PANDUIT®

The Unified Physical Infrastructure℠ Approach

WHITE PAPER

Executive Summary

Whether you're a CIO, a building owner, or a facilities manager, thriving in today's dynamic and resource conscious world demands that your business be agile and flexible at all times. With the rapid and expansive growth of IP-based communication across converged building, factory, and data communication systems, each point of connection across the physical infrastructure becomes mission-critical.

In this environment businesses across all industries are shifting the way they think about the physical infrastructure. Traditional infrastructure solutions are changing from an unrelated set of siloed systems to a unified, integrated solution capable of addressing complex business and technology challenges. Critical enterprise systems and the physical infrastructure that supports them need to be integrated to enable greater reliability, agility, and flexibility while also managing operational costs and meeting sustainability goals.

Unified Physical Infrastructure℠ (UPI)-based solutions are designed to help customers manage risk and change within the physical infrastructure. These solutions intelligently map physical network systems onto logical infrastructure architectures, leveraging real-time information to increase safety and security in the workplace, manage systems more effectively, satisfy regulatory compliance requirements, minimize disruptions, and maximize performance.

Ultimately, UPI-based solutions provide superior business value, helping customers keep pace with technology innovations and build a smarter, unified business foundation.

The UPI Approach: Align, Converge, Optimize

Physical infrastructure systems traditionally have been designed, deployed, and operated separately, often in proprietary silos. When critical systems are integrated through proprietary technologies, they remain inefficient and underutilized because they cannot be leveraged across the enterprise to deliver the greatest value. Customers are demanding robust and innovative infrastructure solutions that address cross-functional challenges across business and technological domains, opening the door for seamless convergence and interoperability of all core systems.

The growing interdependence of systems and applications, and the physical infrastructure needs of each, requires the integration of traditionally disparate and proprietary systems. Effective harmonization of critical systems – communication, computing, power, control, and security – is key to improving performance throughout the enterprise and managing risk into the future. The comprehensive and holistic Unified Physical Infrastructure℠ (UPI) approach enables organizations to connect, manage and automate critical systems and drive operational, financial and sustainability advantages, allowing your business to minimize risk, lower cost, and heighten agility and reliability.

Innovative UPI-based physical infrastructure solutions enable risk mitigation, infrastructure efficiency and productivity along with a substantial reduction in operational costs. The degree of unification across the physical infrastructure can be defined in terms of three levels – Align, Converge, and Optimize – which indicate the extent of integration of the five critical systems across enterprise areas.

Align. The first level involves deploying modular and scalable passive, active and intelligent products, software and tools that align and connect systems within enterprise areas.

Converge. The second level involves integrating these products, software and tools into a converged physical infrastructure solution that extends across more than one enterprise area.

Optimize. The third level of unification involves optimizing the entire physical infrastructure into a seamless interoperable system across all critical systems and areas.

Panduit's UPI approach aligns the physical infrastructure to the logical architecture to address specific challenges and optimize the overall infrastructure design. These solutions initially focus on simple interoperability of critical systems specific to individual enterprise areas (i.e., data centers, building systems, the factory floor). As interoperability becomes better established and more sophisticated over time, these solutions will expand to address convergence across multiple areas. Eventually, they will lead to an optimized and unified physical infrastructure that provides substantial benefits to stakeholders across all enterprise areas.

UPI-based solutions leverage real-time information to enhance business agility, risk management, and security throughout the enterprise. These solutions also address cross-functional challenges around power, cooling, space, security, and policy-based management to result in a robust, scalable, and standards-based infrastructure solution that enables customers across diverse markets to mitigate risk and reduce total cost of ownership (TCO).

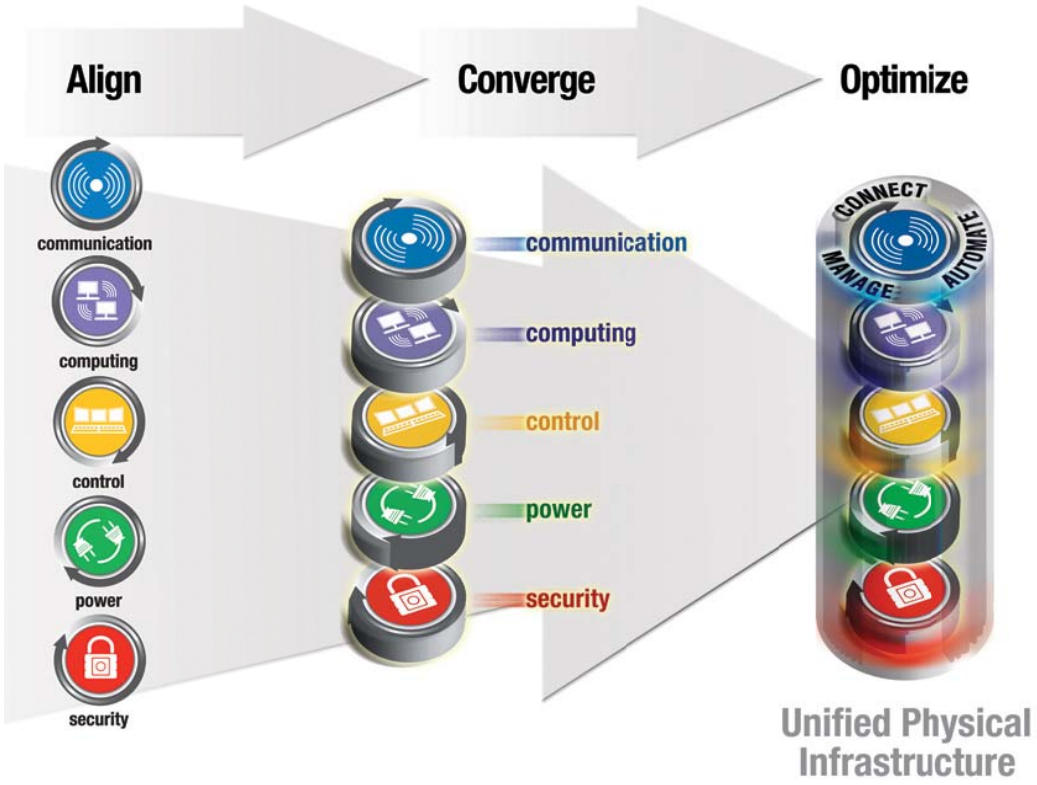


Figure 1. UPI-based solutions span all core enterprise systems.

