IBM Transformation:
Enabling the Globally Integrated Enterprise

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IBM Transformation – Enabling the Globally Integrated Enterprise

- IBM Business Transformation and IT – Strategy and Scope

- IBM's IT Infrastructure Transformation

- Enterprise Virtualization and Progress

- Program Model and Workload Selection

- Business Case and Benefits

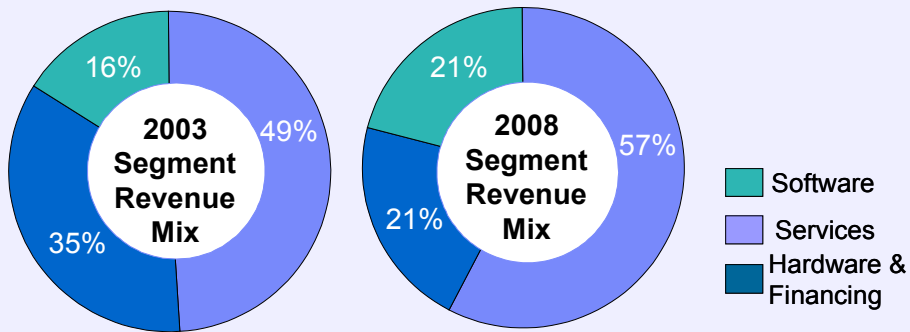- Lessons Learned/Critical Success Factors

IBM's Ongoing Transformation Journey

Business Model, Operating Model and Workforce Transformation

Remixed our portfolio toward services, software, and integrated solutions…

- **Exited commoditized businesses:**
  - PCs
  - Hard disk drives
  - Printing Systems

- **Strengthened position in:**
  - Business Consulting
  - Service-Oriented Architecture
  - Information on demand
  - Virtualization
  - Open, modular systems

- **Acquired over 60 companies in last 5 years**
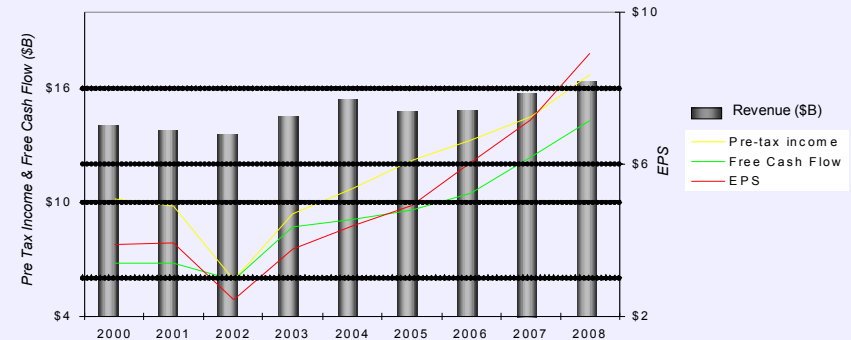 - to complement and scale our portfolio of products and offerings

16% / 49% / 35% — **2003 Segment Revenue Mix**

21% / 57% / 21% — **2008 Segment Revenue Mix**

- Software
- Services
- Hardware & Financing

Shift in geographic mix…

- 2008 revenue:
  - 21% Asia Pacific
  - 37% Europe, Middle East, Africa
  - 42% Americas

- 71% of employees outside US
  - 84K in India, 60K increase in 5 years
  - 16K in China, 10K increase in 5 years

- **Record Performance in 2008…**
  - $103.6B revenue, up 5%
  - $16.7B pre-tax earnings, up 15%

Pre Tax Income & Free Cash Flow ($B) / EPS

Revenue ($B)
Pre-tax income
Free Cash Flow
EPS

2000 2001 2002 2003 2004 2005 2006 2007 2008

  - $8.93 Earnings Per Share, up 24%
  - Strong performance in services, software and growth markets

IBM Strategy and Values

... Building a Smarter Planet

Focus on open technologies and high- value solutions

Deliver integration and innovation to clients

Become the premier Globally Integrated Enterprise

Our world is becoming **INSTRUMENTED.**

Smart traffic systems

Smart food systems

Our world is becoming **INTERCONNECTED.**

Smart supply chains

Smart energy grids

All things are becoming **INTELLIGENT.**

Smart retail

Smart healthcare

IBMers Value

Dedication to every client's success.

Innovation that matters—for our company and for the world.

Trust and personal responsibility in all relationships.

