



Managing Tomorrows Data Centre

'Managing and measuring for energy efficiency'

M P Fieldhouse
IBM Software Group
Tivoli Strategy Manager - UK, Ireland & South Africa
January 2007

Confidential

© 2007 IBM Corporation

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

Business Objectives

*Growth &
Competitive Edge*

*Apply scarce resources
more effectively*

*Risk &
Compliance*

Cost Control

*Address the enormous resource applied to
maintaining business operations*

‘Many inhibitors make innovation more challenging....’

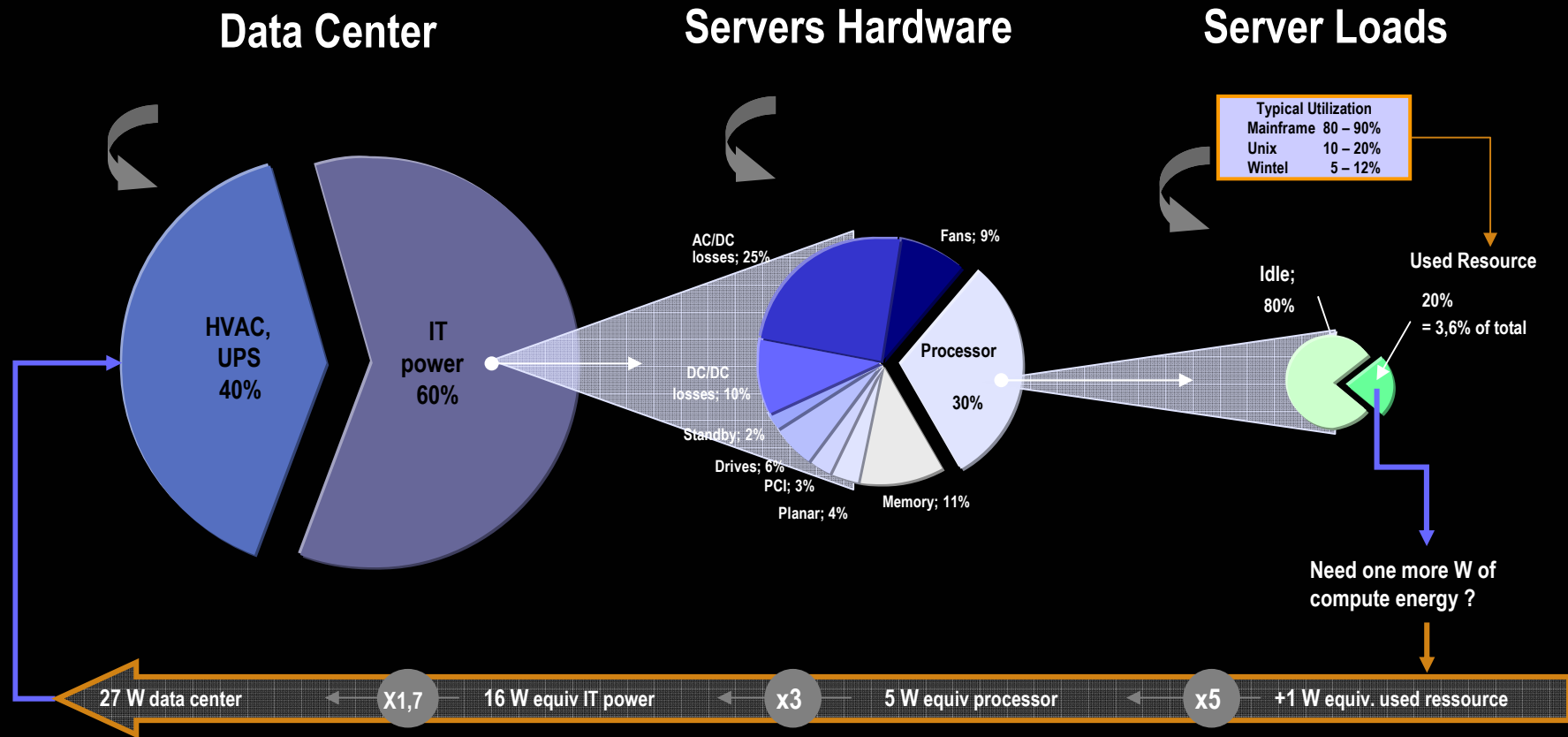
A new and challenging 'Greener' era...

