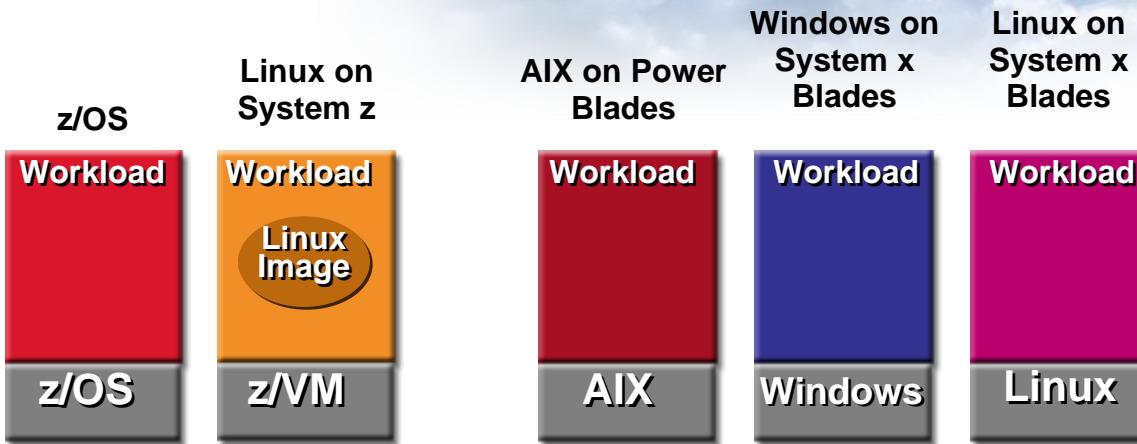**Integrated Service Management**

- Visibility
- Control
- Automation

z/OS

| Workload |
| Linux Image |
| z/OS |

Linux on System z

| Workload |
| z/VM |

AIX on Power Blades

| Workload |
| AIX |

Windows on System x Blades

| Workload |
| Windows |

Linux on System x Blades

| Workload |
| Linux |

zEnterprise zEC12

zEnterprise BladeCenter Extension (zBX)

Fit-for- Purpose strategy extended to the cloud

- Cloud management for multiple environments

- End-to-end Visibility, Integrated Control and Automation.

- Flexibility to adapt to changes in workload requirements.

zBX *Key Concept Summary*

- **First of two Hybrid Architectures from IBM**

- **Mainframe Governance Mechanisms and Practices**

- **Existing Technology Base (Blades)**

- **Targeted Workloads *Will* have Mainframe Dependencies**

- **Full Cloud Capabilities in Near Future for the zBX**

- **Linux on zEnterprise is fully Cloud Capable today**

BG-Phoenics
Combining simplicity with performance and flexibility

The Need:

BG-Phoenics runs numerous multi-tier applications and workloads, requiring it to maintain multiple architectures. The company wanted to simplify and integrate its diverse infrastructure to reduce costs and ensure high quality of service. The key challenge was to achieve this while maintaining the flexibility and optimization of the existing multi-platform approach.

The Solution:

BG-Phoenics added an IBM zEnterprise BladeCenter Extension (zBX) with two IBM POWER7 processor-based blade servers and two Intel Xeon processor-based blade servers to each of its IBM zEnterprise 196 servers. The entire ensemble is controlled using IBM zEnterprise Unified Resource Manager.

The Benefits:

- The zEnterprise System supports BG-Phoenics' vision of being hardware-agnostic, enabling it to choose the best architecture for each requirement
- Standardized tools and virtualization will deliver significant operational cost savings and enable faster time-to-market
- With centrally managed and optimized platforms, BG-Phoenics can be far more responsive to changing client requirements.

"A key driver for adopting zBX was to have the same method for implementing new servers across AIX, Linux and Microsoft Windows."

—*Randolf Sigmund, Team Leader Operating Systems/Systems Management, BG-Phoenics*

Solution components:

- IBM zEnterprise 196
- IBM zEnterprise BladeCenter Extension
- IBM zEnterprise Unified Resource Manager
- IBM BladeCenter PS701
- IBM BladeCenter HX5

Eurocontrol MUAC
Increasing efficiency of air traffic control operations with Smarter Computing from IBM

The Need:

Air traffic management organization Eurocontrol MUAC wanted to maintain safe, secure and cost-effective air traffic control (ATC) support services in an increasingly busy airspace.

The Solution:

Migrated critical applications to a private cloud based on the IBM zEnterprise 196 and integrated IBM BladeCenter servers – ensuring high availability for business support applications.

The Benefit:

- Enabled rapid development of new applications which increase safety and efficiency of ATC operations as flight numbers grow.

- Improved overall planning efficiency for operations from 65 percent in 2006 to 85 percent in 2011.

- Shrunk data center footprint by 80 percent, reduced energy consumption by 58 percent, and cut administrative workload by 50 percent.

"zEnterprise offered the combination of flexibility, high-performance and rock-solid reliability we needed."

— Kumar Sivakumaran, Advanced Middleware Engineer, Eurocontrol

Solution components:

- IBM zEnterprise 196, IBM zEnterprise BladeCenter Extension, IBM zEnterprise Unified Resource Manager
- IBM z/VM, IBM System Storage® SAN Volume Controller

OIP03056-NLEN-00

Health Insurance Institute of Slovenia
Enabling new heterogeneous computing capabilities while preserving mainframe investments

The Need:

HIIS's introduction of an online application for medical insurance placed significant demand on the existing infrastructure. HIIS wanted to upgrade its mainframe to ensure reliable operation of all its mission-critical systems, while maintaining continuity for its legacy applications.

The Solution:

HIIS replaced its existing IBM System z10® Enterprise Class with the new zEnterprise 196. It uses the zEnterprise BladeCenter Extension to support select IBM blade servers and workload optimizers, and zEnterprise Unified Resource Manager to provide cross-platform management tools for the entire zEnterprise ensemble.

The Benefit:

- Maintains continuity for applications, ensuring that there is no interruption to key business processes
- Provides an efficient, high-performance platform for mission-critical applications, helping HIIS maintain high levels of service
- Offers a highly secure and stable environment for processing and managing patient information

"In terms of financial value, IBM zEnterprise System was the most rational decision for us: It gives us a platform for all the services we need in the future, providing more computing resources for less money."

—Samo Fakin, CEO, HIIS

Solution components:

- IBM zEnterprise™ 196
- IBM zEnterprise BladeCenter Extension
- IBM zEnterprise Unified Resource Manager
- IBM DataPower XI50z

ZSP03538-USEN-00

IBM helps transform workload management and system access
Swiss Re IT staff deploys IBM DB2 Analytics Accelerator on IBM zEnterprise to speed queries

Business challenge:

With roughly 2.5 billion transactions in the company's financial data store, fast and accurate analysis is essential for setting the right premiums. To improve access to claims data across its multiple international locations, the company needs to increase system availability, optimize workloads, speed queries and accelerate the generation of claims reports run by internal business users.

Solution:

Deploy the IBM zEnterprise System with IBM DB2 for z/OS to process all data loads from a central location, and IBM DB2 Analytics Accelerator — powered by IBM Netezza technology—to deliver faster responses to individual analytic queries.

Benefits:

- Speeds report generation by as much as 70 percent through faster query response time, and improves staff efficiency by centralizing data on a single platform
- Reduces processing costs and CPU consumption by off-loading workloads to Netezza
- Increases satisfaction among internal business users by delivering a comprehensive overview of claims transactions that integrates operational data with advanced analytics

"We were surprised by the performance gain IDAA provided, as well as its ability to further boost the capacity of our IBM zEnterprise System."

—Reto Estermann, Director, Information Technology, Swiss Re

Solution components:

- IBM zEnterprise System
- IBM DB2® for z/OS
- IBM DB2 Analytics Accelerator for z/OS
- IBM Netezza® data warehouse appliance
- IBM Labs

Swiss Re

IBM zEnterprise Hybrid Architecture Alignment
The zEC12 PureFlex Hybrid Offering

PureSystems – *Offering Overview*
A continuum of value from elements to systems

Flex System Elements

Chassis

14 half-wide bays for nodes

Compute Nodes

X86 and Power

Storage Node
V7000

Expansion inside* or outside chassis

Flex System Manager

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

Expansion
PCIe
Storage

IBM PureFlex System

Pre-configured, pre-integrated **infrastructure systems** with compute, storage, networking, physical and virtual management, and entry cloud management with **integrated expertise.**

IBM PureApplication™ System

Pre-configured, pre-integrated **platform systems** with middleware designed for transactional web applications and enabled for cloud with **integrated expertise.**

Supports choice of

x86 and/or POWER

---

* Statement of Direction. IBM plans subject to change.

