Data Centre Evolution

Managing an efficient data centre for the future

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Presentation v4.1

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

'Many inhibitors make innovation more challenging….'

A new and challenging ‘Greener’ era…

Energy efficiency is a global issue with significant impact

Data Centers’ energy and space usage is at a “tipping point”

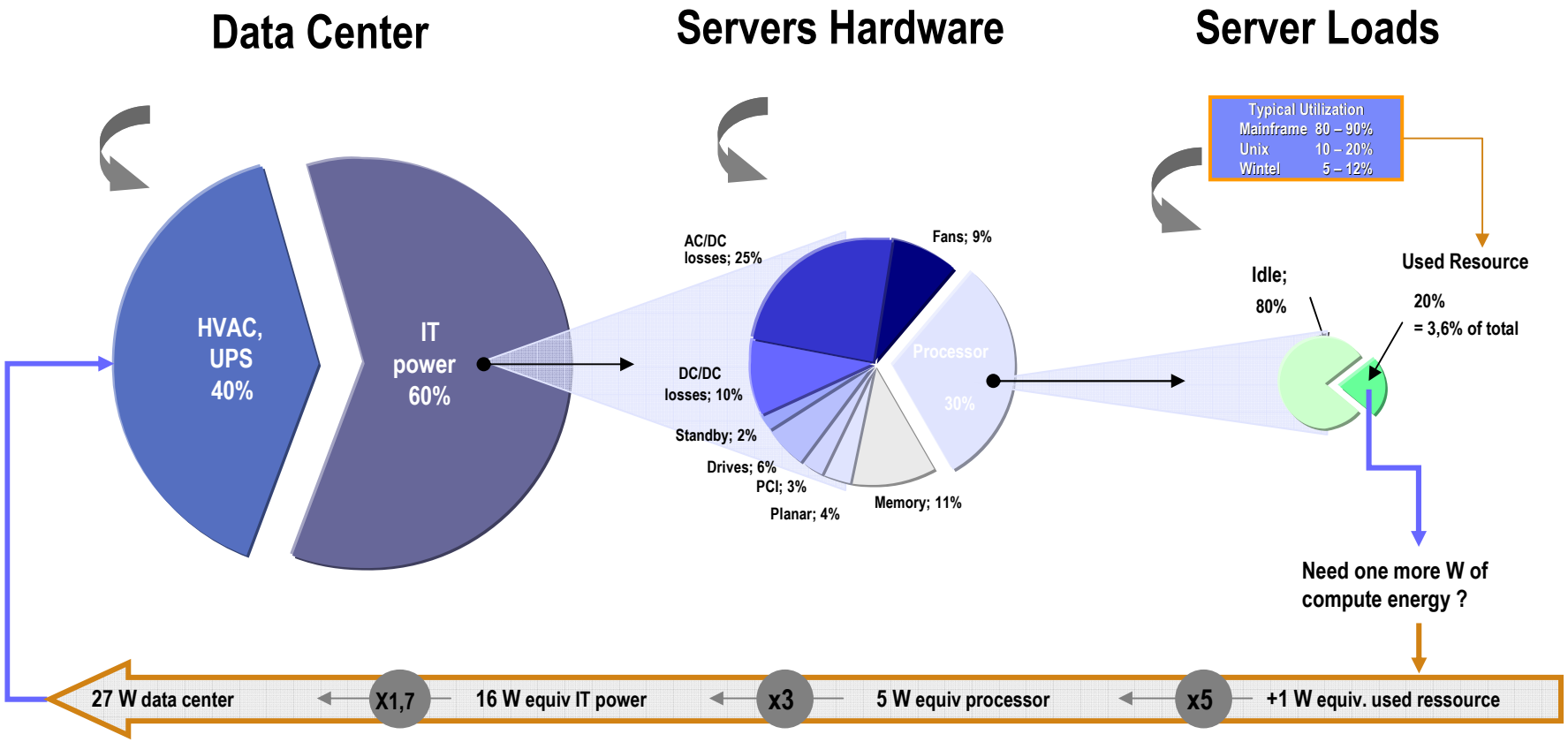
Many Data Centers are literally out of power and space

Increased computing demand & rapidly escalating energy costs

Tightening regulatory restrictions on permitted energy consumption

Is your Data Center facing an energy and space crisis?

How do we consume our energy?



The landscape is changing & Data Centres are evolving

Data centres are evolving to a new breed

They must now adopt many new characteristics

- ✓ Virtualised
- ✓ Dynamic and flexible to environmental and market changes
- ✓ Energy efficient & Environmentally conscious or 'Green'
- ✓ Consolidated and dense hardware footprints
- ✓ Be managed as a holistic eco system – IT, Facilities & operations
- ✓ Provide an infrastructure that meets innovative solutions like SOA, GRID, Virtualization etc
- ✓ Protected, compliant and governed for a secure environment

IBM ‘Project Big Green’

‘A $1 billion-a-year investment initiative will double the efficiency of data centres at IBM and its clients and reduce energy waste.’

What “green” solutions can mean for clients

Reduced energy costs

- **A typical 25,000 square-foot data center requires £1.5 million in power annually – an energy efficient solution can possibly cut those costs in half**

Reduced carbon footprint

- **It’s like taking 1,400 cars off the road…or a 3.5 million pound reduction in coal burned for energy generation**

What does an efficient, ‘Green’ data centre mean?