IBM Strategy and Values

BusinessTransformation and IT

Mission

Align BT/IT to IBM Strategy
to drive our company's success

Transformation Objectives

Accelerate delivery of business value
Improve service quality
Simplify BT/IT processes
Deliver operational efficiency

Priorities

Operational Excellence
Business Value
Showcase Solutions
Team Development

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IBM's own Transformation Experience

IBM IT Transformation

✓ *IBM's own IT investments over the past 5 years have delivered a cumulative benefit yield of $4.1B*

Data Center Efficiencies Achieved

✓ **Consolidation of infrastructure, applications**
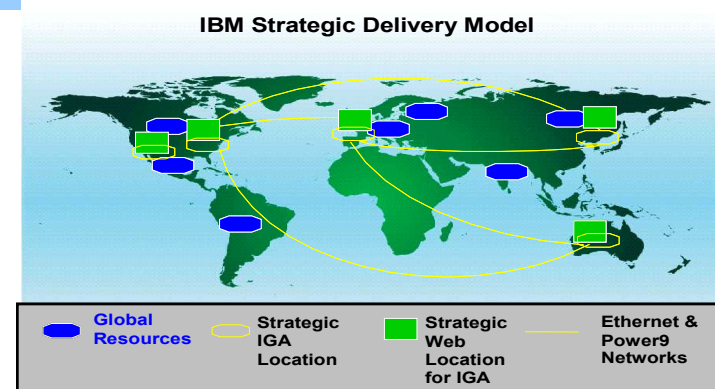✓ **Optimize resources, Globally Integrated Enterprise**

Next Level of Infrastructure Challenge

✓ *Floor space, underutilized and outdated assets*
✓ *Continued infrastructure cost pressure*
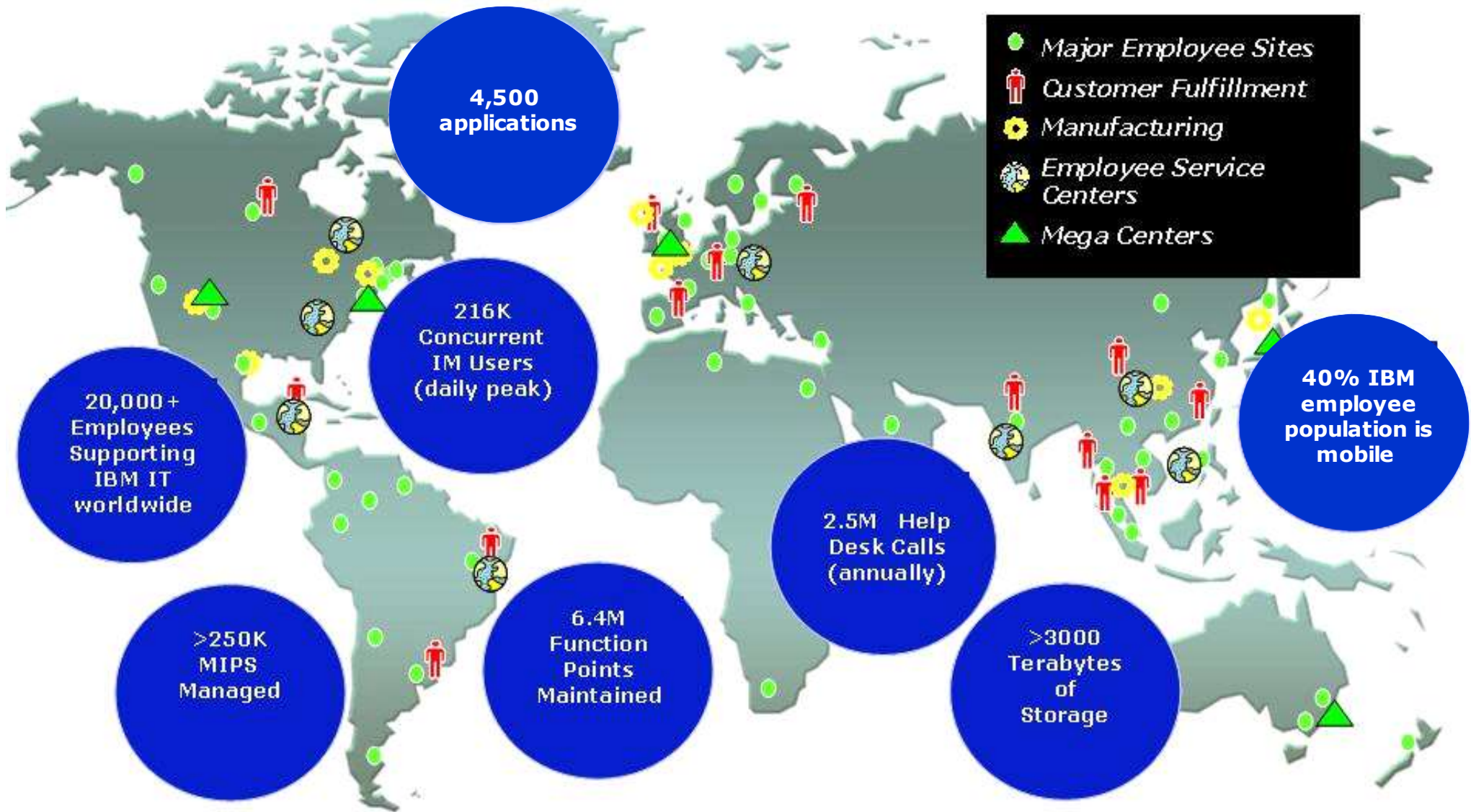✓ *Increase % IT spending to transformation initiatives*