zEnterprise PureFlex Hybrid Architecture – *Logical Design*

**… Offers more features, choices, performance and flexibility**

System z Hardware Management Console (HMC) with Unified Resource Manager

System z

z/OS | z/TPF z/VSE | Linux on System z | Linux on System z

z/VM

System z PR/SM

z HW Resources

Support Element

PureFlex Compute Nodes

Linux on System x | Windows 32 or 64 bit | IBM i, AIX, Linux

VMware, Hyper-v, KVM Hypervisor | VMware, Hyper-v, KVM Hypervisor | POWERVM EE Hypervisor

PureSystems Resources

Management Appliance

zEnterprise **Pure**Flex
User Defined Private Data Network (OSA Express4S)

Customer Network

■ Unified Resource Manager
■ Flex Systems Manager

— zEC12 Management Network
— PureSystems Management Network
— User Defined High Speed Data Network (Layer 2:3)

Customer Network

PureFlex - *Compute Nodes*

POWER			X86				
p260	**p460**	**p24L**	**X220**	**x240**	**X440**	*Watch this space*	**PCIe**
POWER7	**POWER 7**	**POWER 7**	**Intel**	**Intel**	**Intel**	**Intel**	**IBM PCIe**
AIX, Linux, i	AIX, Linux, i	Linux-only	Sandy Bridge EN	Sandy Bridge EP	Sandy Bridge EP	Sandy Bridge EN	Expansion Node
2 Socket	4 Socket	2 Socket	2 Socket	2 Socket	4 Socket	Twin 2 Socket	X86 Nodes Only
◇	◇	◇	◇	◇	◇		◇
64 Bit Processor	64 Bit Processor	64 Bit Processor	64 Bit Processor	64 Bit Processor	64 Bit Processor		I/O Side Card
◇	◇	◇	◇	◇	◇		◇
16 Core Max	32 Core Max	16 Core Max	16 Core Max	16 Core Max	32 Core Max		GPU Cards
◇	◇	◇	◇	◇	◇		◇
256GB Max	512GB Max	256GB Max	192GB Max	768GB Max	1.5TB Max		Fusion I/O (PCIe SSD)
◇	◇	◇	◇	◇	◇		◇
Two Mezz I/O Cards	Four Mezz I/O Cards	Two Mezz I/O Cards	Two Mezz I/O Cards	Two Mezz I/O Cards	Four Mezz I/O Cards		External Storage Attachment
Two 20Gb I/O Hubs	Four 20Gb I/O Hubs	Two 20Gb I/O Hubs	One PCIe Expansion Connector	One PCIe Expansion Connector	10 GbE LOM		
				◇			
				10 GbE LOM			

Management Interface - *The Flex System Manager*

Management

Management

Networking   **Storage**
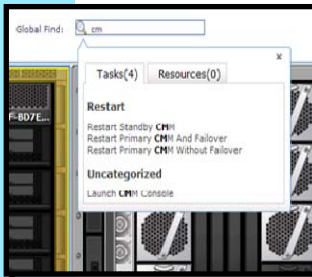
Virtualization   **Compute**

System infrastructure

Reduced risk through integrated platform management

- New user interface

- Provides Cross-resource integration and automation

- Works with your existing toolset

- Easier monitoring, alerts and problem management

- Provides automated resolution processes with integrated expertise
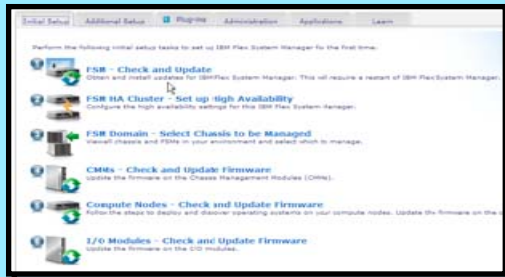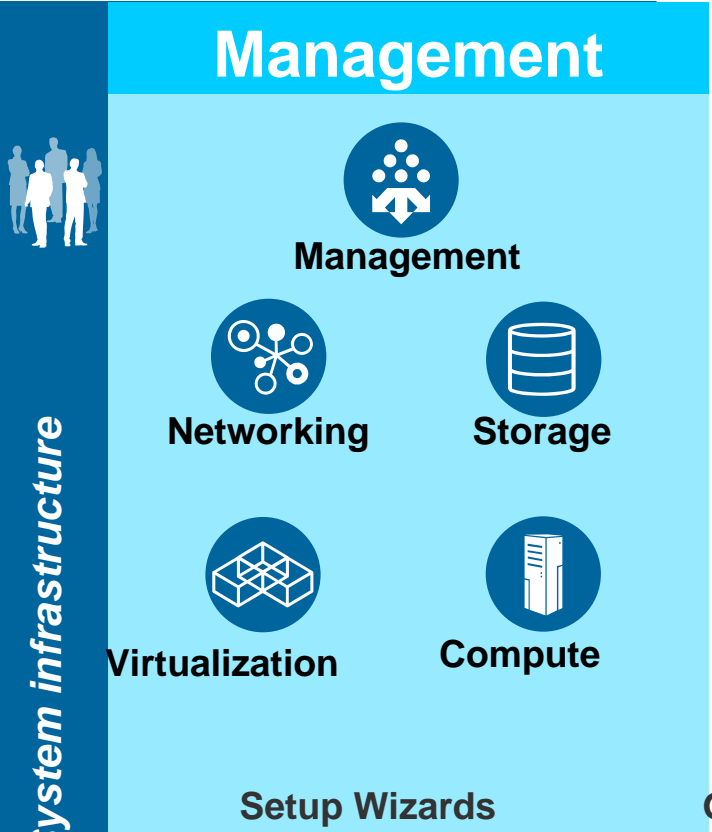
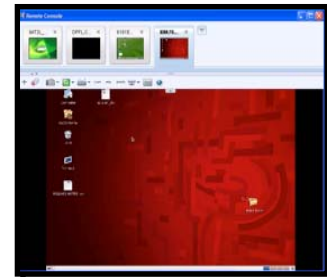**Setup Wizards**   **Global Find**   **Chassis Map**   **Remote Presence**

Cloud Intersect for the zEnterprise and PureFlex *Hybrid* System

PureFlex FSM

- Virtualization of all system resources
  - Compute, Storage and Networking

- Management Integration across physical and virtual resources

- Built-in expertise across system resources - automation, optimization & scalability expertise

- Automatic virtual machine placement and optimization

SmartCloud Entry

- Simplified Cloud administration and management

- Approval, Metering, Accounting and Billing Capabilities

- Platform and Application Image Management to enable faster application and service delivery models

- Capture and catalog new Virtual System Patterns from running systems or import patterns from an existing catalog

- Dynamically provision virtualized resources to deploy systems based on these patterns

IBM PureSystems – The *Patterns* Concept

Patterns of Expertise: Proven best practices and expertise for complex tasks learned from decades of client and partner engagements that are captured, lab tested, optimized, and then built into the system

Definitions:

- **Virtual Appliance:** Software stack on a Virtualized Machine (PaaS Component).
- **Virtual System Pattern:** Collection of the Virtual Appliances required for an Application System (PaaS System). Used to facilitate deployment of application systems.
- **Virtual Application Pattern:** Virtual System Pattern combined with behavioral policies (scaling, high availability, Service Level Agreements, security, multi-tenancy, isolation), customization data and links to complete the deployment of an Application System – (SaaS System). Used to simplify deployment of complete application systems.

Functional Requirements:

- **Capture:** Tooling to create self-describing virtual images for deployment.
- **Deploy & Manage:** Tooling that enables consistent & repeatable deployment of pattern-based application environments to X86, Power, PureSystems, zEnterprise, and Hybrid hardware pools.

IBM Offerings:

- **Capture:** IBM Available tooling is found here .
- **Deploy & Manage:** IBM Available tooling is found here .

IBM PureApplication System Catalog – Patterns Repository
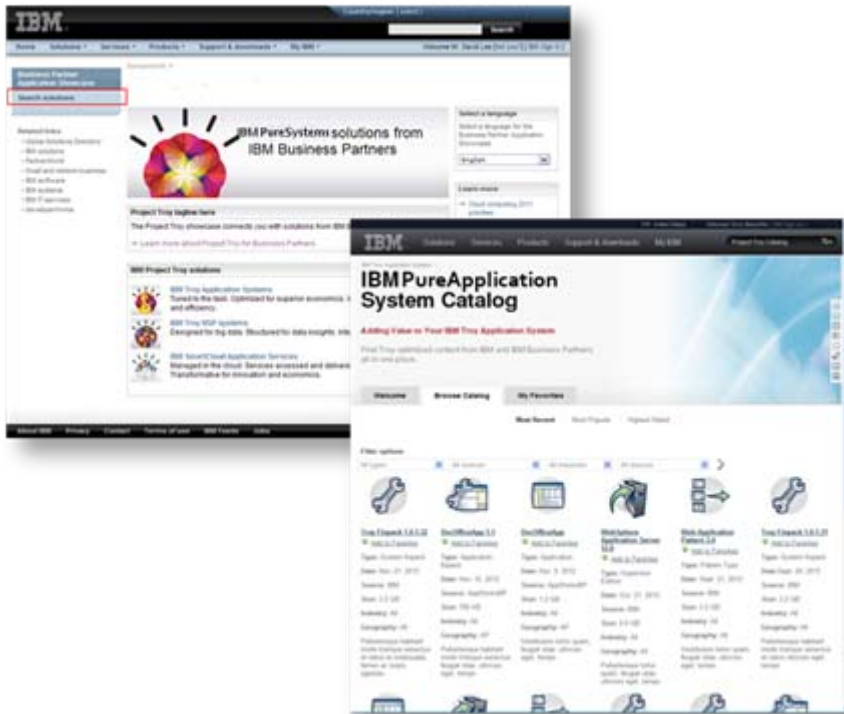
- Solutions from 100+ leading partners

