

IDC FutureScape: Worldwide Future of Connectedness 2023 Predictions

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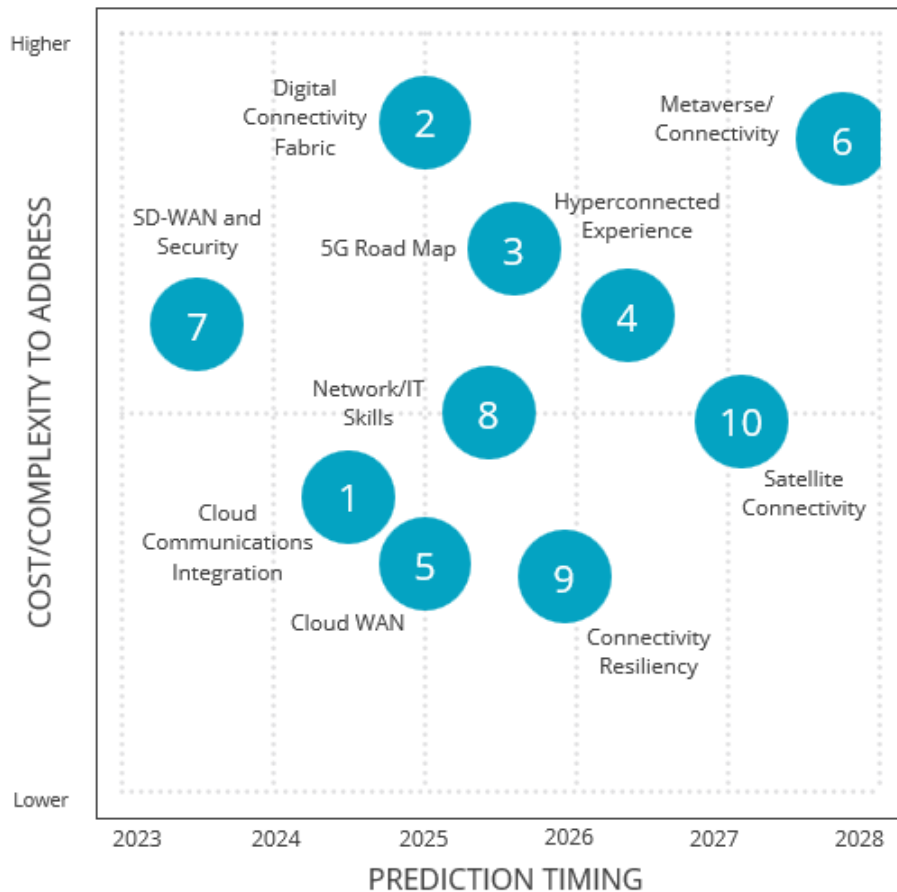
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IDC FUTURESCAPE FIGURE

FIGURE 1

IDC FutureScape: Worldwide Future of Connectedness 2023 Top 10 Predictions



Note: Marker number refers only to the order the prediction appears in the document and does not indicate rank or importance, unless otherwise noted in the Executive Summary.

Source: IDC, 2022

EXECUTIVE SUMMARY

IDC defines the future of connectedness as enabling the timely movement of data across people, things, applications, and processes to create seamless digital experiences. It serves as a road map to help organizations address unevenness in connectivity across different environments and locations. It also helps them become more agile and resilient. Connectivity issues have become a priority as employees, businesses, and consumers increasingly look for digital resiliency, where digital experiences are supported by ubiquitous, reliable, and robust connectivity. There is no actual end state to connectedness. Instead, it is an evolutionary path that improves agility, increases business flexibility, and allows organizations to adapt to change as market or business conditions shift.

Data has long been the lifeblood of every business – critical to making the right decisions at the right time to drive revenue, experiences, and outcomes. Connectivity, however, is the ways and means to keep that data in motion. Unlike the human circulatory system that maintains relatively constant volumes of blood over its lifetime, the enterprise network must scale to support the ever-growing volume of data coming from both inside and outside the organization. Employees and customers have come to expect that any digital interaction with things, applications, processes, or other people is guaranteed no matter where, when, or via what medium they choose. As organizations continue down the path of becoming digital first, they have already been forced to adapt to hybrid work and a distributed workforce. Today, employees, customers, and partners expect seamless digital interactions to mission-critical systems and processes from anywhere. The convergence of physical and digital workspaces and storefronts and the evolution of smart spaces are driving business leaders to align technology, policy, and operations together to drive agility and revenue.

Over the past two years, the impact of the COVID-19 pandemic and the abovementioned business and operational shifts were key drivers of change. In 2022, these changes are driving critical investment decisions that help ensure that enterprises can be resilient, employees and customers can stay connected, and critical processes can function, no matter the circumstances. As businesses look ahead to 2023 and beyond, they face added stressors from inflation and economic uncertainty, regional conflicts, supply chain constraints, and a shortage of workers and staffing that align to key skill sets. While these forces play a role in impacting key decisions, IDC data shows that 81% of organizations are still prioritizing connectivity programs. We expect companies to continue to leverage those investments to automate key processes, transform the workplace, improve the customer experiences, and increase corporate resiliency.

As organizations continue down the path to becoming a more agile and connected enterprises, connectivity programs will embrace 5G, edge, and cloud infrastructure and services to keep data moving. More importantly, these programs will continue to improve efficiency and enable data to provide real-time insights to the business. As networks evolve and business needs scale or change course, enterprise network and IT departments must align systems and processes. This will ensure business continuity, enable employees to be productive, and help the organization quickly adapt to business demands, not to mention new market requirements and connecting anytime, anywhere, and from any physical location.

IDC's future of connectedness 2023 top 10 predictions are:

- **Prediction 1:** By 2024, 75% of enterprises will leverage cloud-based APIs to create customer engagement applications that integrate UCaaS/CPaaS platforms with multichannel options to improve customer experience.
- **Prediction 2:** By 2025, 50% of digital organizations will augment "cloud first" with a "wireless first" multi-access network fabric using diverse technologies for mission-critical and business continuity use cases.
- **Prediction 3:** By 2025, only 30% of organizations will benefit from defined 5G use cases due to fragmentation and lack of leadership among connectivity, technology, and managed services providers.
- **Prediction 4:** By 2026, 40% of enterprises will double investments in hyperconnected digital spaces to increase productivity, improve collaboration, and boost energy efficiency.
- **Prediction 5:** By 2024, 50% of large enterprises will use a hyperscaler's cloud WAN service within their network, either directly or indirectly, pushing telcos further toward the role of service integrators.
- **Prediction 6:** By 2027, the metaverse will account for 70% of annual media traffic growth on the internet, where both consumer and business use cases will drive increased bandwidth demand.
- **Prediction 7:** By 2023, 40% of enterprises will benefit from optimized operational efficiency, enhanced security, and reduced network costs by leveraging SD-WAN and security for cloud-managed networking and security.
- **Prediction 8:** By 2024, 30% of enterprises will extend network attentiveness across all major IT teams (e.g., SecOps, DevOps, and AIOps) by expanding skill development, screening requirements, and NetOps interactions.
- **Prediction 9:** By 2026, 40% of companies will lag in executing a resilient connectivity strategy due to budget shortfalls, as workplace transformation becomes the new normal for customers, employers, and partners.
- **Prediction 10:** By 2027, 80% of G2000 enterprises will require LEO satellites to cover gaps in network coverage for remote, rural, and high-risk international locations.

This IDC study contains IDC's future of connectedness predictions for 2023 through 2028. The outlook is presented through the lens of the 10 predictions that make up the framework for technology-related initiatives in the years ahead. This framework can be leveraged by enterprise C-level business and IT executives to make impactful business decisions that will drive positive business outcomes well into the future of the enterprise.

"The impacts of hybrid work, inflation, global economics, and business uncertainty are forcing enterprises to adapt business operations to counteract disruptive market forces," states Paul Hughes, research director, Future of Connectedness at IDC. "Organizations that adopt and integrate a smart, scalable, and flexible cloud-centric connectivity strategy across the organization will reap the benefits of improved agility, a more productive workforce, and more resilient operations."