Dynamic Infrastructure for a Smarter Planet

✓ **Simplified – rationalized and consolidated**
✓ **Standardized – service catalog**
✓ **Shared – virtualized and shared resources**
✓ **Dynamic – flexible/agile globally integrated enterprise, cloud computing**

	1997	Today
CIOs	128	1
Host data centers	155	7
Web hosting centers	80	5
Network	31	1
Applications	15,000	4,700

IBM Strategic Delivery Model

Global Resources	Strategic IGA Location	Strategic Web Location for IGA	Ethernet & Power9 Networks

IBM Global IT Landscape

4,500 applications

Major Employee Sites
Customer Fulfillment
Manufacturing
Employee Service Centers
Mega Centers

216K Concurrent IM Users (daily peak)

20,000+ Employees Supporting IBM IT worldwide

40% IBM employee population is mobile

2.5M Help Desk Calls (annually)

>250K MIPS Managed

6.4M Function Points Maintained

>3000 Terabytes of Storage

Project 'Big Green'

Double compute capacity with no increase in consumption or impact by 2010

IBM to reallocate $1 billion each year

- Accelerate 'green' technology / services
- Client energy roadmap / IBM capabilities
- Global 'green' team

Re-affirming IBM commitment

- 40% reduction in CO_2 emissions and $250M energy savings / 15 years
- Commit to invest $100M/yr infrastructure to support best 'green' practices

Major proof point for Project Big Green

IBM'S PROJECT BIG GREEN SPURS GLOBAL SHIFT TO LINUX ON MAINFRAME

ARMONK, NY, August 1, 2007

- *IBM will consolidate and virtualize thousands of server images onto IBM System z™ mainframes*
- *Substantial savings: energy, software and systems support costs*
- *80% less energy, 85% less floor space*
- *Enabled by virtualization capability*

Think what we could do for you

IBM

Enterprise Business Value

	Expectations	Benefits Realized	Challenges
	Business Case: • Significant potential savings • Virtualization as a cross-IBM effort	• Savings in energy, software and systems support costs	▪ Decision-Making: Business Unit versus Enterprise view ▪ Detailed internal business case ▪ Integrating project / program priorities
	Standardization and Simplification • Reduced complexity, centralized service • Dynamic allocation, provisioning	• Inventory hygiene, mapping of applications • Dramatically faster provisioning	▪ Incomplete inventory records ▪ Disparate release levels
	Migration and Service Quality - • Efficiency • Stability • Availability • Resiliency	•Improved security and resiliency •Quality – simple, stable, available	▪ Project management discipline ▪ Workload selection and complexity ▪ Architecture for a shared environment ▪ End to end resource balancing and skills management

IBM System z Linux Virtualization Progress

- Established phased approach

- Comprehensive project plan and management system

- Benefits are on track with expectations

- Technical solution, education plan and operational plan

- IBM Time to Value initiatives, integrated into IBM capabilities

- Highest level of support from IBM senior executive team

- Increased focus on decommissioning to realize benefits

Phase 1
"Quick wins"