- Over 100 leading packaged applications available

- Solution Showcase simplifies application deployment

- Build once also use for private and public cloud deployments

- Certified through 'Ready for IBM PureSystems' program

PureSystems *Key Concept Summary*

- **Distributed Governance Mechanisms and Practices**

- **Open Environment providing Choice, Flexibility and Compatibility**

- **New Technology Base (Nodes)**

- **Targeted Workloads *May* have Mainframe Dependencies**

- **Full Cloud, Full Image Management Capabilities**

- **Again, Linux on zEnterprise is fully Cloud Capable today**

IBM zEnterprise Hybrid Architecture Alignment
Hybrid Architecture Cost Justification

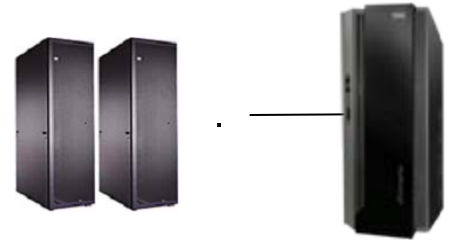# Comparing the costs for zBX hybrid workload deployments

What do I gain by using zBX racks and the Unified Resource Manager?

Can't I just use BladeCenters to do it myself?

Web Facing workloads

Data Processing workloads

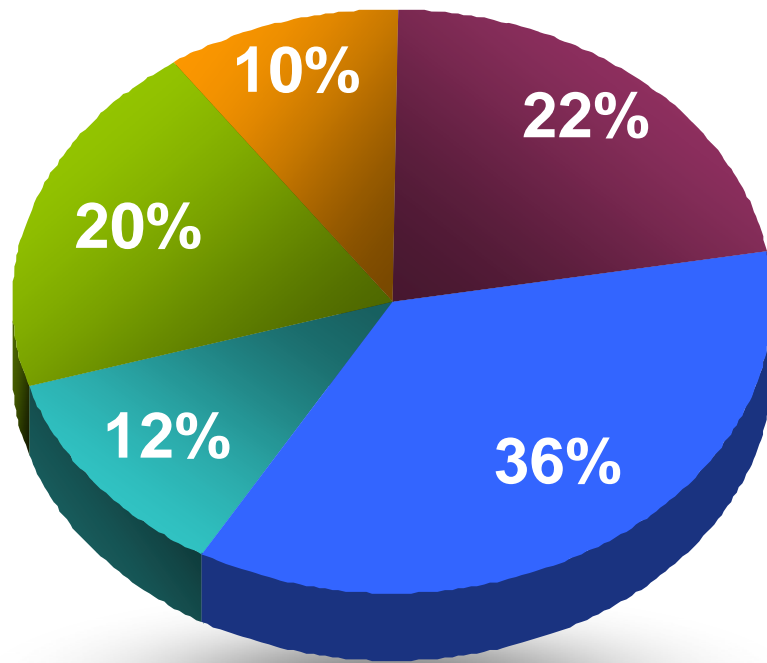POWER7 or HX5 blades in Standard BladeCenter chassis

Do-It-Yourself

POWER7 or HX5 blades in zBX racks with Unified Resource Manager

zBX Hybrid

# Five key IT processes for infrastructure administration

Potential contributors to Project Overruns

10%

22%

20%

12%

36%

Deployment Management
Hardware set-up and software deployment

Incident/Capacity Management
Monitor and respond automatically

Asset Management
Hardware and software asset tracking

Security Management
Access control

Change Management
Hardware and software changes

How are improved labor efficiencies calculated?

Allocation based on customer data from IBM study

Example – Unified Resource Manager labor cost reduction

Deployment Management
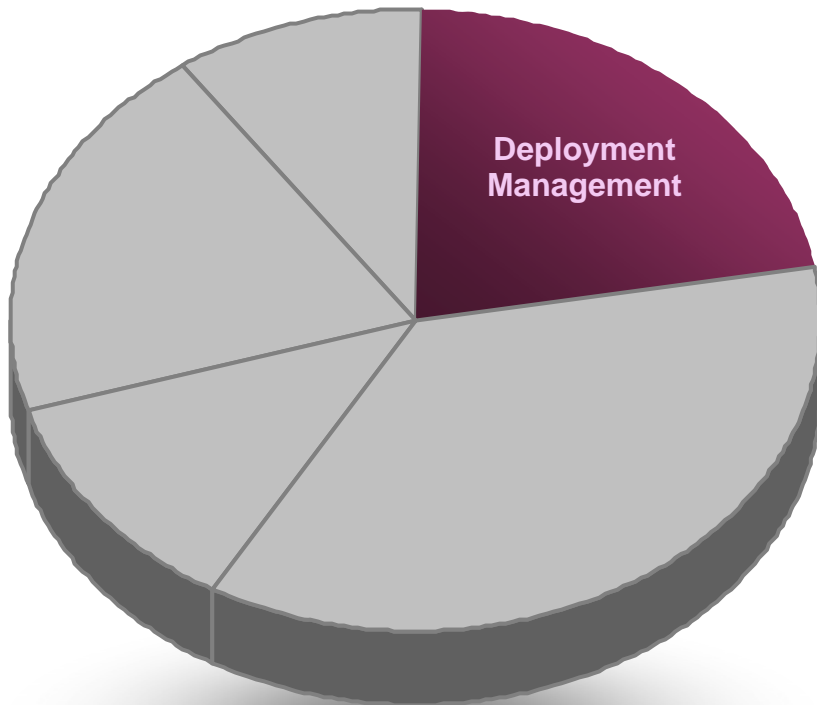
Reduce Deployment Costs

- Unified Resource Manager **automates** hardware deployment tasks
  - Hypervisor setup and configuration
  - Preconfigured networks

Based on IBM internal study. Labor model based on customer provided data from IBM studies

Hypervisor setup and configuration lab test
Do-It-Yourself vs. Unified Resource Manager

DIY Tasks (per Blade)	Elapsed Time	Labor Time
Initial communication setup & education	6 min 26 sec	6 min 26 sec
Boot VIOS disc & install (creates LPAR for VIOS automatically)	37 min 59 sec	36 min
Configure VIOS networking	2 min 49 sec	2 min 49 sec
Create new storage pool for LPARs	35 sec	35 sec
Install VIOS service fix packs	61 min 5 sec	20 sec
TOTAL TIME	**1 hr 48 min 52 sec**	**46 min 10 sec**

Unified Resource Manager Tasks (per Blade)	Elapsed Time	Labor Time
Add entitlement for a blade	90 min	92 sec
TOTAL TIME	**1 hr 30 min**	**1 min 32 sec**

97%
reduction
in labor time

Source: IBM CPO Internal Study
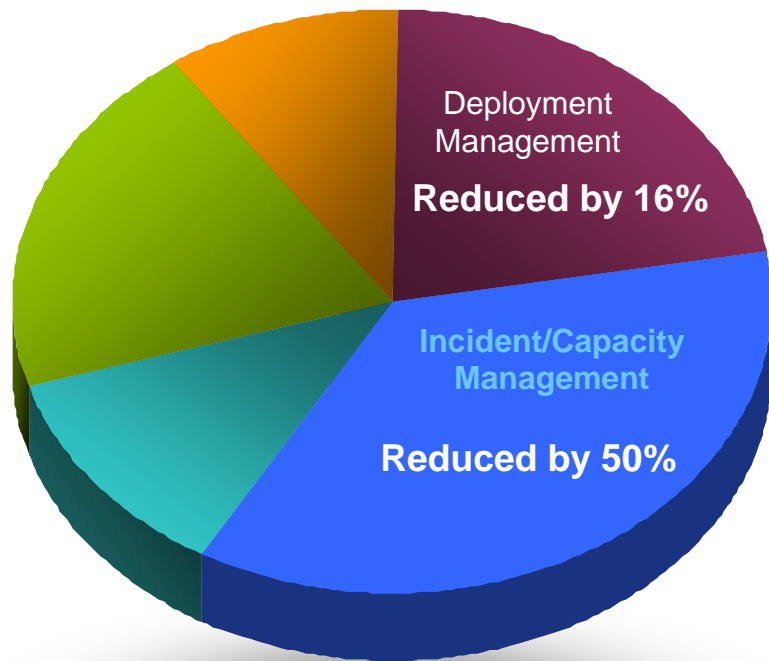
Network setup and configuration lab test
Do-It-Yourself vs. Unified Resource Manager