UPI Principles: Connect, Manage, Automate to Support Sustainability Goals

Enterprises are awakening to the ways that their operations impact the environment. This awareness is especially heightened in the IT sector, as companies investigate and deploy initiatives that promote energy efficiency, cost effectiveness, and all-around "green" awareness. Sustainability initiatives also have become a requirement for doing business with global enterprise customers along the entire supply chain.

Panduit UPI-based solutions are designed to connect, manage, and automate the enterprise infrastructure while being good for both the planet and for business (see Figure 2).

Connect

- High speed data transport technologies support data center consolidation and virtualization efforts for increased resource efficiencies.
- Pre-assembled components and packaging reduction techniques reduce material waste and cabling scrap.
- Connected Building Solutions reduce capital and operational expenses by converging building devices and systems over a consolidated network infrastructure.

Manage

- Lighter, smaller-diameter Category 6A cable enables efficient use of pathway spaces for improved airflow through racks and cabinets to maximize pathways and cooling efficiencies.
- Innovative passive thermal management technologies (including Net-Access™ Cabinets, Vertical Exhaust Duct, and the Cool Boot™ Air Sealing Grommet) house IT assets and applications in a reliable, secure environment and provide a scalable solution for network stakeholders to manage extreme heat loads and optimize power and cooling efficiencies.

Automate

- Intelligent hardware and software for infrastructure management helps to monitor power and cooling characteristics and control the systems to reduce the power consumption.
- Connected Building Solutions simplify building operations and management for greater labor efficiencies.

For more details on the ways that Panduit UPI-based solutions enable consolidation, virtualization, and sustainability goals please download our white papers:

- Improving Data Center Cooling Efficiency
- Physical Infrastructure Considerations for Data Center Consolidation
- Using Centralized Architectures to Achieve Physically Consolidated Storage Environments.

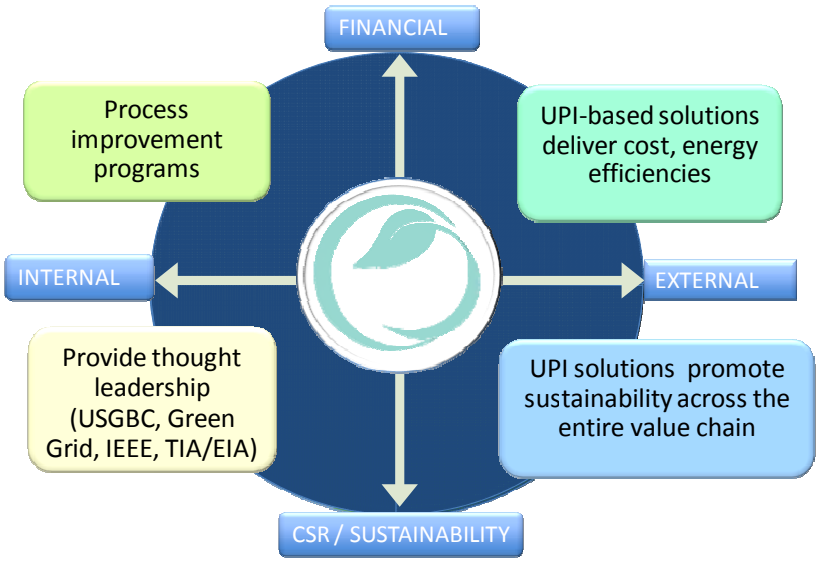


Figure 2. The UPI approach enables financial benefits and promotes Corporate Social Responsibility (CSR).

Key Drivers for the Unified Physical Infrastructure Vision

Forward-thinking enterprises carefully consider the entire physical infrastructure when evaluating and deploying innovative technologies. The revolutionary UPI-based approach to infrastructure design opens the door to seamless convergence and interoperability throughout core business systems across all markets to manage risk, lower cost, increase agility, and support sustainability goals.

Manage Risk

The increasing complexity of the infrastructure architecture leaves it vulnerable to faults, leading to unexpected downtime and longer Mean Time To Repair (MTTR). As convergence becomes the norm, seamless integration requires efficient physical infrastructure management to reduce risks which can occur within any system across the physical infrastructure.

- **Minimize Downtime**. Downtime affects system efficiency and performance, resulting in lost productivity, lost customers, and an often negative impact on the bottom line. In many cases, downtime can significantly affect business revenue streams and damage brand reputation. While downtime can never be completely eliminated, UPI-based solutions can enable faster diagnoses to detect the threat of faults (i.e., broken or compromised connections) before actual downtime occurs.
- **Enhance Reliability.** A reliable physical infrastructure is an engineered system comprised of carefully designed power and cooling capacity; robust data transmission media; effective grounding and bonding of system devices and elements; and pathways that protect, route and manage structured cabling. The use of detailed requirements analysis to produce robust systems comprised of quality components and materials can minimize interruptions and maximize business continuity.

> "Panduit's rich history of innovation and thought leadership continues with a new generation of intelligent solutions for complex logical and physical environments. Focused on integration, service and support, Panduit delivers Unified Physical Infrastructure-based solutions for mission critical Data Center applications."
>
> Daniel Hoff, Chief Technical Officer, PTS Consulting, Inc

- **Robust Security.** Ensuring end-to-end security and regulatory compliance requires complete visibility throughout the physical infrastructure. This visibility can be achieved by using a UPI-based architecture to collect and collate device, system, and administration data into a configuration management database (CMDB), thereby extending real-time intelligence from the physical up to the logical systems to help enterprises maintain secure control of sensitive or confidential information.
- **Enhance Safety**. UPI-based solutions protect against damage to human and capital assets and contribute toward a safer environment. Solutions elements include automated door lock/unlock; alarms and safe paths to egress; proper grounding, labeling, and identification of infrastructure elements; and effective lockout-tagout practices.
- **Ensure Interoperability – Beyond Standards.** Reliable, high-performance UPI-based solutions are developed in accordance with standards such as the Commercial Building Telecommunications Standard (TIA/EIA-568) and Telecommunications Pathways and Spaces (TIA-569), the Telecommunications Infrastructure Standard for Data Centers (TIA-942), and Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications (J-STD-607-A-2002). However, UPI solutions both build on – and move beyond – standards-based architectures to solve unique challenges around consolidation, virtualization, and automation of infrastructure resources.

Lower Cost

Panduit draws from proven methodologies and global best practices to provide customer-specific strategies and solutions which allow enterprises to leverage assets and investments to achieve lowest cost of ownership.