Not everyone thinks of ‘Green’ - other common expressions are ***‘Power control’, ‘Energy efficiency’, ‘Virtualization’, ‘Dense hardware footprints’***

What does the message ultimately mean

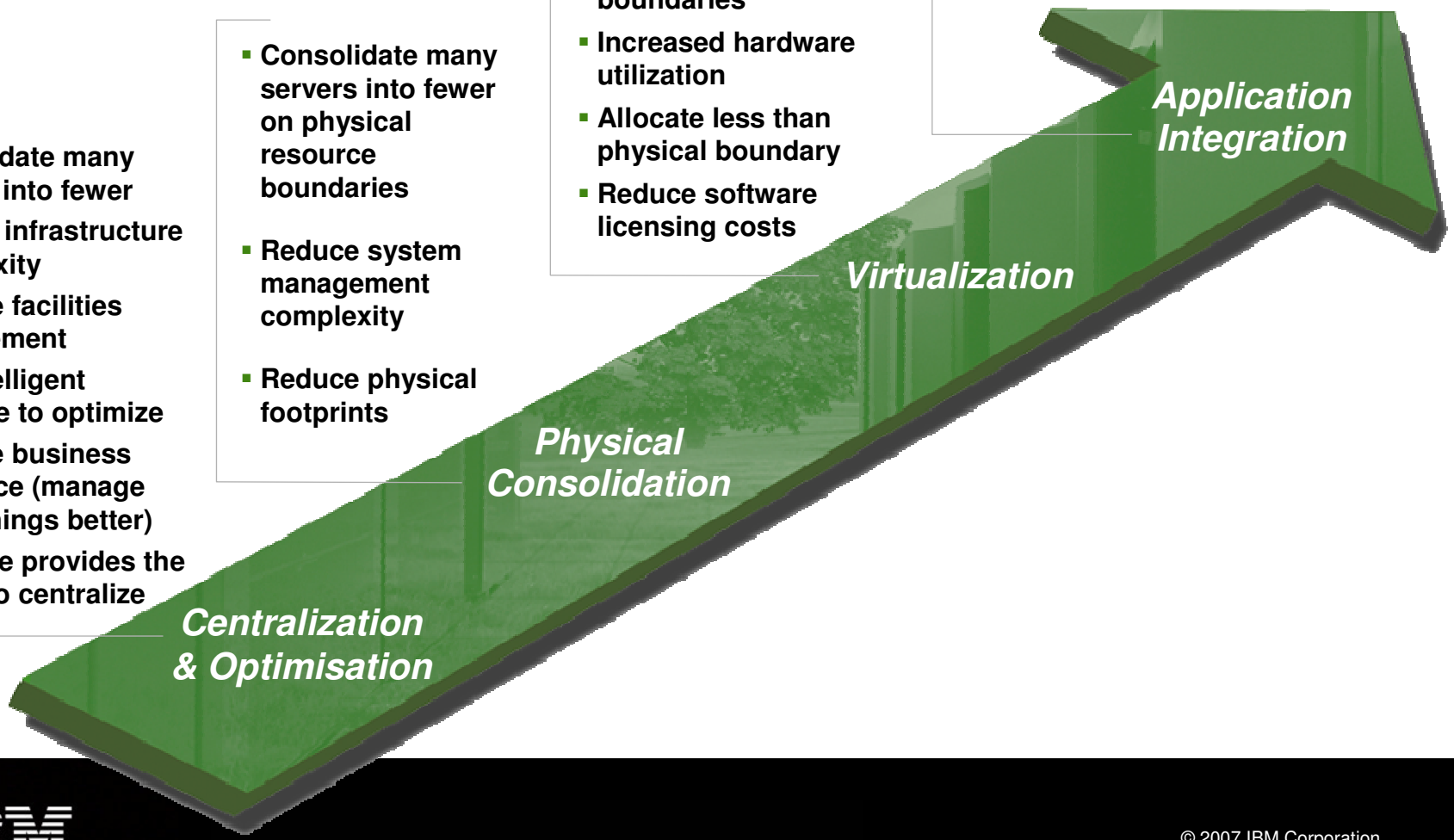
- Data centre optimization and utilization
- Power & Energy efficiency (measuring, collecting, analyzing, visualisation)
- Data Centre Virtualization
- Effective management of the facility

Fundamentally they all relate to space & cost saving, energy efficiency and ultimately ‘Greener’ more efficient data centres

Software innovation is changing the game

- Better **visibility** of Data Centre Assets and change is critical
- Improve **utilization** and footprint through server consolidation and **virtualization** of capacity management & provisioning
- Extend systems **monitoring** to include **Power and Environmentals** with **Spatial Capability**
- Manage **data storage impact** on Power Consumption dynamically
- Extend Service Management to encompass critical Services – **'Power as a Service'**
- **Charging** internal and external customers for these new utility resources