Do-It-Yourself Tasks (for 28 blades)	Elapsed/Labor Time
Planning (includes time to go over docs, etc)	5 hrs
Cabling	2 hrs
AMM Configuration	2 hrs
Logical Configuration (L2)	8 hrs
Blades network configuration	4 hrs
Testing	2 hrs
Documenting the configuration	3 hrs
TOTAL TIME	**26 hrs**

Unified Resource Manager Tasks (for 28 blades)	Elapsed/Labor Time
Planning	3 hrs
Cabling (pre-cabled in zBX)	0 hrs
AMM Configuration (done in zBX)	0 hrs
Logical configuration (L2)	30 mins
Blades network configuration	1 hr 30 mins
Testing (pre-tested)	0 hrs
Documenting the configuration (all part of Unified Resource Manager)	0 hrs
TOTAL TIME	**5 hrs**

81%
reduction
in labor time

Source: IBM CPO Internal Study

Example – Unified Resource Manager labor cost reduction

Deployment Management
Reduced by 16%

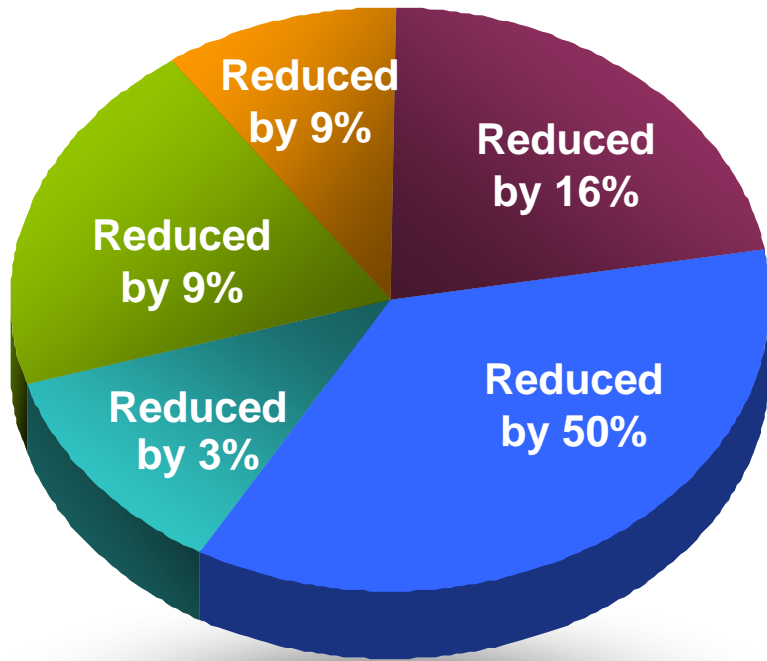Incident/Capacity Management

Reduced by 50%

Reduce Incident/Capacity Management Costs

zManager support to **isolate and fix issues** improves productivity

- End-to-end transaction monitoring to isolate and fix issues with workloads running on multiple heterogeneous virtual servers

- Problem analysis and call home reporting

- Automatic error logging and first-failure data capture (FFDC) data collection for hardware issues

- Guided repair and verification for a hardware service action

Allocation based on customer data from IBM study

Unified Management labor reductions for infrastructure administration

IBM CPO methodology

Deployment Management
Hardware set-up and software deployment

Incident/Capacity Management
Monitor and respond automatically

Asset Management
Hardware and software asset tracking

Security Management
Access control

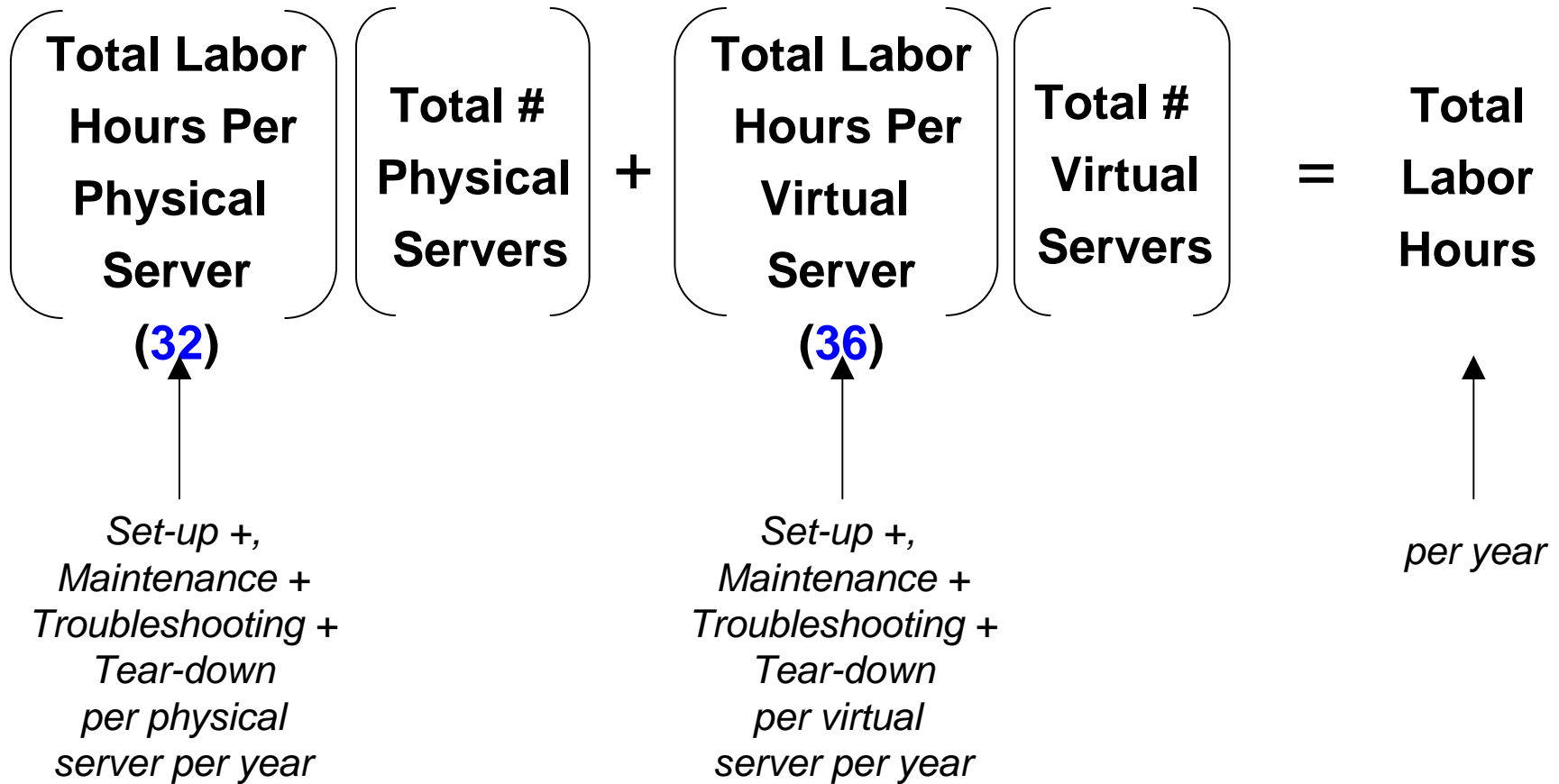**Change Management**
Hardware and software changes

Note: Time allocations were arrived by doing a best fit analysis of data IBM had from customers, internal IBM sites, and Lab Timings.

How do we capture the value of the zHybrid Architecture?

1. Develop a Business Case that takes into consideration the anticipated value the zHybrid Architecture will offer a given workload.