IDC FUTUREScape PREDICTIONS

Summary of External Drivers

- **Storms of disruption** – Accelerating, interconnected uncertainty

- **Cybersecurity and risk** – Scaling and evolving threat environment
- **Economic instability** – Flurry, snowball, or avalanche?
- **Global supply shock** – Refocusing on multisource and resilience
- **Digital business** – Stepping stone to the future enterprise
- **Meaningful intelligence** – Differentiated decision power
- **Ecosystem-based innovation** – Driving enterprise value

Predictions: Impact on Technology Buyers

Prediction 1: By 2024, 75% of Enterprises Will Leverage Cloud-Based APIs to Create Customer Engagement Applications That Integrate UCaaS/CPaaS Platforms with Multichannel Options to Improve Customer Experience

For many IT leaders, the value of integrated UCaaS and CPaaS platforms appears as elusive today as a shadow. This condition is evolving however, as IT decision makers are forced to reckon with their line-of-business colleagues on how to improve customer engagement in the context of their employees' workflows. Businesses of all sizes are at a juncture where accelerated investments in cloud-based integrated communications (i.e., UCaaS) eliminate silos and offer a more efficient and seamless voice, chat, and conferencing-enabled workflow. Larger businesses and enterprises have increasingly enabled cloud-based contact center solutions (CCaaS) with UCaaS capabilities. Not one of these three investment areas addresses the required synergies between internal employees' workflows as enabled by UCaaS and external customer engagement. None of these solutions on their own can offer seamless cloud communications but leveraging APIs and SaaS as well as low-code app development and integrated CPaaS and UCaaS solution offers potential to do so.

According to IDC surveys (2022), enterprises use or have plans to use CPaaS platforms not only for app creation to address customer service functions, contact center services, and marketing but also to enhance sales, financial transaction processes, asset management activities, and more. 3 out of 10 enterprises can already envision how an API is a scalable way for developers to drive omni-channel experiences for customers while driving the interaction content into the messaging, calling, and video communications workflow for employees. As use cases multiply making it clear that there is value in an integrated UCaaS and CPaaS workflow, more IT departments will introduce this solution to their business leadership stakeholders. For example, with some required coding, SMS for Microsoft Teams allows companies to seamlessly connect employees to external contacts. As smaller businesses gain visibility into the API use cases and are shown by CPaaS vendors that there are easy ways to create the integrations without formal developer staff (i.e., low-code/no-code app development approaches), the percentage of businesses integrating UCaaS and CPaaS for customer engagement scenarios will grow exponentially.

Associated Drivers

- **Digital business** – Stepping stone to the future enterprise
- **Meaningful intelligence** – Differentiated decision power
- **Ecosystem-based innovation** – Driving enterprise value

IT Impact

- **Demand for artificial intelligence (AI)**. The use of APIs integrating CPaaS and UCaaS drives the need for AI innovations in the UCaaS platform to adapt and respond to the broader and deeper workflow information.

- **Increased opex spending.** The shift to cloud-based digital engagement platforms for marketing and customer services drives IT spending increases in the next two years.
- **Increased app development.** CPaaS platform providers will significantly invest low-code/no-code app development tools over the next year to show SMBs that there are ways to drive these integrated workflows without requiring technical developers.

Business Impact

- Businesses of all sizes see improved engagement from customers.
- Businesses of all sizes see more efficient employees in tandem with improved employee satisfaction.
- Businesses can point to tangible ROIs grounded in customer metrics to share with budget holders.

Guidance

- Seek use cases that best align with your company's business priorities.
- Bring together line-of-business and IT leadership early in the UCaaS and CPaaS platform selection process so that both are equally invested in integrating customer and employee experiences using these platforms.
- Look for both API and low-code/no-code tools in a CPaaS platform so that no integration is too great or too basic for your team. Alternatively, seek out cloud communications providers that have ready-made solutions that don't require additional coding. This is especially pertinent to SMBs with less programming resources or expertise.

Prediction 2: By 2025, 50% of Digital Organizations Will Augment "Cloud First" with a "Wireless First" Multi-Access Network Fabric Using Diverse Technologies for Mission-Critical and Business Continuity Use Cases

"Cloud first" is a concept that has become embedded in IT planning, as vendors, end users, and IT organizations look to manage cost of IT infrastructure, optimize access to application workloads, and offload system and application update responsibility to third parties. While wireless access has become the norm in office and home environments, traditional IT is set against a "wired first, wireless next" approach to connectivity, especially where connections between enterprise locations and IT infrastructure are concerned.

Adopting a "wireless first" approach to the full connected landscape echoes the trend to "cloud first." A "wireless first" approach looks to outsource access and transport to a service provider using an access point such as a 5G network. The approach may then expand to outsourcing endpoint access to the service provider, removing the need for local, last-mile endpoint connectivity. In this approach, cellular network SIMs replace Wi-Fi access points, NB-IoT replaces other modes of low-power WAN access, and a combination of satellite, microwave, and cellular connectivity brings enterprise locations into a connected mesh.

The adoption of integrated connect, cloud, and security frameworks such as SASE helps address the challenges around offboarding brand and HQ-based workload management, capacity, and security issues, along with routing of workload traffic to multicloud environments.

To successfully adopt a cloud and wireless-first strategy, networking staff need to consider cost, capacity, control, and consumption of connectivity resources. While the cost of cellular networks continues to decline, supporting and planning for SLAs, which meet the needs of larger groups of collocated people, mean networking staff must stay ahead of onrushing requirements (and

disruptions), avoid problems and threats before outbreaks (control), readily adapt the network (capacity), and provide the best possible match between the network and expected business outcomes (consumption).

Associated Drivers

- **Global supply shock** – Refocusing on multisource and resilience
- **Digital business** – Stepping stone to the future enterprise
- **Ecosystem-based innovation** – Driving enterprise value

IT Impact

- **Capacity.** Wireless connectivity is no longer about coverage and throughput alone. Rather, the wireless network must provision sufficient aggregate capacity to meet the needs of users and their traffic flows at any location and any time of day. Meeting this objective is getting easier with advances in self-service tools, but network managers must maintain a connection with their service provider to ensure capacity is available across all forms of wireless connectivity, especially where reliance is placed on public networks.
- **Integrity.** Good planning and operations entail at least minimal overprovisioning of access to cover any prospective equipment failures. Enterprise-class wireless systems rely upon IT planning and operations to consider redundancy in internet service provider backhaul and interconnect.
- **Management.** The management console is key to understanding what's really happening in the network, from handling traffic demands to dealing with security issues. Adopting solutions that support analytics (possibly based on artificial intelligence/machine learning [ML]) in conjunction with automation to predict and address performance issues become an essential capability of a successful wireless-first strategy.

Business Impact

- **Operational agility.** Organizations see improved support for "work anywhere, anytime" business models while optimising the use of connected models within the organization.
- **Increased productivity.** Expect productivity and profitability increases by delivering the best possible connected experience and business outcomes through increased flexibility and adaptability of connectivity landscapes.
- **Managed services growth.** The shift to wireless first allows for use of managed services around connectivity management, workload optimisation, security operations, and multicloud management, reducing pressure on internal skills and enabling rapid adoption of best technologies and practices.

Guidance

- Prioritize connectivity management solutions that simplify designs and operations, support multiple functions, leverage open systems and AI/ML/SDN advancements, and enable ready enhancement.
- Judge service providers on their ability to integrate manage connectivity, security, and multicloud management along with their ability to provide self-service tools, which enable predictive and reactive responses to changes in demand and utilisation.
- Refocus your networking staff operational practices on the buildout of strategic skills (e.g., design, modelling, security, optimization, user experience, cloud services, business analysis, and IT automation). Develop goals that focus on delivery of flexible, adaptive work practices

based on the availability of the network fabric and its ability to adapt to changes in capacity and consumption demands.

Prediction 3: By 2025, Only 30% of Organizations Will Benefit from Defined 5G Use Cases Due to Fragmentation and Lack of Leadership Among Connectivity, Technology, and Managed Services Providers

Despite the excitement about and recognition of the transformative potential for 5G in the enterprise, many companies face the challenge of navigating a broad and diverse mix of vendors, technologies, and services necessary to realize a fully 5G-enabled deployment. According to IDC's August 2022 *North American Enterprise 5G, IoT, and Private Mobile Networks Survey*, 48% of organizations see the complexity of integrating 5G with other technologies and into existing operations as a significant barrier in deploying 5G internally.

