Workspace
Technology Limited

Server Room, Data Centre Management and Monitoring Solutions

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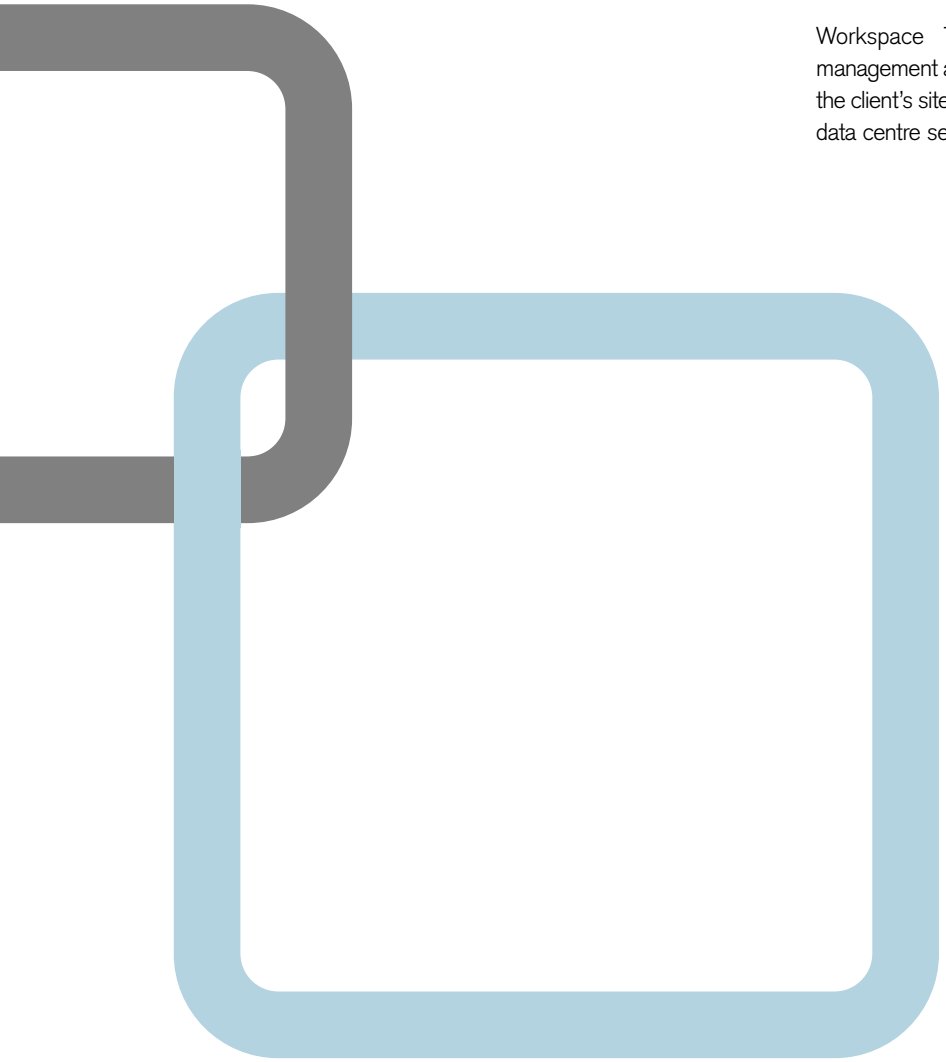
Management & Monitoring Solutions

The ability to alert a business to disasters or potential performance issues at the earliest moment is paramount. If a business can prevent a disaster or the occurrence of "over capacity", it can safe guard against associated disruptions such as waiting for replacement systems or re-locating staff to a recovery centre. The management and monitoring of systems is essential to insuring continued availability and performance during the lifecycle of any Network Critical Physical Infrastructure (NCPI) facility.

Workspace Technology provides a flexible approach to actively monitoring business-critical locations and their systems, to facilitate continuous business availability. NCPI room monitoring systems protect a room and its valuable I.T equipment from damage caused by water leaks, high or low temperatures, smoke or dust, humidity, vandalism, theft and a host of dangerous environmental and physical factors.

Workspace Technology offers a comprehensive range of management and monitoring solutions which can be tailored to meet the client's site-specific requirements, as part of our server room and data centre services & solutions portfolio.



