Share Session 9301 - Extreme Virtualization at IBM: One step at a time, then run like they are chasing you

Business Transformation and IT

IBM Transformation:
Enterprise Computing Model Update

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Linux and Virtualization Architecture and Strategy
August 2009

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IBM Transformation – Enterprise Computing Model Update

- IBM Business Transformation and IT
- Enterprise Virtualization Progress
- IBM Optimization Services
- Lessons Learned Summary

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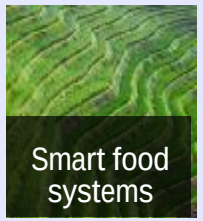
IBM Strategy and Values

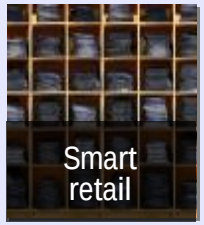
… Building a Smarter Planet

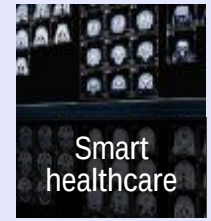
Our world is becoming **INSTRUMENTED.**



Our world is becoming **INTERCONNECTED.**

All things are becoming **INTELLIGENT.**





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.

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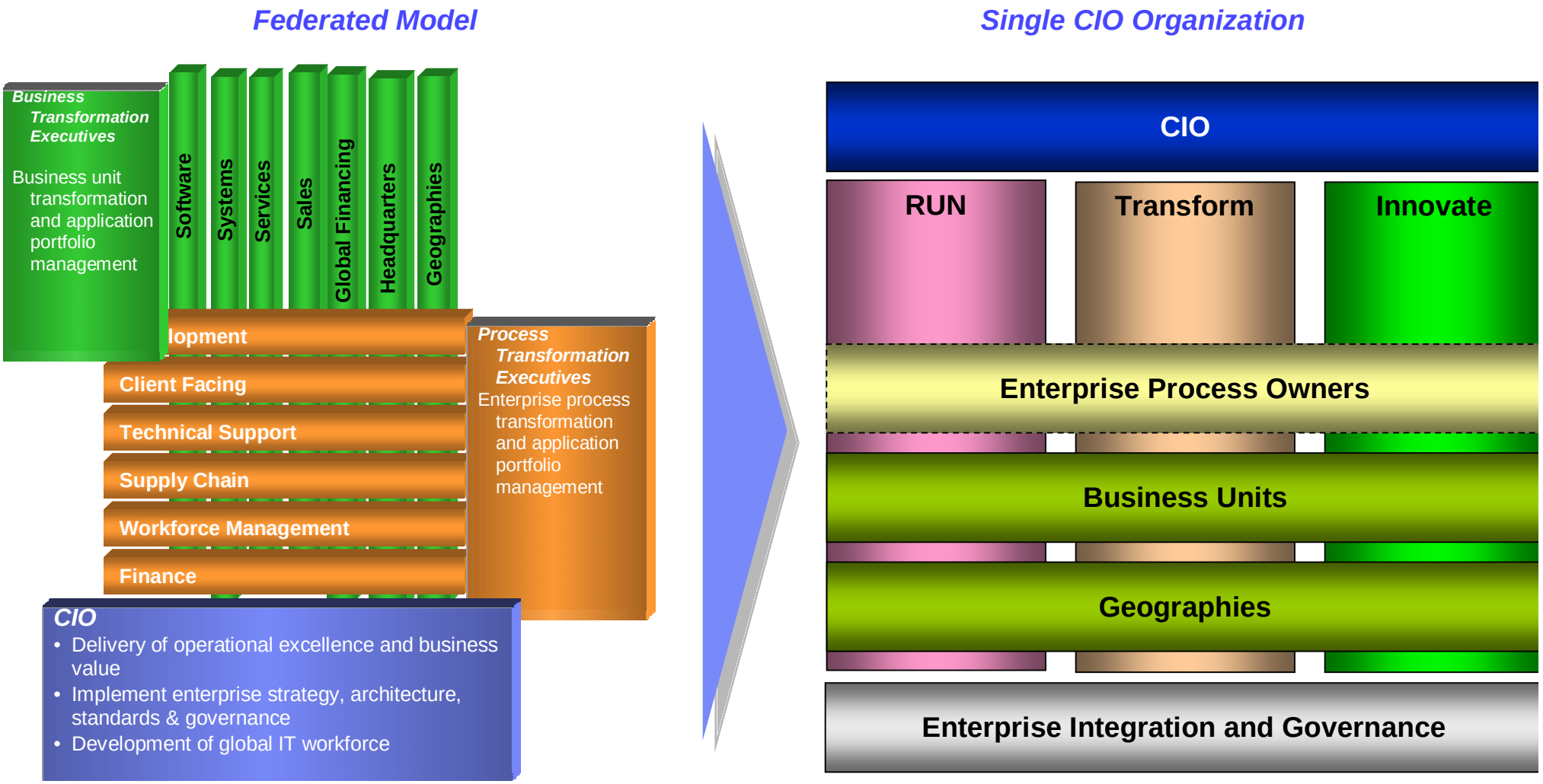
A single CIO organization supports IBM's business strategy



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IBM's own Transformation Experience