IBM's Data Center Energy Efficiency Strategy



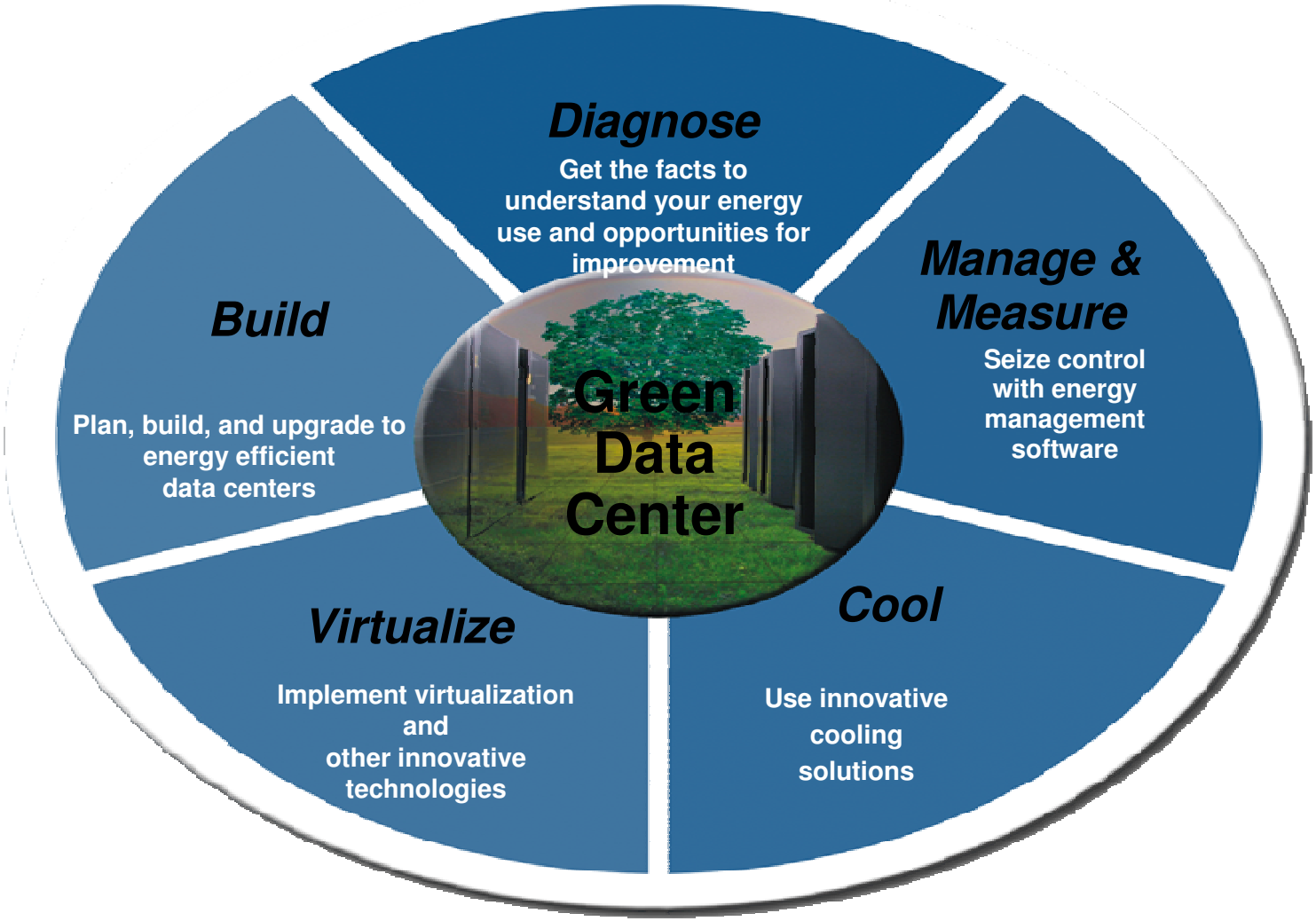
- Consolidate many centers into fewer
- Reduce infrastructure complexity
- Improve facilities management
- Use intelligent software to optimize
- Improve business resilience (manage fewer things better)
- Software provides the ability to centralize

- Consolidate many servers into fewer on physical resource boundaries
- Reduce system management complexity
- Reduce physical footprints

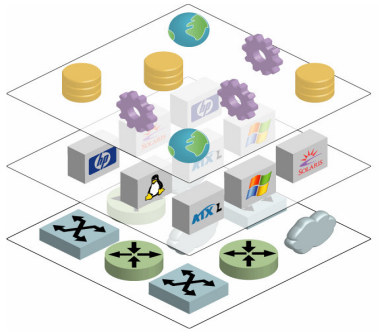
- Remove physical resource boundaries
- Increased hardware utilization
- Allocate less than physical boundary
- Reduce software licensing costs

- Migrate many applications into fewer images
- Simplify IT environment
- Reduction of operations resources
- Improve application specific monitoring and tuning

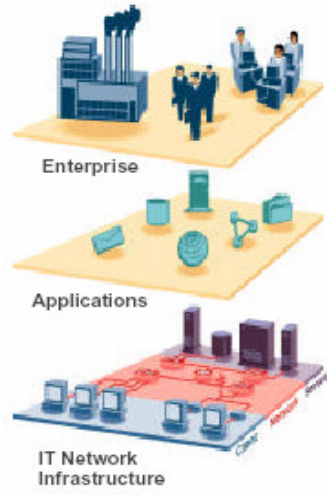
The energy efficient data centre



Visibility - Discovery of Data Centre Assets



- Understand what assets are *ACTUALLY* in the Data Centre
- How they are configured, changes applied and service impact
- How they are being used – what is critical and what is redundant
- The drift from standards and what to 'course correct'