Management & Monitoring Solutions Deployment Architecture

Workspace Technology provides clients with a structured approach to management and monitoring solutions. Designs are based on a tiered architecture, which enables Workspace Technology to scale solutions to meet the demands of small communications rooms, server rooms and large data centre environments.

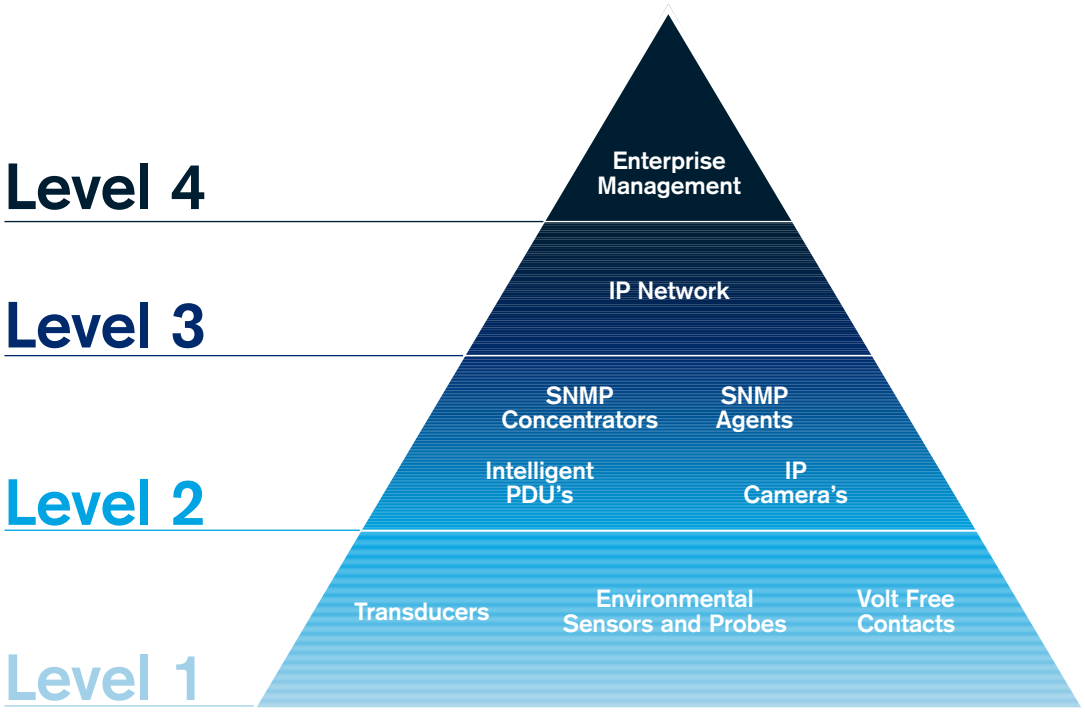
Level 4 - Enterprise Management - This represents an SNMP management platform, which centralises device monitoring and control and acts as an asset management application.

Level 3 – IP Network - This provides the information delivery mechanism, which is generally based on an IP LAN/WAN client intranet.

Level 2 – Device Management - Includes SNMP cards for air-conditioning systems, UPS equipment and generator sets. In addition, Environmental and Power Management SNMP Concentrators gather information for non SNMP sensors and probes.

Level 1 – Sensors & Probes - At the lowest tier of the management architecture sits the environmental sensors and probes. These gather environmental, physical and power related information, which is relayed to concentrator devices.

This tiered architecture enables Workspace Technology to provide scalability of solutions for small and large installations alike.



Level 4
Enterprise Device Manager

As we enter a new era of High Density Computing, the increased state of complexity surrounding business operations has caused organisations to appreciate the critical need to run data centres at higher levels of effectiveness and efficiency.

Enterprise Management platforms such as APC's InfrastruXure Central provides enterprise-level device, monitoring, control and asset management application. These systems allow users to monitor and control hundreds or even thousands of devices from a single console.

Enterprise Management systems can potentially fulfil the following functions depending on configurations and software modules.

Data Centre Portal and Repository - is the centralised hub where all information regarding the data centre is stored and obtained. It holds a system of records about the entire physical infrastructure of the data centre, including equipment, space, power, environmentals, network and storage.