2. Extend that value across a fully populated zBX consisting of 112 POWER® and/or HX5 Blades.

3. Compare the Cost of Ownership between this fully populated zBX against the Client's traditional Server Deployment model.
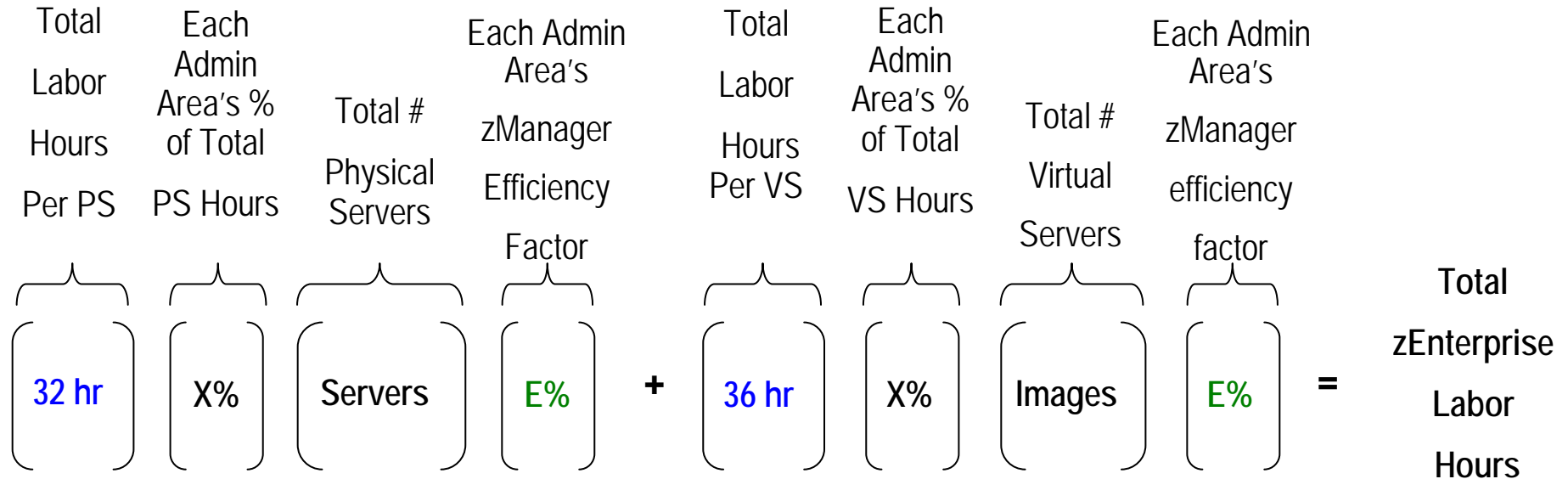
Standard labor cost model for IT administration activities

$$\left(\begin{array}{c}\textbf{Total Labor Hours Per Physical Server} \\ \textbf{(32)}\end{array}\right) \left(\begin{array}{c}\textbf{Total \# Physical Servers}\end{array}\right) + \left(\begin{array}{c}\textbf{Total Labor Hours Per Virtual Server} \\ \textbf{(36)}\end{array}\right) \left(\begin{array}{c}\textbf{Total \# Virtual Servers}\end{array}\right) = \textbf{Total Labor Hours}$$

Set-up +,
Maintenance +
Troubleshooting +
Tear-down
per physical
server per year

Set-up +,
Maintenance +
Troubleshooting +
Tear-down
per virtual
server per year

per year

Next we revise this formula to add the Labor Efficiency Factor for Each Admin Area.

Apply efficiency factor to create customized labor cost model

Total Labor Hours Per PS	Each Admin Area's % of Total PS Hours	Total # Physical Servers	Each Admin Area's zManager Efficiency Factor		Total Labor Hours Per VS	Each Admin Area's % of Total VS Hours	Total # Virtual Servers	Each Admin Area's zManager efficiency factor		Total zEnterprise Labor Hours
32 hr	X%	Servers	E%	+	36 hr	X%	Images	E%	=	

Projected "E" Factor is applied to labor hours for deployment based on hands-on lab studies and customer feedback on tool productivity improvements.

Incident/Capacity Management applies the E Factor to both HW and SW labor.

The other four Categories only apply the E Factor to HW labor hours.

Calculate costs using both labor models

$$\left(\text{Total Labor Hours Per Physical Server } (\textcolor{blue}{32})\right) \left(\text{Total \# Physical Servers}\right) + \left(\text{Total Labor Hours Per Virtual Server } (\textcolor{blue}{36})\right) \left(\text{Total \# Virtual Servers}\right) = \text{Total Current Labor Hours}$$

Total Labor Hours Per PS	Each Admin Area's % of Total PS Hours	Total # Physical Servers	Each Admin Area's zManager Efficiency Factor		Total Labor Hours Per VS	Each Admin Area's % of Total VS Hours	Total # Virtual Servers	Each Admin Area's zManager efficiency factor		
32 hr	X%	Servers	E%	+	36 hr	X%	Images	E%	=	Total zEnterprise Labor Hours

Detailed labor cost comparison calculations

		Hardware				Software				Total Hours	Percent Savings
		Hours / Task	% Deploy Labor	# Physical	Eff. Factor	Hours / Task	% Deploy Labor	# Logical	Eff. Factor		
Deployment	DIY	32	22%	112	1	36	22%	448	1	4337	
	zHybrid	32	22%	112	12%	36	22%	448	1	3643	16%
		Hours / Task	% Deploy Labor	# Physical	Eff. Factor	Hours / Task	% Deploy Labor	# Logical	Eff. Factor		
Incident/Cap Mgmt	DIY	32	36%	112	1	36	36%	448	1	7096	
	zHybrid	32	36%	112	50%	36	36%	448	50%	3548	50%
		Hours / Task	% Deploy Labor	# Physical	Eff. Factor	Hours / Task	% Deploy Labor	# Logical	Eff. Factor		
Asset Mgmt	DIY	32	12%	112	1	36	12%	448	1	2365	
	zHybrid	32	12%	112	85%	36	12%	448	1	2301	3%
		Hours / Task	% Deploy Labor	# Physical	Eff. Factor	Hours / Task	% Deploy Labor	# Logical	Eff. Factor		
Security Mgmt	DIY	32	20%	112	1	36	20%	448	1	3942	
	zHybrid	32	20%	112	50%	36	20%	448	1	3584	9%
		Hours / Task	% Deploy Labor	# Physical	Eff. Factor	Hours / Task	% Deploy Labor	# Logical	Eff. Factor		
Change Mgmt	DIY	32	10%	112	1	36	10%	448	1	1971	
	zHybrid	32	10%	112	50%	36	10%	448	1	1792	9%

Deployment Labor Cost Model

DIY

Total HW labor hours	Deploy % of labor	Total # physical servers		Total SW labor hours	Deploy % of labor	Total # virtual servers		
32 hr	0.22	112	**+**	36 hr	0.22	448	**=**	4337 Hours

zBX

Total HW labor hours	Deploy % of labor	Total # of servers	zBX/zManager efficiency factor		Total SW labor hours	Deploy % of labor	Total # virtual servers		
32 hr	0.22	112	0.12	**+**	36 hr	0.22	448	**=**	3643 Hours **Reduced by 16%**

Productivity savings of 88% is applied to hardware labor hours
for deployment based on hands-on lab studies

Summary
zManager labor savings

Estimated Labor Savings With 2-to-1 Core-to-VI Ratio			
	Constants		**Hours Saved**
	Total Hours		18423
	Improved Hours		13579
	Hours Saved		26%
	FTE Cost per Year		$120,000
	FTE Hours per Year		2080
	Cost per Hour		$58
	Staff Cost Saved per Year		$279,469
	3-Year Staff Cost Savings		$838,408
zBX Costs	**Required Item**	**Per Unit**	**(112 blades)**
	Manage Suite	1600	$179,200
	Second HMC	7661	$7,661
	(2) OSA-3s	24000	$48,000
	(2) INMN TORs	14350	$28,700
	Total zBX costs		$263,561
	zBX 3-Year ROI		218%

Labor Saving calculations:

- FTE Cost per Year can be changed for each account.
- Actual zBX Costs can be used.

Comparing the costs for zBX hybrid workload

What do I gain by using zBX racks and the Unified Resource Manager?

Can't I just use BladeCenters to do it myself?

You could, but zEnterprise can cut the cost of labor to manage these workloads by 26% compared to do it yourself.

The 3-year ROI is 218%!

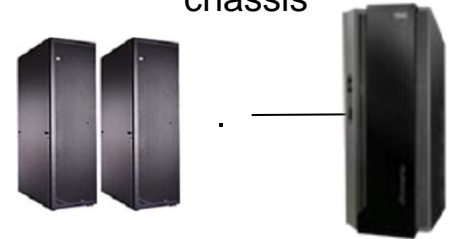# Comparing the costs for PureFlex hybrid workload deployments

What do I gain by using PureFlex and the Flex System Manager?

Can't I just use BladeCenters to do it myself?