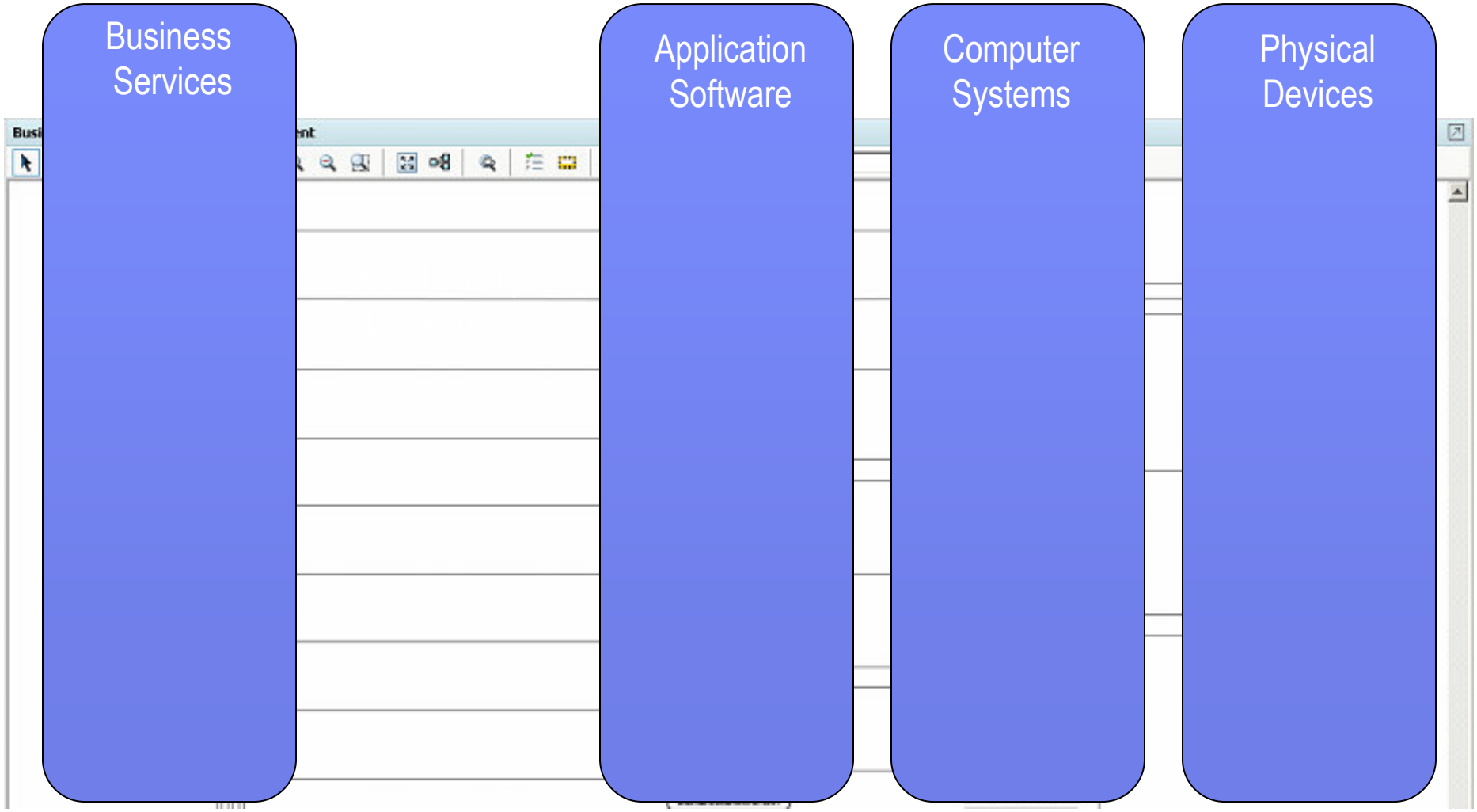


Tivoli Application Dependency Discovery Manager (TADDM)

- **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**

Visibility - Discovery with TADDM

Discovery of Cross-Tier (OSI Layer 2-7) infrastructure components and applications



Managing a virtualised environment

*Tivoli® Provisioning Manager enables **active energy** management of Datacenters through software, server, storage, and network automation and virtualisation*

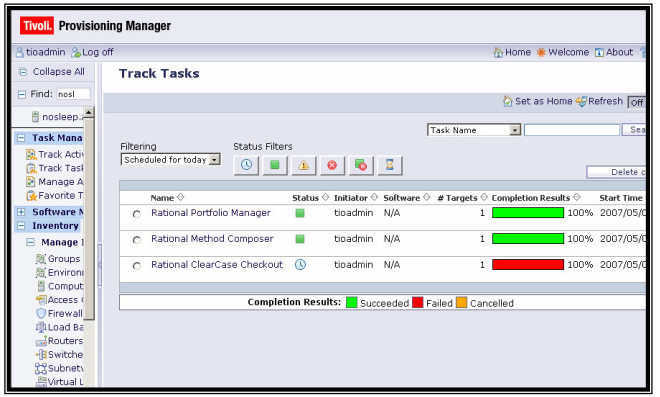
Automated deployment of virtual servers through definition templates

Support for virtualization platforms mainframe, VMWare, MS Virtual Server, LPAR, DLPAR etc

Simplification and automation of datacenter tasks to reduce workload and duplication.

Compliance reporting and remediation for inefficient assets.

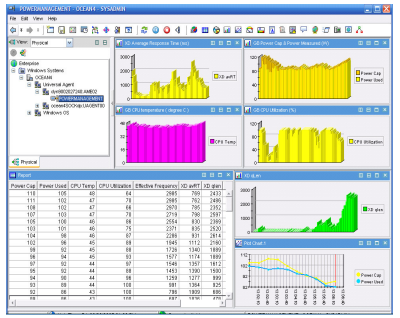
Schedule and manage up/down time to conserve power when systems are not required.



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

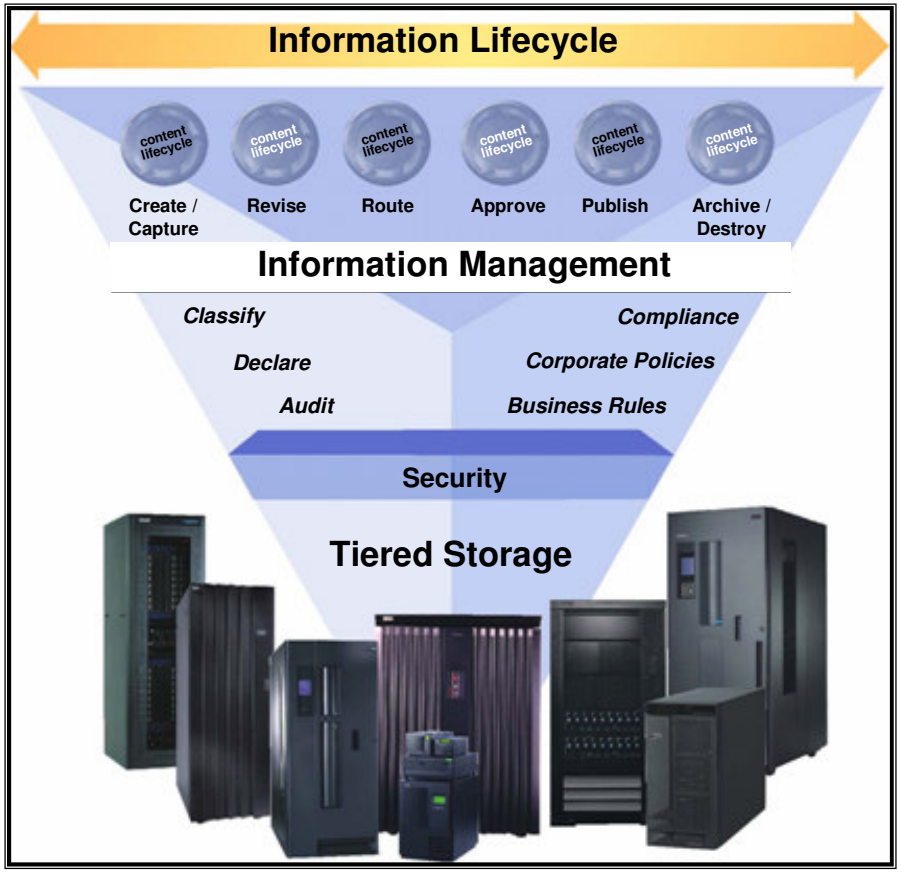
Power efficiency in Information Risk Management