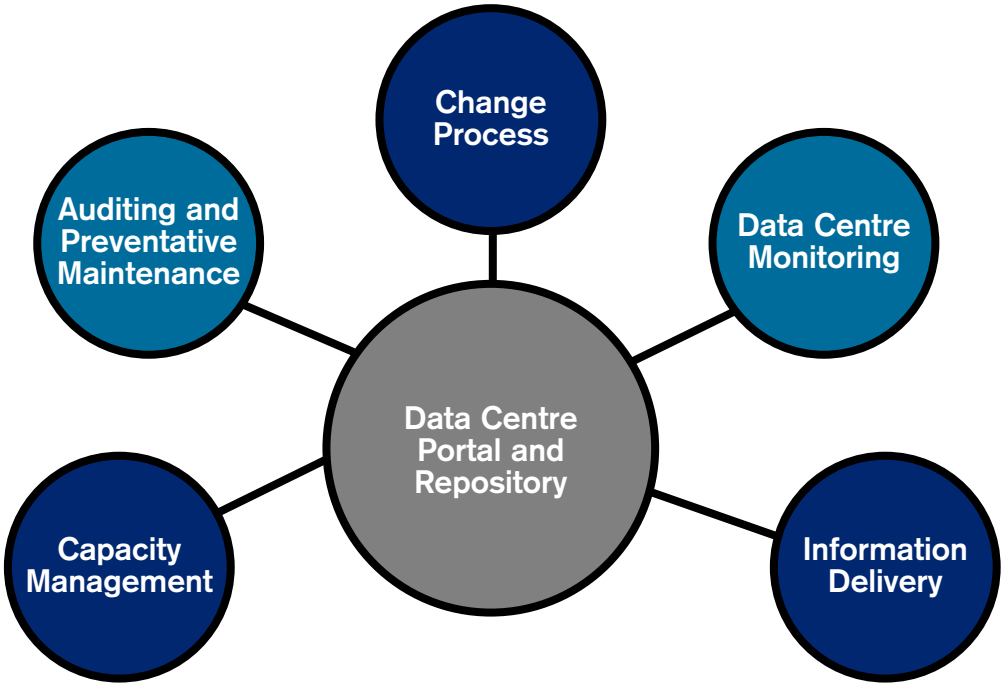
Data Centre Change Process - managed through the Data Centre Portal, it is used whenever a change is needed. Each change is planned by using the repository data, such that the impact of change would be understood before implemented.

Business rules are also used to determine how a change should be performed, ultimately creating the specifications for a particular change. By establishing such a rigorous change process, an organisation minimises the potential of human error.

Data Centre Monitoring - provides a view of all data centres and their components. This system provides a unified view of all physical infrastructure devices and displays alerts as they occur. Monitoring provides real time data to help maintain an optimal environment.

Information Delivery - provides visibility as to the data centre capacity, inventory, number of changes, adherence to SLA's, business process, bottlenecks and workloads.

Capacity Management - measures and assists in delivering key performance indicators that track past usage and forecast future demands. Trend analysis helps organisations plan for the technology refreshes required for a particular data centre.



Level 3
IP Network

In order to communicate SNMP information to the Enterprise Device Manager, there will be a requirement for an IP network infrastructure. Workspace Technology will assess the existing client network and incorporate all appropriate additions including local structured cabling, network switching and firewalls as necessary within any deployed solution.

Level 2
Device Management

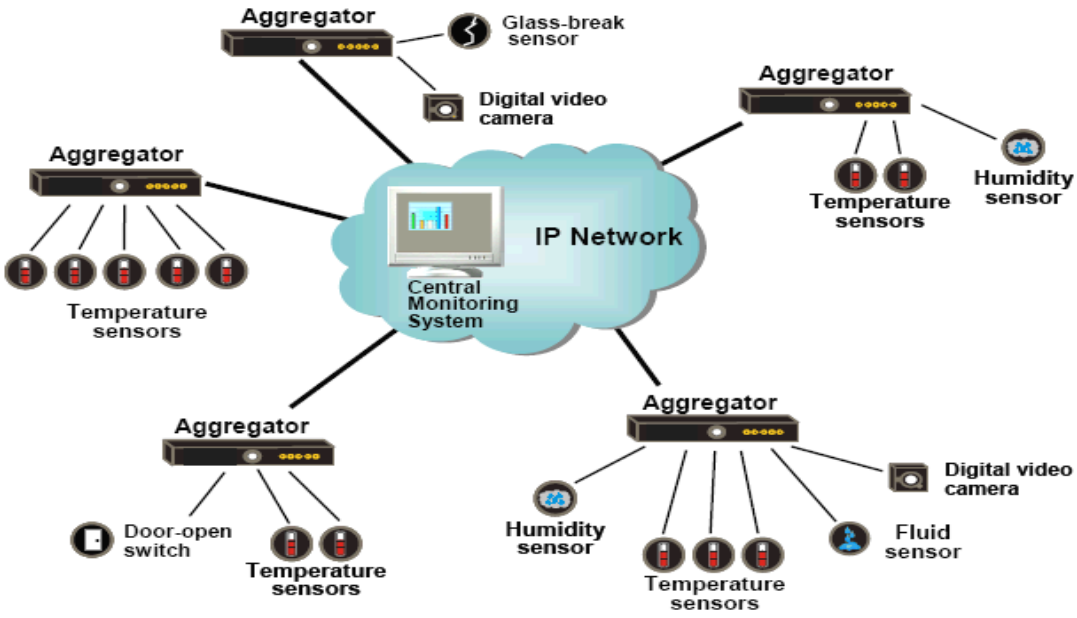
Workspace Technology offers a complete range of device management systems. These can be classified into the following areas:

- **Environmental and Power Management Concentrators**
- **SNMP Device Management Cards**
- **IP CCTV**

Environmental Concentrators - Although it is common to have sophisticated monitoring and alerting capabilities in physical equipment such as the UPS, computer room air conditioner (CRAC), and fire suppression systems, other aspects of the physical environment are often ignored. Monitoring of equipment is not enough. The surrounding environment must be viewed holistically and watched proactively for threats and intrusions. Such threats include excessive server intake temperatures, water leaks, and unauthorised human access to the data centre or inappropriate actions by personnel in the data centre.

With today's technology, monitoring systems can be configured to a level of detail that meets the data centres particular environment and security demands, each rack can be considered a mini " data centre" with its own requirements, with a monitoring strategy that may include multiple data collection points.

Example Cluster of Concentrator Devices



Level 2 - Device Management continued...

Intelligent PDU's

Power Monitoring

Alongside the delivery of reliable power to the network environment, issues of power management are also a key concern to the network manager. For example; unauthorised use of power outlets, locked-up equipment, in-rush current, overloaded circuits, and the need for remote access to power outlets within a rack.

Workspace Technology addresses these concerns through the deployment of intelligent power distribution solutions.

The advantages of this technology include the ability to provide:-

Energy Efficiency - Monitoring critical power feeds is an essential tool to ensure that loads are not deployed without any thought to energy consumption.

Power Balancing - IT infrastructure managers can ensure that the individual phases available within the data centre are correctly balanced. This helps prevent infrastructure failure and makes more efficient use of power delivery components such as UPS, generator, harmonic filters etc.

