

IDC FutureScape: Worldwide Cloud 2022 Predictions

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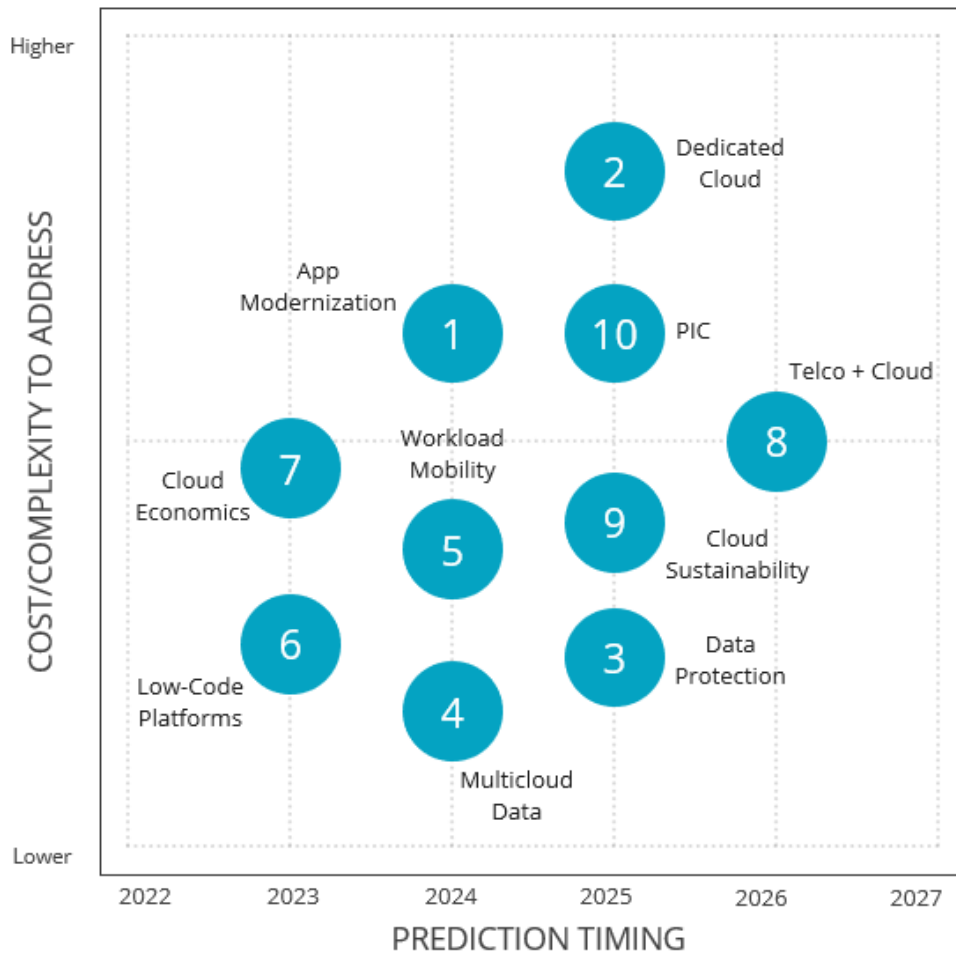
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IDC FUTURESCAPE FIGURE

FIGURE 1

IDC FutureScape: Worldwide Cloud 2022 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, 2021

EXECUTIVE SUMMARY

Cloud in all its permutations will continue to play ever greater, and even dominant, roles across the IT industry as enterprises pivot to a digital-first economy. Digital enablement is now a permanent, yet dynamic fixture in our world. Individual consumers and employees in schools, companies, and governments are always asking whether there is some digital-based capability/enhancement that could improve lives and desired outcomes. Entire industries want to intelligently leverage data to their advantage and can do so because they have faster access to digital technologies built on a cloud foundation.

The following are the top 10 predictions that frame IDC's perspective on how IT organizations can best take advantage of cloud technologies, capitalize on the extension clouds into new locations, and focus on more intelligent governance of cloud resources in the coming five years:

- **Prediction 1:** By 2024, the majority of legacy applications will receive some modernization investment, with cloud services used by 65% of the applications to extend functionality or replace inefficient code.
- **Prediction 2:** By 2025, in response to performance, security, and compliance requirements, 60% of organizations will implement dedicated cloud services either on premises or in a service provider facility.
- **Prediction 3:** By 2025, 55% of organizations will have migrated their data protection systems to a cloud-centric model to centrally manage core, edge, and cloud data protection from the cloud.
- **Prediction 4:** Seeking distributed data consistency, 75% of organizations will implement tools for multicloud data logistics by 2024, using abstracted policies for data capture, migration, security, and protection.
- **Prediction 5:** By 2024, 50% of organizations will use applications built on abstraction provided by managed services including cloud-native technologies to enable consistency in running in any and many locations.
- **Prediction 6:** By 2023, 60% of net-new applications will be developed with no-code/low-code platforms, up from 30% today.
- **Prediction 7:** By 2023, 80% of organizations using cloud services will establish a dedicated FinOps function to automate policy-driven observability and optimization of cloud resources to maximize value.
- **Prediction 8:** By 2026, 70% of CIOs will require cloud and telco partners to deliver secure cloud to edge connectivity solutions that guarantee performance and consistency in data collection.
- **Prediction 9:** By 2025, 85% of organizations will use software and cloud-based infrastructures to create a 35% increase in sustainable efficiencies across workloads and datacenters.
- **Prediction 10:** By 2025, nearly 50% of all accelerated infrastructure for performance-intensive computing (AI, HPC, and BDA) will be cloud based as these systems are increasingly integrated with enterprise software.