Tivoli Storage management

Virtualise 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

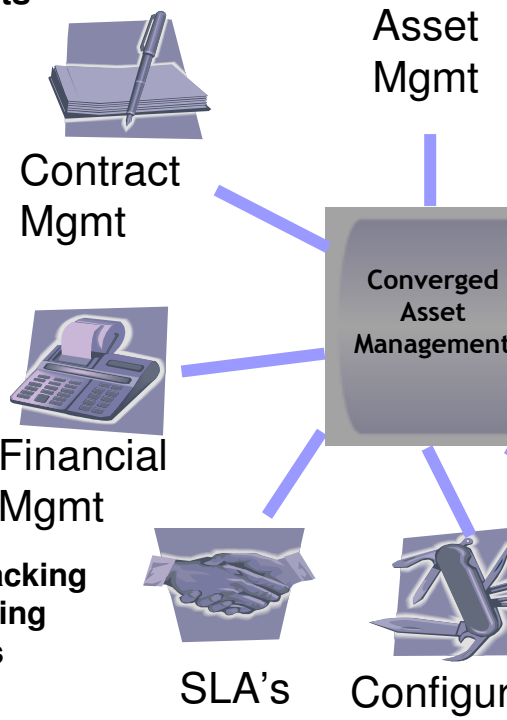
Manage identity to enable secure, seamless collaboration

Increase compliance & reduce reputation risks and audit deficiencies

Virtualised management of enterprise entitlement and access

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

Asset lifecycle components…



- **Master contracts**
- **Software contracts w/ license view**
- **Purchase contracts**
- **Lease / rental contracts**
- **Warranty contracts**
- **Labor rate contracts**
- **Create your own**
- **Notifications**

- **Hardware asset financial life cycle**
- **Installs, moves, adds, changes**
- **Reconciliation/Audit**
- **Integrate with HR systems**

- **Procure based on standards**
- **Create and route purchase orders**
- **Invoices**
- **Invoice vs. PO reconciliation**
- **Use catalogs**
- **Integrate with ERP systems**

- **Hardware**
  - **Desktop, Server, Mainframe**
  - **Network devices**

- **Budgets**
- **Purchase/Lease Cost Tracking**
- **Work/Service Cost Tracking**
- **Currency exchange rates**

- **Software license compliance**
- **Software inventory and use**

Managing the Enterprise & IT asset lifecycle

Accurately manage the lifecycle of assets, from procurement to decommissioning

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

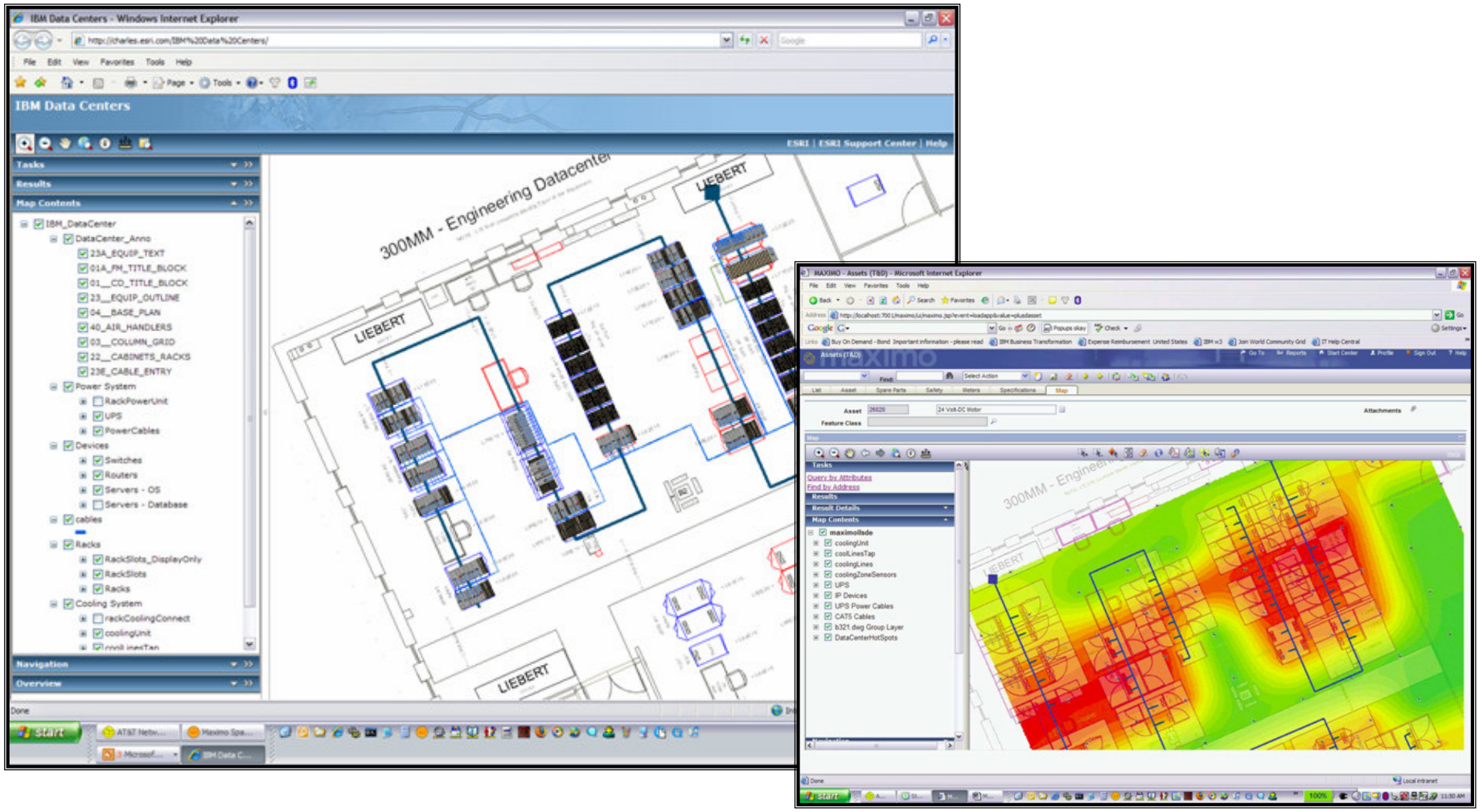
Efficiently manage the maintenance and pro active swap out procedures