IBM IT Transformation

ü *IBM's focus on IT enablement has allowed IBM to reduce IT spending by $1.5 Billion in the past 5 years*

Data Center Efficiencies Achieved

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

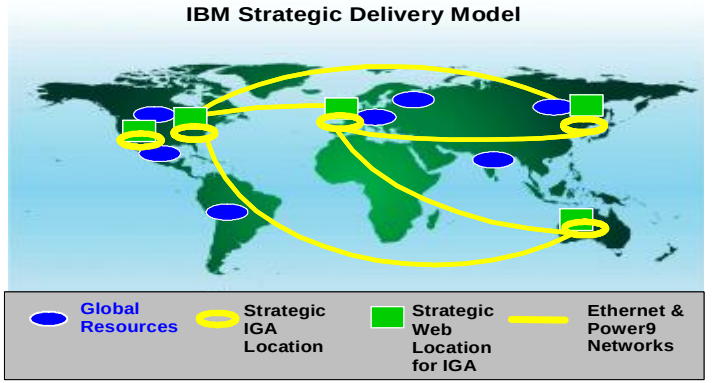
Next Level of Infrastructure Challenge

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

Dynamic Infrastructure for a Smarter Planet

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

	1997	Today
CIOs	128	1
Host data centers	155	5
Web hosting centers	80	5
Network	31	1
Applications	15,000	4,800



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Project 'Big Green'

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 system support costs*
- *80% less energy, 85% less floor space*
- *Enabled by virtualization capability*

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Enterprise Business Value

	Expectations	Benefits Realized	Challenges
	Business Case: . Significant potential savings . Virtualization as a cross-IBM effort	. Savings in energy, space, 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	§ Complex, customized environments § Disparate release levels § Incomplete inventory records § Inefficient processes impact cycle time and labor costs
	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

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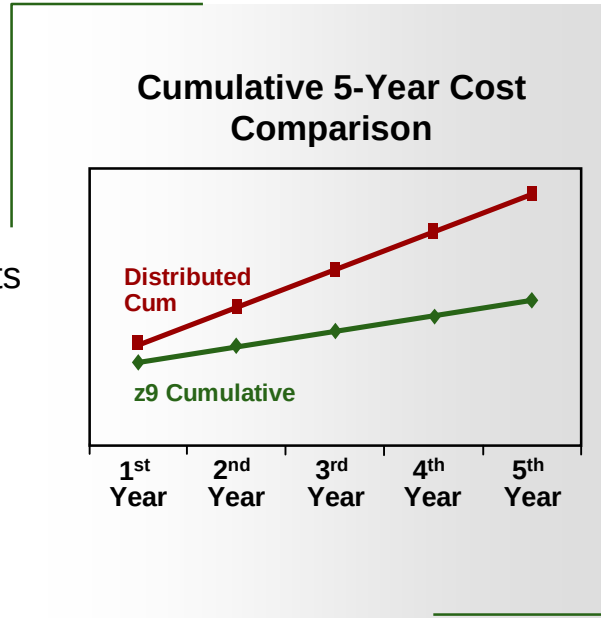
IBM System z Linux Virtualization Progress

IBM implementing New Enterprise Data Center through achievements in

- Server and storage virtualization
- Energy efficiency and resiliency improvements

Benefits are on track with expectations

- Migration management key
- Business case is compelling
- Using System z10 technology, the number of machines could be cut by about half, with greater savings in energy, floor space, software and support costs



Lessons Learned, including:

- Enterprise strategy and sponsorship needed to drive business case and execution
- Compelling business imperative accelerates execution and drives support
- Enterprise view of migration managed by waves drives experience; savings for investment

IBM experience is driving Time to Value initiatives, integrated into IBM capabilities

- Dramatic reduction in labor through new processes supporting workload migrations
- Fall in/out analysis, working with business units, to close gaps in workload pipeline
- Piloting new testing strategy, processes & tools to automate

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Business Case Leveraged RACE Tool, Iterative Approach

Utilized RACE commercial 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 o 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*

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TCO: A Range of IT Cost Factors – Often Not Considered

- ***Availability***
  - High availability
  - Hours of operation
- ***Backup / Restore / Site Recovery***
  - Backup
  - Disaster Scenario
  - Restore
  - Effort for Complete Site Recovery
  - SAN effort
- ***Infrastructure Cost***
  - Space
  - Power
  - Network Infrastructure
  - Storage Infrastructure
  - Initial Hardware Costs
  - Software Costs
  - Maintenance Costs
- ***Additional development/implementation***
  - Investment for one platform – reproduction for others
- ***Controlling and Accounting***
  - Analyzing the systems
  - Cost
- ***Operations Effort***
  - Monitoring, Operating
  - Problem Determination
  - Server Management Tools
  - Integrated Server Management – Enterprise Wide
- ***Security***
  - Authentication / Authorization
  - User Administration
  - Data Security
  - Server and OS Security
  - RACF vs. other solutions
- ***Deployment and Support***
  - System Programming
    - Keeping consistent OS and SW Level
    - Database Effort
  - Middleware
    - SW Maintenance
    - SW Distribution (across firewall)
  - Application
    - Technology Upgrade
    - System Release change without interrupts
- ***Operating Concept***
  - Development of an operating procedure
  - Feasibility of the developed procedure
  - Automation
- ***Resource Utilization and Performance***
  - Mixed Workload / Batch
  - Resource Sharing
    - shared nothing vs. shared everything
  - Parallel Sysplex vs. Other Concepts
  - Response Time
  - Performance Management
  - Peak handling / scalability
- ***Integration***
  - Integrated Functionality vs. Functionality to be implemente (possibly with 3rd party tools)
  - Balanced System
  - Integration of / into Standards
- ***Further Availability Aspects***
  - Planned outages
  - Unplanned outages
  - Automated Take Over
  - Uninterrupted Take Over (especially for DB)
  - Workload Management across physical borders
  - Business continuity
  - Availability effects for other applications / projects
  - End User Service
  - End User Productivity
  - Virtualization
- ***Skills and Resources***
  - Personnel Education
  - Availability of Resources