Phase 2
Highest Savings First

Phase 3-n
Finish Virtualization

Initial Consolidation Challenges

Key Pain Points

- Inefficient processes
- Customized environments
- Lack of information

Defects affecting cycle time & labor costs
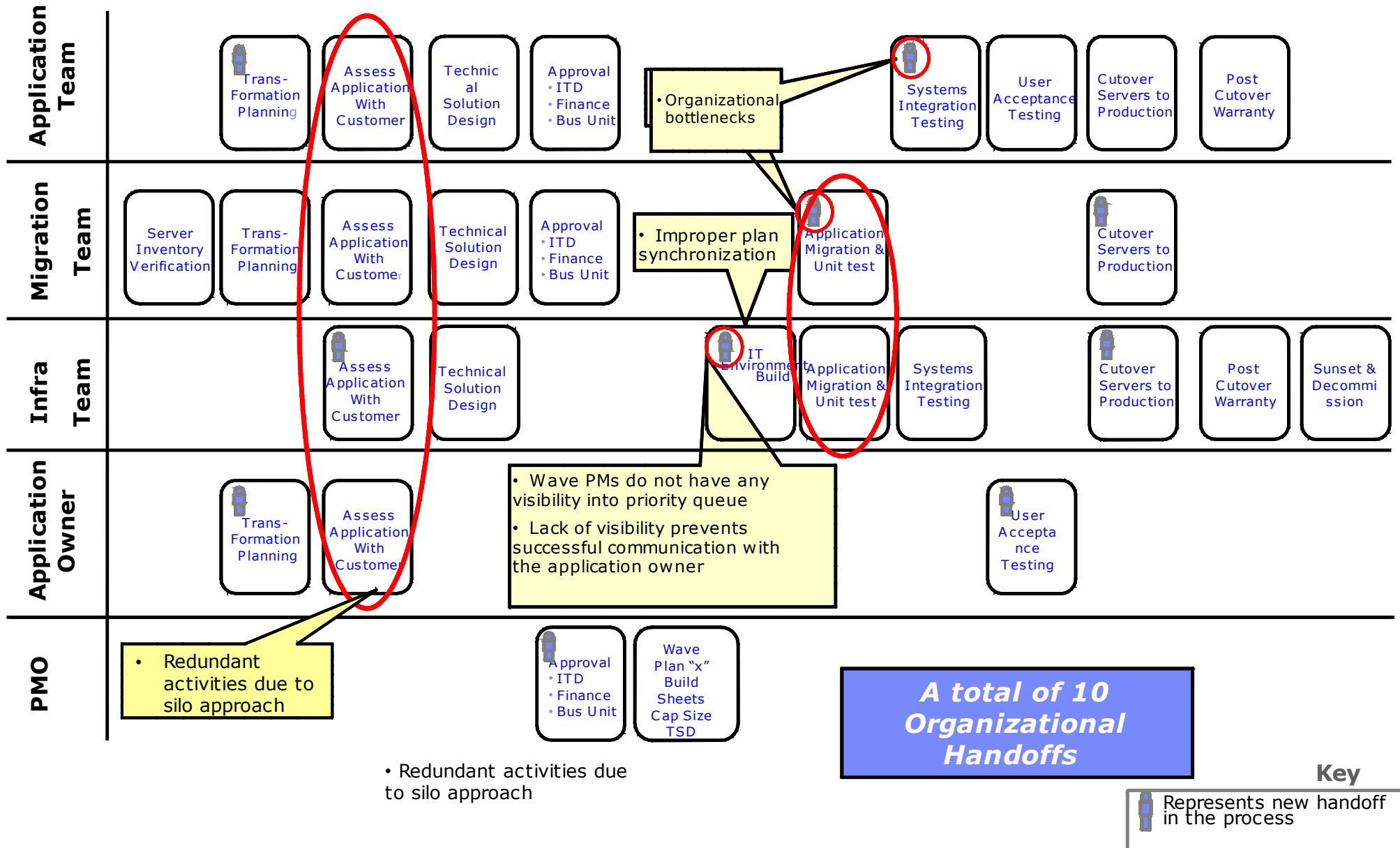
- Inventory verification
- Qualification
- Migration
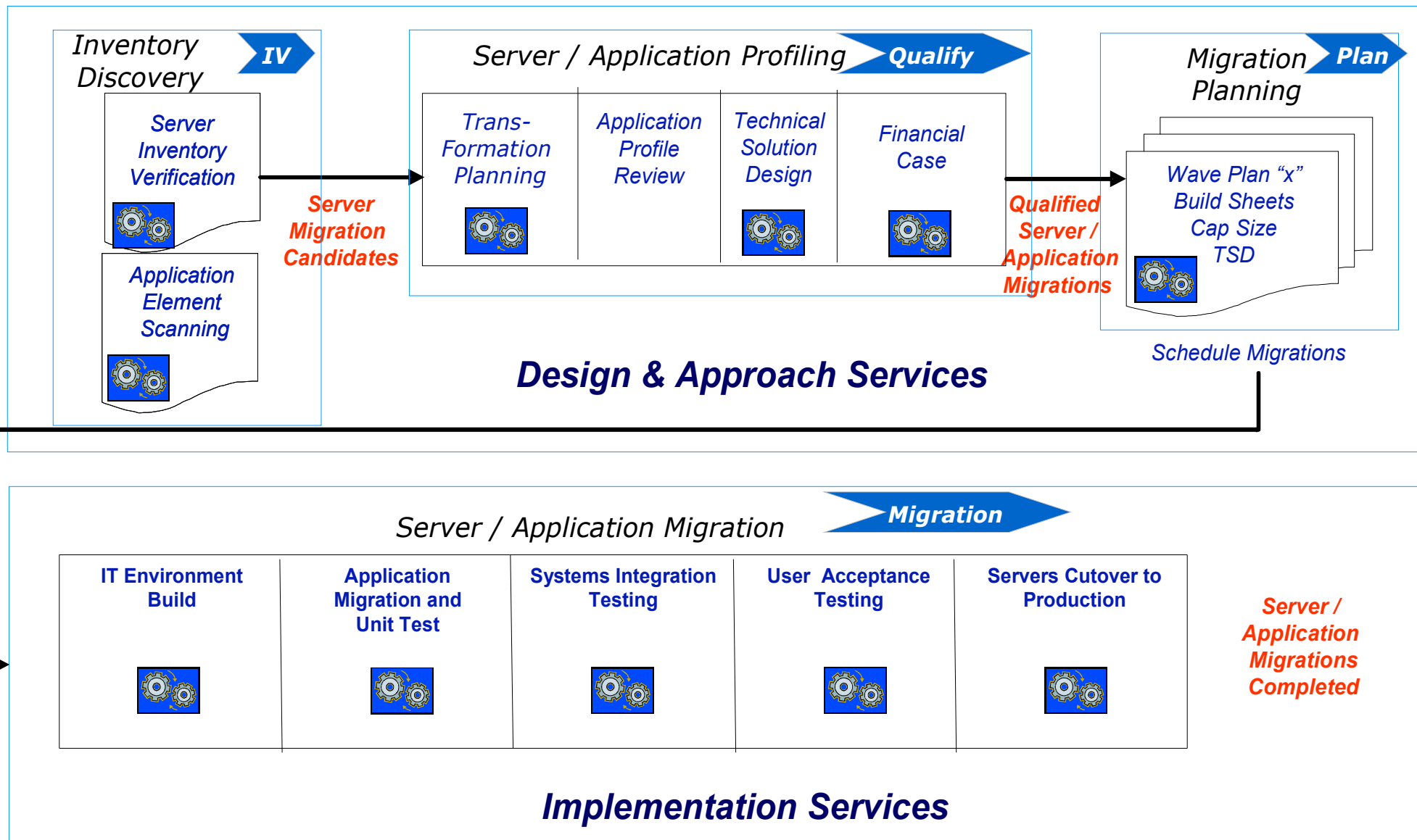
Why is this so difficult?