In fact, 22% of enterprises indicate that they are unfamiliar with the slate of vendors in the 5G ecosystem. That is because, while 5G started as a mobile operator story, many of the complementary technologies that are prerequisites for the more advanced 5G use cases sit beyond the purview of the mobile operator. As a result, there will be a significant amount of competition for the 5G dollar from a diverse set of vendor types – endpoint device makers, network equipment and transport providers, systems integrators, ISVs, and cloud providers. Standard reference architectures have yet to be developed, even by industry, leaving enterprises with an endless supply of vendor demos and slideware. Development and marketing of 5G use cases will concurrently flow top down from 5G network providers, as well as from the endpoint makers up, with a fair amount of white-labeling muddying the waters. In addition, vendors will often find themselves in the position of "competemates," where they go head-to-head on some engagements, but collaborate and co-innovate to pursue other opportunities.

Companies navigating 5G vendor confusion must also contend with the challenge of reconciling the expectation gap resulting from the nascent nature of 5G networks (e.g., types of spectrum coverage, non-standalone versus standalone network variants) with the transformative hype of 5G that sits several years out. Organizations are left to sort through the marketing noise and discern which is the "right" or "best" vendor or vendors to engage, with that uncertainty resulting in lagging 5G adoption.

Associated Drivers

- **Ecosystem-based innovation** – Driving enterprise value
- **Digital business** – Stepping stone to the future enterprise
- **Global supply shock** – Refocusing on multisource and resilience

IT Impact

- **External vendor support.** In-house IT may lack the necessary skills or experience with 5G networking, increasing the reliance on external vendors for the deployment and management of 5G integration with internal, mission-critical operations.
- **Automation.** Integrating 5G connectivity and use cases with advanced analytics, AI, and machine learning will facilitate increased real-time automation with the organization.
- **Partner ecosystem.** Engaging with a more diverse, highly specialized set of 5G vendors beyond connectivity providers becomes commonplace.

Business Impact

- **C-suite involvement.** C-suite leaders become more knowledgeable and more engaged in the technological minutia of 5G as vendors see to gain top-down influence for their 5G solutions.
- **Vendor collaboration.** Greater co-development partnerships between the company and 5G vendors will accelerate access to the latest 5G innovations while providing vendors marketable testimonials for their own solutions.
- **Use case development.** As enterprises deploy preliminary use cases and realize true productivity gains as a result of leveraging a high-speed, low-latency network, deployment of additional use cases can potentially become self-funding.

Guidance

- Begin engaging existing vendors to understand the scope and scale of their 5G development and aspirations, which will help clarify the vendor evaluation process in advance of any 5G deployments.
- Given that 5G networks, and the device ecosystem that connects to them, are still maturing and evolving, utilizing "as a service" consumption models for 5G connectivity and use cases will provide organizations with greater agility to integrate new 5G developments as they become available.
- Understand your vendor partners ecosystem. Examine co-innovation or joint development of use cases. Test them in labs and see how they integrate with other potential partner solutions.

Prediction 4: By 2026, 40% of Enterprises Will Double Investments in Hyperconnected Digital Spaces to Increase Productivity, Improve Collaboration, and Boost Energy Efficiency

The enterprise workspace is no longer what it once was, as hybrid work and a largely distributed workforce keep a significant number of employees away from the office. With offices, campuses, and regional offices now sitting under capacity, organizations sit on unused real estate that continues to cost money and energy to run. As many organizations have embraced a longer-term hybrid work strategy, creating more cost-efficient workspaces has become a priority to increase savings, business efficiency, and sustainability. IDC's 2022 *Future of Connectedness Survey* shows that improving sustainability ranks second only to customer satisfaction in terms of top business priorities for the next 12 months, with 35% of organizations with over 5,000 employees ranking it in the top 2. From a vertical market perspective, over 41% of manufacturing organizations rank it as their top priority.

The hyperconnected digital "smart" space within an office, business site, or public space is typically outfitted with IoT sensors connected to the network. Each collects valuable data that can be used to deliver insights about environmental conditions, available digital services, and how occupants interact within that environment. Real-time insights can be captured, compared with historical data, and then used to reduce HVAC costs, improve safety, operations, or provide flexible connectivity to ensure the right experiences for users within the space. These spaces can thus become localized, lower-cost "islands" of full connectedness, allowing users to take full advantage of productivity and collaboration tools and activities in a local area – without creating wasted utilization of unused space, business resources, or energy.

Hyperconnected digital spaces will be enabled as part of an organization's "wireless first" approach. Using 4G/LTE, 5G, Wi-Fi, and Bluetooth, data generated by smart spaces can be used "intelligently" by AI tools either on premise or in the cloud. Data utilization and management will help provide

organizations with actionable intelligence that can then be used to improve business and operational agility while also cutting energy costs as smart spaces become more prevalent.

Successful implementation of smart spaces will require organizations to align connectivity requirements with enablement technology that synchronizes activities across the virtual and physical spaces, mapping them to the human interaction within that space. This requires enterprise adoption of a cloud- and wireless-first strategy that:

- Connects IoT devices to a scalable wireless network
- Grants secure access to public and private enterprise resources
- Uses AI to make appropriate decisions about connectivity, bandwidth requirements, and localized process and activity decisions
- Ensures that real-time insights are used to maximize user benefit when leveraging the smart space while keeping other aspects tied to cost and environment closely aligned to usage and time

Associated Drivers

- **Digital business** – Stepping stone to the future enterprise
- **Ecosystem-based innovation** – Driving enterprise value
- **Meaningful intelligence** – Differentiated decision power

IT Impact

- **Expansion of IoT, security, data management, and analytics.** Connected smart spaces require increased density of IoT sensors, management platforms, and security protocols and tools that provide real-time information. Constant data creation should provide real-time insights into activities and usage.
- **Increased automation.** Smart spaces bring increased automation to a broad footprint of IT functions. Devices like smart cameras, edge gateways, routers, and related resources can be provisioned at based on time, usage, and need.
- **Centralized management requirements.** Most smart spaces will require a management console with integrated visibility into the network. This will allow better tracking of connected device activity, security issues, and energy/sustainability metrics.

Business Impact

- **Operational agility.** Organizations can focus resources-related functions capabilities inside the utilized smart spaces, offering greater levels of automation and seamless connectivity to appropriate resources when needed. This ensures employees can stay productive when visiting an office or a campus, but by only allocating needed resources in the space needed.
- **Employee experience.** Organizations ensure that resources are available on demand and in real time to the employee. Public and private applications can be optimized for the user in real time, providing a guaranteed connected experience within the organization.
- **Cost savings and sustainability.** Resources are only allocated to the smart spaces being used. This eliminates waste of HVAC, energy, and even localized connectivity resources when not in use.

Guidance

- **Align smart connectivity investments with the organizational road map for hybrid work and RTO.** This ensures that these investments map accurately to space utilization and maximize cost and value for the business.
- **Develop a smart space management plan first.** This allows IT to design and develop an autonomous, self-adapting, and self-managed smart framework based on capabilities and needs and align resources accordingly. Physical, virtual, and human services interactions can then be mapped to capabilities.
- **Align smart space design and connectivity strategy around the most beneficial business outcomes.** Organizations should set a strategy for smart space utilization on where the business benefit will improve the most. This could be aligned to metrics around enhancing customer experience; maximizing worker health, safety, and productivity; optimizing business processes; or reducing costs.

Prediction 5: By 2024, 50% of Large Enterprises Will Use a Hyperscaler's Cloud WAN Service Within Their Network, Either Directly or Indirectly, Pushing Telcos Further Toward the Role of Service Integrators

Networking and IT have been on a long, slow convergence path that has accelerated recently but still has some way to go. The emergence of cloud WAN services from the top cloud service providers now impacts telcos and their existing WAN businesses. Services such as Microsoft Azure Virtual WAN, AWS Cloud WAN, and Google Cloud Network Connectivity Center represent a new paradigm of networking for enterprises as they move to cloud and a potential threat to telcos' existing WAN businesses.

