New Enterprise Data Centre Evolution

Managing an efficient data centre for the future
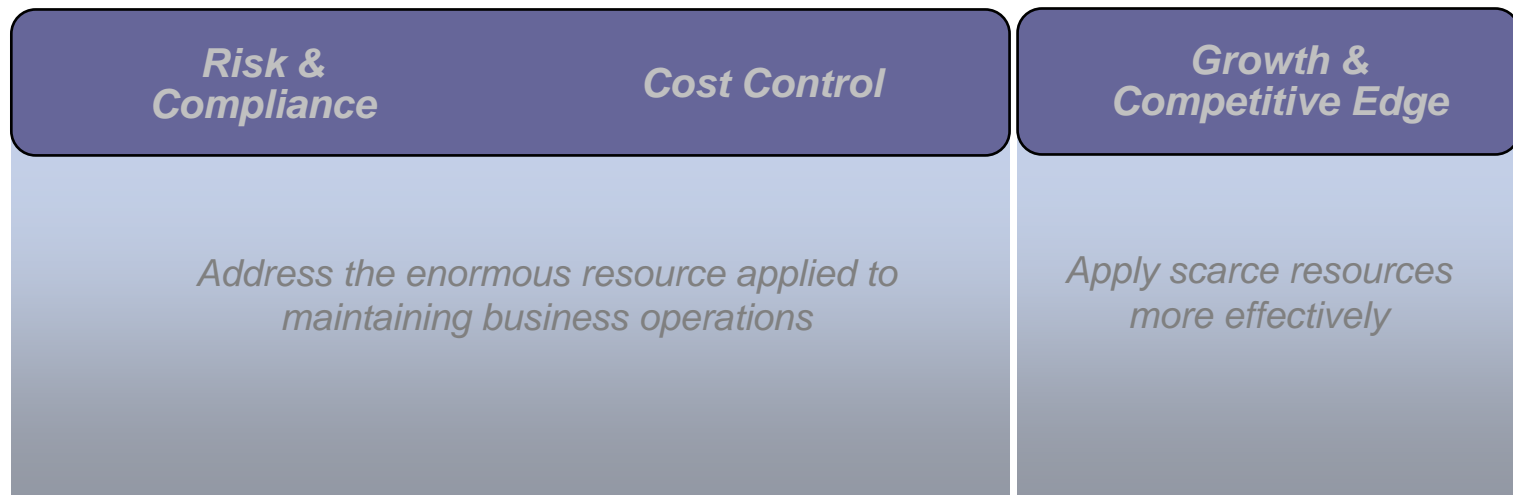
Nicholas Drabble

Green Computing Programme Manager

IBM Software Group – UK, Ireland

New Enterprise Data Centre Event September 2008

Innovation drives competitive advantage

Innovation is the process of delivering new products, services, processes and business models to create unique competitive advantage and accelerate growth.

Business Objectives

Risk & Compliance	Cost Control	Growth & Competitive Edge
Address the enormous resource applied to maintaining business operations		Apply scarce resources more effectively

'Many inhibitors make innovation more challenging….'

The New Enterprise Data Center

An evolutionary new model for efficient IT delivery . . .

New economics: Virtualization with optimized systems and networks to break the lock between IT resources and business services

Rapid service delivery: Service management enables visibility, control and automation to deliver quality service at any scale

Aligned with business goals: Real-time integration of transactions, information and analytics - and delivery of IT as a service

Enabling The New Enterprise Data Center

A holistic, integrated approach

Enterprise Information Architecture

Highly Virtualized Resources

Security and Business Resilience

Efficient, Green and Optimized Infrastructure and Facilities

Business-Driven Service Management

The New Enterprise Data Center has far reaching benefits –

- *Triple asset utilization*

- *Provision new resources in minutes*

- *Eliminate 80% of outages*

- *Up to 60% heat reduction*

- *Reduce floor space by 80%*

- *Reduce disaster recovery time by 85%*

**reallocating resources
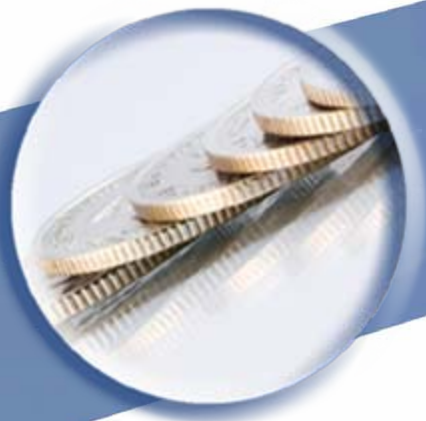from operations to innovation**

Simplified – Drives IT efficiency

Physical consolidation and optimization

Virtualization of individual systems

Systems, network and energy management

Simplified

UPMC

IT Service Transformation Program

Consolidation and virtualization of servers and storage reducing complexity, energy and labor for $40M est. cost reduction

Shared – Rapid deployment of new infrastructure and services

Highly virtualized resource pools

Integrated IT service management

Green by design

Shared

Simplified

Hong Kong Broadband Network

Virtualized multi-vendor storage environment with faster creation of testing environments and over 50% performance improvement

Dynamic – Highly responsive and business goal driven

Virtualization of IT service

Business-driven service management

Service oriented delivery of IT

Dynamic

Shared

Simplified

Research Compute Cloud RC²

*New IT service requests provisioned for researchers –
in minutes, not hours or days – with 95% less
power and footprint expected*

This transformation spans across
people, process and technology…

People

- **Skills shift from operations (break / fix) to IT Business Analysts**
- **Break down silos and organize around IT service delivery**
- **Paradigm shift toward shared environment**