Routinely Assessed Cost Factors

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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

2009 Progress Update

- Refined workload segmentation
- Integrated workload selection approach
- Expansion to Europe / Japan
- Business case validation
- Process improvement and automation
- Global BT/IT CIO organization
- Broadened optimization focus

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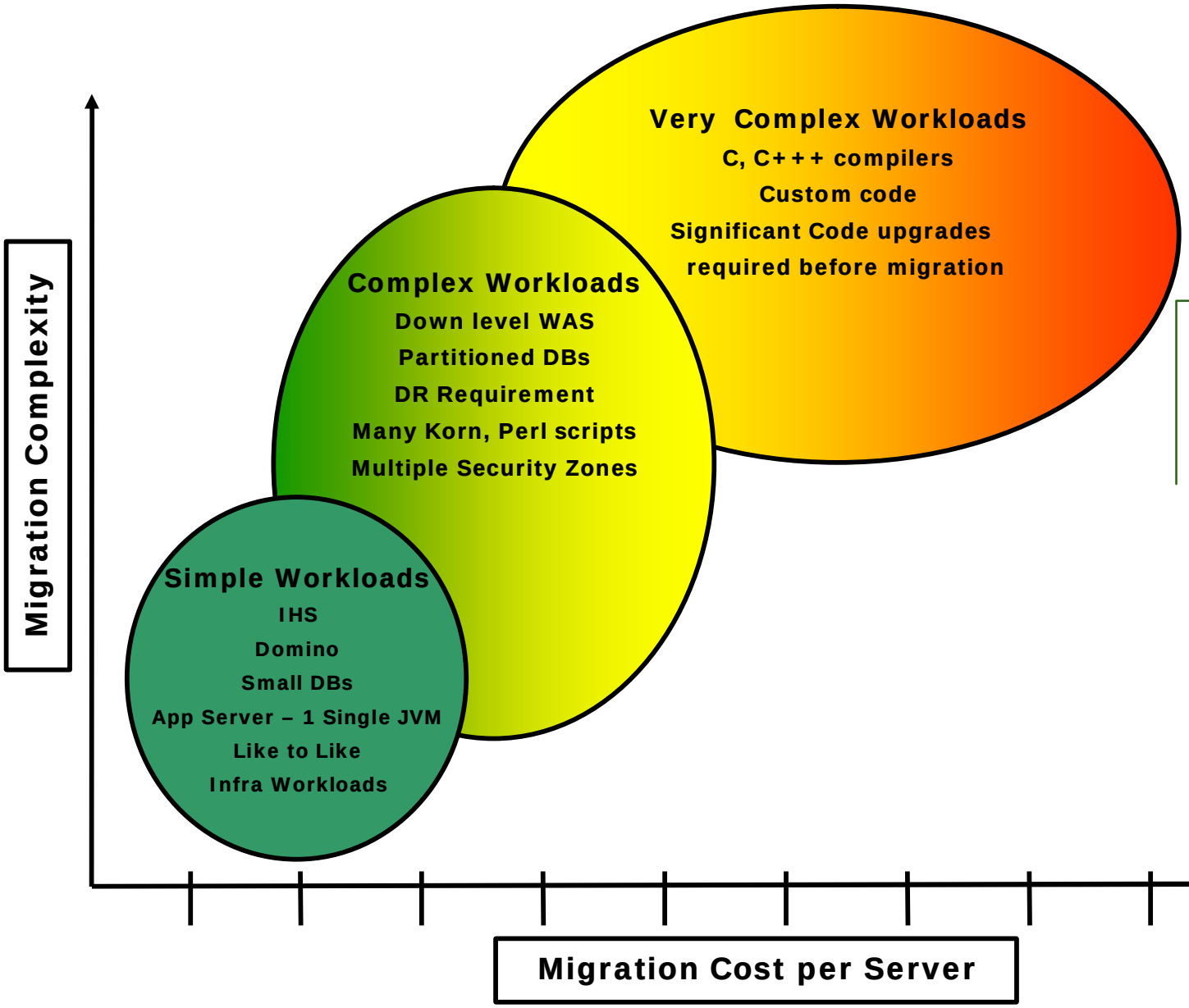
Workload Complexity is a Critical Variable Influencing Migration Costs



2009 Focus

- Process simplification
- Data integration
- Automation

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An Enterprise Workload Selection Process Enables Migration Success