This IDC study provides IDC's top 10 predictions for cloud for 2022 and beyond.

"Cloud is now firmly established as an essential element of a digital-first strategy," said Dave McCarthy, vice president, Cloud and Edge Infrastructure Services at IDC. "As organizations look to

automate operations, deliver rich customer experiences, and launch new products and services, cloud has become the primary accelerator of innovation."

IDC FUTUREScape PREDICTIONS

Summary of External Drivers

- **Pervasive disruption continues** – Volatility, opportunity, and resilience
- **Digital ecosystem** – Thriving in a multiplatform world
- **Embracing digital first** – New strategies for complexity and ubiquity
- **The future enterprise** – Thriving in a jungle of agile innovation
- **The velocity of connectedness** – The future is data in motion
- **Intelligence on demand** – Navigating the torrent of data

Predictions: Impact on Technology Buyers

Prediction 1: By 2024, the Majority of Legacy Applications Will Receive Some Modernization Investment, with Cloud Services Used by 65% of the Applications to Extend Functionality or Replace Inefficient Code

Every new application one day will become a legacy application, and the industry currently has a nearly inexhaustible supply of applications that need some refactoring to move forward to cloud deployment. Exactly what that refactoring includes will vary widely.

For some applications, a straight lift-and-shift approach to a cloud-based virtual machine (VM) is the most expedient and least impactful way of moving an application to cloud. Increasingly, organizations are looking at a Kubernetes orchestration environment as a more desirable deployment platform and are repackaging VMs into a container for deployment into a Kubernetes service such as Red Hat OpenShift, Microsoft Azure Kubernetes Service (AKS), Google Kubernetes Engine, or AWS Elastic Kubernetes Service, thus using readily available VM-to-Kubernetes migration tools. This approach also requires no rework of application code.

However, for a portion of existing applications, an approach offering greater long-term benefits is to refactor part of the application itself. For applications that are candidates for some direct refactoring, customers can consider one of several relatively easy approaches, using a set of foundational cloud services offered by all public clouds to extend the value of that application. IDC research finds that customers are already keen on using cloud services offering API management, serverless/function computing, and event-based actions to replace some portion of existing applications. Using these or other cloud services to improve the functionality and efficiency of existing applications is projected to be an approach used for 65% of existing applications being migrated to public cloud by 2024.

Associated Drivers

- **Pervasive disruption continues** – Volatility, opportunity, and resilience
- **The future enterprise** – Thriving in a jungle of agile innovation
- **Embracing digital first** – New strategies for complexity and ubiquity

IT Impact

- Application migration and modernization backlogs remain high, but a growing set of foundational cloud services provide the tools needed to break off pieces of legacy applications and then recreate them using modern, efficient tooling.
- Triaging applications for viability to be modernized continues to be a requirement that pits benefits of improvements or helps refactoring against the return on investment (ROI), along with the risks of breaking something else.

Business Impact

- Modernizing applications brings value to the business by increased competitiveness and the ability to outflank competitors.
- Business representatives must work with technology professionals to come up with plans for what applications are best candidates or most badly in need of modernization or refactoring.

Guidance

- Experiment with new technologies (e.g., event-driven functions, Kubernetes orchestration platforms, and API management) to gain experience and assess viability.
- Set a goal to identify and begin modernizing a noncritical application as a pilot project, which can serve as a realistic test case for your organization.
- Move proactively to modernize more critical applications where you can. Your competitors will be doing the same, and failure to invest can leave an organization in a disadvantaged competitive position.

Prediction 2: By 2025, in Response to Performance, Security, and Compliance Requirements, 60% of Organizations Will Implement Dedicated Cloud Services Either On Premises or in a Service Provider Facility

Public cloud services offer end users access to a variety of shared compute and storage resources, a broad marketplace of applications, and flexibility in paying for only used services while taking away a burden of datacenter and infrastructure management. Although the flywheel of shared cloud services grows bigger, more robust, and reliable, businesses continue to express a need to extend the cloud experience (and cloud-native technologies) into their datacenters and critical business locations. This demographic includes businesses with a large installed base of traditional enterprise applications that cannot be "lifted and shifted" into the public cloud for a variety of reasons.

Concerns with security and data privacy, compliance with regulatory requirements, inadequate performance, and service costs that exceed end-user expectations inhibit companies from making this shift. This demographic also includes businesses that seek to offer software as a service (SaaS) via a B2B or B2C model and for those a shared tenancy infrastructure-as-a-service model presents security and scaling challenges. Finally, emerging digital infrastructure strategies being adopted by many enterprises look to establish integrated autonomous IT operations across a consistent ubiquitous cloud-native environment to optimize costs, performance, security, compliance, and overall digital infrastructure resiliency.