Process

- **Standardization**
- **Disciplined**
- **Repeatable and documented processes**
  - Change and configuration management
  - Process automation

Technology

- **Open standards**
  - Open management across server, storage, networking
  - Open networking standards
- **Role of systems and networking in recentralization**
- **Intelligent automation of IT & Facilities**

Multiple new factors now impacting Organizations

Costs

Oil reaches $135 a barrel
May 2008

Regulatory Mandates

Increased regulatory scrutiny, with government regulations around water usage, carbon emissions etc

"Going Green"

Workload Growth

Growth in Application and Business workloads doubles every 2 years driving the need new servers, DASD, power and cooling

Operational

Capacity shortages for data centre power and cooling are limiting ability to expand

Social & People

Customers have started evaluating the green credentials of suppliers and products

Cultural Shifts

Demographics changes and global teams require collaboration across cultural, generational and geographic boundaries

Extended Attributes of a Greener Organization

People

Workload

J2EE

SOA

Infrastructure

Optimized **People** resources and collaboration beyond boundaries to drive business growth while reducing travel and physical real estate costs

Efficient execution of business **Workloads** with processes and applications designed to maximize energy efficiency while meeting business needs.

Visualization, control and automation of **Infrastructure** to deliver a power efficient organization. Leverage consolidation, virtualization, and optimization.

So . . . How can Software make you greener?

Virtualize the infrastructure to reduce operational overheads and increase support efficiency

Reduce commuting with online collaboration and increasing work from home

Reduce business travel by using online collaboration

People

Reduce use of paper by enabling business processes to use eForms and images

Shift workloads to underutilized servers to reduce energy and floor space needs

J2EE SOA

Workload

Optimize business processes to reduce energy footprint and costs of operations

Schedule execution of workload to off-peak hours to use lower cost energy

Infrastructure

Turn the power down when work (transactions) slows down

Compress your data to lower storage and server needs

Optimize HVAC for hot spots to reduce energy consumption

Consolidate and Virtualize to eliminate floor space and compute infrastructure

What does 'Green' data centre mean?

Not everyone thinks '***Green***'

More likely *'Virtualization'*

                'Optimization'

                        'Energy efficiency'

                                'Out of Power or Space'

                                        'Reduce operational cost'

Evolving to "New Enterprise Data Centre"

- ⇒ Data centre optimisation and utilisation
- ⇒ Energy efficiency (measuring, collecting, analysing, visualization)
- ⇒ Data Centre Virtualization
- ⇒ Effective management of the facility and IT as a holistic entity
- ⇒ Increased agility to meet business priorities and demands

"We've only ever been told to perform … but never efficiently"

Tivoli 'Green' Service Management
An Integrated Approach to controlling energy costs

Visibility
See your business

Provide unified views of data center resources, IT services, and costs in the context of energy

Control
Manage risk & compliance

Establish policy-based management to ensure efficient use of available resources and capabilities while maintaining service levels
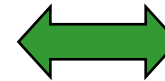
Automation
Build agility into Operations

Implement closed-loop monitoring and management to ensure optimal power consumption as workloads vary across business cycles.

Software innovation - changing the game

- Better **Visibility** of data centre assets and change is critical

- Improve **Utilization** and footprint through server consolidation and **Virtualization** with capacity management & provisioning

- Extend systems **Monitoring** to include **Power and environmentals** with **Spatial capability** and integrated **Asset Management**

- Manage **Data Storage impact** on power consumption dynamically

- Extend Service Management to encompass critical Services and **Active Energy Management**

- Integrating **People, Process** and **Technology** with **Workflow Automation**

- **Accounting/Chargeback** for internal and external customers for these new utility resources

Visibility – Discovery and Mapping

- Understand what assets are actually in the Data Centre

- How they are configured, changes applied and service impact

- Understand inter-dependencies and business service linkage

- How they are being used – what is critical and what is redundant

- The drift from standards and what to 'course correct'
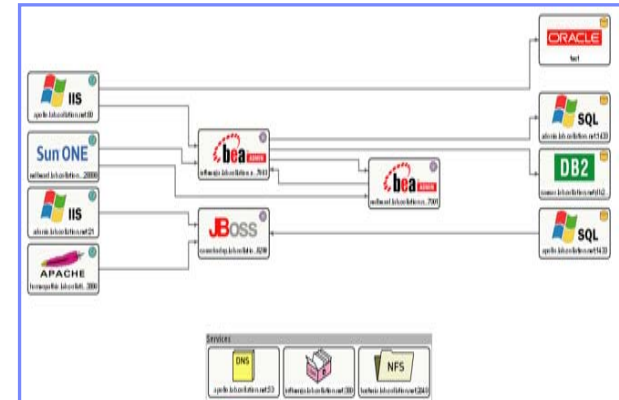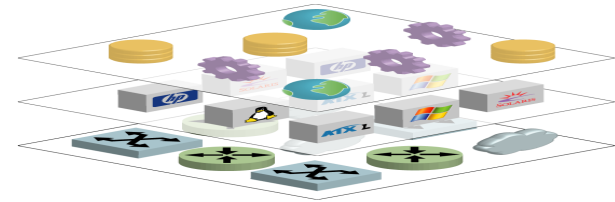
Tivoli Application Dependency Discovery Manager (TADDM)