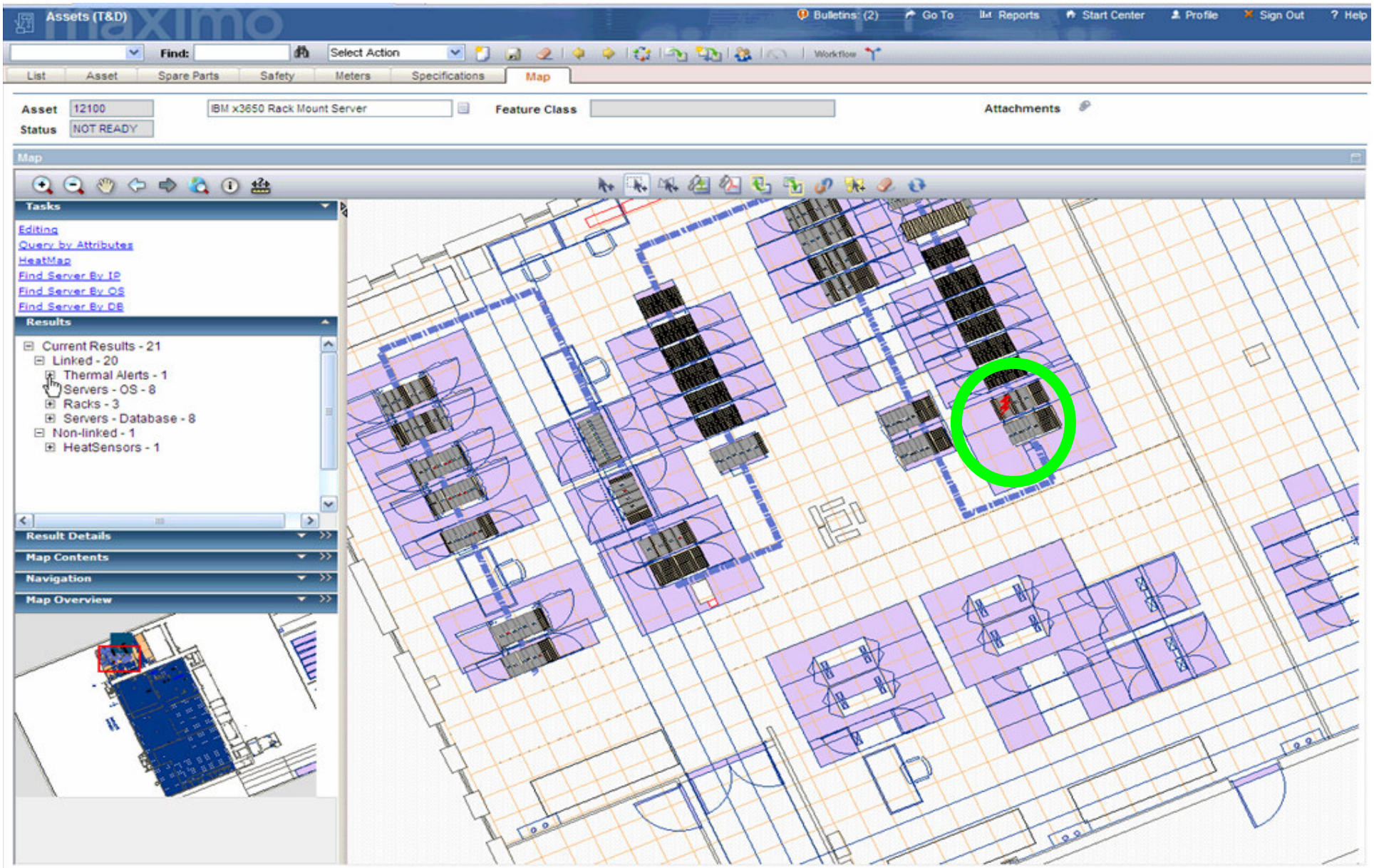
Contract management with suppliers

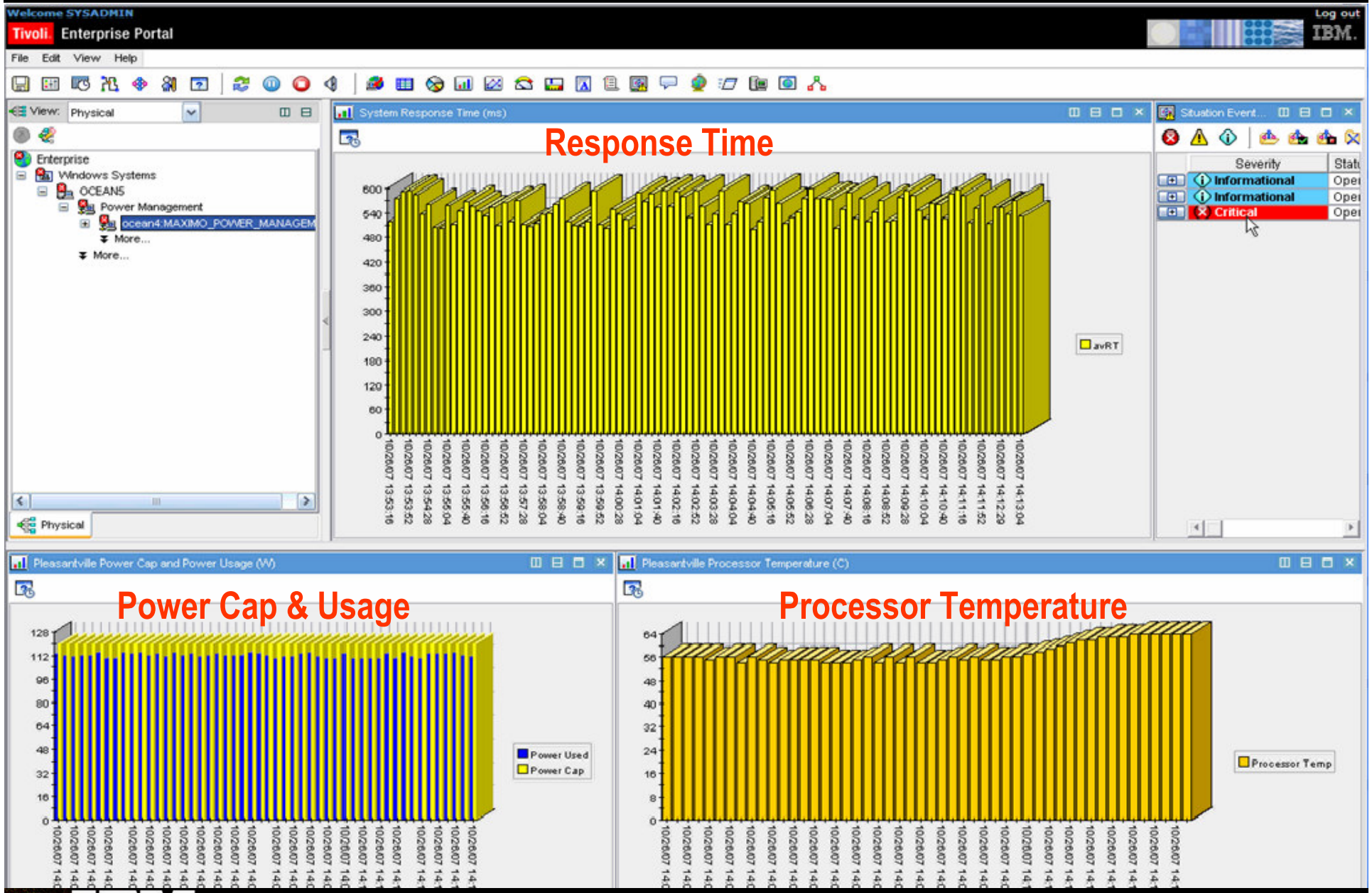
Asset inventories, geo spatial detail and ownership information for compliance reporting