To maintain business resiliency and speed digital transformation, enterprises must seek to enable consistent end-to-end operational automation and control using ubiquitous cloud-native architectures paired with consumption-driven pricing and on-demand infrastructure scalability. Organizations will weigh the benefits of using a mix of solutions from leading public cloud service providers and traditional infrastructure software/equipment providers. They will select one or several partners to provide strategic

dedicated platforms that extend shared management and data control planes across on-premises, edge, and public cloud infrastructure. The challenge will be to choose between a wide array of cloud services offerings and solutions that provide full turnkey stacks, which can be deployed on end-user premises, in colocation facilities, or at service provider datacenters, and offer a public cloud-like experience but via dedicated tenancy, opex consumption, and managed services operating models.

Greater availability of offerings in this space lends itself perfectly with increasing interest from the end-user community in these types of services. In addition, greater availability of multicloud management tools makes adoption of dedicated cloud services a smoother experience as it creates less disruption to current operations and enables movement toward hybrid IT solutions. IT buyers become more and more outcome focused as dedicated cloud services and solutions shift much of the lower-level tech refresh and infrastructure life-cycle operations tasks to service providers. Business and DevOps stakeholders become more engaged as consistent end-to-end performance, security, and compliance become simpler and most cost effective to implement.

Associated Drivers

- **Digital ecosystem** – Thriving in a multiplatform world
- **Embracing digital first** – New strategies for complexity and ubiquity
- **The future enterprise** – Thriving in a jungle of agile innovation

IT Impact

- Growing adoption of dedicated cloud infrastructure as a service will drive further shift in spending on IT infrastructure as a service from OEM vendors and service providers and will be a core part of enterprises' hybrid cloud extension.
- Integration of dedicated cloud and public cloud resources, unified workload management across dedicated cloud and public cloud services, and seamless workload movement between dedicated cloud and public cloud environments will be critical IT operational goals.
- IT buyers will need to rethink infrastructure architectures and adopt a comprehensive approach that considers how to automate and optimize consistently across clouds, datacenters, and edge across multiple lines of business (LOBs).

Business Impact

- Growing adoption of dedicated cloud services will drive IT teams to focus vendor selection on business outcomes and ROI.
- IT skills will need to pivot to be more business focused and to embrace policy-driven operations as vendors and service providers take more direct responsibility for feeds and speeds.
- LOB teams will need to more closely collaborate with IT organizations to align procurement and operational controls with business priorities, while business leaders need to closely follow dedicated cloud service innovation road maps to meet operational requirements.

Guidance

- Build a network of service partners that can supply expertise critical for establishing trust, as these partners will be critical enablers of dedicated cloud services strategies. For many vendors, delivery of services, especially on customer premises, is a new competency.
- Embrace multicloud management tools that span a variety of cloud operating models, enabling end-user movement to hybrid cloud IT operations and comprehensive policy-driven operations models that span infrastructure resources.

- Plan for workload placement to not remain static. Workload migration to public cloud and workload churn are part of the digital infrastructure world.

Prediction 3: By 2025, 55% of Organizations Will Have Migrated Their Data Protection Systems to a Cloud-Centric Model to Centrally Manage Core, Edge, and Cloud Data Protection from the Cloud

According to IDC research, more than 90% of organizations use the cloud as a strategic element in their data protection schemes. In some cases, this is as an offsite data repository to ensure data survival in the event of failure at a primary site; in other cases, it facilitates test/dev, staging, DevOps, and the like.

Currently, nearly half (48%) of data remains in a core repository. However, data is growing faster in the cloud and at the edge, making consistent governance of data across locations and environments critical. Thus the balance of data will tip to noncore repositories, primarily cloud, within the next two to five years. As this balance tips – especially driven by cloud-native application deployment – organizations will take a cloud-centric placement and governance approach to data protection, whereby products, systems, and services (i.e., backup as a service, disaster recovery as a service) will be deployed and managed centrally in the cloud, with integration capabilities extending to on-premises edge locations.

Associated Drivers

- **The velocity of connectedness** – The future is data in motion
- **Intelligence on demand** – Navigating the torrent of data

IT Impact

- Traditional on-premises backup strategies must be rearchitected to better address cloud and edge data protection while continuing to address requirements at the core.
- IT teams will need to update data protection skills and processes to become cloud oriented.
- Enterprises with legacy data silos will be challenged to develop a cohesive cloud data management strategy, resulting in extended buyer evaluation, proof of concept, and integration periods.

Guidance

- Start architecting the transition from core central data protection to cloud-centric methodologies well before any implementation is undertaken.
- Include cloud data protection as an integral dimension – it should not be added as another data protection silo, but rather as a transition from core-to-cloud architectures.
- Include container data protection as a part of a comprehensive cloud data protection strategy, and understand that container backup must go beyond recovering persistent data to enable system-level recovery.

Prediction 4: Seeking Distributed Data Consistency, 75% of Organizations Will Implement Tools for Multicloud Data Logistics by 2024, Using Abstracted Policies for Data Capture, Migration, Security, and Protection

Business data is being spread throughout the organization – in different locations, with different formats, different business owners and, in many cases, with different management and governance policies. Organizations have a wide array of data: structured data, unstructured data, cloud object data, NoSQL data, data held in proprietary SaaS applications, and data within cloud-native

containerized applications increasingly being deployed in production environments. This distribution of data and associated processes threatens to exacerbate data sprawl. It leads to inefficiencies in operations, processes, and workflows, resulting in increased costs and potentially serious security and compliance vulnerabilities for organizations.