Agent-less Discovery automates application mapping and device discovery

Records change for compliance and audit control

Populates CCMDB and integrates with IT Service Management processes
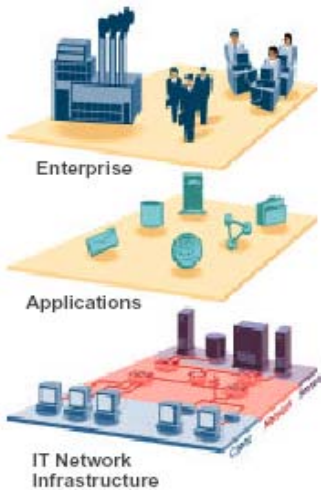
Consolidate, Virtualize, and Optimize by Provisioning with Energy Intelligence

Provision new servers as needed with
Tivoli Provisioning Manager
instead of keeping servers active

Exploit virtualization to increase
utilization of individual servers to
minimize number of active units

Move workload to alternative data
centers where energy is less
expensive or less constrained
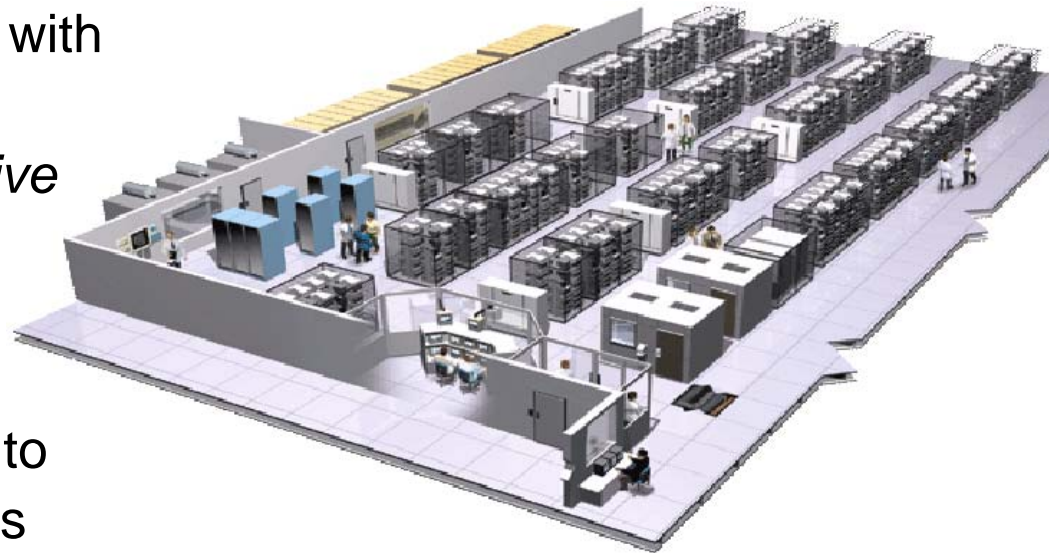
Support for mainframe, VMWare, MS Virtual
Server, LPAR, DLPAR. Provisioning of servers,
storage and network infrastructure.

Dynamic on-demand capability.

Monitoring for active energy management

Tivoli Monitoring family provides the ideal platform for gathering IT and enterprise events for effective operations

Critical resources can be monitored for availability and running data, including events relating to power, temperature and system stability from many sources including:

- ➲ IT Infrastructure – Systems, software, applications
- ➲ Facilities – Generators, Air Conditioning

Event management has traditionally been limited to IT assets only, however intelligent facilities equipment can now be integrated e.g.

- ➲ HVAC (Heating, Ventilation, Air Conditioning)
- ➲ Intelligent power supplies and generators

Energy Management Example
Dynamic server consolidation & integrated facilities

VAC 1

APP 1 | APP 2

System 1

VAC 2

APP 3 | APP 4

System 2

VAC 3

APP 5 | APP 6

System 3
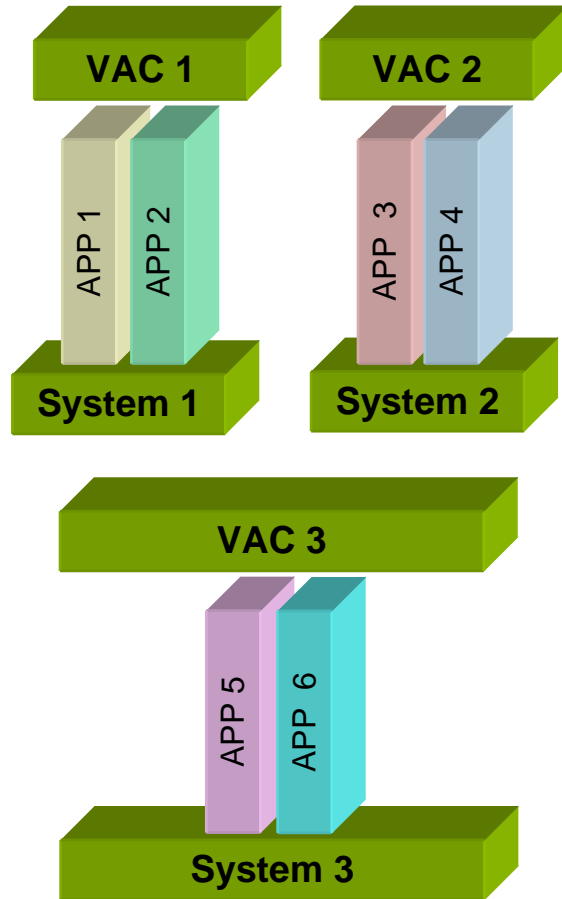
Use of hibernation, powering off servers, and other low power states in combination with other workload balancing and provisioning tools can provide a valuable tool in management of Power and Thermal issues.