- Energy efficiency is a global issue with significant impact
- Data Centres' energy and space usage is at a "tipping point"
- Many Data Centers are literally out of power and space
- Increased computing demand creates 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

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 and presenting data)**
 - **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

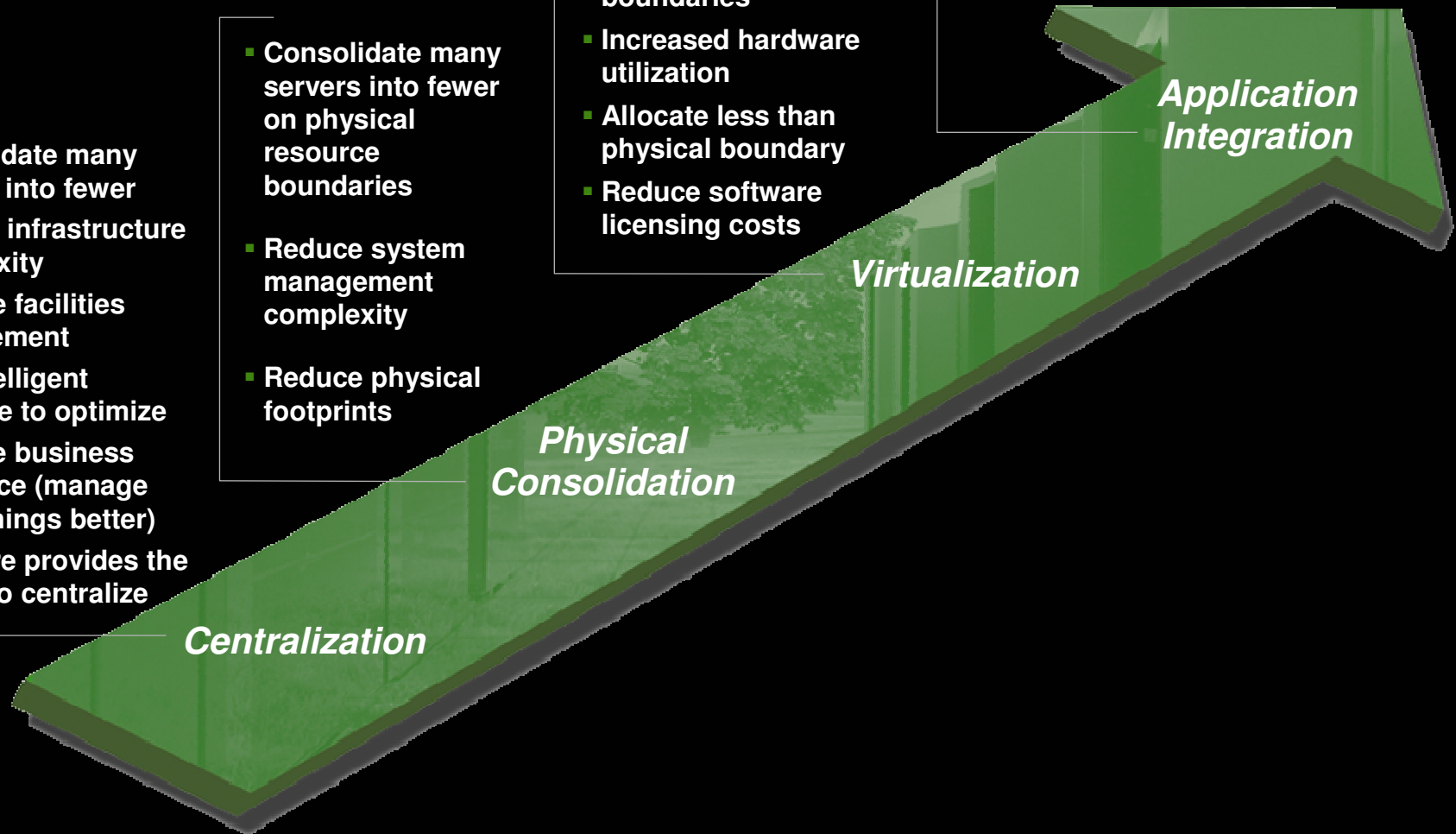
IBM's Data Center Energy Efficiency Strategy