Web Facing workloads

Data Processing workloads

POWER7 or HX5 blades in Standard BladeCenter chassis
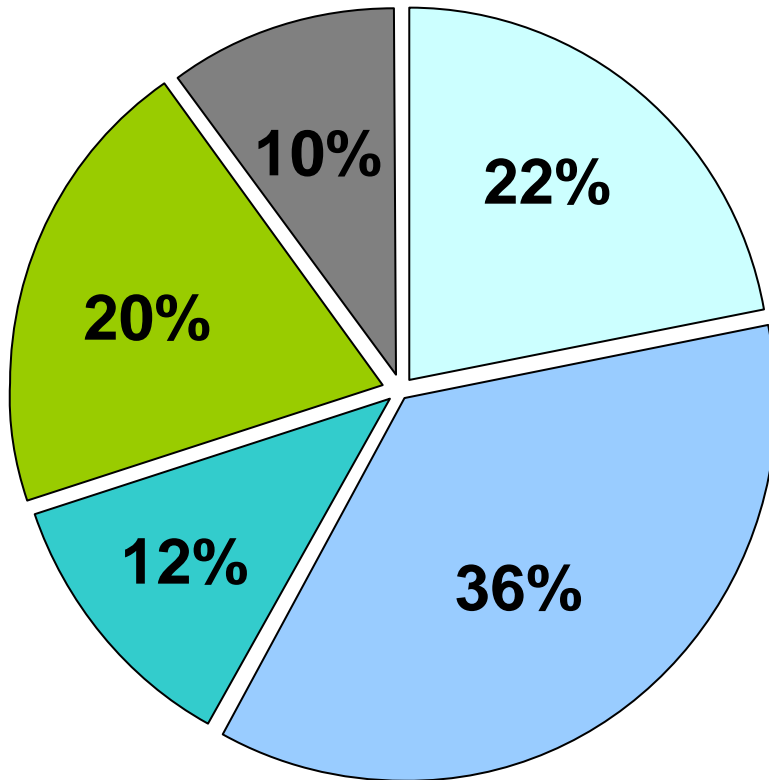
Do-It-Yourself

POWER7 or Intel nodes in PureFlex racks with Flex System Manager

PureFlex Hybrid

Five Key IT Processes For Infrastructure Administration

Potential contributors to Project Overruns

Deployment Management
– *Hardware set-up and software deployment*

Incident/Capacity Management
– *Monitor and respond automatically*

Asset Management
– *Hardware and software asset tracking*

Security Management
– *Access control*

Change Management
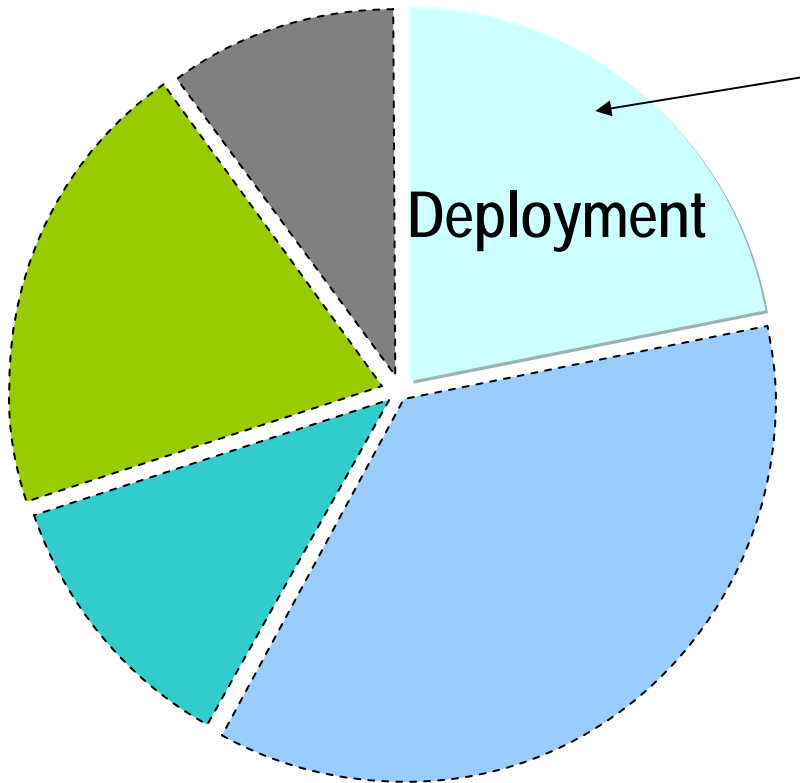– *Hardware and software changes*

How are improved labor efficiencies calculated?

Note: Time allocations were arrived by doing a best fit analysis of data IBM had from customers, internal IBM sites, and Lab Timings.

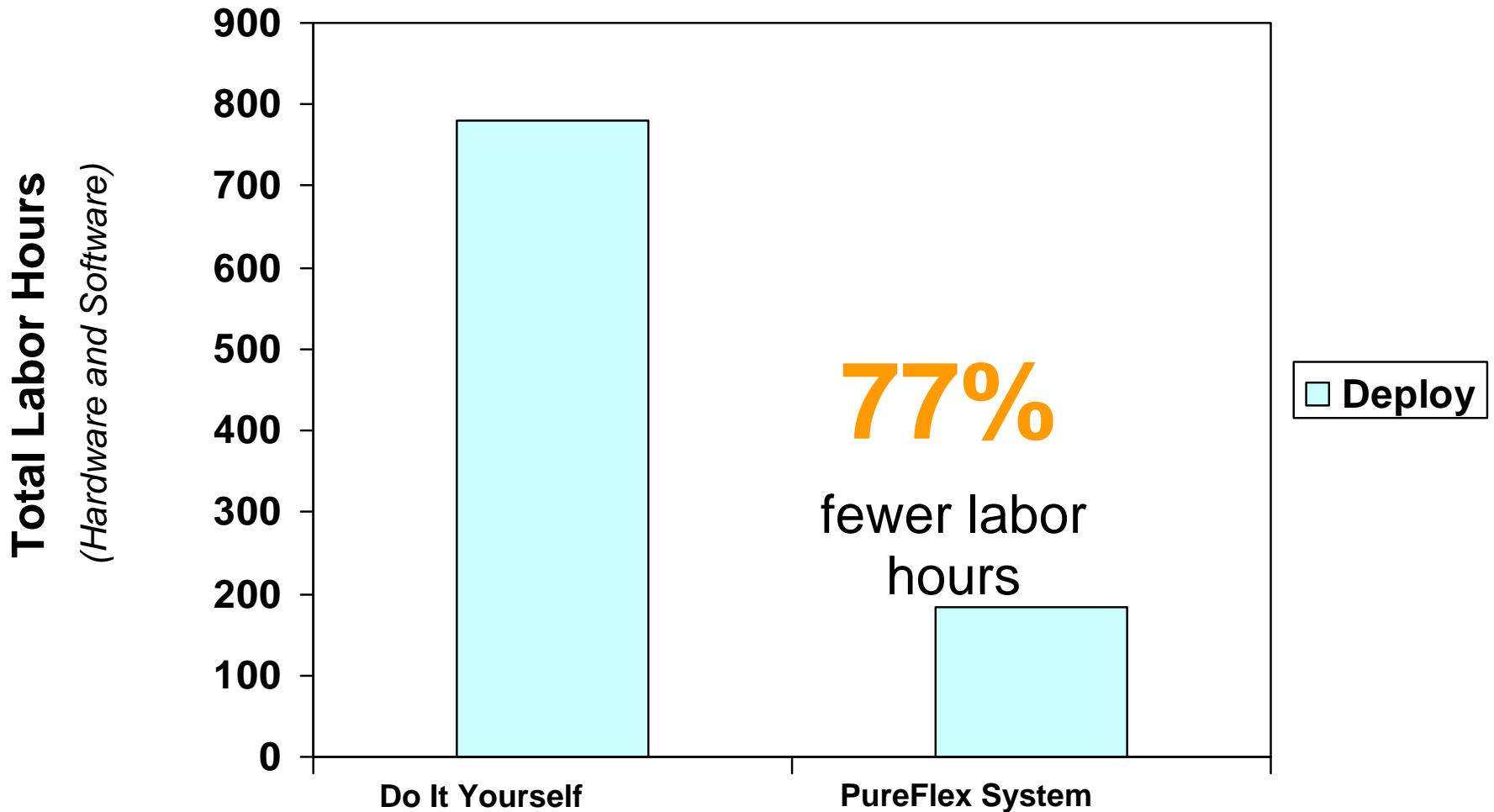Allocation based on customer data from IBM study

Example – PureFlex System Labor Cost Reduction

Reduce Deployment Costs

Deployment

- Infrastructure and management software set up in a ready-to-go integrated system

- Self-service console with automated approvals to request workload provisioning

- Deploy a cloud workload in 4 clicks

PureFlex System Cuts Total Deployment Labor Hours

77% fewer labor hours

□ **Deploy**

Total Labor Hours *(Hardware and Software)*

Do It Yourself | PureFlex System

Deployment Labor Cost Model

DIY

| Total HW labor hours	Deploy % of labor	Total # of servers		Total SW labor hours	Deploy % of labor	Total unique stacks		
32 hr	0.22	28	+	36 hr	0.22	448	=	3745 Hours

PureFlex System

Total HW labor hours	Deploy% of labor	Total # of servers	PureFlex System efficiency factor		Total SW labor hours	Deploy% of labor	Total unique stacks	PureFlex System efficiency factor		
32 hr	0.22	28	0.03	+	36 hr	0.22	448	0.24	=	857 Hours **Reduced by 77%**

Productivity savings of 97% is applied to hardware labor hours and 76% applied to software labor hours