Automate Energy Control
Policy based automation

Control Energy Consumption
Consolidate workloads to reduce

Integrated Facilities Control
Match cooling & heat loads

Power efficiency in Information Risk Management

Tivoli Storage management

Virtualize the storage
All storage can appear as a cohesive platform to increase utilisation

ILM traditionally was to . . .
Move data to the most cost effective storage for its current use

In the future it will . . .
Move data to the most power efficient storage that satisfies usage requirements
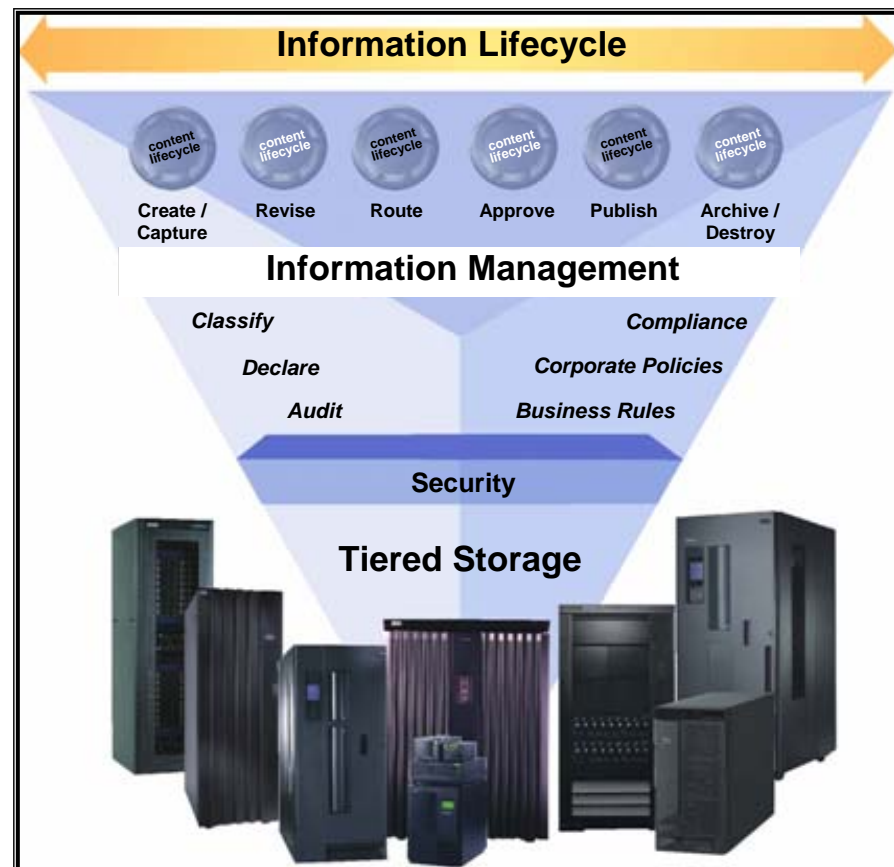
Data Centre Security and Entitlement

Tivoli security solutions provide a seamless operational and enterprise approach to Security, Risk & Compliance.

Manage enterprise threats and vulnerabilities

Deliver continuous and reliable access to information and services

Manage identity to enable secure, seamless collaboration

Increase compliance & reduce reputation risks and audit deficiencies

Virtualized management of enterprise entitlement and access

Maintaining a securely managed data centre provides business resiliency and effectiveness in managing highly Virtualized, dynamic and efficient data centres.

Managing the converged asset lifecycle

Discover & manage the lifecycle of assets, from procurement to decommissioning

Understand the energy efficiency of assets, from servers to HVAC units

Efficiently manage the maintenance and pro active swap out procedures

Contract management with suppliers

Asset inventories, geo spatial detail and ownership information for compliance reporting