Unfortunately, the problem of data sprawl will not go away on its own. IDC research consistently shows that enterprise data growth will expand 30% annually. According to IDC, the enterprise storage systems installed base in aggregate (including public cloud + dedicated cloud + traditional IT) will grow at a five-year CAGR of 30.9% – reaching 5,451EB (or 5.5ZB) in 2025. Without proper policies for data capture, migration, security, and protection, this exponential data growth and data sprawl will quickly become unmanageable, exacerbating enterprise IT infrastructure inefficiencies, operational inefficiencies, and ultimately threatening an organization's ability to remain secure and compliant.

There is little reason to believe that enterprises' data growth will slow or enterprises' reliance on data as a business asset will diminish. Petabyte-scale deployments will become commonplace even in midsize organizations.

Traditional data management strategies will no longer be sufficient to cope with such data volumes, nor will they be able to provide comprehensive data services for security, protection, and compliance. As a result, IDC expects organizations to prioritize strategic adoption and implementation of tools and services for multicloud data logistics over the next three years. We expect this to remain a significant area of opportunity as organizations with increasingly complex data estates shift from a "best-in-class product/service selection strategy" to a strategy that embraces cross-cloud data management platforms that can apply consistent and increasingly universal policies for data security and protection by abstracting underlying data regardless of location or repository.

Associated Drivers

- **Digital ecosystem** – Thriving in a multiplatform world
- **The velocity of connectedness** – The future is data in motion
- **Intelligence on demand** – Navigating the torrent of data

IT Impact

- IT teams will find themselves in situations where existing data management strategies are unable to address the scale and interoperability requirements of heterogeneous cloud environments.
- Lack of visibility into line-of-business planning will lead to challenges in how to assess, classify, and catalog enterprise and customer data.
- Upskilling and training to build operational expertise to run infrastructure at scale across a range of environments will require new and continued investments by IT organizations.

Guidance

- Leverage DataOps as a way to socialize thinking around data logistics. Make DataOps about adopting practices to leverage data faster, make better informed business decisions, improve competitiveness, capitalize on business opportunities, and improve business operations.
- Add comprehensive data management tools for security, disaster recovery, and compliance that can ensure quick identification of a ransomware attack, take steps to respond effectively, and recover data from backups rather than pay ransoms.

- Find and eliminate data silos, which lead to inconsistent data management policies, data retention, and data governance; inefficient and redundant deployment of human and technical resources; and underutilization of data as a business resource.

Prediction 5: By 2024, 50% of Organizations Will Use Applications Built on Abstraction Provided by Managed Services Including Cloud-Native Technologies to Enable Consistency in Running in Any and Many Locations

For decades, organizations have been procuring enterprise applications to enable business process automation within functions such as finance, human resources, procurement, manufacturing, and supply chain. Historically, these transaction-centric systems were monolithic, highly customized on-premises systems.

The adoption of shared public cloud services, often across multiple public clouds and/or in increasing numbers of cloud locations, is driving application creators – both ISVs and enterprises – to abstract applications from the underlying infrastructure, leveraging an expanding set of foundation cloud services (FCS) for compute, data, and app integration. These abstractions build on top of standard cloud-native FCS offerings in virtually any location where the application may be deployed.

Since organizations may change application providers, or may change preferred cloud relationships, a more standard abstraction service (leveraging open source where possible) will make movement of the apps and data easier. Utilizing applications that are abstracted through common services ensures future deployment options are easier to achieve. This is a major step forward — since in the past, this was difficult to achieve, if not outright impossible.

Associated Drivers

- **Digital ecosystem** – Thriving in a multiplatform world
- **Embracing digital first** – New strategies for complexity and ubiquity
- **The future enterprise** – Thriving in a jungle of agile innovation

IT Impact

- Reworking applications to leverage managed cloud services is a transition that will require time, expertise, and application packaging.
- Cloud evaluations will need to include qualifications for key managed services that are required by applications.

Guidance

- Identify the managed services that will be used by internally and externally generated applications and understand those services and where they are available.
- Triage existing applications to identify which ones are the best candidates to use abstracted services and get those on the short list to be modernized.

Prediction 6: By 2023, 60% of Net-New Applications Will Be Developed with No-Code/Low-Code Platforms, Up from 30% Today

Organizations had strong demand for application development solutions during the COVID-19 pandemic as they innovated quickly to serve customers, enable employees, and forge new business models. No-code/low-code application platforms are one of the solution areas organizations used to deliver these business results. IDC research shows that many organizations are significantly using no-code/low-code application platforms to deliver net-new applications and code changes today, and their use will expand as the need for cloud innovation accelerates even more in the coming years.

A common myth is that these no-code/low-code capabilities as part of augmented application development are used only by a special class of "business developers" or the legendary "citizen developers." IDC research shows that developer personas of all types – full stack, front end, back end, and other types – are also making significant use of code abstraction (as delivered by no-code/low-code tools) to effectively do their jobs. Therefore, every organization needs to see augmented application development with no-code/low-code platforms as a viable opportunity to empower a continuum of developer skill sets. Using the term *augmented application development* can help overcome some of the baggage with the term *no-code/low-code* and build mindshare among all types of developers.