Example – PureFlex System Labor Cost Reduction

Reduce Incident/Capacity Management Costs

Deployment
Reduced
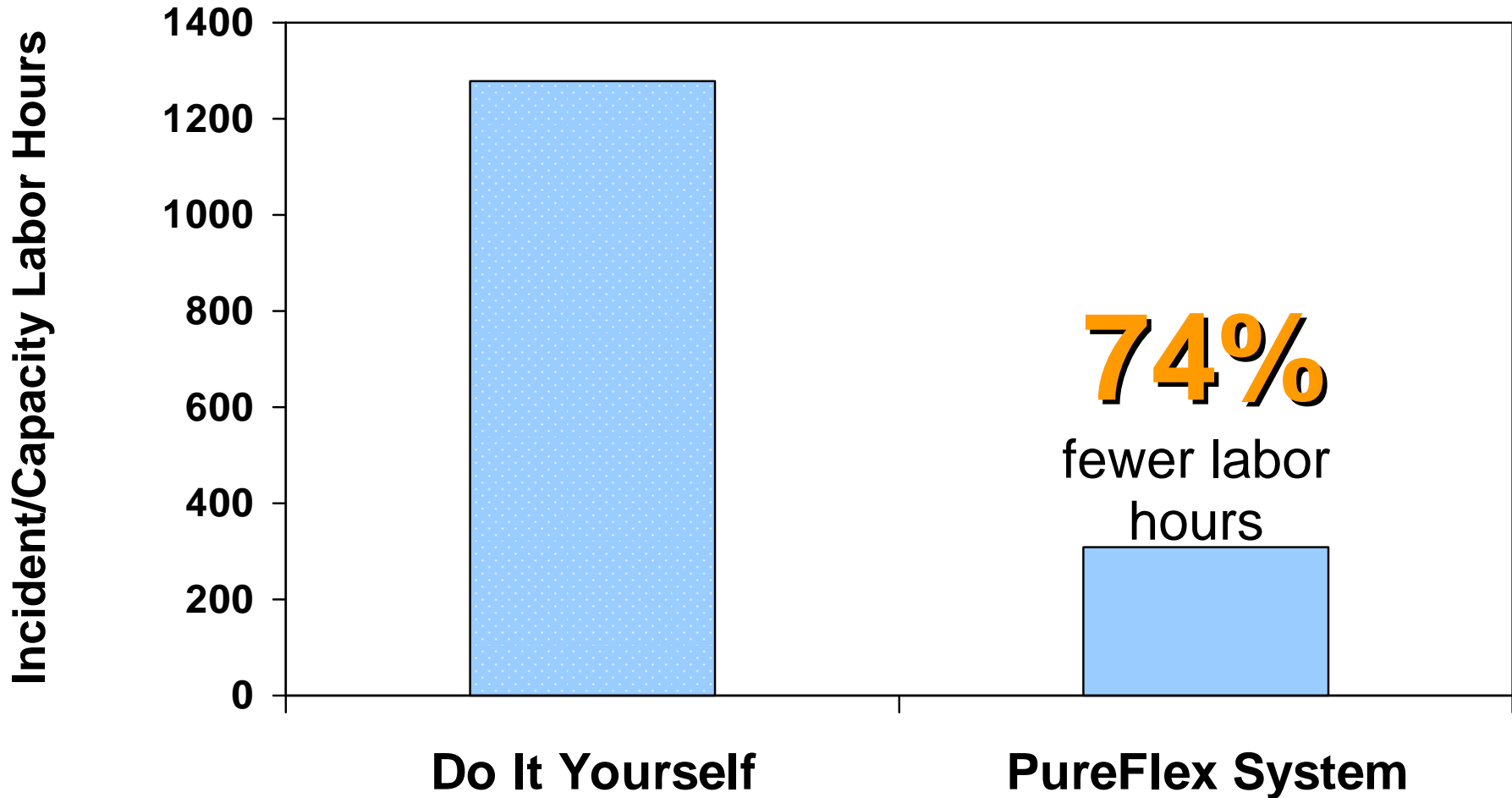by 77%

Incident/Cap
acity
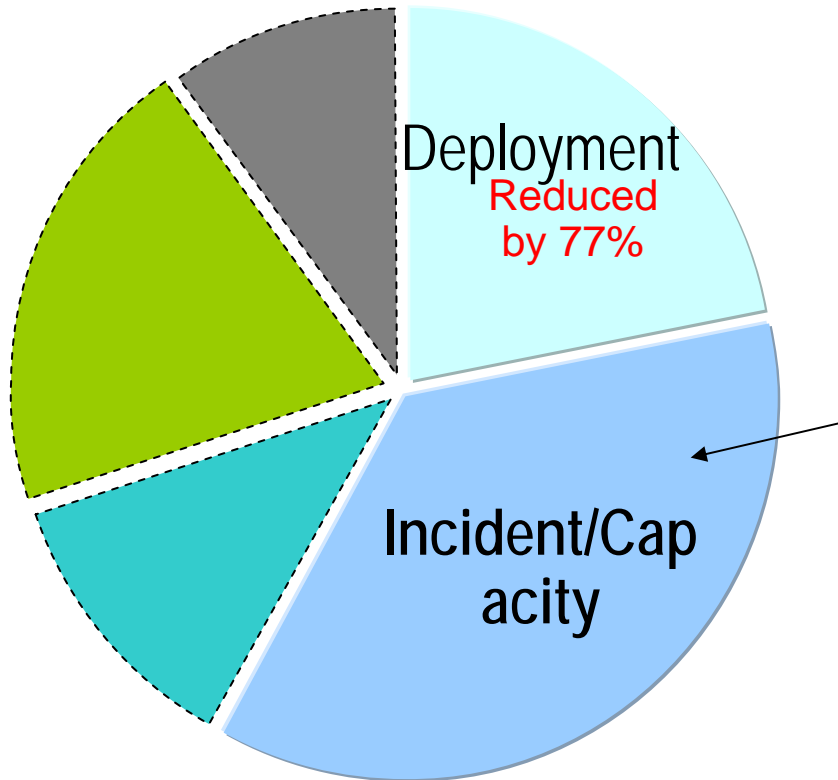
- Monitoring to quickly isolate issues with hardware and workloads running on multiple virtual servers

- Resource adjusts* for workloads to meet performance goals

- Automated parallel VM deployment

- Image Lifecycle Management

* PowerVM™ on IBM PureFlex Systems delivers superior scale-up efficiency that outperforms vSphere 5.0 by 59%, running the same workloads on Linux across virtualized resources

* "TPoX Benchmark Results on IBM PureFlex Systems", April 2012

PureFlex System Cuts Incident/Capacity Mgmt Labor Costs

Bar chart comparing Incident/Capacity Labor Hours. "Do It Yourself" ≈ 1280 hours; "PureFlex System" ≈ 310 hours. **74%** fewer labor hours.

Summary: PureFlex System Labor Savings For Case Study

17024 **total** hours per year reduced by **51%** to **8281** hours per year

Change Management
Standardization of images and firmware, coordinated automated firmware changes

Reduced by 5%

Deployment Management
Quick deployment of workloads via self-service portal with automated approvals
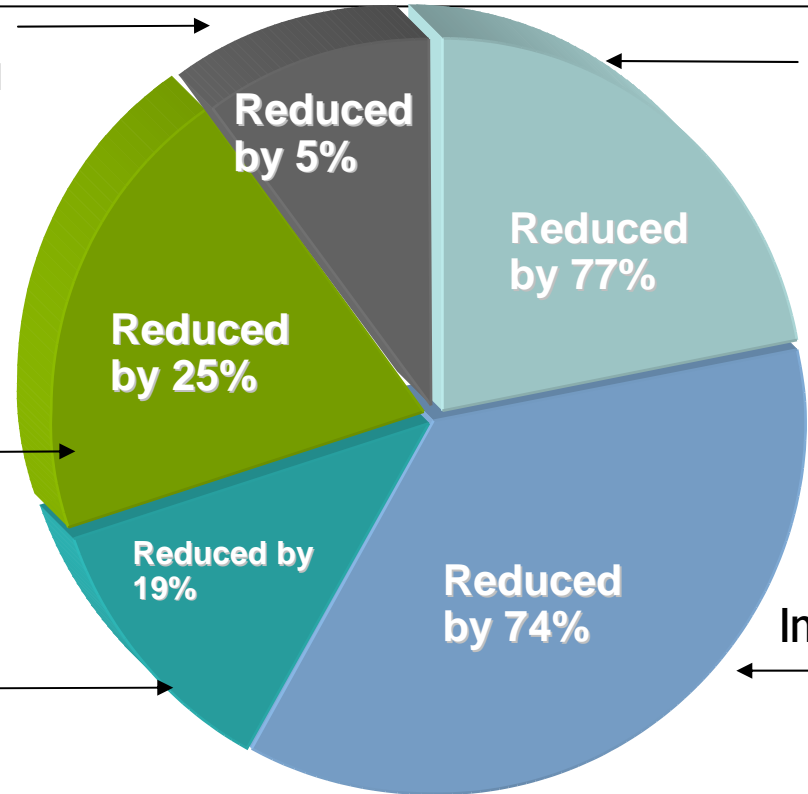
Reduced by 77%

Reduced by 25%

Security Management
Centralized fine-grain access control

Reduced by 19%

Reduced by 74%

Incident/Capacity Management
Quickly isolate and fix issues with automation

Asset Management
Metering and billing for workloads

Summary
FSM labor savings

Estimated Labor Savings with 2-to-1 Core-to-VI Ratio			
Constants		**Hours Saved**	
Total Hours		17024	
Improved Hours		8281	
Hours Saved		51%	
FTE Cost per Year		$120,000	
FTE Hours per Year		2080	
Cost per Hour		$58	
Staff Cost Saved per Year		$504,383	
3-Year Staff Cost Savings		$1,513,148	

PureFlex Costs	Required Item	Per Unit	(28 Nodes)
	Node	-2,594	-$72,632
	Chassis	16,852	$67,408
	Rack	2,699	$2,699
	FSM	2,611	$2,611
	(3 Years) HW Maint	1,022	$85,848
	(OTC) Smart Cloud	21,000	$84,000
	(OTC) Services	2,500	$2,500
	Total costs		$172,434
	3-Year ROI		778%

Labor Saving calculations:

- FTE Cost per Year can be changed for each account.
- Actual PureFlex Costs can be used.