Manage incidents, problems, changes and configurations from a single platform

Production Assets	Facility Assets	Transportation Assets	IT Assets

Asset Management

Geospatial integration for assets and data centres
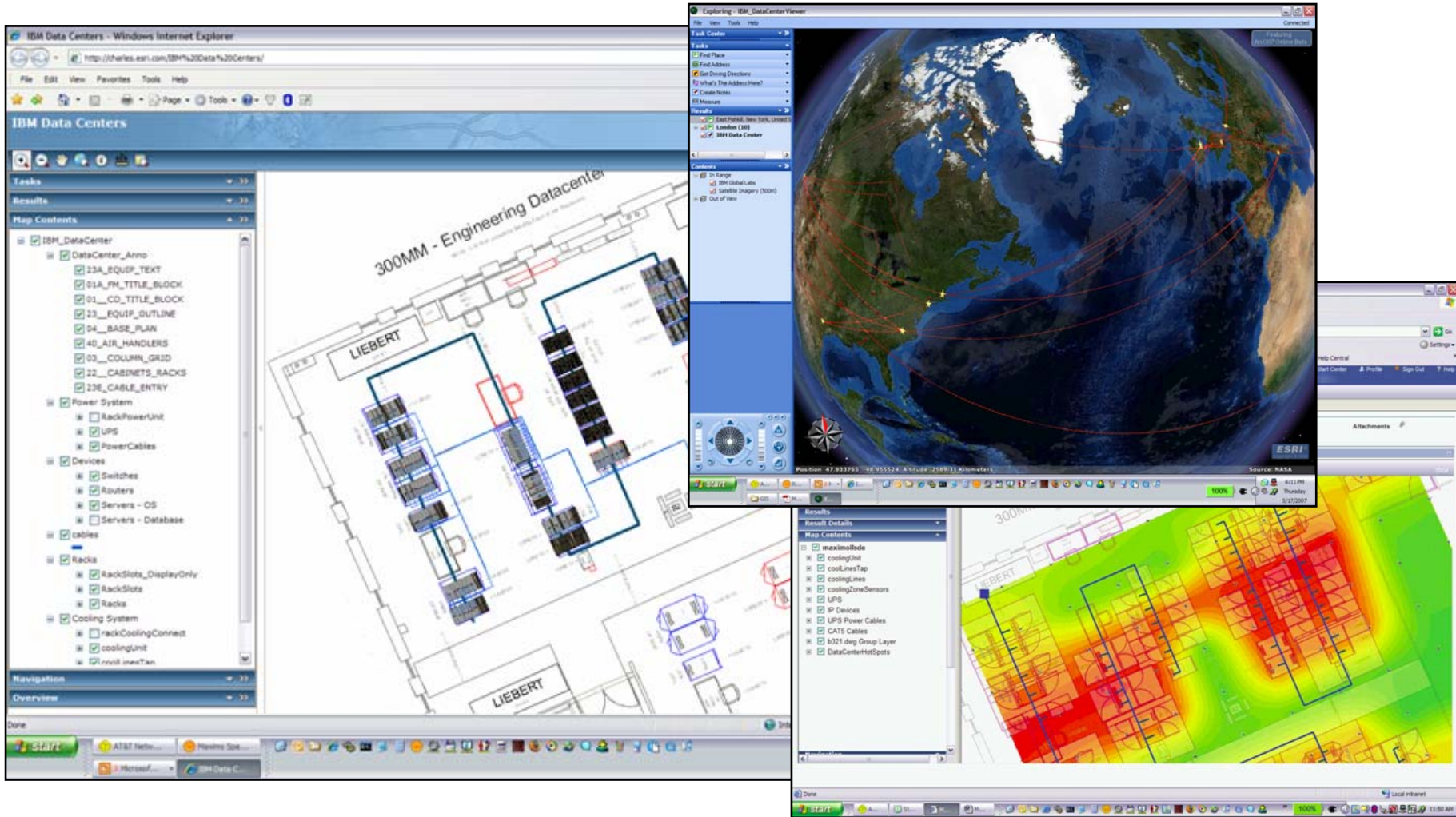
Tivoli Monitoring for Energy Management

Now all your IT compute data plus all your facilities metrics in one spot ! ! !
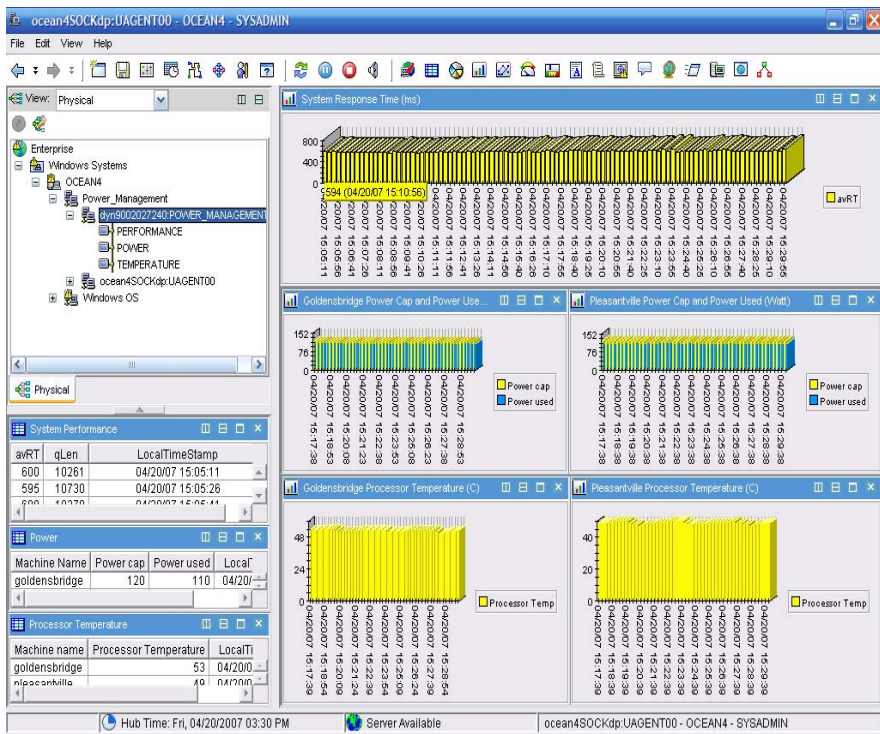
Visualize the power consumption and thermal signatures of data center resources

Alert operators and facility managers before servers reach critical energy and temperature thresholds

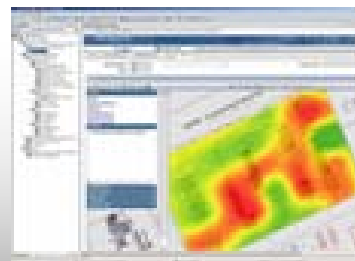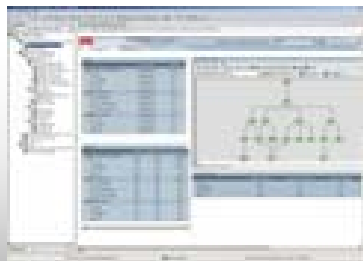Automate and control server's energy usage to optimal levels including triggers to 3rd party partners

New Partner Ecosystem Announced May 08:

Infrastructure Management from IBM Tivoli
Optimize your infrastructure by blending IT and Facilities capabilities

New IBM Tivoli Monitoring

Green Energy Adapters

New IBM Tivoli Asset

Management spatial

visualisation

Data Centre
Infrastructure Assets

Tivoli software

Facility
Infrastructure Assets

Tivoli Green Management
(Monitor, Measure and Manage)

Tivoli Software
IBM® Systems Director
and Active Energy Manager

EAT•N

APC
by Schneider Electric

Johnson Controls

t.a.c

SYNAPSENSE

SIEMENS

MatrikonOPC

OSIsoft.