- Data center managers under pressure to manage growth while reducing capital and operational expenses can deploy scalable, modular systems that optimize real estate, improve thermal management, and simplify infrastructure complexity.
- Manufacturing systems (i.e., process control, motion control, numerical control) drive a plant's operation efficiencies and provide real-time information to business systems.
- Building systems (i.e., lighting, access, HVAC) are becoming more integrated and intelligent to reduce energy costs, improve climate control, and enhance employee productivity, security, and safety.

Increase Agility

The Panduit vision is based on a deep understanding of the most effective use of integration to combine almost all discrete systems within the physical infrastructure, enabling flexibility across applications for improved business agility.

- Panduit Reference Architectures intelligently align physical infrastructure systems to optimally support logical architectures. These architectures map secure, scalable, and consistent infrastructure designs and enable consistent deployment of sustainable IT infrastructures across both greenfield and retrofit applications.
- The UPI vision is realized through the use of open standards based frameworks designed to enable tangible infrastructure and business process improvements for increasing functionality, interoperability, and manageability of mission-critical operations across the enterprise.
- The UPI approach prepares the physical infrastructure to withstand multiple logical infrastructure equipment refresh/upgrade cycles, reducing the need to remove and replace the infrastructure and providing the scalability to grow as business requirements change over time.

Enhance Sustainability

Reliable UPI-based solution offerings enable enterprises to meet sustainability goals by driving resource and energy efficiencies across the physical infrastructure.

- Smart Data Center Solutions reduce IT assets and streamline management and maintenance tasks to achieve operational cost efficiencies, maximize real estate utilization, and optimize power and cooling efficiency over the data center lifecycle.
- Industrial Automation Solutions enable improved productivity by integrating Ethernet and control system networks to achieve increased convergence across process line and automated systems.
- Connected Building Solutions achieve higher asset utilization within an improved cost structure over the building lifecycle by converging building devices and systems and managing energy resources more effectively.

Panduit Solutions Enable the UPI Vision by Industry and Application

Panduit's Unified Physical Infrastructure (UPI) vision delivers a comprehensive strategy for unifying the design, deployment, and management of the physical infrastructure. These solutions leverage strategic partnerships with industry leaders and incorporate innovative product systems, appliances, software and services. Panduit solutions are tailored by industry and customized by application, and are supported by an aligned partner community to drive resource and energy efficiencies across the physical infrastructure.

INDUSTRY SOLUTIONS

Financial Services

Exponential increases in data traffic and instant access to account information push network speed, bandwidth, security, and reliability requirements to extreme levels. Electronic commerce, algorithmic trading, and customer demand are driving consolidation, integration, and centralization of networks. Stringent security measures, including stronger access controls, detailed tracking, and more secure transfer methods, are required to ensure network uptime, reliability, and performance. Effective compliance with industry regulations, crisis management, and disaster planning are essential to manage business risk and protect the bottom line.

Progressive UPI-based infrastructure solutions deliver maximum reliability and performance to support these unique business demands. For example, High Speed Data Transport (HSDT) Solutions accommodate intelligence applications, electronic trading, unified communications, and information-rich account services, while secure infrastructure tools from port to cabinet help protect data from both internal and external threats.

> "Panduit's quality solutions deliver high network performance levels and accommodate our requirements for future expansion. The high-end Panduit solution we have installed is certainly a good investment."
>
> Ramdan Pawi, Chief Information Officer, Accenture

For more details on these solutions please download our Financial Services Solutions brochure.

Industrial

The industrial sector is comprised of many diverse environments, including life sciences, metals and mining, food and beverage, and pulp and paper. Harsh outdoor environments (frigid cold, intense UV rays, rain, salt spray, winds) and demanding indoor conditions (high vibration, caustic chemical vapors, washdown, and radiation) require robust, reliable infrastructure solutions that can withstand these challenging specifications. UPI-based solutions deliver resilience against harsh environments, providing long-term reliability and reducing repair and replacement.

Oil and Gas

With increasing volumes of oil and gas being found in difficult and remote terrain, the oil industry is under pressure to find technology solutions that are both compatible with the harsh environments and are safe to deploy while maximizing production. Green awareness and a changing, heavier crude oil mix are forcing refineries to reconfigure processes and leverage control systems to achieve business objectives.

UPI-based physical infrastructure solutions complement and enhance the performance of predictive and intelligent process control systems to maximize uptime and safety while maximizing production and optimizing reliability, availability, and remote monitoring capacity.

Government

Governments are embracing online channels and high-performance networks in an effort to enhance service, satisfy demand, adhere to mandates and manage budgets most efficiently. These improvements require replacement of outdated technologies and legacy systems to provide citizen access upon demand and improve system interoperability and information sharing, all while adhering to mandates that force agencies to "do more with less" through technology.

Deployment of UPI-based infrastructure solutions for e-government initiatives helps improve bandwidth, expand access, enhance service, maintain security, and satisfy demand. More specifically, UPI-based Connected Building Solutions support government-mandated "green" building orders to achieve energy reductions and resource-efficient operations and maintenance practices.

For more details on secure government solutions please download our white paper *Managing Physical Security Risk in the Data Center: Protecting Against Network Intrusion Using Keyed Connectivity Systems*.

Health Care

Safety and privacy regulations within the health care sector are extremely stringent, and systems in these environments require a fully operational physical infrastructure at all times to maintain mission-critical connections and ensure quality of care. Also, unlike other industries, patient demand is constant regardless of the economy, and portable and mobile devices are increasingly being used to access and manage patient records.

"Panduit's leadership, comprehensive solutions and Unified Physical Infrastructure approach aligned perfectly with the needs of this project. We were able to integrate over a dozen critical building systems onto a single network. This streamlines administration and simplifies maintenance and upgrades by enabling our team to handle network-related issues, instead of depending on a variety of external vendors."

Selim Nart, Global Network Architect, Vignette Corporation (now Open Text)

A robust, reliable UPI-based physical infrastructure helps organizations achieve reliability, availability, and security goals while supporting the increasing amount of bandwidth, automation, and mobility required in medical equipment and processes. For example, the very high bandwidth required by modern medical imaging technologies necessitates the deployment of HSDT Solutions in conjunction with physical network security devices that enable hospitals to record, store, and protect patient records.

Wind Energy

Wind energy systems transform kinetic energy into electrical energy that can be harnessed for practical use. Enterprise demand for this renewable energy resource has spurred the development of wind energy infrastructure solutions that can withstand outdoor environments and can be deployed quickly anywhere around the globe. From turbines to network control centers and grid-connected substations, end-to-end UPI-based offerings deliver capacity improvements while addressing system complexity, helping end-users implement projects quickly and safely.