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

2009 Focus

- Location optimization
- Europe & Japan

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

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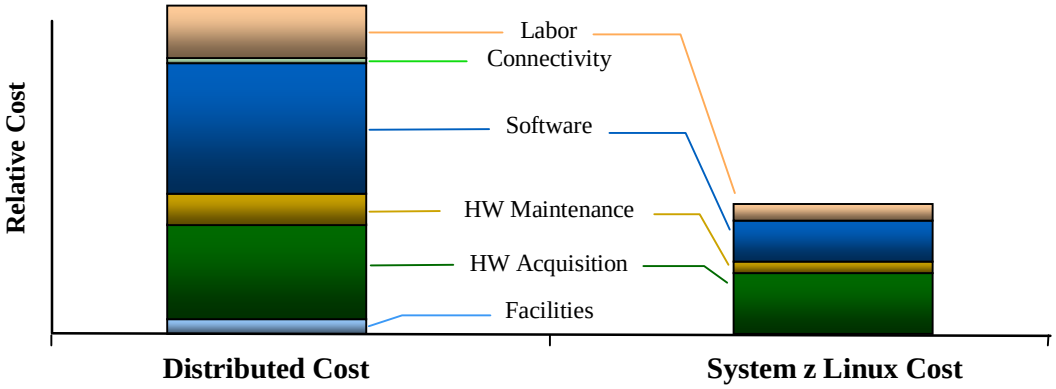
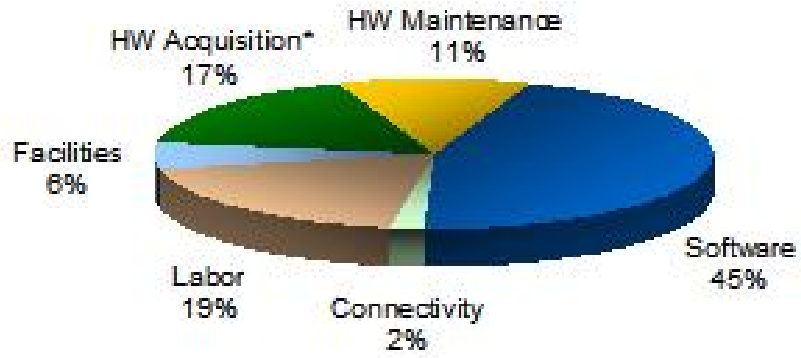
Client View of TCO Comparison for Similar Distributed Workload vs. System z Linux results in Potential 60-75% Gross Cost Savings / 5 yrs

Operating Cost: Distributed vs. Mainframe



Potential Savings: Categories as a % of Gross Savings



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

Validation Results

- *Updated*
  - Space checker boarding
  - Redundant servers
  - HW age / mix
  - LEAN labor efficiencies
  - Network port mix
- *Added*
  - Space reuse cost avoidance

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

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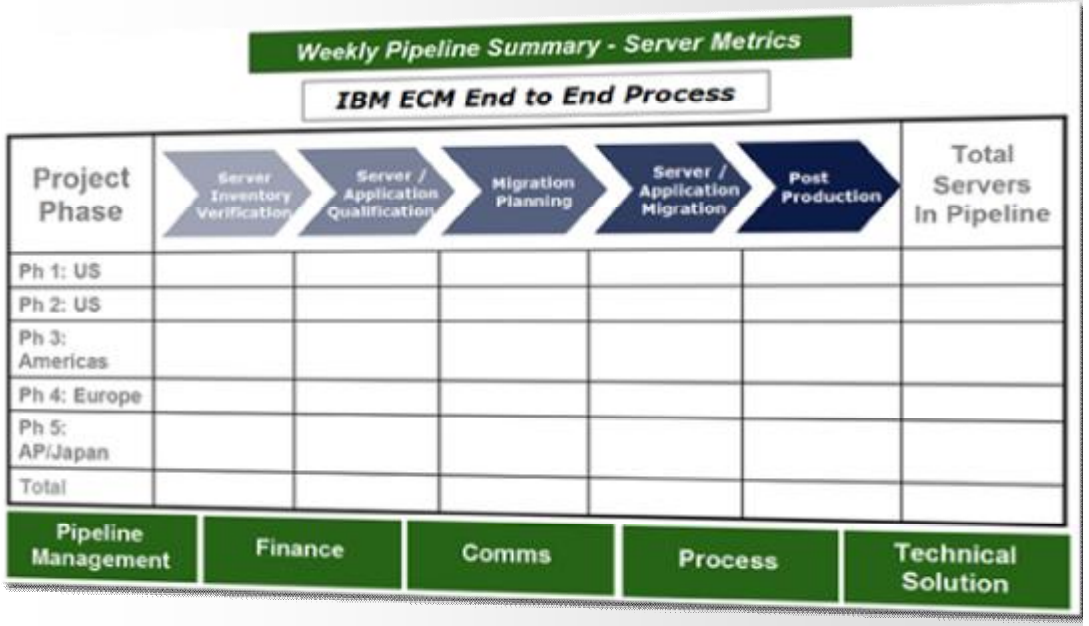
IBM is Using a 'Work in Process' Approach to Manage the Migration