Enterprises have been able to construct WANs across cloud backbones by piecing together individual cloud provider networking services, but the process was fragmented and difficult to manage at scale. Cloud WAN services wrap components up into a managed middle-mile network that is easy to deploy and manage and designed to bring users, sites, and cloud workloads together in a single network. Cloud WAN services will take away from telcos' existing WAN businesses, primarily private IP (MPLS), but also to a lesser extent SD-WAN. Telcos need to work with rather than against cloud providers to integrate cloud WAN into their offerings as well as retaining the last-mile relationship.

Beyond the WAN market, cloud WAN services will help accelerate the move to cloud native. This puts added pressure on the traditional service providers to step up their game. While traditional network architectures such as MPLS were designed in the era of datacenter-centric IT, they were positioned as a secure alternative to internet-based networks and only supported internet access as an afterthought. The world has moved on – enterprise IT's center of gravity lies inside the cloud and is accessed predominantly via the internet.

Associated Drivers

- **Ecosystem-based innovation** – Driving enterprise value
- **Digital business** – Stepping stone to the future enterprise
- **Storms of disruption** – Accelerating, interconnected uncertainty

IT Impact

- **Network resilience and reliability.** As cloud service providers continue to expand their footprint into the enterprise network, the benefits of network resiliency increase as cloud scale and reliability reach further into the network itself.

- **Cloud-first acceleration.** Enterprises can work more directly with their hyperscaler partner to shift more connectivity-related solutions and services away from traditional connectivity solutions. This approach brings the long-term benefits of cloud scale and cost to the forefront.
- **Automation.** Cloud WAN via the hyperscalers allow the enterprise to leverage additional embedded capabilities such as faster provisioning, network visibility, and traffic analytics.

Business Impact

- **Vendor partner simplification.** As cloud service providers continue to expand their footprint into the enterprise network, the roles and responsibilities of those providers will gain increasing traction.
- **Accelerated telco transformation.** The expansion of the cloud service providers' connectivity portfolio puts the onus on the traditional service providers to evolve and fast. Today, just 17% of enterprises see the telco as their most trusted partner for connectivity.
- **Co-development partnerships.** As the roles between the cloud service provider and network service providers continue to blur and enterprises look for their trusted partner, telcos must evaluate the best path to navigate the changing service ecosystem.

Guidance

- **Assess network topology and costs.** As enterprises migrate further toward a cloud-first approach, determine the framework to prepare for the next-generation network architecture and how cloud WAN impact costs and scale.
- **Build a cloud "fabric" that creates network efficiency and resiliency.** This should include integrating security, cloud, workload management, and access management that promotes greater connectivity and removes the barriers that are still common across individual departments.
- **Align vendor expectations with internal business outcomes.** No single provider is the center point for connectivity, even as the foundational outcomes of connectedness are rapidly changing vendor roles. Ensure business and IT staff are aligned around the expectations of those changes, particularly as cloud-first technology shifts force a review of vendor partner benefits.

Prediction 6: By 2027, the Metaverse Will Account for 70% of Annual Media Traffic Growth on the Internet, Where Both Consumer and Business Use Cases Will Drive Increased Bandwidth Demand

The telecom industry has spent the past decade focusing on building the infrastructure needed to support the billions of people and "things" that are now online. That has yielded transformational technologies from remote work and distance learning to streaming entertainment and online gaming. The move to the metaverse is an unprecedented opportunity for the telecom industry. Over the next decade, the so-called "metaverse" is expected to reach a billion people around the world, host a billion-dollar digital commerce industry, and support millions of jobs for creators and developers. This will require vast enhancements in capacity and fundamental shifts in network architectures and their deployment, as well as industrywide collaboration – from tech companies to network operators, service providers, policymakers, regulators, and more – to prepare for the metaverse.

IDC defines the metaverse as a network of immersive digital environments where people can interact, game, work, and shop, through virtual reality (VR) headsets connected to internet. It will account for 70% of annual media traffic growth on the internet by 2027, which will require significant advancements in network latency, symmetrical bandwidth, and overall speed of traffic. As the digital

and physical worlds converge, we are leading a new layer of the infrastructure stack, the "Enterprise Metaverse." Creating the metaverse will require a global effort to collaborate on this new journey. The metaverse is all about connecting virtual experiences, but networking with VR can use enormous amounts of data. VR streaming is a resource-intensive process and poses a significant challenge to the bandwidth of current network infrastructure. 5G technology will provide the power necessary for real-time data transfers and enable people to connect to these augmented reality (AR)/VR experiences from anywhere, not just from their homes or offices. 5G will also improve throughput, latency, and concurrency and subsequent versions like 6G and beyond will add exponential effects to connectivity performance.

Immersive video streaming will require the industry to fill the identified gaps. Streaming a 720p video on a standard smartphone screen requires 1.3-1.6Mbps of downlink throughput, and on a smartphone held at arm's length, 720p resolution is sufficient to achieve human retinal resolution. But on a head-mounted display sitting just centimeters from the eyes, retina-grade resolutions will need to be many orders of magnitude larger, even beyond 4K resolutions. Solving this problem will require innovations across the hardware and software stack, as well as revolutionary improvements in network throughput and create a symmetric bandwidth.

Future digital experiences present opportunities for mobile network operators to participate in the metaverse's development and capture value by leveraging the advanced capabilities of 5G networks, edge computing, and slicing technologies. Combined with 5G (and future 6G) networks, it will disrupt a swathe of industries, such as gaming, entertainment, retail, and even architecture and manufacturing. Edge computing will see an increased demand as it provides more computing power, bandwidth, and concurrent connections that are required to pump this data at much greater speeds in real time, which is necessary for high-quality immersive experiences in virtual spaces. A similar opportunity awaits the next generation of metaverse-ready networks. The need to simultaneously deliver enhanced speeds and ultra-low and uniform latency and jitter will stress both fixed and mobile networks, and achieving these benchmarks will require cross-layer and cross-domain optimizations.

Associated Drivers

- **Storms of disruption** – Accelerating, interconnected uncertainty
- **Digital business** – Stepping stone to the future enterprise
- **Ecosystem-based innovation** – Driving enterprise value

IT Impact

- **Leveraging core competences:** The metaverse is about connecting virtual experiences. Organizations can reimagine the future of connectedness via high-speed 5G, 6G, and Wi-Fi 6 networks and unlock the metaverse. Mobile operators have the potential to generate new revenue streams for new types of service offerings.
- **Network slicing:** Network slicing is another opportunity for operators to monetize 5G, as it offers the capability to isolate and tailor portions (or "slices") of the network to cater to the differing needs of customers or future virtual applications.
- **Cloud and datacenter expansion:** Increase in online marketplace largely driven by gaming and emerging applications in socializing, fitness, commerce, virtual learning, and other use cases will drive cloud demand and expand the datacenter market.
- **Blockchain-based AR/VR:** Blockchain will form the base of digital business by providing a decentralized and transparent infrastructure, in providing digital proof of ownership, digital

collectibles, transfer of value, governance, access, and interoperability within the virtual environment powered by AR/VR.

Business Impact

- **Collaboration:** A high-quality metaverse-type environment will enable meetings, workshops, and collaborative work sessions to move from 2D screens to immersive virtual workplaces, using avatars to allow employees to work together similar to the real world. Within immersive meetings, an avatar will represent a person and use AI to imitate movements and gestures – without the need for an AR or VR wearable.
- **Virtual products:** The metaverse environment will offer businesses a virtual marketplace to sell digital products, such as media, games, and software. This will create opportunities for consumer brands, especially luxury and designer brands, to extend their offerings from physical to virtual products.
- **Metaverse value chain:** A new value chain will be developed that provides new business opportunities revolving around technology to harness its full potential. At the infrastructure level, there will be new opportunities for hardware and software companies.

Guidance

- **Assess new products and services:** The new virtual world will provide new physical business opportunities. Understand the potential markets where your business's products or services or skills and capabilities could be translated into new virtual products or services. Develop strategies to diversify revenue streams by building and selling new virtual offerings complementing to physical products and services.
- **Focus on digital business models:** Identify threats and opportunities for new or disruptive business models with the emergence of the metaverse as a place to do business. Reposition your brand/organization in the value chain to realign with metaverse's value chain. Look for relevant partners for long-term relationships to adapt quickly to the fast-changing technology environment.
- **Proactively build new applications and use cases:** Metaverse will offer multiple opportunities to business that could go a long way in the new virtual world era. Revamping business goals to grab virtualization opportunities offered by the metaverse such as building apps and use cases across global collaboration, training, or game development.
- **Observe the changing landscape:** Assign a dedicated team to keep track of the latest developments across the globe related to business opportunities offered by the emerging virtual industry. Explore metaverse opportunities specific to your industry and business objectives and identify partners and collaborators to help you extend your capabilities.