- Complexity
- Skills
- Management systems

Our original zLinux Migration production process

Our Enhanced Migration Process – *IBM Optimization Factory Application Migration*

Inventory Discovery   `IV`

Server Inventory Verification

Application Element Scanning

→ *Server Migration Candidates*

Server / Application Profiling   `Qualify`

Trans-Formation Planning	Application Profile Review	Technical Solution Design	Financial Case

→ *Qualified Server / Application Migrations*

Migration Planning   `Plan`

Wave Plan "x" Build Sheets Cap Size TSD

Schedule Migrations

Design & Approach Services

Server / Application Migration   `Migration`

IT Environment Build	Application Migration and Unit Test	Systems Integration Testing	User Acceptance Testing	Servers Cutover to Production

Server / Application Migrations Completed

Implementation Services

= denotes integrated automation

Workflow is highly Standardized, Streamlined and Automated to maximize efficiency

IBM is Using a 'Work in Process' Approach to Manage the Migration

Management Approach and Reporting

- Process approach borrowed from factory line management

- Metrics for each sub-process

- Process fallout – tracked by cause

- Daily status calls issue resolution

- Weekly management review cadence

Weekly Pipeline Summary - Server Metrics

IBM ECM End to End Process

Project Phase	Server Inventory Verification	Server / Application Qualification	Migration Planning	Server / Application Migration	Post Production	Total Servers In Pipeline
Ph 1: US						
Ph 2: US						
Ph 3: Americas						
Ph 4: Europe						
Ph 5: AP/Japan						
Total						

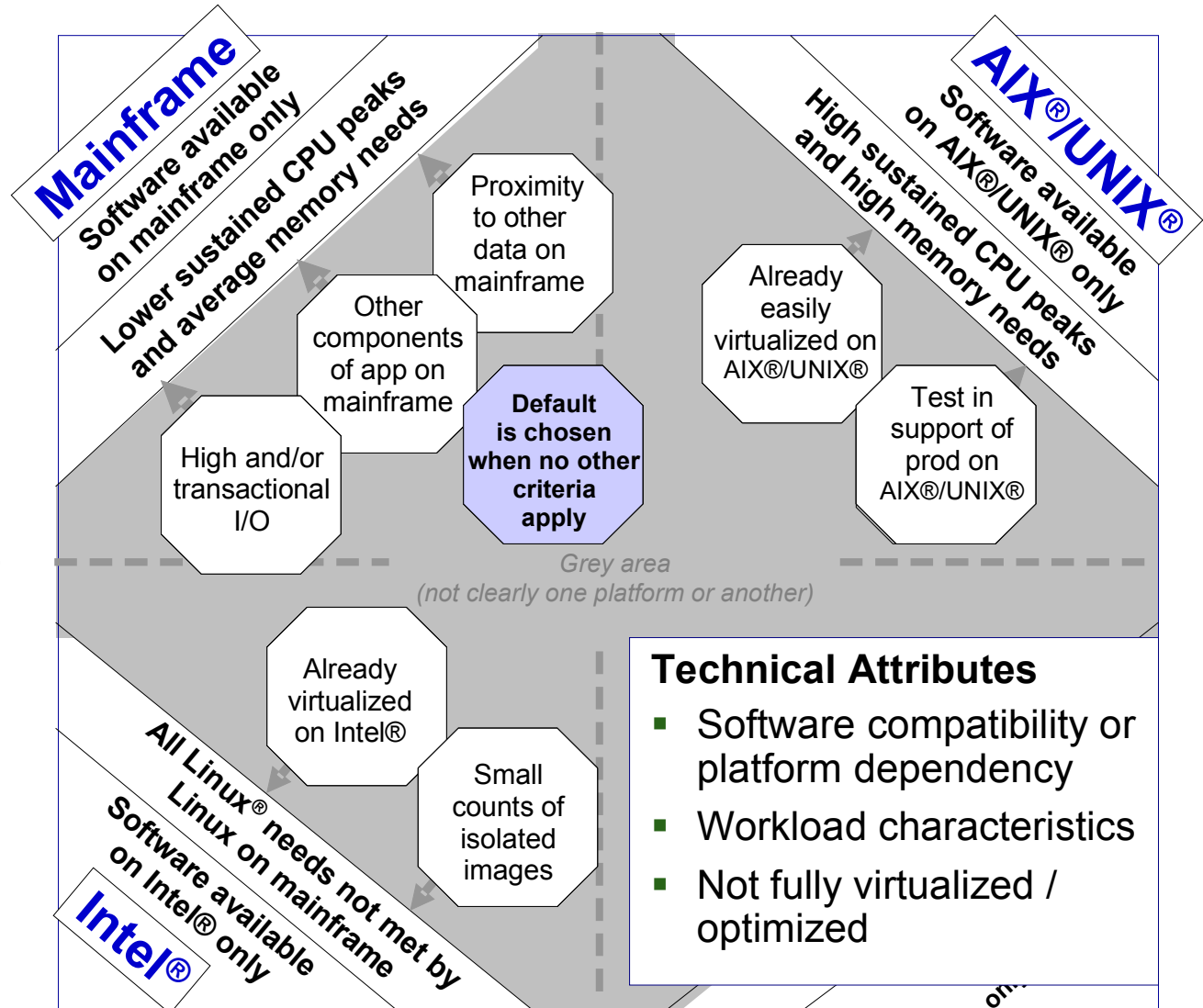| Pipeline Management	Finance	Comms	Process	Technical Solution