Management Approach and Reporting

- Process approach borrowed from factory line management
- Metrics for each process and sub-process
- Quality measured with process fallout – tracked by cause
- Daily status calls for issue resolution
- Weekly status reporting for CIO and management team



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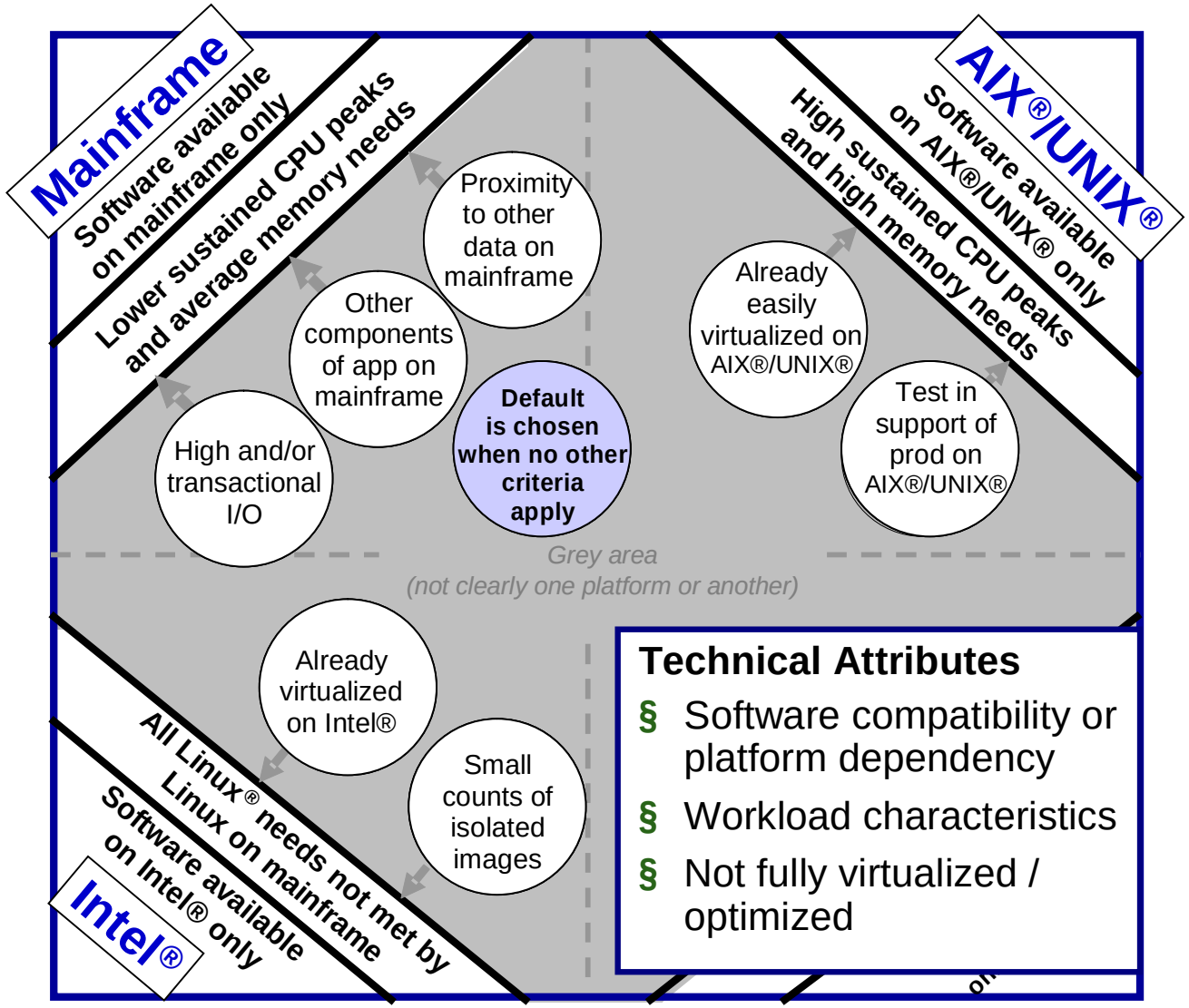
Each Workload is Evaluated for Suitability Based on Technical Attributes

Priority Workloads for Consolidation:

- **WebSphere® applications**
- **Domino® Applications**
- **Selected tools: Tivoli®, WebSphere® and internally developed**
- **WebSphere MQ**
- **DB2® Universal Database™**