APPLICATION SOLUTIONS

Data Centers

Panduit understands today's vital business and technology challenges and how they impact data centers. Successful businesses depend on data and information, yet today's data centers have become far more than information processing sites. As the nerve center of successful businesses, they must evolve to accommodate a broad array of rapidly-changing demands, from greater performance requirements to optimizing limited data center real estate and controlling the cost to power and cool active equipment.

The potential for risk increases with consolidation of multiple systems and convergence of new technologies. For example, failure of cooling equipment can lead to server failure, which in turn results in downtime that then interrupts business operations. To avoid these interdependent risks, a unified management system must leverage a physically mapped logical network to provide the monitoring and reporting capabilities that are crucial to efficient infrastructure diagnoses and troubleshooting.

> "We initially selected Panduit for their commitment to innovation of the physical infrastructure, but their dedication to our business partnership over the past four years has allowed Morgan Stanley to select them as a global infrastructure partner, supplying consistently high quality solutions and support globally."
>
> Mike Shaw, Vice President IT Services, Morgan Stanley

Panduit's comprehensive data center infrastructure ranges from HSDT Solutions, thermal management, cable management, and Physical Infrastructure Management software, and is designed as an integrated solution rather than a system of discrete components. This unified approach to infrastructure architecture also simplifies asset management by enabling:

- Managed movement of network switches, servers, applications and resources from site to site.
- Tracking of network connections, security systems, energy usage and other important assets to identify and resolve problems before they affect general operations.
- The ability to automate the collation of device, system and administrative data across the network into a configured management database.
- Real-time security integration with logical network design to speed isolation, notification and resolution of potential security breaches.

Panduit's Data Center Solutions embody the next wave of systems integration and risk management methodologies by aligning and harmonizing critical systems to support the delivery of secure, energy-efficient, real-time data and services. This approach encourages stronger, more frequent interaction between IT and facilities management to deliver a physical infrastructure that best fits the demand profile of high-density data center applications.

For more details on these solutions please download our *Data Center Solutions* brochure and the *Data Center Design Guide: Mapping Cisco Nexus, Catalyst, and MDS Logical Architectures into PANDUIT Physical Layer Infrastructure Solutions*.

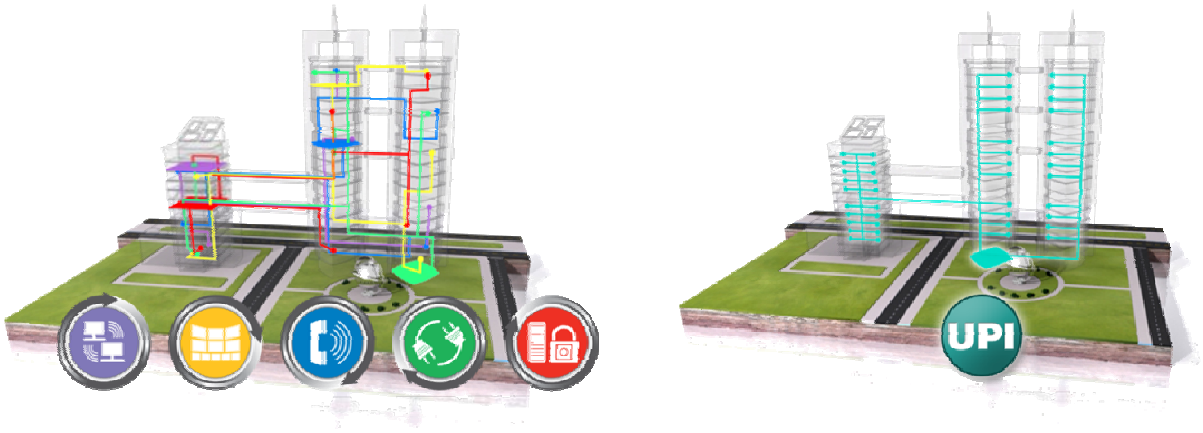
Figure 3. UPI-based data center solutions support data center virtualization and consolidation by providing greater visibility, management, and control of the physical infrastructure.

Connected Buildings

Building stakeholders are increasingly utilizing UPI principles to drive interoperability and convergence of building devices and systems that were formerly deployed and managed separately through proprietary, closed technologies. These new intelligent infrastructure design strategies reduce operational expenses with no additional capital costs to fulfill the requirements of current day building systems and provide a flexible migration path to adopt future technologies.

Connected Building Solutions realize UPI design principles in the form of an intelligent infrastructure that extends throughout a property to both connect technology components and bridge stakeholder needs. These solutions enable linked facility and network systems to be built directly into the building fabric, extending the reach of cabling infrastructures to all endpoint devices and creating seamless integration of building systems with new services like IP telephony, wireless connectivity, digital media and unified communications. The completed infrastructure enables distinct business advantages for building owners and property managers:

- Flexibility to accommodate ever-changing user needs, from mobility services to environmental controls that optimize worker comfort.
- Greater visibility and control of critical systems that identify, monitor, and resolve problems before they affect tenants, enhancing overall security and safety.
- New levels of technology convenience that ultimately work to differentiate an owner's building, and attract tenants who require robust network applications.
- Minimized installation of disparate systems cabling, which reduces initial deployment and maintenance costs throughout the lifecycle of the building.
- Converged networks that enable enhanced commissioning and help meet energy performance requirements for a LEED rating.



Pre-Convergence UPI-Enabled

Figure 4. The UPI-based Connected Building Solution links facility and network systems directly into the converged building network, generating and sharing data over a single platform to enhance building efficiency.

Successful connected building projects result not from following a fixed set of instructions, but from engaging in an open dialogue between stakeholders and partners at every stage, leveraging knowledge across the organization and vendors to reduce communication gaps. Industry standards and UPI-based reference architectures can support customized approaches to deploying specific systems and technologies. No matter what level of customization is used, stakeholders can realize higher asset utilization from their investment by following UPI best practices at each phase of the building's lifecycle.

For more details on these solutions please download our *Connected Building Solutions* brochure and our new white paper *Achieving Financial and Functional Advantages in Connected Building Solutions with the Unified Physical Infrastructure (UPI)*.