Each Workload is Evaluated for Suitability Based on Technical Attributes

▪ Fit for Purpose

– Workloads matched to platform: fit for purpose
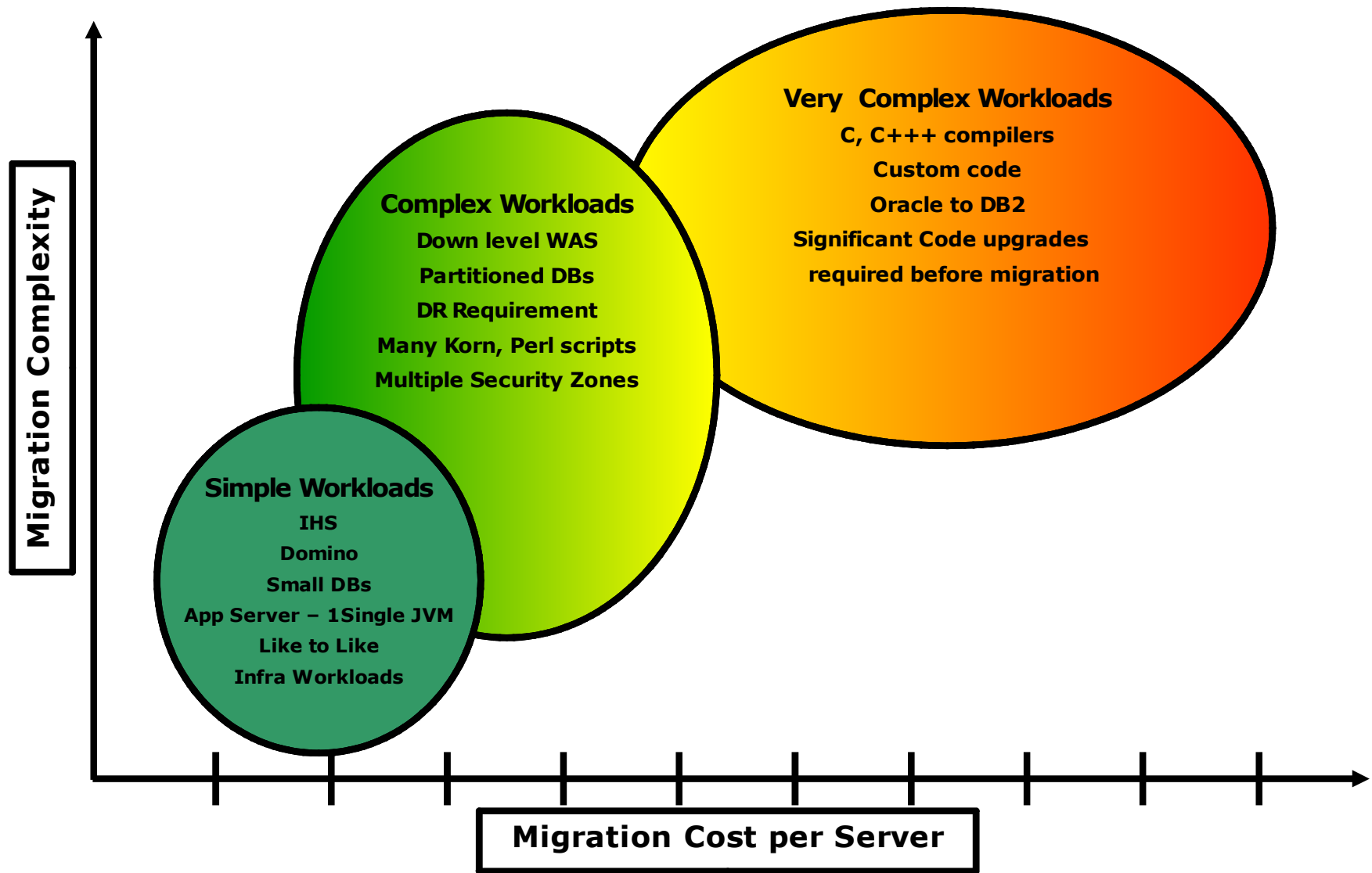
– Consider compatibility, performance, costs