IT Assets

3rd Party Servers
and Storage

vmware

IBM Systems

Energy Service Management Capabilities

Optimize your enterprise for energy efficiency

How much power am I using?

How much money can I save by reducing power?

What services are costing me the most in power consumption?

Can I change and still meet my service level agreements?

What should I do first?

Gain Visibility to Energy Usage
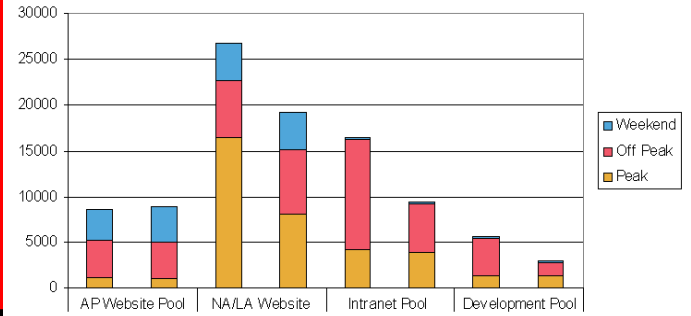New energy Optimization reports included in ITM Tivoli Monitoring

Track and trend changes in energy usage over time

Combine different data types and energy usage into a single report.

Obtain information needed to qualify for power company or government rebates and incentives

Advanced Control and Automation of the Data Center's Energy Usage

Data Center Power Usage and Expenditures

	Current Environment		Optimized Environment	
	Units	Costs	Units	Costs
Number of physical servers	150		45	
Server Power usage per year (kWh)		228,096	$ 25,090	122,864	$ 13,515
Associated Facilities power usage per year (kWh)		484,000	$ 44,000	411,400	$ 37,400
Carbon Emissions per year (tons CO2)	3874		2906	
Storage Infrastructure		1,090,933	$120,000	727,275	$ 80,000
Networking Infrastructure		727,289	$ 80,000	363,637	$ 40,000
Administration Personnel required per year	6	$480,000	2	$160,000
New hardware / upgrades needed			4	$ 8,000
OS Licensing per year	150	$ 15,000	45	$ 4,500
Virtual Machine Software per year			30	$ 4,500
Other Software			45	$ 4,500
Total per year		2,530,318	$764,090	1,625,176	$352,415

Power Consumption (kWh)   Carbon Emissions (tons CO₂)   Total Costs ($)

Current Environment
Optimized Environment

Compare current power utilization and costs to the optimal configurations

Model incremental changes to analyze how the data center environment will change
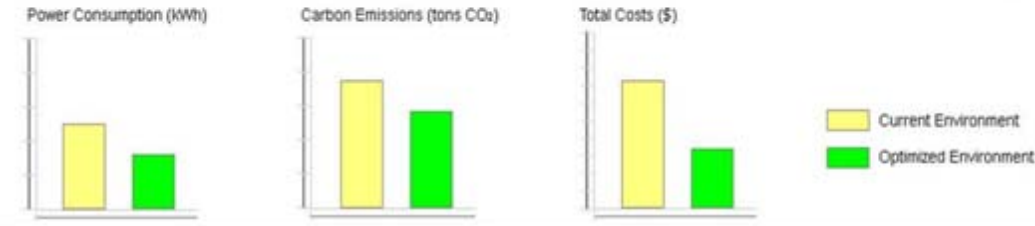
New energy Optimization reports included in ITM Tivoli Monitoring

Chargeback of resources including energy used, plus power and thermal trends.

Who used what?
How much did it cost?
Usage based accounting & chargeback
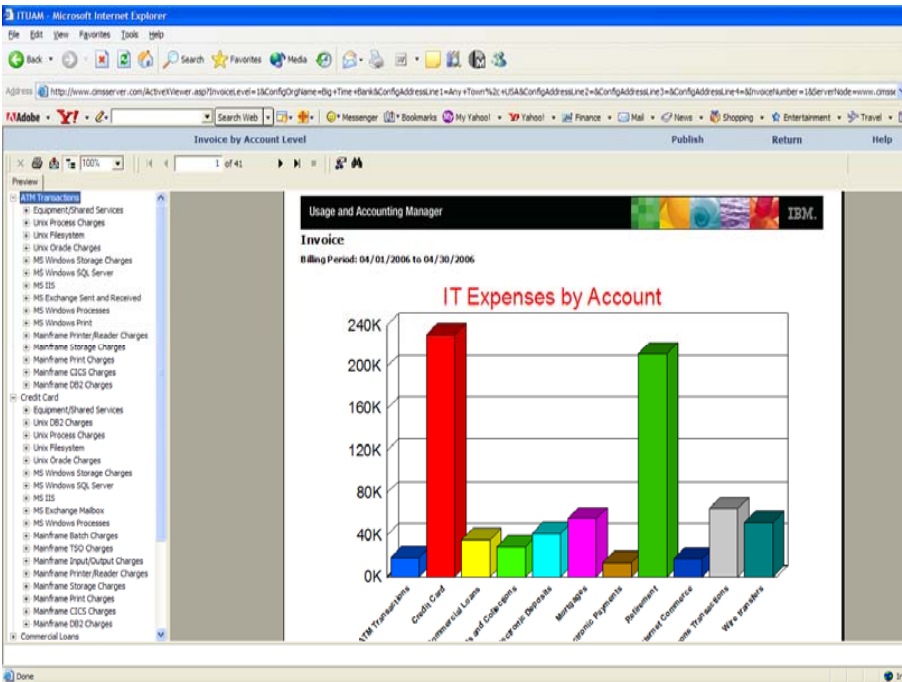
Aggregate power consumption data and determine cost of power via ***Tivoli Usage and Accounting Manager***