> "Panduit's Unified Physical Infrastructure Vision establishes the foundation for the 'Information Utility' – a single building information network. With a UPI approach, the building systems become a true business asset, enabling stakeholders to help transform their organization, improve business processes, and enhance real estate value."
>
> Dr. Rick Huijbregts, Director Real Estate Business Development, Cisco Systems

Industrial Automation

Control systems have migrated from closed, proprietary systems to open systems. In the continual evolution of these factory automation systems, IP-based networks are the de facto standard. This, coupled with the growing number of automation devices connected via Ethernet, is forcing manufacturers to consider an alternative approach to factory network planning, design, and installation.

Panduit UPI-based Industrial Automation Solutions ease the deployment of industrial networks and automation control systems to enable expansion of operations as well as increase collaboration and productivity. These solutions take an integrated and holistic approach to the physical network architecture, enabling organizations to bridge communication between factory floors and corporate offices. This enables distributed systems to respond to current market needs, and facilitates remote management and monitoring of equipment for improved productivity tracking and more efficient business practices.

On the factory floor, physical infrastructure design and deployment must address factors such as safety, security, and performance. The UPI approach calls for a Structured Environmental Analysis (SEA) in order to identify physical infrastructure elements that will withstand harsh factory floor conditions while optimizing network performance and safety. To help stakeholders address these concerns, a subcommittee of the Telecommunications Industry Association (TIA) developed the Mechanical, Ingress Rating, Climatic, Electromagnetic (MICE) classification system (see Figure 5). This system provides a structured method of categorizing the environmental classes to determine the level of hardening required for network infrastructure elements: media, connectors, pathways and enclosures. In certain cases such as final assembly areas, commercial grade components can be used.

By integrating production, data acquisition, purchasing, quality, logistics, sales, and building automation systems onto a single common infrastructure, UPI-based Industrial Automation Solutions help customers improve network efficiency, reduce operational costs, and increase manufacturing productivity.

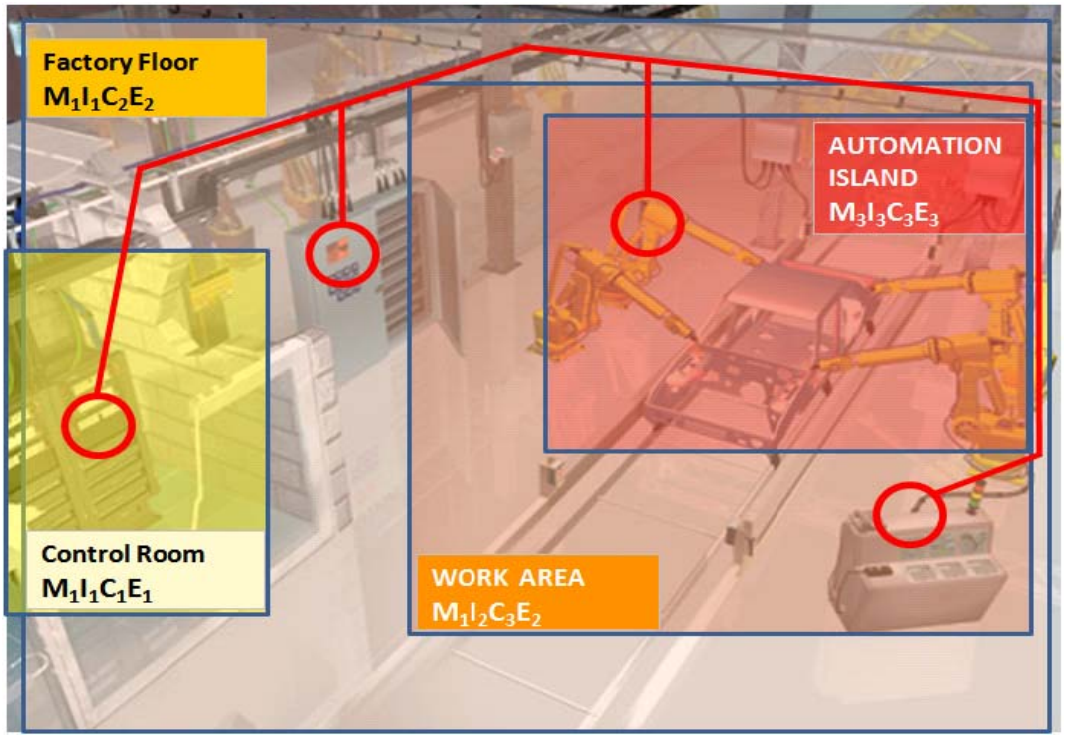
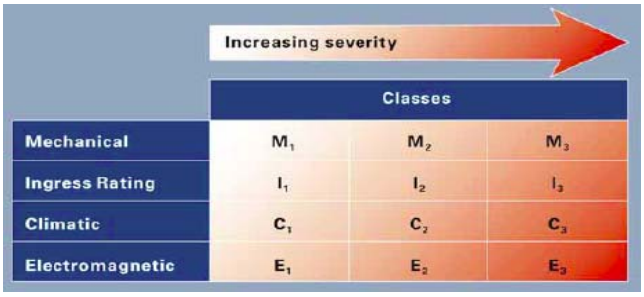


Figure 5. An end-to-end UPI-based Industrial Automation solution cuts across several industrial settings, ranging from environmentally controlled rooms to more harsh environments.



TECHNOLOGY SOLUTIONS

Panduit, in collaboration with our technology partners, combines best practice methodologies, physical and logical architectures, and a comprehensive portfolio of products and services to deliver robust, scalable Unified Physical Infrastructure-based solutions enabling a broad range of technologies to meet current and future business requirements.

- **Wireless**. Distributed network topologies are increasingly bringing power, switching, and data transfer functions closer to endpoint devices for improved network manageability and scalability. Network stakeholders can use wireless technologies to deliver additional freedom and mobility to users as well as added flexibility in deploying wireless-enabled endpoint devices to track manufacturing assets.

  Integrated wired and wireless networks are an essential element of successful enterprise and industrial environments. Holistic UPI-based solutions balance factors including power, effective range, and security to design and deploy a wireless network physical infrastructure that meets performance demands while providing a migration path for future growth.

> "An optimized data center infrastructure must address the interdependencies between the logical network and physical layer infrastructure. Cisco and Panduit have collaborated to create enterprise data center topologies that provide guidelines for high-performance, flexible, scalable, and reliable data center design."
>
> Deepak Munjal, Data Center Solutions Marketing Manager, Cisco Systems
>
> Panduit is a Solutions Enabler Partner for IP Communications within the Cisco Technology Developer Program

- **Web 2.0.** Web-based business management systems and rich collaboration services (collectively known as "Web 2.0") require increasingly complex and large-scale database processing capabilities. At the same time data center managers are under pressure to manage growth in services while reducing capital and operational expenses. With per-cabinet equipment densities increasing to meet these processing demands, organizations are looking to UPI-based solutions that combine passive exhaust containment systems with high-speed data transport systems to optimize energy efficiency and mitigate risk.