These platforms will enable a continuum of capabilities, from no-code/low-code features to integrating with pro code development tools that can build sophisticated extensions. The ability to code will be further augmented by artificial intelligence (AI)/ML to offer intelligent coding suggestions, including learning programming languages or code via natural language prompts. In addition, these platform solutions will more aggressively package up AI/ML components, making it easier to incorporate new technology to deliver value to end users.

Associated Drivers

- **Digital ecosystem** – Thriving in a multiplatform world
- **Embracing digital first** – New strategies for complexity and ubiquity
- **Intelligence on demand** – Navigating the torrent of data

IT Impact

- IT and technology groups will need to determine whether the organizationwide use of a vendor's solution for augmented application development is preferable for the organization or whether it makes sense to make the decision within individual lines of business.
- IT will be responsible for the management and security of data that is piped into no-code/low-code platforms for augmented application development.
- Technology management will play the role of making sure guardrails for security, compliance, and reliability are in place.

Business Impact

- More business roles, including developers who report into lines of business, will have responsibility to identify the opportunity to make use of augmented application development.
- Organizations have reported an order of magnitude improvement in being able to deliver net-new applications and features using augmented application development (e.g., from more than one year to less than three months), particularly when AI components are useful.

Guidance

- Understand your business strategy and associated application/product road maps to determine where augmented application development may serve your needs; it is unlikely that a single vendor's no-code/low-code capabilities will be the silver bullet for all use cases.
- Strive for software elegance (i.e., the ability to deliver value with less code and less code complexity).
- Reskill and invest in people to take advantage of augmented application development platforms, including in understanding the AI/ML components available and how to use them to propel business value.

Prediction 7: By 2023, 80% of Organizations Using Cloud Services Will Establish a Dedicated FinOps Function to Automate Policy-Driven Observability and Optimization of Cloud Resources to Maximize Value

Underpinning the success of cloud is a new economic model that replaces capital purchases with operating expenses. In the cloud, infrastructure services are charged for on a consumption basis – you only pay for what you use. This allows organizations to rightsize their cloud resources, yielding better utilization metrics. Attaining the ability to scale up or scale down based on demand will be essential for the efficient operation of a digital service.

Cloud services also provide granular visibility into usage and costs. This real-time transparency can identify overprovisioned or underused resources so that administrators can be proactive in optimizing the environment. It helps drive ownership and accountability of technology, operational, and financial decision making. According to IDC survey data, 53% of organizations cited total cost of operations as the top factor influencing the selection of a cloud infrastructure provider.

While the principles of cloud economics are compelling, not every organization is reaping the benefits. Some organizations have experienced higher costs by moving to the cloud, which has led IT decision makers to question whether the promise of modern cloud economics is real or just clever marketing.

To address this concern, a new role is emerging, and will expand further, within organizations called FinOps, which is the practice of bringing financial accountability to the variable spend model of cloud, enabling distributed teams to make business trade-offs between speed, cost, and quality. This FinOps role (an individual or a team) will be responsible for optimizing the use of cloud resources and will require access to a growing set of software tools that can automate policy-driven governance and reporting.

Associated Drivers

- **Embracing digital first** – New strategies for complexity and ubiquity
- **The future enterprise** – Thriving in a jungle of agile innovation
- **Pervasive disruption continues** – Volatility, opportunity, and resilience

IT Impact

- Architecture decisions related to cloud infrastructure and platform services can have a large impact on the overall cost structure. Simply rehosting an application to a cloud provider can lead to higher costs than on-premises infrastructure.
- In a similar way that server virtualization led to "VM sprawl," the ease in which cloud resources can be provisioned can result in cloud sprawl. This problem grows as organizations use multiple cloud providers.

Business Impact

- The variable nature of cloud costs can be difficult to predict, especially for newer applications without a significant operating history. The complexity of cloud pricing models amplifies this concern.
- A lack of policy or governance around how cloud resources are provisioned can lead to unexpected costs, which can negatively affect the profitability of a business unit or service offering.

Guidance

- Create policies and procedures that dictate the required governance for how cloud resources are provisioned and managed within the organization and assign oversight to a dedicated individual (or a team).
- Look for opportunities to improve commercial terms through concepts like reserved instances or volume commitments, recognizing that the metrics used to price cloud services can vary by provider.
- Utilize tools that can enhance visibility into current spending, automate compliance with corporate policy, and identify opportunities for resource optimization.

Prediction 8: By 2026, 70% of CIOs Will Require Cloud and Telco Partners to Deliver Secure Cloud to Edge Connectivity Solutions That Guarantee Performance and Consistency in Data Collection

Edge IT deployments are quickly becoming essential to digital-first businesses. The aggregation, analysis, storage, and transfer of data from and to new edge locations can be accomplished in many different ways and through many different partners. Selecting the best option considering performance, latency, and security will require much greater transparency than what is available today. As providers of edge capabilities (especially telco providers) seek to differentiate their offerings by providing guarantees on performance, organizations must have clear insights into the best edge performance architectures and profiles by use case.