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

Geospatial integration for assets and data centres







Distributing energy & use charges

Tivoli Usage and Accounting Manager

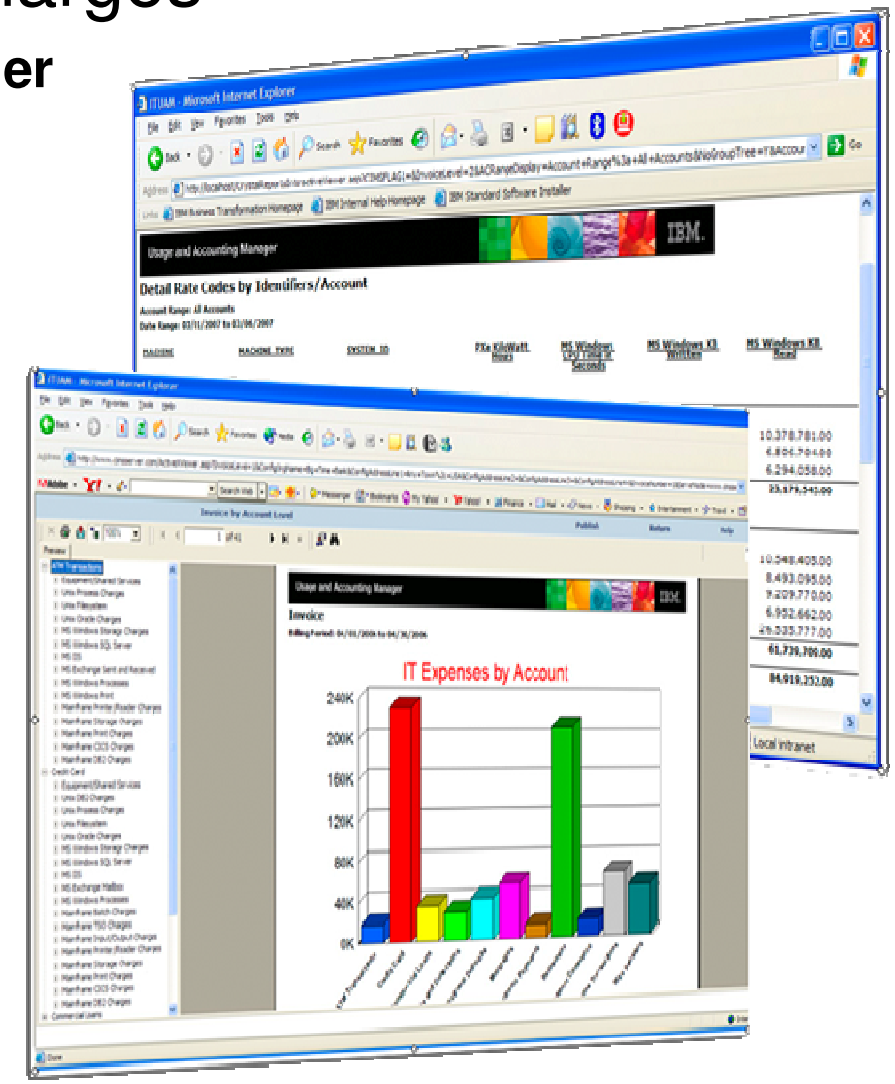
Who used what?