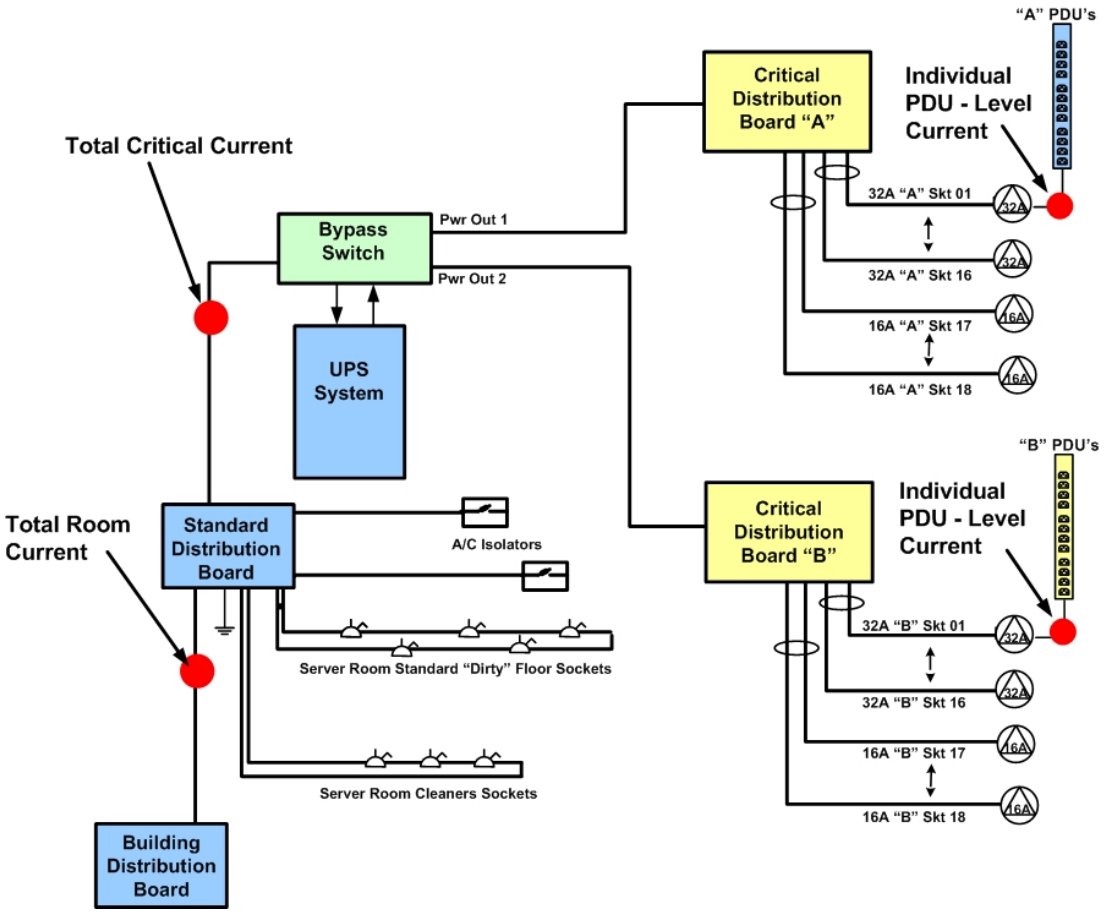
Power Availability – There is a finite limit before a circuit breaker supporting a PDU cuts in to prevent overloading and dropping the load (maybe your application servers!). This can be avoided by monitoring power closely. Where load sharing resilient A and B feeds are deployed to ensure the integrity of the solution, the maximum current must remain below a 45% threshold.

Billing Stream - Monitoring KWhr enables certain organisations to bill their customers (Web hotels, hosting companies etc.) for consumed power, thereby adding to their income revenues.

Remote Reboot & Power Control - Locked up or unresponsive equipment can be rebooted remotely, saving on site visits. In addition, the power strips can be used for sequenced start up of devices to prevent in-rush current.

Workspace Technology will integrate intelligent PDU's and three phase current transducers to create customised solutions to meet the individual needs of the customer.

Example Design for Deployment of Power Monitoring



SNMP Device Management Agents

SNMP Management agents are available for installation into many Air Conditioning, UPS systems and generator AMF panels. The installation of the SNMP card network enables the host equipment. Workspace Technology incorporate SNMP technology within key server room systems as standard.

The MIB information associated with the SNMP cards is loaded onto the Enterprise Management platform allowing centralised monitoring and management off all Server room equipment.

IPCCTV

The deployment of IPCCTV gives users the ability to monitor and record video over IP networks. The flexibility of digital technology enhances the data centre mangers ability to protect expensive real-estate and assets.

Based on the required level of security, IP camera technology can be configured for general surveillance, deployed for remote access control/validation and for remote investigation of technical problems.

Workspace Technology will agree the security strategies and deploy an IPCCTV configuration to match.

Options include fixed, Pan Tilt Zoom and day/night to match specific applications. Our consultants will calculate the required bandwidth and data volumes to ensure appropriate data storage capacity can be allocated.

Level 1
Sensors and Probes

It is not cost effective to imbed SNMP agents into every sensor, control and alarm device. Instead probes, sensors and volt free contacts are wired directly to Level 2 devices such as the APC Netbotz or Sinetica Hawk-i.

Temperature Monitoring - of all the environmental parameters which need to be kept in check, temperature control is top of the list for many network managers. All equipment has an optimum range of operating temperature. Exceeding this may cause permanent damage to components, thereby invalidating manufacturer's warranties and posing a threat to overall network availability.

Consequently, temperature control is a key concern for today's data centre manager. There are so many parameters to factor into the provision of a temperature controlled data environment and the dynamics of the environment are difficult to predict with accuracy. The increase in data-centre hot spots is making the task of temperature control an even greater problem. As power loads within rack enclosures increase, so does the heat output, sometimes with the result that entire cabinets are hotter than they should be.