Prediction 7: By 2023, 40% of Enterprises Will Benefit from Optimized Operational Efficiency, Enhanced Security, and Reduced Network Costs by Leveraging SD-WAN and Security for Cloud-Managed Networking and Security

A key challenge for enterprises in today's complex networking environment is to ensure secure and predictable networking performance while mitigating uncontrolled increases in networking cost. Adoption of SD-WAN architecture is predicated on the assumption that it optimizes networking economics and improves business agility. The self-healing capabilities of SD-WAN solutions have proven to optimize networking economics by integrating capabilities that improve last-mile performance, accelerate access to software and infrastructure-as-a-service (SaaS and IaaS) applications, and enhance support for custom user applications. Native security functions enabled

within SD-WAN are becoming increasingly common, such as enabling end-to-end encrypted traffic, data loss prevention (DLP), and intrusion detection/prevention (IDS/IPS).

Meanwhile, managing SD-WAN and security from the cloud through tools like cloud access security brokers (CASB) or secure web gateways (SWG) brings myriad benefits from centralized management to common policy enforcement across on-premises and cloud-based applications. Combined, more integrated management of networking and security for distributed users and applications will help enterprises address challenges related to increasing traffic capacity, unpredictable traffic peaks, and cloud adoption, including:

- **Strong consumer appetite for on-demand video.** This trend was further underscored in the early months of COVID-19, with unprecedented 30% growth on a month-to-month basis. This is augmented by video streaming, both linear and live. CDN traffic is projected to reach 80% of all internet traffic by 2024, dominated by video streaming (around 65% of CDN).
- **Growth of global ecommerce to support the digital economy.** The shift to global ecommerce has accelerated with the pandemic as more enterprises discovered that omni-channel reach to customers across the sales and supply value chains is critical to survival and competitive advantage.
- **Emergence of the distributed enterprise.** The unprecedent growth of remote and hybrid work environments are exacerbating the pressure on WAN traffic, especially to support video communications.
- **Shift of compute to the edge.** IDC predicts that by 2023, over 50% of new enterprise IT infrastructure deployed will be at the edge rather than corporate datacenters, up from less than 10% today. By 2024, the number of apps at the edge will increase 800%. This shift will drive innovation in new services, especially latency-sensitive apps.
- **Continued adoption of the cloud.** Cloud adoption is transforming wide area networks as secure direct cloud connectivity replaces legacy WAN technologies.

Data governance and security are always at the forefront for network decision makers. A network transformation strategy should integrate these capabilities to meet applicable data compliance standards and regulations and also guard against security threats.

Associated Drivers

- **Digital business** – Stepping stone to the future enterprise
- **Cybersecurity and risk** – Scaling and evolving threat environment
- **Economic instability** – Flurry, snowball, or avalanche?

IT Impact

- **Adaptable network:** The network architecture must adapt to the needs of a hybrid workforce. It needs to harmonize employee experience independent of location or access method.
- **Scalable network:** A distributed enterprise requires a scalable network architecture. The network needs to accommodate for unpredictable traffic demands and resilient to adverse network conditions.
- **Secure cloud access:** The network is critical to supporting multicloud and hybrid cloud deployments (including SaaS, IaaS, and PaaS). It also needs to provide efficient and secure access to these cloud resources independent of access methods: onsite, remote, or at home. Secure direct access to the cloud is becoming a requirement that enterprises must incorporate in their network transformation initiatives.

Business Impact

- **Improved network economics.** Enterprises will enjoy better network economics due to optimized consumption of network resources, improved response to adverse conditions, and better management of unpredictable bandwidth requirements.
- **Enhanced application access.** A key tenant of SD-WAN architecture is providing direct access to multicloud resources including IaaS, PaaS, and SaaS. With direct connectivity, users will enjoy improved performance and lower latency, all contributing to better cloud experience.
- **Lower security risk.** Integration of security with SD-WAN will mitigate risks related to security threats such as DDoS attacks, illegal access to IT resources, and other security risks.

Guidance

- **Embrace network transformation as a strategic imperative.** Network transformation is fundamental to executing a successful digital transformation strategy. The network facilitates the flow of information, supporting key macro trends such as cloud adoption, emergence of distributed enterprise, and growth of data traffic.
- **Integrate security with networking.** Enterprises view security as the top challenge among all IT initiatives. Rogue actors are increasingly looking for network vulnerabilities to request ransomware, disrupt operations with DDoS attacks, and gain access to valuable resources. Guarding against these attacks is critical for maintaining a healthy business environment.
- **Align network strategy to provide a compelling customer experience.** Customer experience is a key differentiator in today's omni-channel environment. Ensuring equity when traversing physical and virtual customer transactions is important to maintaining a high level of customer satisfaction.

Prediction 8: By 2024, 30% of Enterprises Will Extend Network Attentiveness Across All Major IT Teams (e.g., SecOps, DevOps, and AIOps) by Expanding Skill Development, Screening Requirements, and NetOps Interactions

IT organizations are under tremendous pressure to deliver on the promise of the digital business model. At the center of the digital infrastructure serving this business model is the network. Connectedness permeates all things digital – applications, security, cloud, customers, information, collaboration, and IoT. It is hard to conceive any major or even minor digital initiative whose success is not dependent on failsafe and fast connections. In fact, most digital exchanges involve not just one connection, but a web of connections moving across wireless, campus, datacenter, cloud, internet, branch, and WAN backbone networks. Connectedness is not only critical but also extremely complex.

Given connectedness is a prime determinant of success for digital initiatives, all IT functional levels – from engineering to development to operations to support – and technology – security, applications, cloud, and datacenter – domains should be aware of any impacts to the network. For too long now, the network has been considered a utility – a resource that is always available and can be used however one wants. Well, as we know with every other major utility (e.g., water, electricity, fuels), care must be taken to manage, protect, and use utility resources properly and safely.

Associated Drivers

- **Storms of disruption** – Accelerating, interconnected uncertainty
- **Digital business** – Stepping stone to the future enterprise
- **Meaningful intelligence** – Differentiated decision power

IT Impact

- **Optimize hyperconnected environment.** This streamlines engineering, development, and operations and helps Strengthen the organization's security posture and practices.
- **Bolster digital infrastructure services and service levels.** This helps avoid problems such as unplanned network or service outages or performance issues and will help address accelerating/solidifying digital enhancements.
- **Improve IT staff productivity, teamwork, and impact.** This lessens tactical demands and boost strategic contributions.

Business Impact

- **Improve business resiliency.** The improved responsiveness of all digital infrastructure will allow organizations to become more proactive, help eliminate business bottlenecks, and break down barriers to success.
- **Accelerate innovation.** Organizations will see heightened and accelerated business returns through rapid and reliable digital rollouts and innovation.
- **Improve digital experience.** Greater attention across the organization will help ensure a consistent and secure digital experience for workers, partners, and customers anytime, anywhere.

Guidance

- **Organize for success.** Leverage hiring standards, reporting structures, a cooperative culture, and reward programs that incent IT staff to extend their own knowledge base, cross-IT collaboration, and delivery/quality responsibilities.
- **Promote shared projects, responsibilities, tools, and data.** Heighten involvement of all IT staff and teams with networking engineering and operations teams. Prioritize tools and techniques that can be shared across IT.
- **Provide for ongoing cross-training in connectedness.** Organizations will improve agility when network and IT support staff learn the intricacies of DevOps, SecOps, CloudOps, and AIOps processes, even if they are outside their core area of expertise. Frontline support staff could do more knowing the network and related tools.
- **Encourage network staff education.** Drive the networking staff out of the comfort of continual tech-focused network monitoring and management and encourage more cross-IT interactions, line-of-business evangelism, and teaching and learning opportunities.

Prediction 9: By 2026, 40% of Companies Will Lag in Executing a Resilient Connectivity Strategy Due to Budget Shortfalls, as Workplace Transformation Becomes the New Normal for Customers, Employers, and Partners

As workplace hybrid practices become firmly embedded, the urgency of the work anywhere, anytime digital business model assumes delivery of reliable digital connections. This expectation has become crystal clear to connectivity providers over the past few years. As a result, increased monitoring, intelligence, and re-architected networks across fixed and cellular now more consistently reduce the risk of failure or outage.