- 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

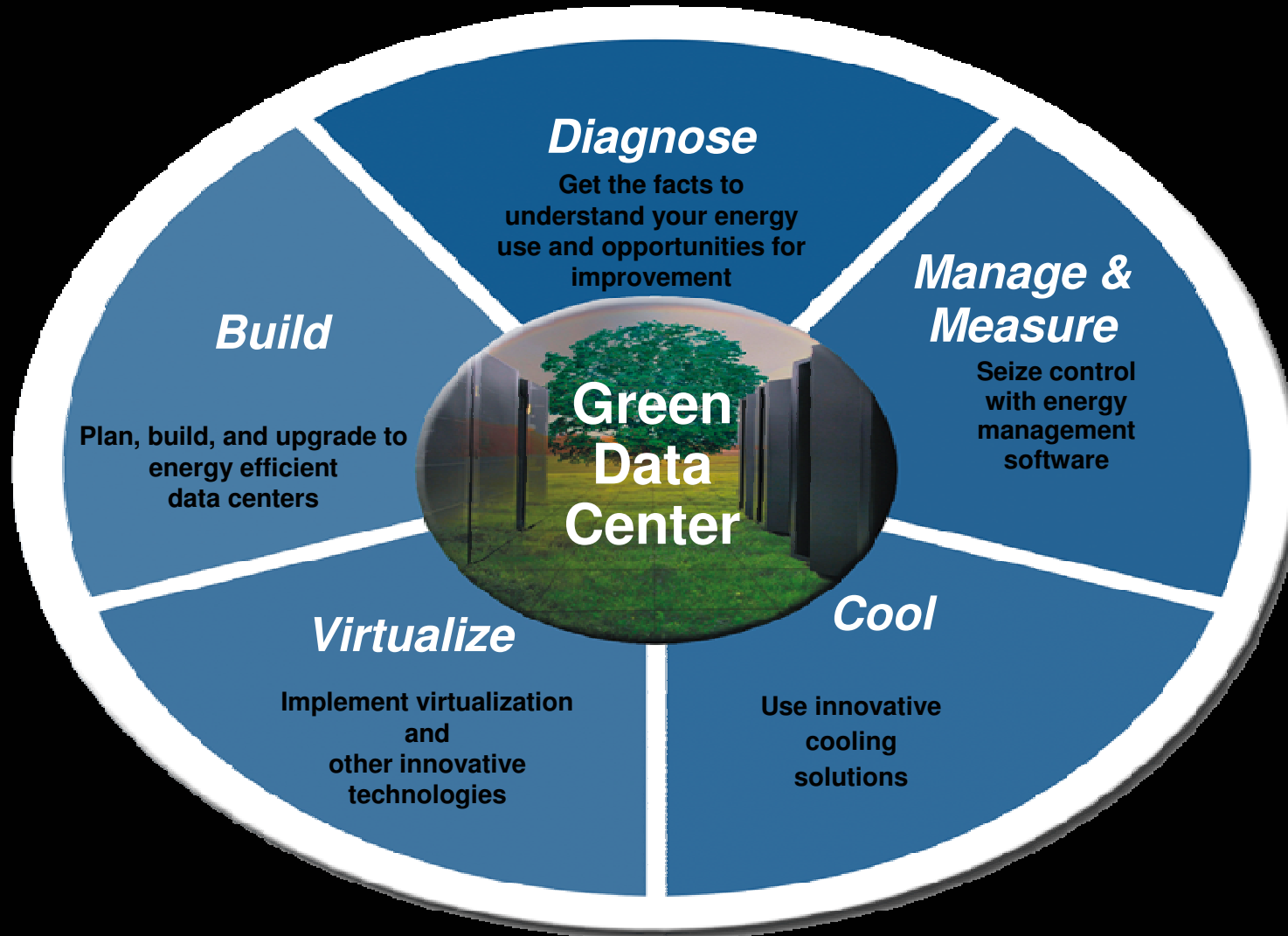
- Remove physical resource boundaries
- Increased hardware utilization
- Allocate less than physical boundary
- Reduce software licensing costs