Humidity Sensors - The water vapour contained in air protects IT equipment from dangerous static discharge. If humidity is too low there is a risk of static discharge, if too high there is a risk of moisture build up. Reliance on precision cooling solutions to maintain proper humidity levels in a computer room or data centre does not always insure proper humidity levels at the IT equipment air intake.

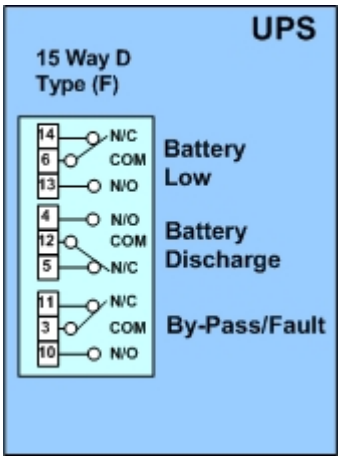
It is therefore essential that the levels of humidity are closely monitored through the deployment of suitable sensor probes.

Water Detection - Even in the best designed server rooms and data centre environments it is very difficult to avoid the installation of water and condensate pipe work associated with the air-conditioning plant. This pipe work represents a risk to the operation of the facility should there be a leak. To help mitigate risk the installation of rope or spot moisture detection sensors will provide warning alarms at the earliest opportunity.

Sensors		Location	Best Practice	Applicable Industry Guidelines
Temperature Sensors		Rack	Install, top, bottom & middle to monitor inlet temperature of devices in rack.	ASHRAE Guildlines
Humidity Sensors		Row	One per cold aisle at the front of rack in middle of row.	ASHRAE Guildlines
Rope leak Sensors Spot leak Sensors		Room	Leak rope placement around each CRAC system, around cooling distribution units, and under raised floors, and any other leak source.	No industry Standard

Level 1 Sensors & Probes continued...

V Example UPS VFC Port



Λ Hawk-i keypad

Other sensors include fire detection, air quality and PIR sensors. Based on the rack layouts, location and security requirements, Workspace Technology's consultants will make recommendations based on industry best practice.

Volt Free Contacts / Micro Switch

Equipment such as UPS, systems Generator sets and Air conditioning units will incorporate Volt Free Contacts or VFC, also known as dry contacts. These are changeover contacts that can we wired as either Normal Open N/O to Normal Closed N/C. Each contact will represent an alarm or active condition of equipment. For example, a UPS may have "on Battery due to mains failure", "low battery threshold", "UPS failure/bypass". More sophisticated panels may enable individual VFCs to be programmed for a customised installation.

In addition, door contacts (micro switch) devices can be installed to registered door entry into rooms, caged areas or cabinets.

Workspace Technology will incorporate VFC signals into customer designs, wiring directly back to Level 2 concentrator devices.

Keypad Control

Keypad access control units can be incorporated into solutions to restrict access to the server room or cabinets within the room. Code entry into the keypad will activate magnetic locks which we can incorporate into standard cabinet door handles.

Output Control

The use of Boolean logic within concentrator and management devices enables alarms or thresholds to trigger operation of output voltages. For example the Sinetica Hawk-I concentrator supports four digital normal open/normal closed outputs.

Examples of programmed output control include:-

- On temperature threshold breach, automatically turn on a fan or CRAC
- Remotely provide access to specific racks with electronic doors
- When water is detected in a remote data centre, automatically turn on sump pump
- When motion is detected in the data centre after normal hours of operation, automatically capture video and alert the security guards.

About Workspace Technology

Workspace Technology provides a range of services for Network Critical Physical Infrastructure (NCPI) facilities which include communications, server and data centre facilities.

The design and implementation of ecodesign* energy efficient solutions forms part of Workspace Technology's overall strategy for providing clients with a complete turnkey approach to the design and build of server room and data centre solutions.

Workspace Technology's expertise and services incorporates consultancy, upgrades, expansion, re-locations, turnkey design & build, planned maintenance and support and remote monitoring services.

A copy of Workspace Technology's "Environment" Server Room Solutions and Services can be downloaded from **www.workspace-technology.com.**

Workspace Technology work with a number of leading manufacturers of Monitoring & Management solutions including APC, Sinetica and Jacarta.

*ecodesign represents Workspace Technology's commitment to help clients reduce their carbon footprint through the deployment of energy efficient technology and designs

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