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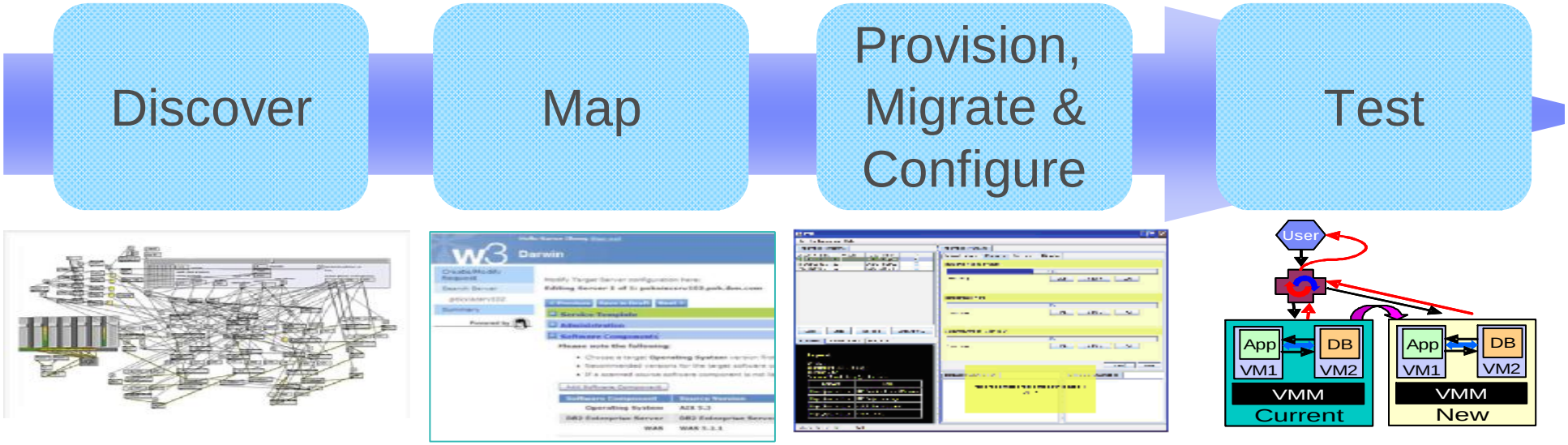
Process Automation will Enable Migration Productivity Improvements

- Application migration tools & services to replatform distributed applications to z Linux, and soon PowerVM
- Tooling will discover, map, migrate, and test applications moving to z Linux
- Improves time to value and accelerates ROI



Discover server inventory and application dependencies

Create migration request for target server using source server data

Provision OS and software, migrate source configuration, customize per request

Accelerate the test process for web applications

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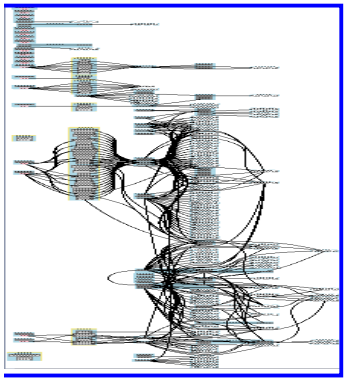
A Broadened Focus on IT Optimization will be Enabled by ECM

Discover Server Inventory & Application Dependencies



End State Architecture & Roadmap

Optimization Priorities

Data Center Consolidation Plan

Platform

Location

Service

Service Catalog

- P to Z
- P to P
- X to X VM Ware
- X Linux to Z
- X, P, Z to CLOUD
- Storage

E2E Run Portfolio (CIO, IT Delivery, GBS)