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



The energy efficient data centre

Requires Visualization, Control and Automation of your Facility and Data Center



Managing a virtualised environment

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

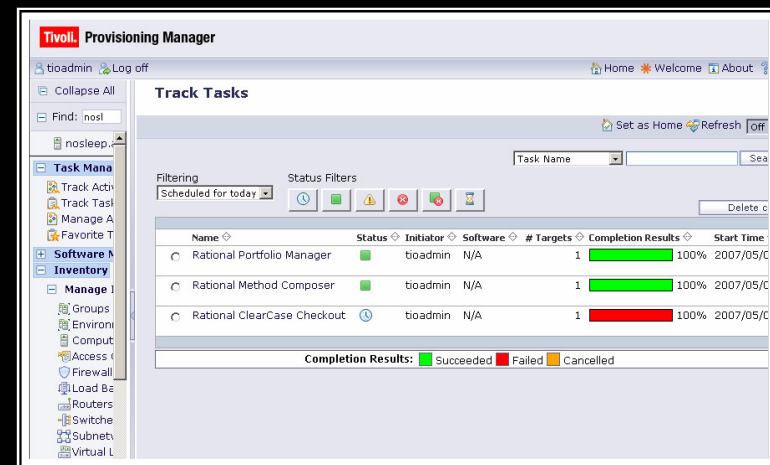
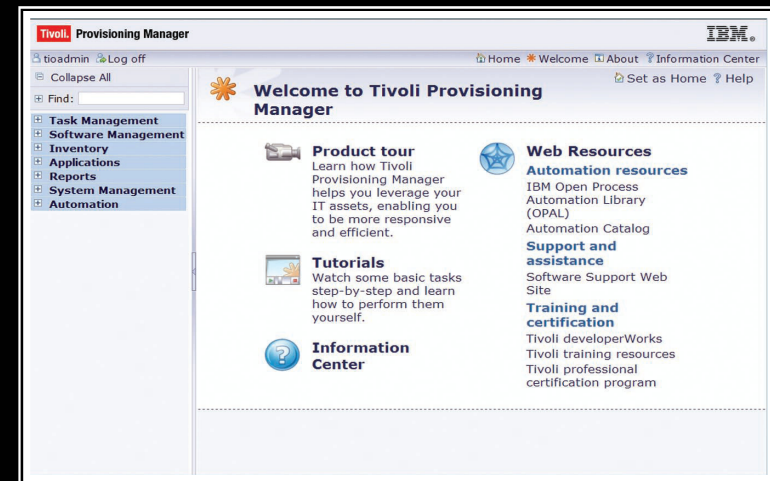
Automated deployment of virtual servers through definition templates

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.

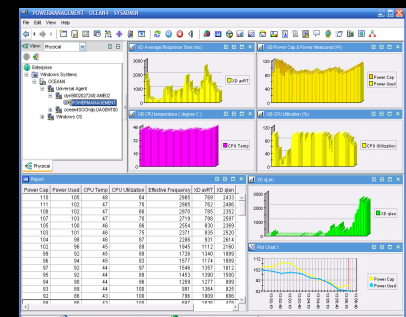
Schedule and manage up/down time to conserve power when systems are not required.