  For example, Panduit HSDT Solutions connect hardware assets to optimize network bandwidth, throughput, and latency for on-demand data delivery, and the Panduit Vertical Exhaust System (VES) passively channels heat from hardware assets directly into the hot air return plenum. The result is a unified infrastructure system with both verified bandwidth and effective thermal management to achieve maximum revenue generating potential at minimal risk.

- **Scalable Infrastructure Management Platform**. A unified infrastructure management system must leverage a physically mapped logical network to provide the monitoring and reporting capabilities that are crucial to timely diagnoses and troubleshooting of infrastructure problems. The Panduit® Physical Infrastructure Manager™ Software Platform is a browser-based client server software solution that maps and monitors both the physical layer and network resources to enable better infrastructure visibility and reduce network operational cost. This platform also allows integration between third-party programs.

What is Panduit Doing to Realize the UPI Vision?

Panduit's initiatives are revolutionizing the ways that enterprises approach physical infrastructure deployment and design. The industry is increasingly recognizing the ways that Panduit solutions allow customers across different industries to migrate towards the UPI vision that meets their integration and convergence needs.

UPI Architecture Realized in New Panduit World Headquarters Building

Figure 6. The new Panduit World Headquarters Building in Tinley Park, IL USA will provide state-of-the-art visibility and control of all critical building systems, integrated and aligned under a single unified intelligent infrastructure.

When planning its new World Headquarters Building, Panduit project leaders invested in a UPI-based Connected Building Solution to enable convergence of facility systems onto a single network for improved control, communication, and management. This unified approach to infrastructure architecture offers advantages to owners, employees, visitors, and guests:

- Improved building system management, providing greater visibility and control of critical systems that identify, monitor, and resolve problems before they affect workers, enhancing overall security and safety.
- Converged networks that enable enhanced commissioning and help meet energy performance requirements for LEED Gold certification.
- Multi-technology architecture that extends the reach of cabling infrastructures to all endpoint devices, creating seamless integration of building systems including IP telephony, wireless connectivity, digital media and unified communications.
- Converged infrastructure design to reduce deployed capital and maintenance costs throughout the lifecycle of the building.
- Flexibility to accommodate changing user needs, from mobility services to environmental controls.

The new facility will enable collaboration through unique design features ranging from open office concepts, shared work spaces, and the deployment of the latest tools. Also, to provide a healthy workplace and minimize our ecological footprint, Panduit will achieve Leadership in Energy and Environmental Design (LEED) Gold certification, reinforcing our commitment to the environment and delivering significant energy savings.

Resource Management

Panduit helps organizations realize higher asset utilization from their infrastructure investment by applying UPI principles across people, processes, and systems.

- **People.** Panduit's UPI vision calls for a collaborative exchange across organizations, from internal teams such as finance, IT, and facilities to stakeholders across the value chain (architects, engineers, consultants, contractors, and manufacturers).
- **Processes.** The holistic UPI approach to infrastructure design drives process efficiencies across the project lifecycle, enabling stakeholders to realize improved operational benefits such as lower total cost of ownership (TCO) and optimized facility management.

"Panduit has provided us with a comprehensive end-to-end cabling infrastructure that allowed us to converge voice, data, and security and building controls into a single network. The Panduit grounding system and cooling management ensure the reliability and performance of our network and Cisco equipment. MMM Group sees an optimized, unified physical infrastructure as a strategic advantage to enable us to manage our business more effectively and better service our customers now and into the future."

Dan Butler, Partner, MMM Group Ltd.

- **Systems.** Panduit's consultative approach aligns people and processes toward the UPI vision. This approach enables stakeholders to effectively align and converge the complex array of systems that comprise the Unified Physical Infrastructure.

UPI principles should be leveraged across all phases of the project lifecycle (see Figure 7) to drive operational, financial, and sustainability advantages. Panduit includes operational energy efficiency, end-of-life, and disposal considerations for all product and UPI-based solution designs to help us choose materials that have the least possible impact on the environment when we process them, as our customers deploy and use them, and at product end-of-life.

Also, to enable our customers to achieve sustainability benefits across the value chain, applicable Panduit products comply with the material restrictions of European directives on the Restriction of Hazardous Substances (RoHS; 2002/95/EC) and Waste Electrical and Electronic Equipment (WEEE; 2002/96/EC), and all global Panduit manufacturing facilities are registered to the ISO 14001:2004 and ISO 9001:2000 standards.

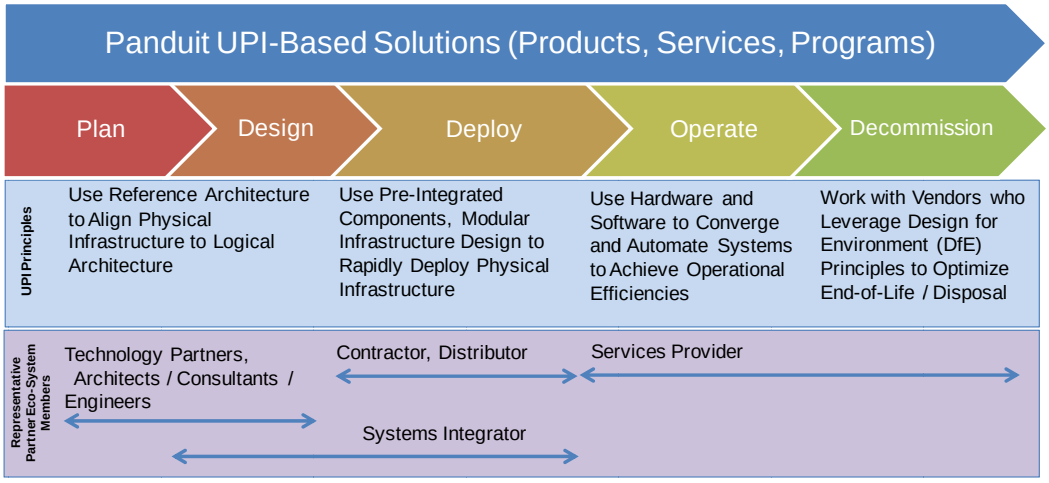
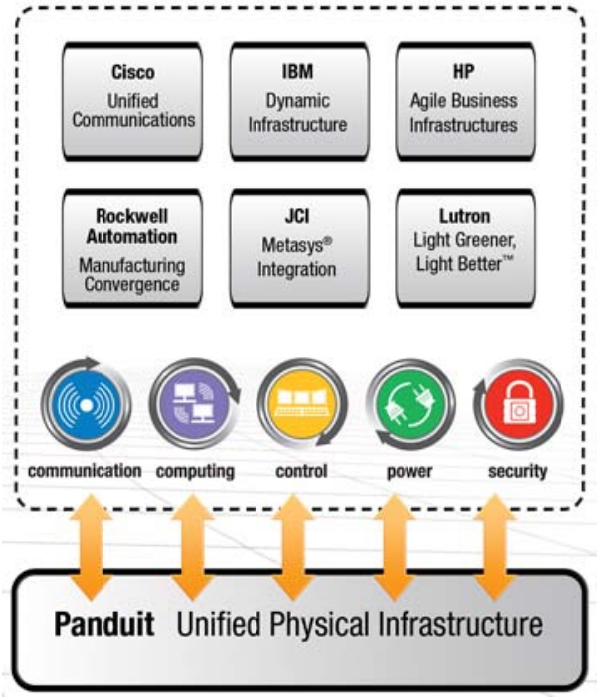