Edge IT will increasingly support applications that improve the safety of people, operational efficiency, and cybersecurity. For this reason, decisions on edge platforms and infrastructure will not be solely driven by cost and time to deploy. Organizations will also need complete transparency and trust in the reliability, consistency of performance, and redundancy of their edge partners as they rely on more edge resources to support critical functions.

Understanding of performance, latency, and costs must become table stakes as organizations modernize and invest in IT service at the edge.

Associated Drivers

- **The velocity of connectedness** – The future is data in motion
- **Digital ecosystem** – Thriving in a multiplatform world
- **Intelligence on demand** – Navigating the torrent of data

IT Impact

- Edge IT deployments require a higher level of autonomous operations given their remote nature, and many organizations are not equipped with open, standardized architectures that can be monitored and managed remotely.
- Deploying cloud architectures to new edge locations requires a greater understanding of capacity needs, and being able to measure the value of edge initiatives versus spend on edge will become a critical skill for the IT organization.
- IT organizations may feel less central to the success of edge initiatives as cloud partners and telco providers are increasingly important to enable edge IT services.

Guidance

- Develop a framework to understand the performance and latency minimums for each use case and workload. This is an important step in the edge IT journey because it will allow decision makers to make the best business decisions for each edge initiative.
- Invest in a new skill set or shift this responsibility to a trusted provider. At the scale many organizations are operating, extending to multiple edge locations can be simplified by relying on a trusted partner for the data and network connectivity needs.
- Demand full transparency from partners to provide full transparency into the performance parameters of each option.

Prediction 9: By 2025, 85% of Organizations Will Use Software and Cloud-Based Infrastructures to Create a 35% Increase in Sustainable Efficiencies Across Workloads and Datacenters

Focusing on building a more sustainable organization is a high priority today for many organizations, and such efforts have been linked with the ability to attract customers, investors, and top talent. As organizations seek to improve their use of resources, the IT organization will emerge as an important partner in understanding how to become more operationally efficient. While executive leadership and support is a top factor for success, the IT organization is essential in identifying areas for improvement, deploying technologies that increase operational efficiency, and measuring the impact of initiatives on the organization.

Given the growing importance of cloud, in all its permutations, to future enterprises, sustainability must be a key area of cloud innovation. IDC conducted a study of organizations that had committed to improving environmental sustainability to understand the characteristics of successful organizations and the obstacles that impede success. A key finding from this study was that IT organizations play an essential role in success.

For this reason, IT organizations must establish a process to measure the financial impact and business outcomes directly related to sustainability initiatives to ensure continued executive support. Beyond the expected savings from improved resource utilization (e.g., the energy bill), the IT organization should also focus on softer metrics such as customer loyalty, investor interest, and the ability to attract top talent as the most impactful outcomes of a successful sustainability program.

Associated Drivers

- **Embracing digital first** – New strategies for complexity and ubiquity
- **The future enterprise** – Thriving in a jungle of agile innovation

IT Impact

- As organizations adopt goals for sustainability, the implementation of policies and technology required to achieve them is placed in the hands of IT.
- While the potential exists to capture telemetry from equipment in order to understand its impact on sustainability, most monitoring systems have been designed to focus on performance or availability.

Business Impact

- Sustainability can help drive profitability for the company by improving efficiency.
- An eco-friendlier organization can drive customer loyalty and attract better talent.

Guidance

- Secure executive support to create advocacy that will help spread sustainability goals across the entire organization.
- Take a data-driven approach to sustainability goals. Progress needs to be measurable.
- Enable software tools that can aggregate data on resource usage, equipment health, cost, and carbon impact; these tools are helpful to understand the current state and measure progress over time.

Prediction 10: By 2025, Nearly 50% of All Accelerated Infrastructure for Performance-Intensive Computing (AI, HPC, and BDA) Will Be Cloud Based as These Systems Are Increasingly Integrated with Enterprise Software

Accelerated computing is any type of computing that uses a standard host CPU to manage the workload handoffs and some type of coprocessors to execute the bulk of the workload instructions. Understanding the importance of the cloud supply chain for adoption of acceleration is critical. By 2025, nearly half of all accelerated computing capacity will be cloud based as leading cloud service providers to service their internal workloads (e.g., recommendation engines, machine translation, search engines) and support external offerings (e.g., AI platforms, modeling and simulation environments).

Three increasingly important workloads for enterprises that will most benefit from accelerated computing are AI, modeling and simulation, and big data and analytics (BDA). These are workloads that will call for ever more sophisticated algorithms to obtain insights from highly complex relationships and vast amounts of data, often made possible through parallelization of the workload using coprocessors (GPUs, FPGAs, ASICs) and compute and storage clusters.

These performance-intensive computing (PIC) workloads will drive new digital processor designs, new analog AI processors, photonic computing, neuromorphic computing, and quantum computing. For businesses, such environments are tough and expensive to build, which is why organizations will be increasingly looking to leading cloud providers for their accelerated PIC workloads, allowing them to run these workloads with an opex model while flexibly scaling out and scaling back based on demand.