Organizations have learned that they now must be able to deliver a resilient connectivity strategy that provides uninterrupted bandwidth to keep business operations running smoothly. Organizations now must be able to respond, adapt, and evolve based on both real-time and long-term connectivity demands. This adaptation should extend beyond the network to include existing LTE and emerging 5G-enabled endpoints.

Connectivity resiliency strategies define how people, processes, and technologies align around a common goal of guaranteed uptime, technology changes, and the shift in business needs as the organization and markets change. An effective strategy marries performance and capacity planning with technology futures and business outcome planning. Enterprises must continually assess their current network, IT, cloud, and application footprint to get a full understanding of how people, processes, systems, and "things" interact and the actions needed in case of one or more technology-related issues.

Associated Drivers

- **Storms of disruption** – Accelerating, interconnected uncertainty
- **Digital business** – Stepping stone to the future enterprise
- **Ecosystem-based innovation** – Driving enterprise value

IT Impact

- **Road map realignment.** The road map of key applications, services, and business outcomes must be aligned to cost-effective integrated connectivity technologies to allow digital business models to operate, regardless of location or issue. This could be via owned or managed connectivity solutions that allow access/usage anywhere and that eliminate risk of siloed data.
- **Automation/AI benefits.** The evolution of automation and analytics tool and skills that provide predictive issue management and automated responses to detected bottlenecks will integrate and align with the needs of customer engagement.
- **Wireless first.** Enterprises will plan for inclusion of wireless connectivity (5G, Wi-Fi, satellite, microwave) to complement or replace existing wired connectivity and ensure resiliency.

Business Impact

- **Operational efficiency.** Enterprises can reduce or eliminate the risk of business disruption or employee productivity-related issues, both of which can negatively impact costs and time to revenue.
- **Employee experience.** Organizations will have lower risk of employee or customer dissatisfaction from lack of responsiveness or need for access to critical information, which can have a direct impact on brand equity, NPS, and related metrics.
- **Better cost focus around transformation.** Aligning costs associated with resilience with adaptability, flexibility, and responsiveness become part of the overall digital business transformation model.

Guidance

- Determine what acceptable service levels would be around the disruption of business operations and critical network/IT/customer-facing processes and set guaranteed SLAs and timelines for fault resolution.
- Perform an internal gap analysis to assess existing connectivity capabilities, strengths, weaknesses, and priorities for the entire organization. This should include network access capabilities, on-premises and hosted application access, and usage patterns.
- Align complementary technology investments to growth and change strategy that allows adaptation based on business needs or business shifts.
- Invest in connectivity management solutions that embrace autonomous processes such as robotic process automation (RPA) to increase efficiency and reduce manual tasks.

Prediction 10: By 2027, 80% of G2000 Enterprises Will Require LEO Satellites to Cover Gaps in Network Coverage for Remote, Rural, and High-Risk International Locations

For many years, the potential of satellite internet was a frustrating proposition, with high latency and low speeds. However, over the next several years, the growing availability of low Earth orbit (LEO) satellites will be a game changer for bandwidth-starved rural and remote locations. The leading companies striving to offer services include SpaceX's Starlink, Amazon's Kuiper, and OneWeb (Eutelsat). Starlink has already launched thousands of satellites and is available in over 30 countries. OneWeb, initially backed by Softbank and merged with Eutelsat in mid-2022, has launched several hundred satellites and counts government agencies and network service providers as key customers. The other major potential competitor is Amazon subsidiary Project Kuiper, which plans to launch over 3,000 satellites over the next several years.

The goal of these companies is to blanket the globe with mega constellations of low-cost satellites to offer broadband access and eventually mobile connectivity. Starlink currently offers up to 350Mbps service at around 20ms latency. At \$500 per month, for businesses the service may not be competitive with 5G fixed wireless access (FWA) and fiber-based service. However, its availability in rural and high-risk remote areas will be a boon for industries such as energy, mining, and government agencies. In addition, technology advances that will bring limited text messaging service to some mobile phones should be available by the end of 2022. Apple announced a free introductory satellite texting service on the iPhone 14, while mobile operators in the United States have inked deals with Starlink and OneWeb to provide connectivity.

LEO satellites connectivity must overcome several challenges. To provide seamless connectivity, thousands of low orbiting satellites travel up to 17,000mph and circumvent our planet a dozen times per day. As more satellites are launched, congestion and the potential for catastrophic collisions and dangerous space debris is concerning. Another issue is spectrum availability, with the FCC examining the contentious issue of potentially freeing up the 12GHz band for 5G usage. Nevertheless, the benefits of another connectivity option for billions of consumers and millions of commercial customers around the world will be a positive force once these networks are fully operational.

Associated Drivers

- **Digital business** – Stepping stone to the future enterprise
- **Storms of disruption** – Accelerating, interconnected uncertainty
- **Ecosystem-based innovation** – Driving enterprise value

IT Impact

- **Aligning use cases.** Companies in specific verticals should explore particular use cases that don't require mission-critical low-latency requirements.
- **IoT expansion.** LEO satellites will potentially offer global IoT capabilities but will require custom development capabilities.

Business Impact

- Cost-effective low orbit satellite connectivity will exponentially expand the use of global connectivity beyond industrial use cases, first responders, and the media segment.
- Low orbit satellite connectivity will offer mobile connectivity to billions of consumers in rural and remote locations, opening new business markets for mobile operators and commercial applications.

- While the initial costs of business terminals are relatively high, as companies scale up in the coming years, technology innovation and competition lower prices.

Guidance

- Companies should explore low orbit connectivity beyond the current providers.
- Determine the optimal applications for low orbit connectivity. Latency and reliability should be key considerations.
- Explore IoT applications that don't require always-on mission-critical capability for remote and geographically distributed sites.

ADVICE FOR TECHNOLOGY BUYERS

As organizations look forward to 2023 and beyond, the forced remapping of enterprise network and IT strategies must adapt to ensure connectivity priorities remain at the forefront of all critical investment decisions. Organizations must continuously evaluate both short- and longer-term business goals and look at what technology investments can get them there. The outcome is increased agility that improves network and IT efficiency, keeps employees, customers and partners engaged, helps ensure business continuity, and accelerates time to revenue.

IDC offers the following advice for organizations as they look to transform the connectivity strategies:

- **Make connectivity resiliency core to business success.** Connectivity resiliency is a fundamental requirement of business continuity and digital resiliency. In crisis situations, decision makers should invest in resilient access and backhaul that embraces next-generation mobile technologies such as 5G, SD-WAN, and NaaS to ensure the changing business demands are met in real time.
- **Think smart and scalable but act sustainable.** Organizations should formalize processes and methodologies that can embrace smart connectivity with an environmentally sustainable approach. Cloud-based and virtualized connectivity solutions can provide speed, agility, and security of the network, but also bring a lower energy footprint without sacrificing any innovation gains.
- **Align connectivity investments around experience metrics.** The benefits of faster network access, cloud-based collaboration tools, and easy access to mission-critical applications will improve employee experience, improve business workflows, and contribute to revenue gains. Decision makers focusing on connectivity transformation should map success metrics to gains in employee productivity, customer experience, and partner interaction.
- **Measure and track the tactical and strategic successes of connectedness initiatives with performance-based KPIs.** Any transformative effort to reducing connectivity and data silos should be mapped to KPI-driven business outcomes. This will help ensure progress and success metrics as organizations invest in providing seamless connectivity for in-office and work-from-home workers and allowing easier access to new productivity tools and processes.