▪ Priority Workloads for z Virtualization:

– WebSphere®, Domino®, DB2 Universal Database®, WebSphere MQ®

– Selected tools: Tivoli®, WebSphere® and internally developed

Mainframe
Software available on mainframe only
Lower sustained CPU peaks and average memory needs

AIX®/UNIX®
Software available on AIX®/UNIX® only
High sustained CPU peaks and high memory needs

Proximity to other data on mainframe

Other components of app on mainframe

High and/or transactional I/O

Default is chosen when no other criteria apply

Already easily virtualized on AIX®/UNIX®

Test in support of prod on AIX®/UNIX®

Grey area (not clearly one platform or another)

Already virtualized on Intel®

Small counts of isolated images

All Linux® needs not met by Linux on mainframe
Software available on Intel® only

Intel®

Technical Attributes
▪ Software compatibility or platform dependency
▪ Workload characteristics
▪ Not fully virtualized / optimized

Workload Complexity Costing

Strategy: Segment migration costs based on complexity of workload

Objective: Minimize contract risk by segmenting applications into price / variability segments

Migration Complexity (y-axis)

Very Complex Workloads
C, C+++ compilers
Custom code
Oracle to DB2
Significant Code upgrades
required before migration

Complex Workloads
Down level WAS
Partitioned DBs
DR Requirement
Many Korn, Perl scripts
Multiple Security Zones

Simple Workloads
IHS
Domino
Small DBs
App Server – 1Single JVM
Like to Like
Infra Workloads

Migration Cost per Server

Enterprise View enables success in workload migration

Location View
Southbury GWA consolidation -
sunset of first-generation Web Architecture

Environment View
Development and Test Environments
allowing for iterative development and
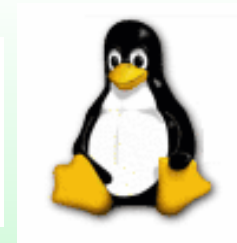better application quality

Migration Candidates Sourcing

Application View
Portfolio analysis and
"fit for purpose" selection -
OnDemand Workplace, e-mail, Supply Chain
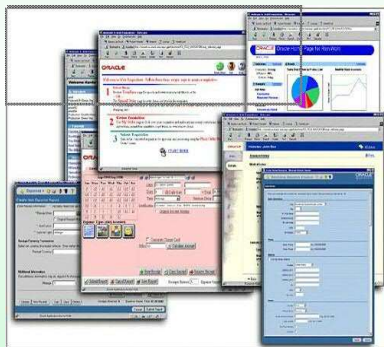
Technology View
Bulk Moves –
35K Notes applications (GNA),
IBM http servers, Domino

Business Case Leveraged RACE Tool, Iterative Approach

Utilized RACE modeling tool

– Foundation for internal business case, constructed specific environmental variables

Created financial plan for "known universe"

– Identified relevant sample (5-10%) of most likely servers to be migrated and gathered financial profile information for each

Engaged SME's within IBM

– Provided business case assumptions (i.e. depreciation/maintenance), modified as appropriate

Iterative Process

– Continuously engaged with core SME's to ensure most current information
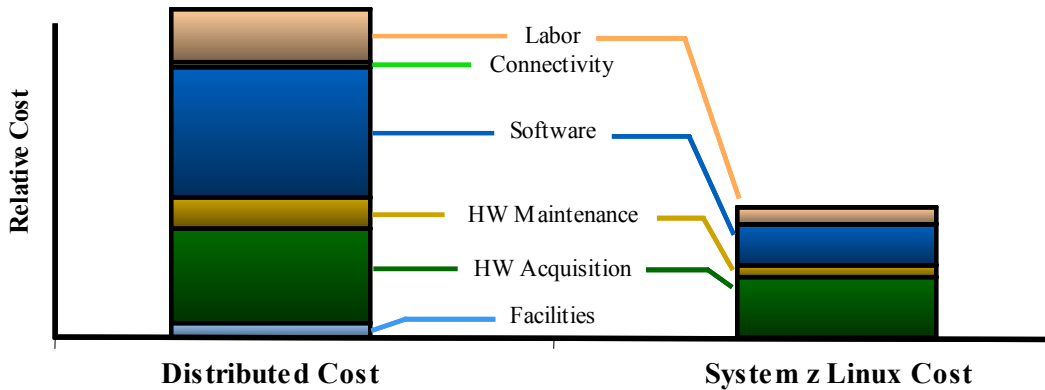
Project Metrics

– Weekly report of migrated servers and their disposition status (reuse or disposal using GARS*) and Energy Certificate status
– Working to incorporate actuals into the Business Case such that we can refresh our assumptions