Comparing the costs for PureFlex hybrid workload deployments

What do I gain by using PureFlex and the Flexible System Manager?

Can't I just use BladeCenters to do it myself?

You could, but PureFlex can cut the cost of labor to manage these workloads by 51% compared to do it yourself.

The 3-year ROI is 778%!

IBM zEnterprise Hybrid Architecture Alignment
Hybrid Workload Characteristics

zEnterprise and PureSystems Provide the Foundation to Optimize Multi-platform Workloads

Workloads that …

- Include distributed components

- Rely on or would benefit from highly secure and scalable mainframe Application or Data Services.

  .

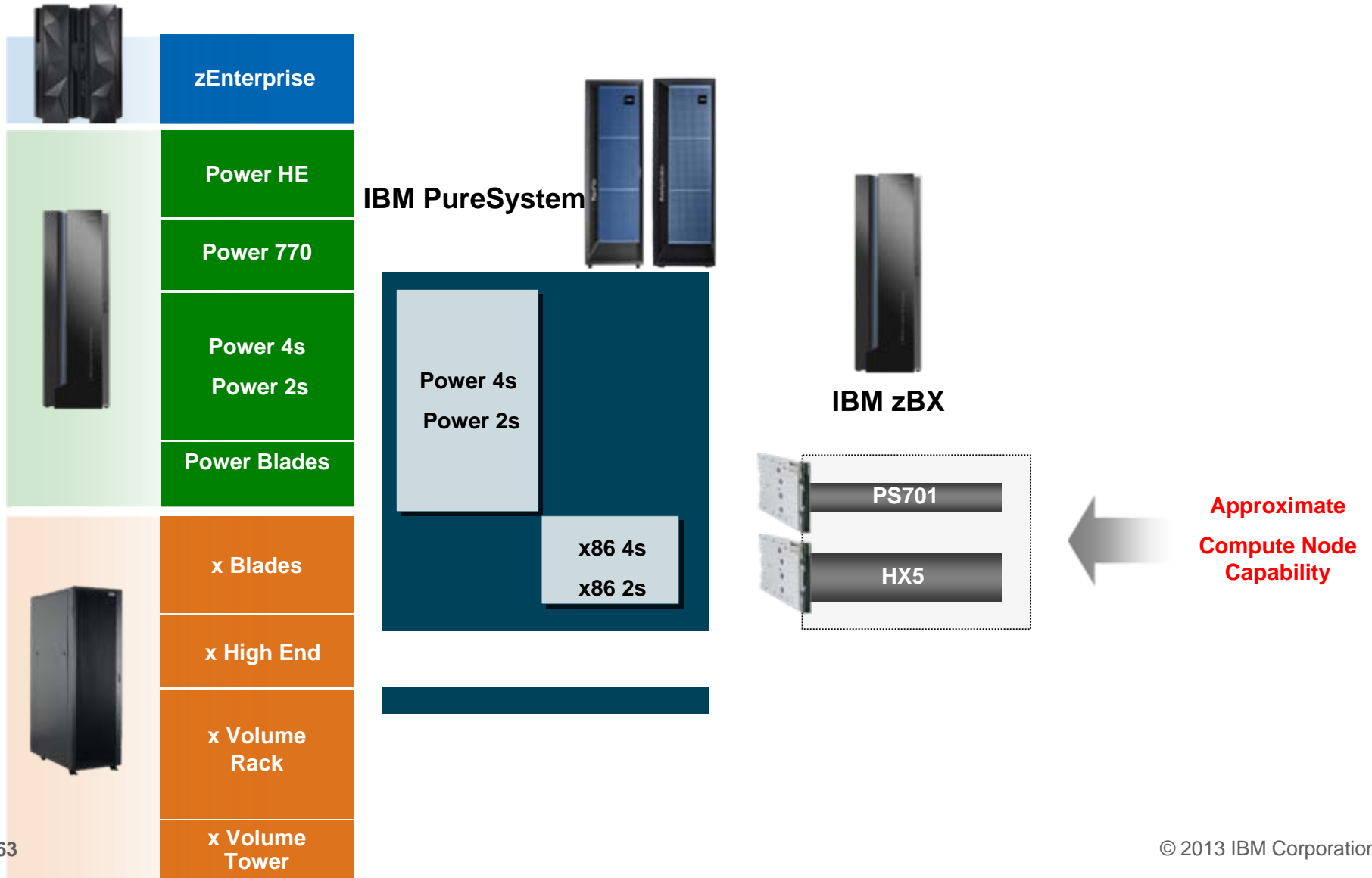- Are strategic workloads driven by a Line of Business looking for fast deployment.

… and …

- Reside in production and/or test environments.

- Looking to reduce Operational cost of application deployment and management..

… but also may benefit from …

- Single pane of glass to manage disparate environments
- Workload-centric policies and management

Considerations – Local Storage, *Compute and Networking Scale*

zEnterprise

Power HE

Power 770

Power 4s
Power 2s

Power Blades

x Blades

x High End

x Volume Rack

x Volume Tower

IBM PureSystem

Power 4s
Power 2s

x86 4s
x86 2s

IBM zBX

PS701

HX5

Approximate

Compute Node Capability

Hybrid Architecture Building Block Summary

IBM zEnterprise EC12 (zEC12)	IBM zEnterprise 114 (z114)	Management Framework *Offerings*	Integrated Expert Systems® PureFlex	zEnterprise BladeCenter Extension zBX
The next generation of mainframe technology, more performance, more scale, more efficient		**IBM** Flex System Manager	High Performance Fabric that supports all major distributed Operating Systems	A CI Offering that supports selected distributed Operating Systems
		Unified Resource Manager		

Thank You

Back-up Slides

Capture Tooling

For Capture of Virtual System Patterns, in order of capability:

- **z/OS -** not applicable

- **Linux on System z -** IBM Systems Director 6.3 with the VMControl Plug-In provides this support.

- **x86 Windows (32 bit) -** IBM Systems Director 6.3 with the VMControl Plug-In provides this support, SmartCloud Entry for x86, IWD, ICCT.

- **x86 Windows (64 bit) -** IBM Systems Director 6.3 with the VMControl Plug-In provides this support, SmartCloud Entry for x86, IWD, ICCT.

- **x86 Linux -** IBM Systems Director 6.3 with the VMControl Plug-In provides this support, SmartCloud Entry for x86, IWD, ICCT.

- **POWER AIX -** IBM Systems Director 6.3 with the VMControl Plug-In provides this support, SmartCloud Entry for x86, IWD, ICCT.

- **Linux on Power -** IBM Systems Director 6.3 with the VMControl Plug-In provides this support, SmartCloud Entry for x86, IWD.

- **PureFlex -** IBM SmartCloud Entry, ICCT, IWD.

- **PureApplication -** Integrated as part of base offering.

Deploy & Manage Tooling

For Deploy & Manage of Virtual Application Patterns, in order of capability:

- **z/OS -** not applicable

- **Linux on System z -** IBM Systems Director 6.3 with the VMControl Plug-In provides this support, SmartCloud Entry for x86, TPM for System z, IWD.

- **x86 Windows (32 bit) -** IBM Systems Director 6.3 with the VMControl Plug-In provides this support, SmartCloud Entry for x86, TPMiF, IWD.

- **x86 Windows (64 bit) -** IBM Systems Director 6.3 with the VMControl Plug-In provides this support, SmartCloud Entry for x86, TPMiF, IWD.

- **x86 Linux -** IBM Systems Director 6.3 with the VMControl Plug-In provides this support, SmartCloud Entry for x86, TPM, IWD.

- **POWER AIX -** IBM Systems Director 6.3 with the VMControl Plug-In provides this support, SmartCloud Entry for POWER Systems, TPM, IWD.

- **Linux on Power -** IBM Systems Director 6.3 with the VMControl Plug-In provides this support, SmartCloud Entry for POWER Systems TPM, IWD.

- **PureFlex -**IBM SmartCloud Entry, TPM, IWD.

- **PureApplication -** Integrated as part of base offering.