EXTERNAL DRIVERS: DETAIL

Storms of Disruption – Accelerating, Interconnected Uncertainty

- **Description:** It's an extraordinary moment: We have our most impactful pandemic in 100 years, our first invasion in Europe in 75 years, and our first global inflation in 40 years. While change

and disruption are nothing new, this year feels faster, more wide ranging, and farther reaching – the most dramatic change in a generation – affecting the psychology of leaders. It's not just a few things but the interconnected nature of them together, the domino effect, and the unexpected yet consequential impacts that generate a perfect storm of instability. The global order is under threat from the Russia-Ukraine war. The war's impact on energy has shocked markets, resulting in both a renewed interest in expanded fossil fuels and a greater clean energy imperative. "Climate action failure" and "extreme weather" are cited as severe immediate and long-term risks. Disruptions in grain and fertilizer exports are adding to inflation and threatening massive food insecurities. Rising interest rates challenge the economy and IT spending. While some adaptations from the COVID-19 pandemic are now integrated into global business and operating models, impacts are still felt in supply, labor, and more. Supply chain difficulties and chip shortages are expected to continue until at least 2024. Developing economies, seeking to digitize rapidly, have limited resources, while the speed of technology-enabled solutions marches on. It's undeniable that these external forces are increasingly interwoven, not temporary, impacting organizations' business and digital plans concurrently, becoming storms of disruption.

- **Context:** With storms of disruptions, there is a lot of complexity, but it cannot easily be teased apart. The multidimensional interactions among issues/people/companies drive constant change and redefine competition continuously. In addition to individual drivers, seeing the whole of the system is important. Concern about the future is heightened and growing. WEF reports that 84% of experts are either "concerned" or "worried" about the outlook for the world (www3.weforum.org/docs/WEF_The_Global_Risks_Report_2022.pdf). Yet 95% of business leaders report that their crisis management needs improvement, according to PwC (www.pwc.com/gx/en/issues/crisis-solutions/global-crisis-survey.html). Global supply chain pressures increased in 2Q22. Global GDP growth is projected to slow sharply in 2022, to about 3%, and remain at a similar pace in 2023. Crude oil prices have almost doubled since 2021, while natural gas prices in Europe have increased 4x to 5x, according to OECD (www.oecd.org/coronavirus/en/data-insights/energy-prices-are-spiking). Fertilizer prices surged in March, up nearly 20% since January 2022 and almost 3x higher compared with a year ago. Currently, 193 million people globally are acutely food insecure, but FAO predicts insecurity will worsen in at least 20 countries in 3Q22 (www.fao.org/3/cc0364en/cc0364en.pdf).

Cybersecurity and Risk – Scaling and Evolving Threat Environment

- **Description:** The exponential proliferation of digital transformation, the increasing distribution of data and workflows, hybrid work models, hybrid multicloud, edge computing, and so on have thrust the world onto a new trajectory of digitalization and interconnectedness, accompanied by the increasingly frequent, costly, and damaging occurrence of cyberincidents, sometimes even paralyzing critical services and infrastructure. Data breaches add to the increasing concerns and governmental interventions regarding privacy. Ransomware has increased exponentially, while the texture of attacks is much more targeted and personalized. The dark web is teeming with hacking services that offer comprehensive skills, affordable pricing, and quick engagements. At the same time, organizations find it challenging to respond to cybersecurity incidents due to the severe shortage of skilled professionals. Small and medium-sized enterprises, most affected by the skills shortage, represent a weak link that puts the whole ecosystem at risk. Beyond zero trust approaches, cyber-resilience – the ability of an organization to anticipate, withstand, recover from, and adapt to any threats to its resources – is the new name of the game in not only defending against cyberattacks but also preparing for swift response and recovery when an attack does occur. Artificial intelligence will permeate all

aspects of cybersecurity, both in attack and defense. In a deeply connected society, digital trust is the currency that facilitates future innovation and prosperity.

- **Context:** Nation-state attacks – such as NotPetya, originally targeted at Ukraine but which quickly wreaked havoc globally – are increasingly common. Ransomware, the most common cyberthreat today, saw a significant increase in the first half of 2021, with global attack volume increasing by 151% (per the World Economic Forum (WEF) Global Cybersecurity Outlook, 2022). Also, 70% of attacks in 2021 were personalized and targeted, not malware based. Cybercriminals – "black hat" hackers – can be hired to break into social media accounts (for about \$230), erase debts, and even change students' grades (for \$394-526), according to the same report. In the past several years, the WEF report says that indirect attacks – successful breaches coming into an organization through third parties – have increased from 44% to 61%. And 43% of attacks are aimed at SMBs; only 14% are prepared to defend themselves, according to Accenture. At the same time, 53% of cyberleaders say they have gaps in key talent and skills. IDC reports that 45% of organizations would need to increase spending by 20% to maximize risk mitigation.

Economic Instability – Flurry, Snowball, or Avalanche?

- **Description:** For the first time in decades, a relatively predictable economic environment has been upended by extreme uncertainty. Global markets are beginning a fundamental shift after nearly 15 years, defined by low interest rates and cheap corporate debt. This is the first economic slowdown since the widespread adoption of the "as a service" model for IT and other sectors, with unknown, perhaps broad, implications. Inflation has reared its ugly head, accompanied by an increase in interest rates. Combined with global conflict, rising commodity prices, surging sovereign debt, and supply chain constraints, it points to uncertain economic growth, even recession. Organizations are pivoting to use technology as a hedge against inflation, with staff augmentation, operations optimization, and process automation. While digital acceleration requires tech investment, the reality of rising costs of key components is likely to outstrip budgets. The disruption from the COVID-19 pandemic has caused developed countries to prioritize resilience over cost minimization and drive regional convergence at the expense of global integration to minimize supply chain disruptions. Rolling waves of instability will impact different areas in different ways at different times. Labor market imbalances; protectionism; and widening digital, education, and skills gaps exacerbate the digital divide, increasingly separating relative "winners" from "losers." Every new crisis heightens the disparities.
- **Context:** Global growth is projected to slow from an estimated 6.1% in 2021 to 3.6% in 2022 and 2.7% in 2023 (www.imf.org/en/Publications/WEO/Issues/2022/04/19/world-economic-outlook-april-2022). War-induced commodity price increases and broadening price pressures have led to 2022 inflation projections of 7% in advanced economies and 10% in emerging market and developing economies. But inflation in the United States and United Kingdom unexpectedly accelerated to 9.1% and 10.1%, respectively, in June 2022, the highest since December 1981. Increased energy prices are driving inflation forecasts for 2023 European economies as high as 18.6% with potential global impact (www.ft.com/content/778e65e1-6ec5-4fd7-98d5-9d701eb29567). Global federal banks continue to raise interest rates to slow inflation, raising different concerns and requiring recalculation of acquisition intentions. Yet IT spending continues to outpace GDP, even more so when spending on devices is removed. Spending on IaaS continues to outpace other spending growth. IT cost price increases from inflation are expected to have the biggest impact on IT spending in 2022, with the greatest impact likely on managed services, PaaS, SaaS, and professional services, with expected delays in project initiation.

Global Supply Shock – Refocusing on Multisource and Resilience

- **Description:** If we hoped that supply uncertainties from the COVID-19 pandemic were behind us, we need to think again. Supply uncertainty and demand volatility continue, with lockdowns and prolonged supply chain disruptions driven by global vaccine inequality and zero-COVID-19 policies. The Russia-Ukraine War adds a further layer of chaos. Skills shortages continue to impact supply. The global business landscape is at a critical inflection point where the old structures have been shattered and are being pieced back together with new approaches toward resilience. Policymakers and business leaders are struggling to find an appropriate new balance between global and local solutions, shortening supply chains and diversifying to reduce risk. Concerns about national economic security, inflation and interest rates, data sovereignty, cybersecurity, and climate change are redistributing capital (e.g., semiconductor foundry capacity or rare earth mineral mining) to address critical component shortages. The accelerated bifurcation of East/West alliances, trading, and technology stacks further complicates and motivates realignments and new alliances. Strategies look to reconfigure supply toward "profitable proximity," with a greater emphasis on self-reliance, partner ecosystems, and managing costs. "Multisource" is the supply-side approach to spread risk and reliance across suppliers, providers, and vendors, including new mechanisms for rapid pivots, while the challenges of sensing and predicting demand increase.
- **Context:** IDC Manufacturing Insights reports that one-third of executives cite supply chain disruption as a primary business concern – not just for existing operations but also as an issue in new product development, where the ability to accurately respond to demand is critical for innovation. Semiconductor manufacturing in Taiwan (64% of total worldwide production) is seen as an increasing risk. While global instability is a major factor in supply uncertainty, the number 1 cause of supply chain disruptions in the United States was unplanned IT outages at 68% ([procurementtactics.com/supply-chain-statistics](https://www.procurementtactics.com/supply-chain-statistics)). Other common causes of supply chain disruption include adverse weather (62%), loss of talent (51%), cyberattacks (50%), and fire (44%). IDC's *Supply Chain Survey* found lack of supply chain visibility and lack of digital competencies as the top 2 challenges. On average, U.S. retail operations have a supply chain accuracy of only 63%, according to Procurement Tactics. In addition, a COVID-19 pandemic-induced shift from "experiential" to "product" created both unprecedented and largely unpredictable demand volatility. IDC reports that better use of demand data, supplier diversification, logistics contingency planning, and improved planning tools are the key steps for improved supply chain planning.