Figure 7. Multi-phase project lifecycle for developing a UPI-based infrastructure solution.

UPI: the Foundation for Innovation

Panduit is the only vendor in the industry with a tightly integrated portfolio of innovative physical infrastructure solutions and services. Thorough established strategic alliances with top global industry leaders such as Cisco Systems, IBM, HP, Rockwell Automation, Johnson Controls, and Lutron, Panduit develops holistic UPI-based solutions for our customers.

We continually invest in relationships and resources to solve our customers' greatest business and technology challenges. Our unique, robust partner ecosystem offers a lifecycle of services for innovative modeling, predictable execution, and operational excellence. This comprehensive approach to infrastructure design, deployment, and management allows benefits to be realized across systems and throughout the entire enterprise.



Industry leaders, technology partners, and the analyst community agree that the effective deployment of an aligned, unified physical infrastructure is critical to business operations. Panduit's UPI approach aligns with and reinforces the technology vision and strategy of these groups, which enables the development of innovative solutions that address cross-functional physical layer challenges. Appendix A provides an overview of these industry and analyst visions, demonstrating the many points of intersection and alignment between the UPI vision and similar partner initiatives.

Technology Strategy and Offering Portfolio

By following a progressive technology strategy of unification, instrumentation, and integration, UPI solutions enable enterprises to align systems, reduce costs, improve processes, and generate business intelligence. An effective technology strategy transforms the infrastructure in the following ways:

- **Unification.** Connect and standardize systems to enable holistic management of a portfolio of streamlined, scalable physical infrastructure solutions.
- **Instrumentation.** Improve operational processes by bringing all systems under one dashboard to allow deepest visibility into the physical infrastructure and enable best business decisions.
- **Integration.** Deploy enterprise resource management and policy-based management applications to enable a more agile, automated approach to managing the unified, instrumented infrastructure.

The result is a standardized infrastructure that is available to all enterprise applications, allowing for a more agile and automated approach to systems management and monitoring (see Figure 8).

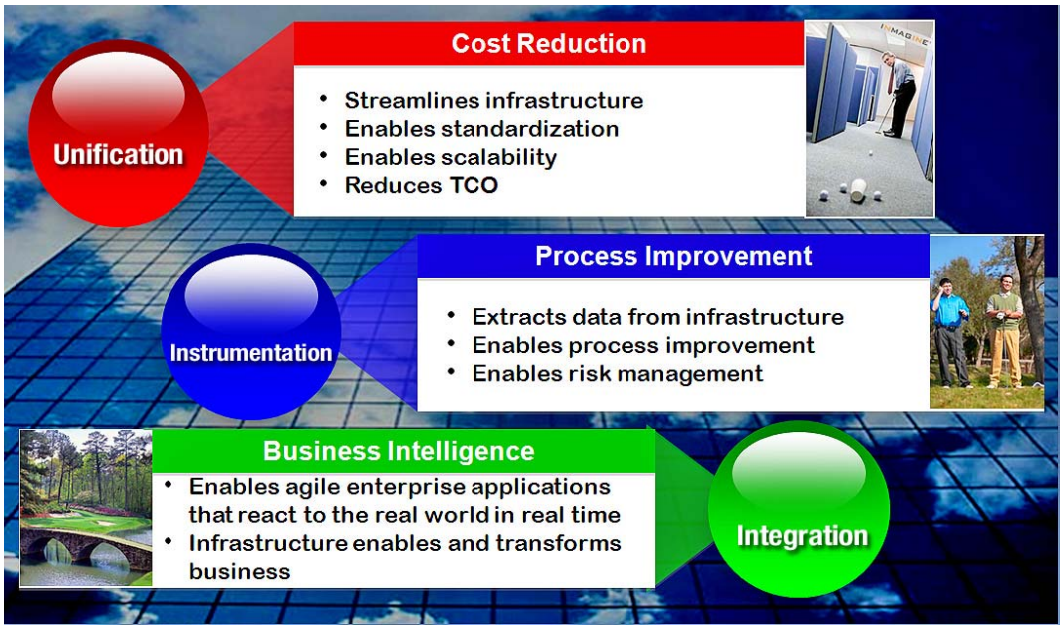


Figure 8. Utilize a UPI-based technology strategy to transform your infrastructure.

The Panduit Difference

Minimize Infrastructure Risk. Maximize Business Value.

Organizations need to keep pace with rapidly changing business and technology paradigms in order to deliver superior value to their customers. Panduit's UPI-based approach helps organizations solve business problems by aligning and harmonizing critical systems to mitigate risk, lower cost, increase agility, and enhance sustainability across the physical infrastructure.

As the only vendor in the industry with a tightly integrated physical infrastructure solutions and services portfolio, Panduit combines best practice methodologies, physical and logical architectures, and end-to-end support to help customers achieve the following:

- Migration from silo-based or proprietary architectures to open, integrated systems
- Deployment of technologies to meet current and future requirements
- Convergence of innovative technologies and applications
- Improved business agility, energy efficiency, and reduced life-cycle costs.