Monitoring for active energy management

- 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 Data Lifecycle Management

Tivoli Storage management

Virtualise the storage

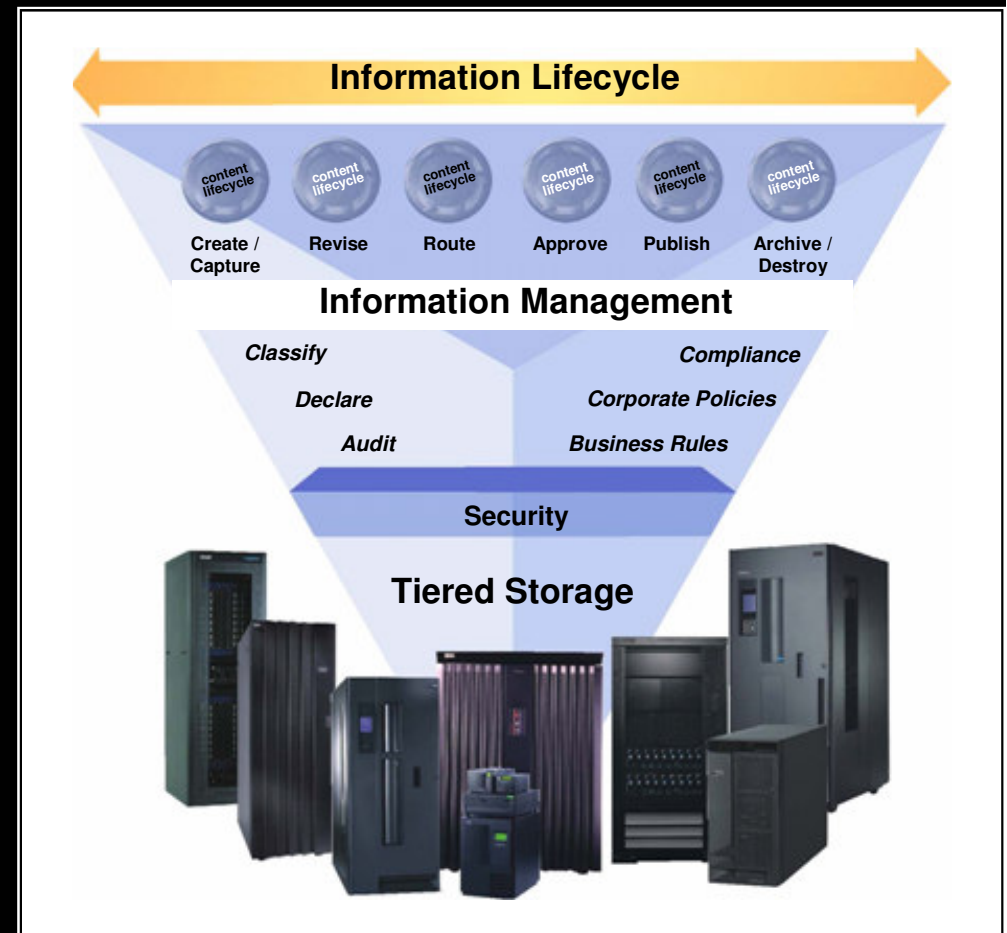
All storage can appear as a cohesive platform

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



Asset lifecycle components...



Managing the converged 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 single platform