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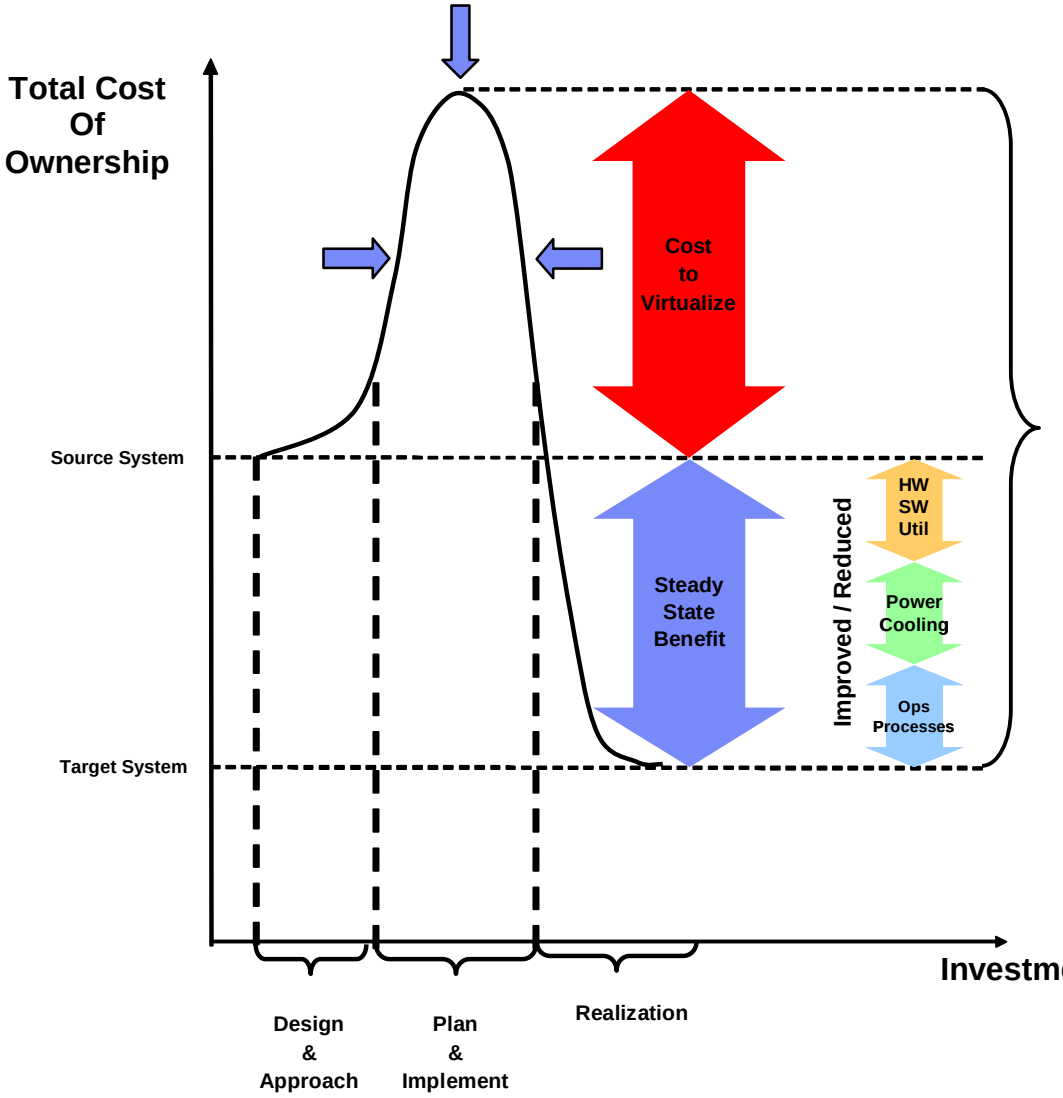
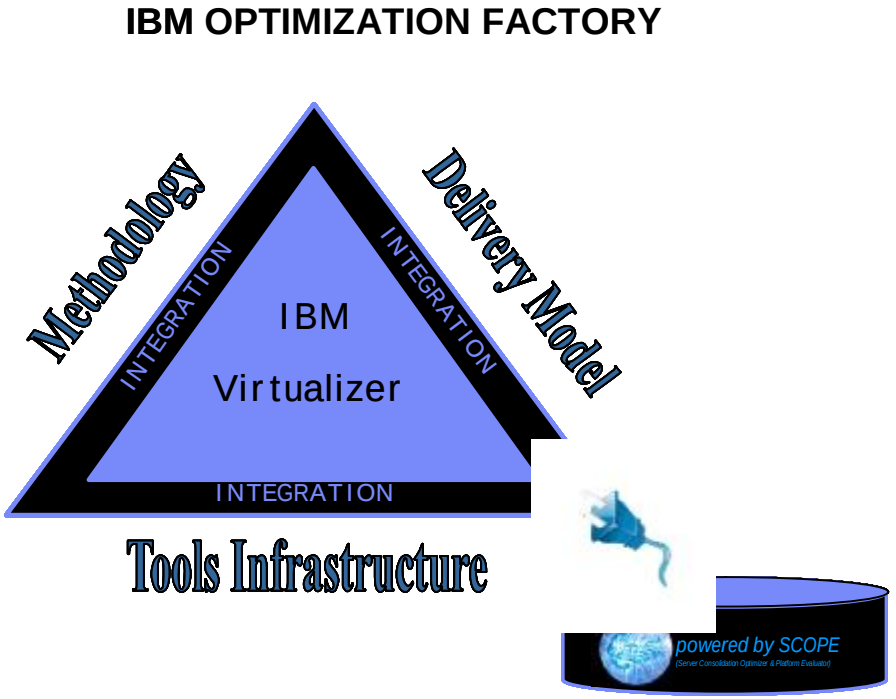
The IBM Optimization Factory simultaneously reduces one-time costs while maximizing steady-state benefits of virtualization





Leverage innovation & integration to consistently produce optimal virtualization designs with the least TCO for a given level of investment.

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The IBM Optimization Factory deploys this approach for System z Linux Consolidation and Migration Solution as two pre-packaged offerings

2 Scope Packages / Engagement Phases

Design & Approach Services

Logical Level

Deliverables:

- ***"As is" client environment***
- ***"To be" target architecture***
- ***High Level Solution Description***
  - ***Logical Level Ops Model***
  - ***Architecture Decisions Document***
- ***Business Case***
- ***High Level Transition Plan***

Planning & Implementation Services

Physical Level

Deliverables:

- ***Physical Design (Micro level)***
- ***Implementation Plan***

Execute:

- ***Consolidated Environment***
- ***Application Migration***

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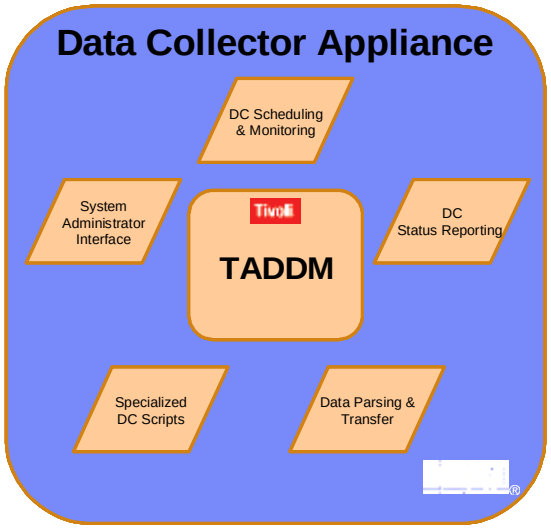
IBM has a continuing tool development program to enhance data collection and reduce cycle times for migrations