Overall, the Panduit UPI approach mitigates risk within the physical infrastructure, providing availability, reliability, security, and safety to help improve business agility and reduce cost of ownership. This approach leverages Panduit and partner capabilities in a collaborative manner to help organizations gain competitive advantage. Visit www.panduit.com/UPI to investigate how the UPI approach can transform your physical infrastructure.

About Panduit

Panduit is a world-class developer and provider of leading-edge solutions that help customers optimize the physical infrastructure through simplification, increased agility and operational efficiency. Panduit's Unified Physical Infrastructure (UPI) based solutions give Enterprises the capabilities to connect, manage and automate communications, computing, power, control and security systems for a smarter, unified business foundation. Panduit provides flexible, end-to-end solutions tailored by application and industry to drive performance, operational and financial advantages. Panduit's global manufacturing, logistics, and e-commerce capabilities along with a global network of distribution partners help customers reduce supply chain risk. Strong technology relationships with industry leading systems vendors and an engaged partner ecosystem of consultants, integrators and contractors together with its global staff and unmatched service and support make Panduit a valuable and trusted partner.

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Appendix A. Alignment of UPI with Other Industry Leaders

Panduit's UPI approach aligns with and reinforces the technology vision and strategy of other industry leaders, which enables the development of innovative solutions that address cross-functional physical layer challenges across power, cooling, space, security, and energy efficiency / sustainability. This appendix provides an overview of key industry and analyst visions, demonstrating the many points of intersection and alignment between the UPI vision and similar partner initiatives.

Organization	Vision	Benefits	Enablers	Green / Sustainability
Panduit	Unified Physical Infrastructure: Help customers manage risk within the physical infrastructure by intelligently converging physical and logical systems.	• Manage risk • Lower cost • Increase agility • Enhance sustainability	Panduit Reference Architectures intelligently align physical infrastructure systems to logical architectures, enabling consistent deployment of sustainable IT infrastructures.	Panduit is committed to being a socially responsible corporate neighbor that designs solutions and facilities that are good for the environment and for business. These values guide the development of resource-efficient UPI-based offerings that enable customers to support their own sustainability and business goals.
Cisco	Unified Communications: "Simplify business processes that depend on human interaction."	"Combine all forms of business communications into a single, unified solution for powerful new ways to: • Collaborate across companies and work spaces • Accelerate decision making and customer service cycles • Innovate across the value chain • Integrate applications."	"With a unique systems approach to architecture, technology, partnerships, and services, Cisco's Unified Computing System uses a simplified architecture for the virtualized data center that streamlines data center resources, scales service delivery, and radically reduces the number of devices requiring setup, management, power and cooling, and cabling."	"Cisco is committed to a high level of environmental responsibility in our business operations, culture, products, and customer solutions. By deploying innovative information technology and using the network as a platform for 21st century environmental management, we believe we can significantly alter our greenhouse gas footprint and help our customers meet their sustainability goals."
IBM	Dynamic Infrastructure: "Organizations supported by a dynamic infrastructure can deliver superior business and IT services with agility and speed, while addressing the day-to-day operational needs to improve service, reduce cost and manage risk."	Information availability, security, retention, and compliance; business continuity and resiliency; energy efficiency; asset management	"IBM can help you reevaluate and reconstruct your IT environment, methodically aligning your IT investments and infrastructure design with the business goals for enhanced flexibility and responsiveness. Services include developing an IT transformation and optimization roadmap and technical architecture."	"IBM energy and environment solutions and services are available to help identify and rectify energy trouble spots, enabling energy savings, increased power availability, operational efficiencies, and increased sustainability."

Appendix A. Alignment of UPI with Other Industry Leaders (cont.)

Organization	Principles	Benefits	Enablers	Green / Sustainability
HP	Agile Business Infrastructure: "Delivers a complete set of integrated infrastructure products and services designed to help manage the technological and financial challenges of perpetual change and achieve unparalleled agility at a low TCO."	"Integrate generations of disparate systems and applications into a single, unified resource; manage unpredictability and accelerated change in today's global business; ability to respond quickly and effectively to new revenue opportunities."	"Highly flexible, fault-tolerant development framework for creating and deploying new revenue-generating applications and dynamic web services."	"Help customers meet their most demanding technology challenges while reducing their environmental impact, energy costs, and technology carbon footprint."
Rockwell Automation	Manufacturing Convergence: "Tight integration of control and enterprise systems, bridging the needs of plant and IT networking."	Productivity, Globalization, Innovation, Sustainability	"Rockwell Automation's Integrated Architecture™ system is the leading control and information solution for facilitating convergence in the manufacturing space, through adherence to a common set of principles – scalable, open, and information enabled."	"Business advantages include reducing energy costs, measuring/ managing carbon footprint and process emissions, and raising worker safety."
NEC	Dynamic IT Infrastructure: "Your IT infrastructure — the root of your business — must flex and change for IT to become a business partner. By adopting NEC Dynamic IT Infrastructure, you can lower your total cost of ownership by simplifying platform manageability and reducing IT complexity."	Consolidation, Virtualization, Deduplication, Business Continuity	"Four fundamental technology shifts: • Forklift to future evolving upgrades, to eliminate migration burden • Ad hoc recovery to resiliency, to avoid business interruption • Hands-off management, to reduce daily repetitive tasks • Consume to conserve technology, to save energy and space."	NEC is dedicated to minimizing our collective carbon footprint. We eliminate wasteful consumption by providing right-sized solutions that evolve with your needs.
Gartner	Real Time Infrastructure (RTI): "An IT infrastructure shared across customers, business units or applications, where business policies and service-level agreements drive its dynamic and automatic optimization to reduce costs while increasing agility, flexibility, and quality of service."	Virtualization, consolidation, process improvement and automation, alternate delivery models, power and cooling demands	"RTI architectures enable companies to fulfill IT business process, application and infrastructure requirements from 'resource pools,' rather than dedicated resources. Invest in RTI architectures for environments that are commonly shared."	"RTI architectures reduce costs by achieving better and more efficient resource usage and by reduced system-management (labor) costs."
Forrester	Organic IT: "an emerging data center architecture that will cut IT costs in half by building the computing infrastructure built on low-cost, redundant components that automatically share and manage enterprise computing resources."	"Organic IT attacks three key problems that firms face in deploying technology today: • Low use. • Expensive integration. • Complex manageability."	"The architecture of Organic IT creates a flexible, modular foundation and immediate cost savings for enterprise customers by using infrastructure built on low-cost, redundant components that share resources."	"Organic IT helps businesses achieve higher infrastructure utilization, increases in cost and labor efficiency, and greater technology responsiveness to business needs."