Associated Drivers

- **Intelligence on demand** – Navigating the torrent of data
- **Embracing digital first** – New strategies for complexity and ubiquity
- **The velocity of connectedness** – The future is data in motion

IT Impact

- Cloud-based PIC environments shift spending from capex to opex, resulting in a smaller datacenter footprint, less infrastructure staff to maintain a complex on-premises environment, and the availability of prebuilt software stacks on top of the compute for many workloads.
- A more complicated data management regime in a cloud-based PIC environment may include sensitive or regulated and data movement, leading to extra expense.

Guidance

- View PIC in cloud within the framework of an end-to-end compute strategy for workloads requiring acceleration. This includes the datacenter (including colocation centers), the edge, and the cloud.

- Conduct as much early scientific experimentation as possible with these workloads on premises to avoid cloud billing, and consider regulatory and compliance issues as that may keep data behind your firewall.
- Architect for the future. In the next few years, data for PIC workloads will start to move back and forth between the on-premises datacenter, the edge, and the cloud, and in all three scenarios, they will often require accelerated compute.

ADVICE FOR TECHNOLOGY BUYERS

Initial adoption of cloud at enterprises was often seen primarily as an alternative IT purchasing model and a shift from capex-based to opex-based consumption models. The justification has since evolved. The potential of cloud is truly unlocked when cloud is adopted as both a technology platform and an operational model, jointly enabling agility and responsiveness for the business. This requires changes in skill sets, processes, and organizational structures, bringing together IT and business to deliver agility and responsiveness.

IDC believes the following action can help organizations maximize the value potential of cloud:

- IT organizations must proactively prepare for a cloud strategy that includes use of foundational cloud resources distributed across platforms and premises but unified in a manner that allows consistent governance, policies, and automation across this distributed footprint.
- As cloud usage has increased, spending on cloud is now highly visible in an organization's overall IT budget. Management of spend will be critical to control costs while maintaining budget flexibility for new digital initiatives. Implementing a cost management strategy that leverages automation is an imperative.
- Cloud-native frameworks and cloud-native services are increasingly proving their applicability and relevance for both traditional enterprise use cases and new digital initiatives. But modernization exercises need to be planned carefully because of skill set and tooling limitations.
- Organizations must prioritize applications that can quickly demonstrate the value of new frameworks and services to communicate the value broadly, as they expand the availability of cloud-native skill sets and tools across the organization.
- Data compliance and regulation to ensure control over end customers' data are gradually emerging across the globe. Digital services and SaaS providers need to actively increase their awareness of these needs and build controls and evaluations that ensure they meet emerging cloud governance requirements in their areas of operation.
- Organizational structures need to evolve to minimize silos across cloud operations and business operations. Colocating IT as a partner within the business and increasing the level of engagement between business planning and cloud planning will help the enterprise deliver business outcomes and customer experiences in an agile and responsive manner.

Pervasive Disruption Continues – Volatility, Opportunity, and Resilience

- **Description:** In an interconnected world, any disruption is felt across the entire ecosystem, leading to more volatility, challenges, and opportunities. Survival is linked not to size or strength but to resilience and the ability to change – to move quickly, adapt, seize opportunities, and be ready for the next disruption. Adaptations and lessons learned from the COVID-19 pandemic are becoming permanent, requiring revised global business and operating models. Digital resilience approaches counter supply chain disruptions. Organizations are preparing for the return to office, the return to travel, new consumer spending patterns, the challenges of finding (higher-cost) talent, and the possible return of inflation in an environment of continued economic uncertainty. Innovation and digital resiliency become key to navigating ongoing disruption. Beyond headwinds like the pandemic are crosswinds like exponential scientific advancements and innovations enabled by enormous compute resources – leading to advances in healthcare, food production, alternative energy generation, and storage. The pace of disruption may, in fact, be increasing.
- **Context:** OECD revised its economic outlook for 2022 to 4.4% GDP growth due to strong vaccine rollout and "massive fiscal stimulus by the United States." The global economy, after 18 months of shock, has recovered to pre-pandemic levels. However, the global recovery is uneven. Many countries, vulnerable to a lingering recession, will require three to five years to return to pre-pandemic standards. IDC reports that with growing global growth, 71% of decision makers give top priority to digital infrastructure resiliency investments over the next two years. IDC projects global IT spending to increase in parallel with GDP growth in 2021 and to exceed GDP growth in 2022-2024 (~5%). Digital innovation investments continue to support growth in digital resiliency. "An uptick in forward-looking investments aimed at accelerating the business should ensure that core investments remain stable and digital transformation remains a top priority."

The Future Enterprise – Thriving in a Jungle of Agile Innovation

- **Description:** The COVID-19 pandemic proved that organizations that were well along the path to being digital businesses are surviving much better – even prospering under the pressures. Future success no longer relies on imagining what the future will look like or scrambling to adjust to immediate disruptions but rather on continuous innovation in response to "every moment" challenges and opportunities. And innovation is not just internal; organizations need to extend innovation into their ecosystems, including with partners. Innovation's accelerating velocity is enabled by digital technologies, software, AI, and cloud, which fundamentally democratize access to the building blocks for innovation. Digitally native start-ups, looking to disrupt existing industries and business models, add more urgency. Changes are everywhere: in banking and financial transactions, the workforce, decentralized corporate governance, data provenance, edge computing, and elsewhere. Dynamic change provides a constant imperative to innovate both technology and cross-functional solutions. Organizations with the ability to quickly sense and respond to market changes and dynamics are key to strategic innovation in the enterprise now and in the future.
- **Context:** Now more than ever, organizations are looking for new ideas and innovative practices to improve the effective use of resources and accelerate the ability to deliver digital products and services to customers, patients, and constituents. IDC predicts that by 2024, 80% of enterprises will overhaul relationships with their suppliers, providers, and partners to better execute digital strategies for ubiquitous deployment of resources and for autonomous IT