Data Discovery



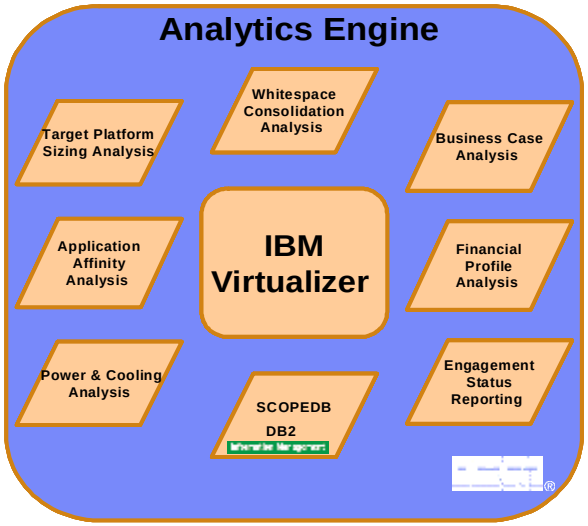
Comprehensive- self contained appliance that scans the environment for comprehensive server, application and configuration information

Non-Invasive- agentless data collection tools run with optimized data collection schedule & monitoring to minimize impact to your infrastructure

Secure – the secure interface for entering credentials allows system administrators retain control over sensitive information

Streamlined- Fast and efficient packaging of collected data for uploading to IBM's automated Analytics Engine

Analysis



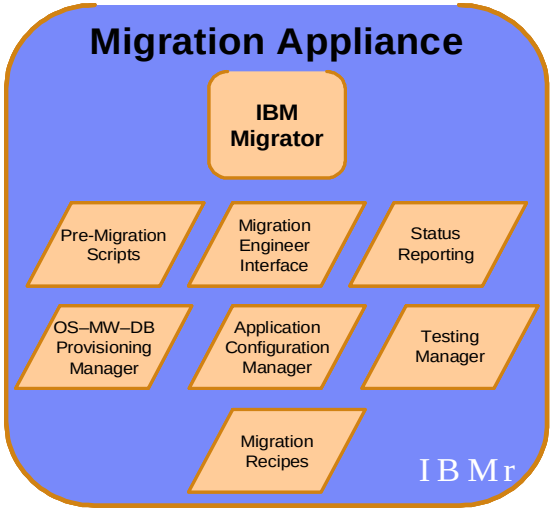
Integrated whitespace - consolidation function that analyzes opportunity to further consolidate remaining distributed workload

Integrated Power/Cooling – calculates energy savings using advanced power management techniques

Comprehensive – View of overall engagement progress and status and that reduces time and effort for weekly project status reports

Financials - business case features enables architecture decisions to be made optimally using both technical and financial factors

Workload Migration



Simplified- specialized routines that simplify the collection of middleware, database, and application configuration data

Controlled- dynamic interface for controlling and directing application migrations

Automated- automated server, middleware, and database provisioning speed cycletime and ensure consistent results

Proven- fully tested and validated recipes for provisioning, configuring, and migrating a variety of middleware, database, and other software products

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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

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Energy Efficiency Certificates Deliver Savings

By formally decommissioning servers, IBM is able to demonstrate energy savings and receive energy efficiency credits (EECs)

Client requirements

- **Lower energy costs and achieve business benefit of Energy Efficiency**
- **Demonstrate Energy Efficiency Commitment**

Solution

- **Virtualized workloads onto System z platform and reduced energy consumption**
- **Hundreds of servers in pipeline to be redeployed, sent to GARS* and/or energy efficiency certificates issued**
- **IBM applied for EECs for eligible decommissioned servers to receive Energy Efficiency Credits**
- **GARS for asset reuse, recycling and/or reclamation**

Benefits

- **Quantifable energy reductions, tradable certificates**
- **Demonstrated commitment to energy efficiency**

**IBM Global Asset Recovery Services*

The Next Level in Green Energy Markets

What is an Energy Efficiency Credit?

A Neuwing EEC (Energy Efficiency Credit) is a measured & verified Megawatt Hour (MWh) of Energy Savings i.e., Energy Efficiency

NEUWING ENERGY

EECs quantify, measure, verify, certify and monetize data center energy efficiency projects

November 2, 2007 Press Release

IBM Launches World's First Corporate-Led Energy Efficiency Certificate Program

In Conjunction With Neuwing Energy, Program Will Provide Clients Documentation and Third-Party Verification of the Energy Saving Results of Their Projects. Read more

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Decommission Process Overview

Server available as a result of virtualization efforts

Server Ready

Check for technical viability and asset value to determine if h/w is a redeployment candidate

If redeployed

Request completed to coordinate shipping and update property control

If not redeployed

Complete Machine List Database and ship to GARS*

Apply to Neuwing for energy efficiency certificates

Tracking tool is updated to reflect disposition of the assets in the project

Capture savings in business plan and business case

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nfrastructure 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 with dedicated team**
- **Inclusive leadership for execution of migration**
- **Leverage talent and capability across all of IBM to drive 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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All performance information was determined in a controlled environment. Actual results may vary. Performance information is provided “AS IS” and no warranties or guarantees are expressed or implied by IBM

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