Digital Business – Stepping Stone to the Future Enterprise

- **Description:** A digital business sees value creation based on the use of digital technologies for both internal and external processes, including stakeholder engagement, employee commitment, and product and services experiences. Building and leading a digital business is the next step toward the future enterprise, with CEOs indicating that digital product and service revenue will jump from the current 30% factor to over 40% by 2027. While some parts of operations may never be purely digital, digital businesses are committed to a digital-first strategy that builds value and growth by aligning all parts of the business and IT landscape with digital workflows. Both the supply side and consumption side face increased scrutiny for investment, and development strategies for both digital and nondigital assets demand omni-channel leverage for the digital business to get support or funding. Implications include reprioritization of digital customer experience, evolution to fully digital operating models, more resilient digitally enabled supply structures, and automation to address risks and challenges. Regulatory factors are also driving digital business focus, where the use of data and the trusted engagement with automation drive new risk mitigation investments. Businesses that

are launched or relaunched in the digital universe are gaining measured operational and competitive advantage, driving digital-native considerations across most sectors. Digital business is bringing together business and digital strategy, where technology is both a common denominator and a dominant driver of value and growth.

- **Context:** According to IDC's 2022 *Worldwide CEO Survey*, "technology" is the number 1 word of the year for CEOs. In 2021, the dominant solutions for major monetization workflows were manual/custom, indicating a high greenfield focus. A 2021 *IDC Survey of Monetization* indicates that digital investment is a focus for 95% of CEOs, and 27% self-assess as "pioneers." According to McKinsey, in the next step in the digital journey, integration of digital and operations capabilities will drive step change improvements in revenue, customer experience, and cost (see *IDC PeerScape: Future IT – Practices to Establish a New Digital Business Operating Model*, IDC #US47857221, June 2021). According to IDC's *Future Enterprise Resiliency and Spending Survey, Wave 7*, operational efficiency (43%) and customer satisfaction (42%) are higher priorities than profits (37%) (see *Market Analysis Perspective: Worldwide Digital Business Models and Monetization, 2021*, IDC #US46247521, September 2021). In the drive to the future enterprise, digital businesses will prioritize deeper understanding of consumption models, recognizing usage intelligence as a critical driver for development of value and growth strategies, with an expected 60% of IoT-using organizations creating new data-driven offerings and recurring business models (see *IDC FutureScape Webcast: Worldwide Digital Business Models and Monetization 2021 Predictions*, IDC #US47028620, December 2020).

Meaningful Intelligence – Differentiated Decision Power

- **Description:** Data is now well embedded at the core of strategic capability for every organization. Data-centric capabilities and infrastructure are now critical to empowering performance-intensive computing and unleashing business value. Meaningful intelligence has moved beyond technical challenges of speed and precision, and organizational intelligence is now expected to enable better decisions, be more efficient, and improve knowledge across the organization. Differentiated decision power leverages real-time insight as the critical capability to keep up with the speed of change. Further, where trust is now paramount in all enterprise activities, ethical data strategies demand a balance between the potential of data and the critical respect for people's privacy and preferences; data and ethical use expectations have reset the bar for privacy, trust, visibility, and responsibility – both with respect to customer stakeholders and in the context of government interventions, regulations such as GDPR, and antitrust actions. Speed and experimentation are now also critical to meaningful intelligence, making digital twins a mainstream strategy that is broadly leveraged in support of measurably differentiated decision power. Data literacy and democratization have shifted organizational focus from straightforward distribution of data to more immersive strategies to find and leverage truly differentiated decision power. Metadata is a critical decision support tool, providing context through workflow linkages and automation. Data optimization and democratization are core strategies to mitigate skills shortages, create data-driven decision value, and deliver strong competitive advantage.
- **Context:** The differentiating power of data is a fact: IDC's August 2021 *Future of Intelligence Survey* indicates that 77.3% of respondents have a senior-level executive responsible for enterprise intelligence (see *IDC FutureScape: Worldwide Future of Intelligence 2022 Predictions*, IDC #US47913321, October 2021). According to IDC's 2022 *Business Intelligence and Analytics Survey*, 40% of organizations have started tracking new KPIs in the past 18 months. IDC's *Future of Intelligence Survey* also indicates that investments in enterprise intelligence (including data culture and democratization) improved employee retention and

productivity. Yet the focus on ethics and trust has never been higher, with the European Commission proposing regulation of artificial intelligence systems described as "the first ever legal framework" on AI (digital-strategy.ec.europa.eu/en/library/proposal-regulation-laying-down-harmonised-rules-artificial-intelligence). If that regulation follows the GDPR path, it will set the benchmark for most global economic sectors. The worldwide data integration and intelligence (DII) software market grew over 10% in 2021, indicating an unprecedented focus on gathering intelligence about data and leveraging data capture that "listens" to database transactions to inform on what is happening in the business (see *Worldwide Data Integration and Intelligence Software Market Shares, 2021: Accelerated Growth in a Digital-First World*, IDC #US47920522, June 2022).

Ecosystem-Based Innovation – Driving Enterprise Value

- **Description:** Innovation has shifted from tactical DX investments that aggregate siloed strategies to holistic, ecosystem-aligned enterprise commitments. Strategic innovation, led by the CEO, boards, and C-suite, now demands clear and measured links between technology innovation and outcomes. IT organizations are seeing a shift in investment priorities, with ecosystem-driven models now materially impactful to strategy, planning, and execution. Ecosystem commitments carry new challenges including consideration of IP protection and cybersecurity, where intelligent innovation has hastened business evolution across the workload, enterprise, and ecosystem control planes. Accelerated digitalization has also forced companies to fundamentally reimagine how they can leverage ecosystem relationships. The enterprise that is positioned to be bold has the most ecosystem leverage, realizing high-value outcomes to the benefit of both the enterprise and discrete workloads. This next generation of innovation has moved beyond bridging historic gaps and siloed investments with respect to customers, cost, and supply chain; it is now driving long-term and measurable strategic integration of enterprisewide business functions. Successful ecosystem alignment is now leading the C-suite discussion in terms of driving enterprise value and what success looks like. Organizations are investing in creative ways to leverage the ecosystem for both co-innovation and industry leadership.
- **Context:** Trusted ecosystem models are leading organizational response in the drive to digital business, empowering high-value innovation and tangible outcomes that can be delivered at scale. Ecosystem-based, multipartner solutions will drive speed and value through commercial intelligence, operational value, and increased value and differentiation, with insights driven by AI/ML (48%) and value metrics for pricing (49%) at the top of immediate digital business priorities (see *IDC FutureScape Webcast: Worldwide Digital Business Models and Monetization 2021 Predictions*, IDC #US47028620, December 2020). Tech spend by business leaders will overtake spend by IT by 2023 (see *Worldwide Line-of-Business Forecast, 2021-2025: C-Suite Tech Spending in a Digital-First World*, IDC #US48459721, December 2021). The need to reassess use cases and ensure alignment will drive commitment across the "digital dream team." Planning and budget cycles will be driven to become more dynamic in response to evolving ecosystem models. Technology architectures will be driven to support the needs on the broader C-suite for business models of the future (see *The C-Suite Tug of Digital Value in the Future Enterprise*, IDC #US48052721, August 2021).

LEARN MORE

Related Research

- *Critical External Drivers Shaping Global IT and Business Planning, 2023* (IDC #US49631122, October 2022)
- *IDC PlanScape: Future of Connectedness - Creating a Secure, Scalable Enterprise Connectivity Fabric* (IDC #US49544422, August 2022)
- *The Future of Connectedness: Defined - Update* (IDC #US49530122, August 2022)
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