Production Assets

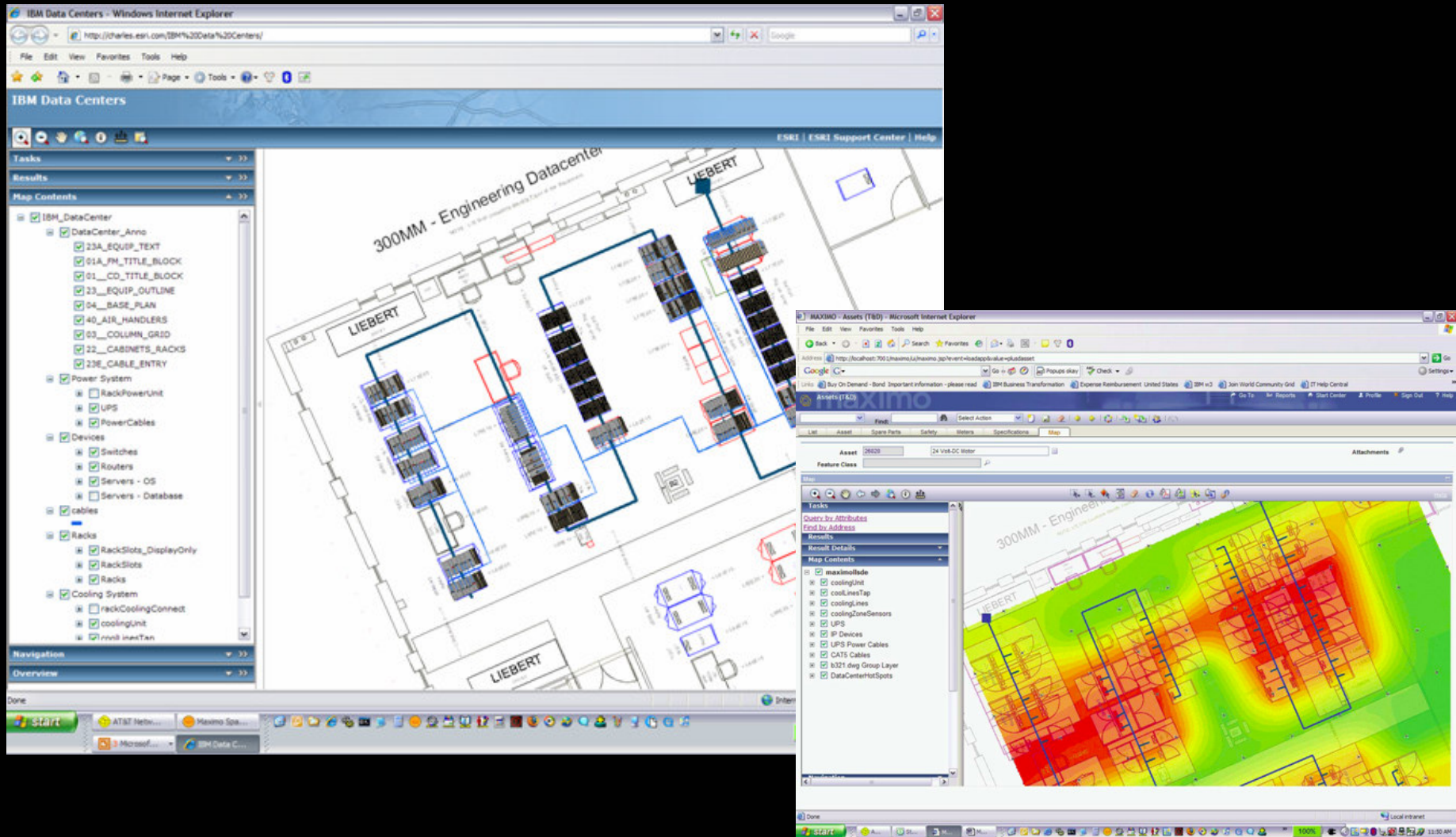
Facility Assets

Transportation Assets

IT Assets

Asset Management

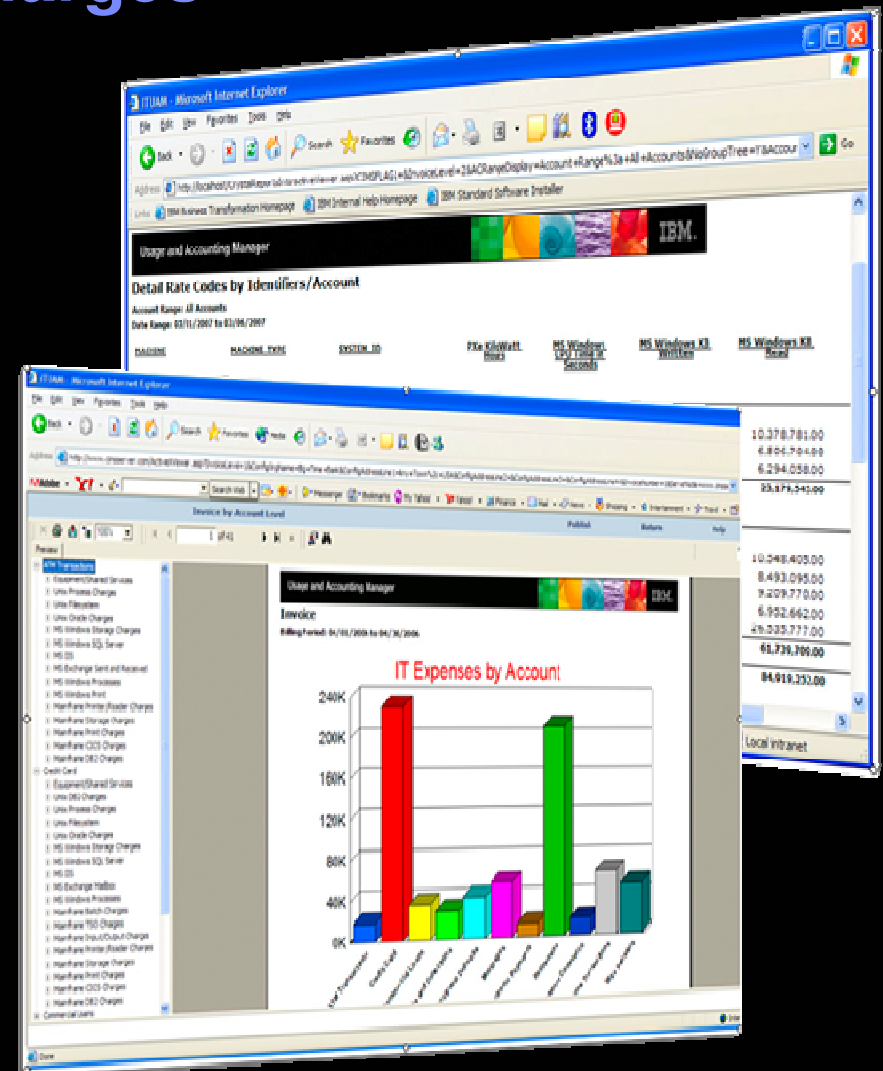
Geospatial integration for assets and data centres



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

Tivoli Software is critical for active energy management

- **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...

Tivoli Provisioning Manager

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

Asset and CI CMDB

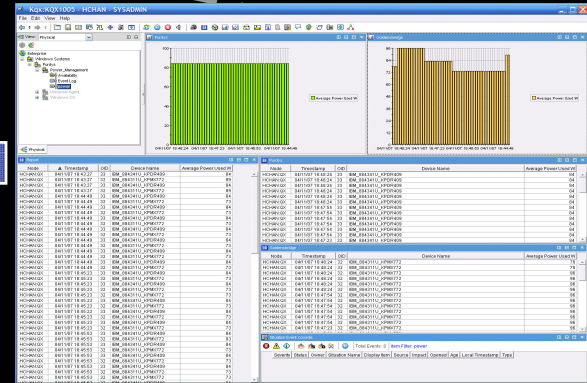
Usage and Account Management

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

Data warehouse

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

Enterprise Portal



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



- IBM Power Data Provider
- IBM PowerExecutive
- IBM Director

ITM Power Data Provider is an IBM Director extension that feeds the ITM Power Agent.

Power Agent

IBM Tivoli Monitoring Family

ITM Power Agent augments performance data traditionally collected from performance managers and the OS with power and temperature data. All of these data are aggregated for consumption by TEP and TDW.

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