How much did IT cost?

Chargeback to user

Chargeback to service

As power becomes an expense for IT it can be recovered from the business and customers



Integrated Role-Based Dashboards

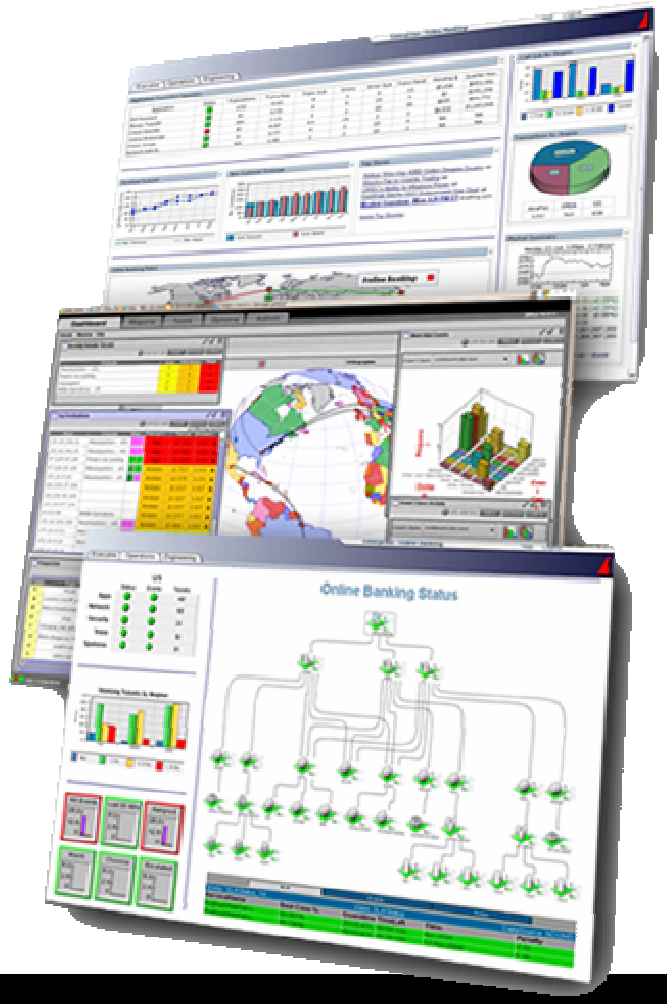
Enabling better & faster decisions across all operational areas of the Data Centre

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.



Active Energy software platform

Power monitoring and reporting - ITM

- Monitor, track and report actual power consumption - Power consumption alerts and situations

Power chargeback – ITUAM

- Monitor and Charge users for power consumption

Dynamic workload consolidation – TIO/TPM

- Consolidate workloads as transaction rates decrease - Turn off unused servers - Undo consolidation as workload increases

Storage optimization for efficiency - TPC

- Effectively manage storage utilization to reduce need for additional power consuming storage

Identify and remove unnecessary resources – CCMDB

- Discover resources across the IT infrastructure that are not needed and remove them from operations

Schedule workloads for reduced power costs - TWS

- Schedule workloads at non-peak time periods to take advantage of lower power costs

Properly maintain assets for optimum efficiency – Maximo

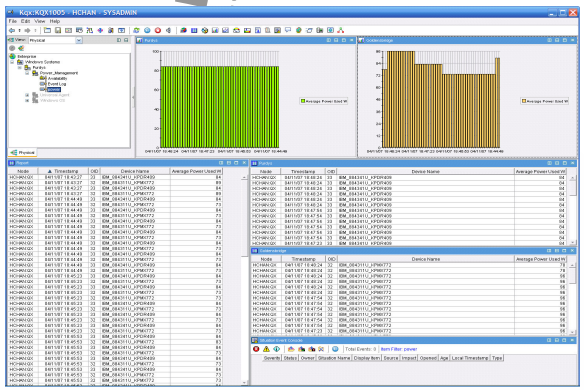
- Track and ensure that energy consuming assets are properly maintained (preventive and proactive maintenance) for energy efficient operations

A working example…

Usage and Account Management

TUAM and other Tivoli managers consume the historical aggregated performance and power data stored in **TDW**.

Enterprise Portal



Tivoli Provisioning Manager

Used to place servers in standby mode when they are not needed.

Asset and CI CMDB

Data warehouse

Data warehouse stores availability, performance and capacity metrics for IT and non IT devices for historical reporting

PowerExecutive interacts with hardware management module, monitors power usage, temperature, and control power caps.

IBM Power Data Provider

IBM PowerExecutive

IBM Director

Power Agent

IBM Tivoli Monitoring Family

In Summary

Optimization provides a significant opportunity to understand where we are currently and where to improve

Optimization, consolidation and virtualisation are part of the continual improvement process

Many forces are responsible for these changes including space and energy

Solutions are available today that can make a substantial difference, allowing evolution into a future model

Solutions will support several major themes from Consolidation, Virtualization, Asset Management, Infrastructure management and charge back

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