IBM Global Asset Recovery Services

Client View of TCO Comparison for Similar Distributed Workload vs. System z Linux results in Potential 60-75% Gross Costs Savings / 5 yrs
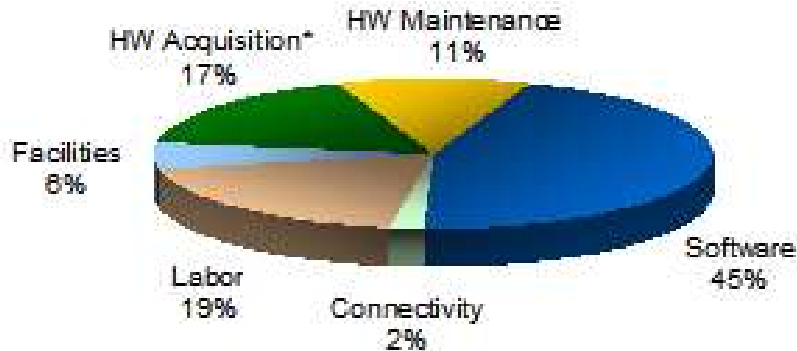
Operating Cost: Distributed vs. Mainframe

- Labor
- Connectivity
- Software
- HW Maintenance
- HW Acquisition
- Facilities

Relative Cost

Distributed Cost   System z Linux Cost

Potential Savings: Categories as a % of Gross Savings

HW Acquisition* 17%
HW Maintenance 11%
Facilities 8%
Labor 19%
Connectivity 2%
Software 45%

* HW Acquisition compares server/disk refresh of distributed environment to the cost of acquiring new mainframes/storage

Dramatic Simplification

Unit	Distributed	System z Linux	% Reduction
Software Licenses	26,700	1,800	93%
Ports	31,300	960	97%
Cables	19,500	700	96%
Physical Network Connections	15,700	7,000	55%

Results will vary based on several factors including # of servers and work load types

In addition to compelling savings, by virtualizing distributed workload onto System z Linux, ECM operational benefits are being realized

From application owner perspective …

- Speed: Rapidly clone environment - hours vs. days vs. weeks
- On demand resources: Add system resources (memory, cpu) as needed
- Scalable growth: I/O intensive workloads and cyclical applications
- Enable new business models: Significantly reduced need for dedicated development and test servers

From infrastructure owner perspective…

- System stability: Server reboot/recycling greatly reduced
- Simplification: Less hardware and related features to manage
- Improved change management: Significantly less security patches to apply
- Increased agility: non-disruptive changes

Infrastructure Transformation – Lessons Learned

Preparation
- Motivate business units
- Build the business case
- Gather data

Start-Up
- Start small
- Run operations while transforming
- Manage complexity, monitor progress continually
- Define reference architecture

Execution
- Integrate view of waves, resources
- Communicate real-time lessons
- Create enterprise view of workload, server selection
- Address cultural and organizational transformation

Critical Success Factors

- Sponsor with an enterprise view

- Strategic investment for migration

- Clear goals, dedicated team, inclusive leadership for execution of migration

- Leveraging talent and capability across all of IBM to drive rapid results
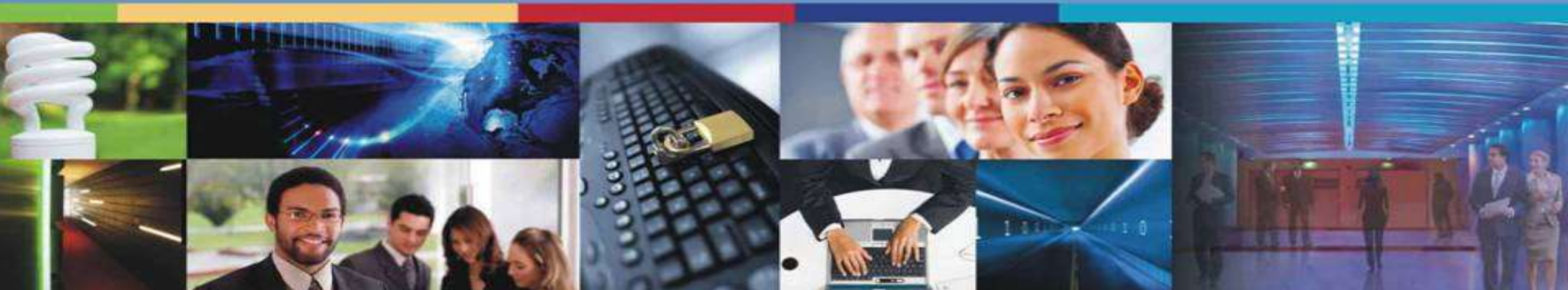
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DB2*	IBM Business Partner Logo*	System z	z10
Db2 Universal Database	IBM Logo*	System z9	z/OS*
Domino*	POWER5	System z10	zSeries*
GARS	Power Systems	Tivoli*	z/VM*
HiperSockets	System I		

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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.

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