Set a benchmark for energy usage to better track improvements

Report on the amount of power consumed, when it was consumed, and which services consumed it

Introduce power utilization accountability

Integrated Role-Based Dashboards
Enabling better & faster decisions across all operational areas of the Data Centre

Different roles have different informational and operational requirements.

UI integration strategy focused on dashboard and portal requirements of common operational organizations:
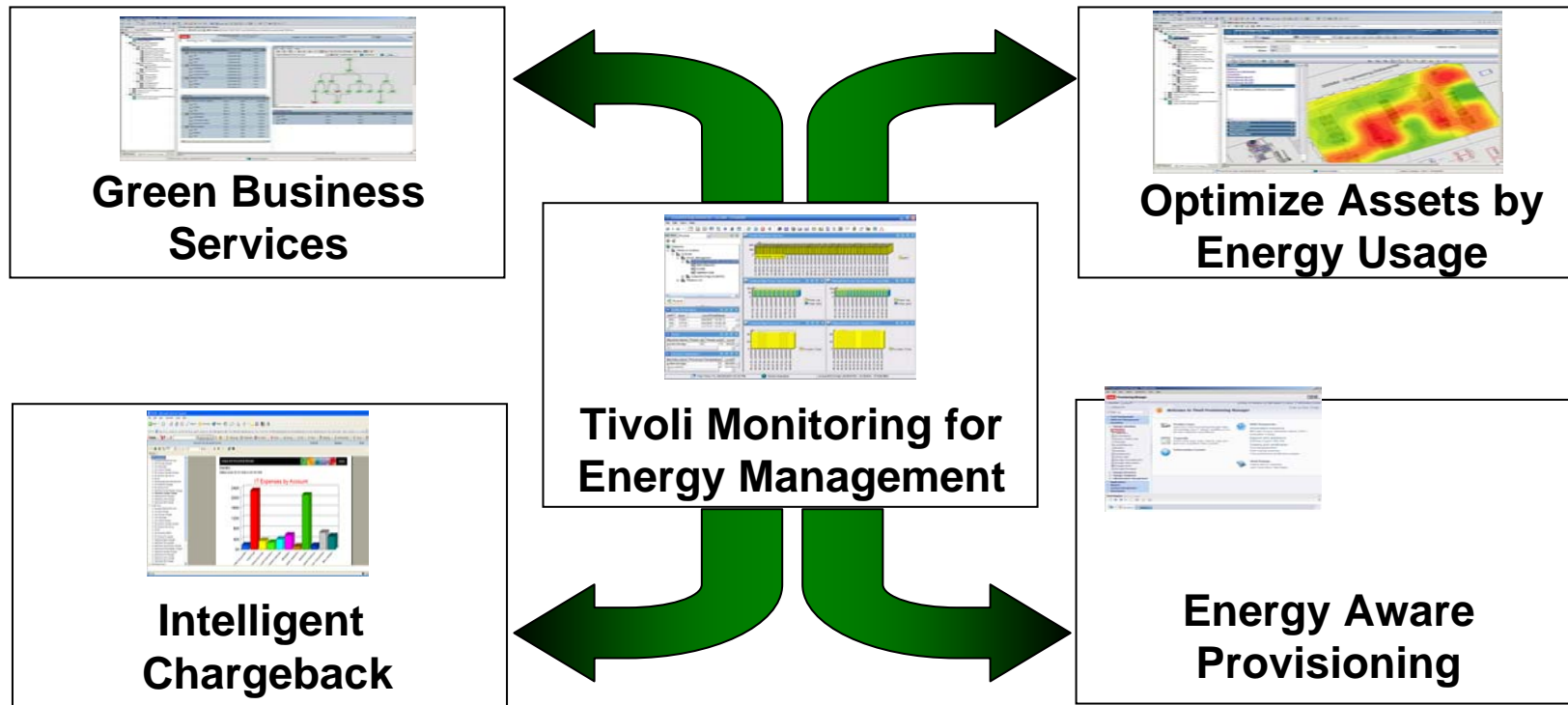
- IT Operations
- Service Provider
- Business Operations
- Storage Management
- Security Operations
- Energy & carbon dashboards
- Common reporting

Delivers appropriate data and capability to different operational and business audiences.
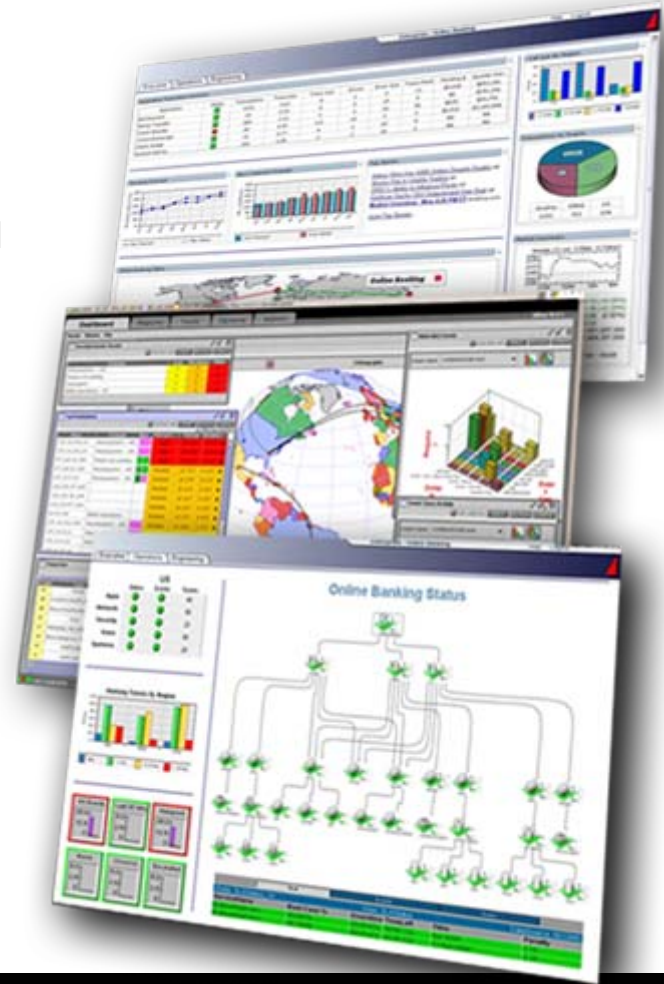
IBM Service Management's 'Green' Data Center
Using Green Data to accent Tivoli's existing event architecture and data model

Green Business Services

Optimize Assets by Energy Usage

Tivoli Monitoring for Energy Management

Intelligent Chargeback

Energy Aware Provisioning

Typical Virtualization Example - IBM Data Center

Improved operational costs up to 70% with aggressive distributed platform virtualization
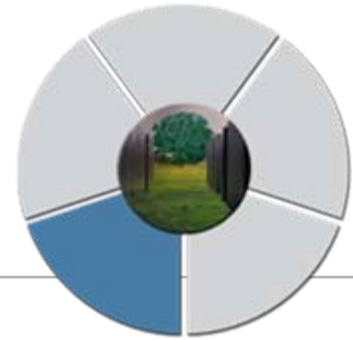
Client requirements

Improve IT equipment utilization
Reduce IT hardware requirements

Solution

Advanced POWER Virtualization (APV) and VMWare
Reduced number of physical servers
- Wintel from 11,000 to 1,500
- Unix from 8,500 to 1,500

Three times improvement in server utilization
Formed a Virtualization Center of Excellence to implement best practices across geographies

Benefits

Operational savings of up to 70%
- Space, power and cooling, maintenance, software support and personnel costs
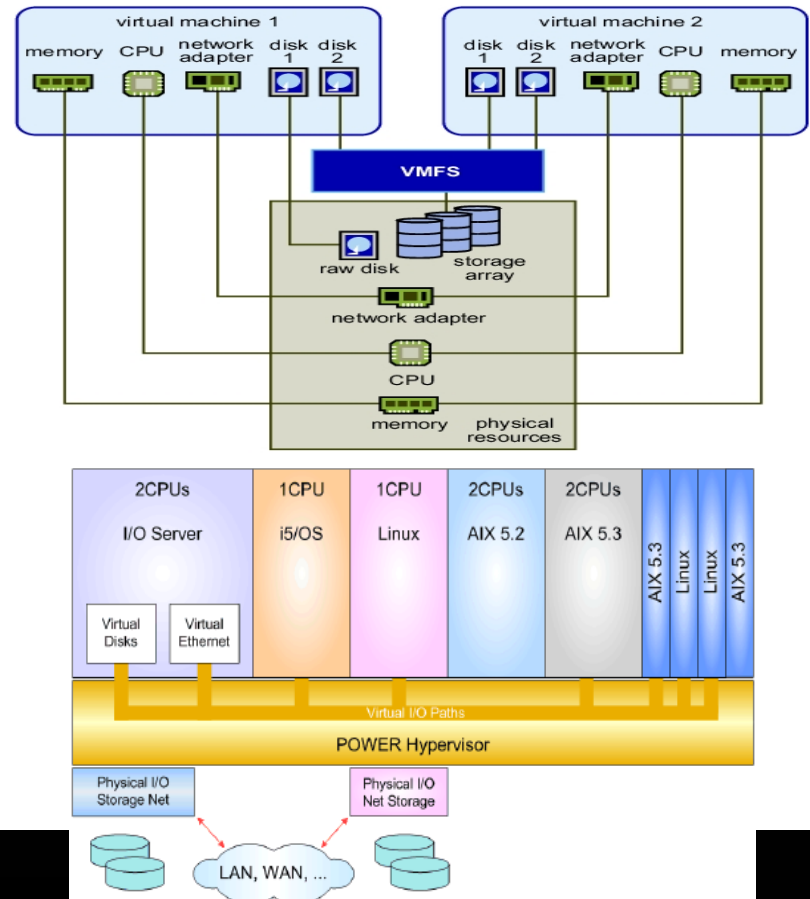
Tivoli Service Management Summary

Visibility

See your business

Control

Manage risk & compliance

Automation

Build agility into Operations

Provide unified views of data center resources, IT services, energy and costs
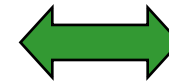
Establish policy-based management to ensure efficient use of available resources and capabilities while maintaining service levels

Implement closed-loop monitoring and management to ensure optimal utilisation and efficiency as workloads vary across business cycles.