operations. Ecosystem business models are emerging across multiple industries, and some of those most significantly affected by this change will be the IT industry itself. At the same time, IDC predicts that up to a quarter of Fortune 500 companies will have to become software producers to digitally transform and maintain their Fortune 500 status. Wherever the future takes us, those organizations with the ability to innovate with multifaceted solutions to dynamic changes will come out on top.

Embracing Digital First – New Strategies for Complexity and Ubiquity

- **Description:** During the pandemic, changes in behavior, consumption, and supply forced companies to adopt digital-led business and operating models that endure lockdowns, movement restrictions, social distancing, and more. Work from anywhere, connectivity, scalability, security, throughput, resiliency, and redefining internal processes for remote access will define the next normal. Organizations are shifting to a complex hybrid world, changed by delivery of "anything, anywhere" and customer requirements that redefine product and service expectations. As national economies emerge from the pandemic, there is pent-up demand for products and services, especially in tourism, hospitality, entertainment, and travel. Some consumers have amassed household savings. The confluence of heightened savings, pent-up demand, and a return to normalcy will create strong growth for many, but not all, businesses – exacerbating the inequities of recovery and prolonging supply disruptions. However, the spike in demand may be the first wave of permanently altered behaviors and systemic changes. Enterprises must address the complexity and continued evolution of hybrid work, delivery, customer engagement, and supply models. Exponential change will come from successfully embracing and exploiting new complexities in innovative ways.
- **Context:** COVID-19 has acted as an accelerant to adopting digital-first business and operating models. Consumers are expecting to return to in-person shopping and still have delivery anywhere, anytime. Employees are expecting to work from anywhere and go into the office. United Airlines CEO Scott Kirby predicts "huge pent-up demand" for business travel, despite the general adoption of virtual meetings – "as tough as this pandemic has been, it has not changed human desire to be together." OECD projects global economic growth to be 5.8% in 2021 as demand increases with the vaccine rollout. WFH or WFAnywhere has created unexpected demand for long-term "workacation" rentals. Airbnb reports that a significant portion of rentals are now for 30+ days. A hybrid and more complex model is the new strategy.

The Velocity of Connectedness – The Future Is Data in Motion

- **Description:** Access to technology and digital connectedness are now critical. We are more connected than ever, with ever-increasing amounts of data in motion. The velocity of connectedness has changed how people socialize, shop, learn, work, and collaborate, creating a rich, seamless, immediate, and interoperable experience, regardless of the location of people and data. Businesses connect people, things, applications, and processes in real time, enabling new levels of automation and digitization. While the new connectedness enables new products or businesses, it also brings new attack surfaces and levels of dependency. The digital divide – the gap between people, organizations, and countries that do or don't have access to technology and the skills to use it – becomes more consequential, even in everyday tasks. The increased importance of connectivity requires governments to consider whether affordable and effective internet has become a fundamental human right and a pressing need for investment. The communications industry's journey of systemic change – starting with 5G and cloudification – will have broad, long-lasting consequences. The challenge and opportunity will be creating innovative connected products and services that expand current advances.

- **Context:** COVID-19 has reshaped how people and businesses think about connectivity. Creation, management, and consumption of data must be realigned with the core assumption that data will always be in motion and data volumes will increase. Services and products need ubiquitous deployment among people, things, processes, and applications. IDC predicts that by 2023, enterprises will get a 30% boost in productivity by re-architecting networks to include a "branch of one" operating model, enabling the same secure application experience as they get on premises and supporting the right experience for each user. Digital enterprises will commit resources to develop, foster, create, and mandate connectivity-driven outcomes. Those that deploy strategic, integrated connectivity throughout the organization will realize higher return on investment through gains in revenue, customer retention, infrastructure longevity, and efficiencies.

Intelligence on Demand – Navigating the Torrent of Data

- **Description:** Many organizations are drowning in data they are collecting but not using, focusing on the immediacy, not the importance, of data. Artificial intelligence is playing a key role in interpreting and harnessing huge volumes of data to create insight and value and enable dynamic learning across the organization and in the flow of work. But organizations need to maintain a balance between the potential of AI and the realization that people are still needed in the loop. Delivering intelligence where and when it's needed poses new challenges to resource allotment and data control. And as automation and augmentation increase, so do concerns around trust, visibility, and responsibility. Issues with bias and misuse, surveillance, invasions of privacy, and more are met with government interventions, regulations such as GDPR, and antitrust actions. While regulations may level the playing field for data and automation, competitiveness requires creativity, differentiation, and balance between governance and innovation. Organizations that strike that balance and harness data, AI, and learning will achieve an asymmetrical advantage in the market, benefiting from superior predictions, improved engagement, processes, operations, enterprise decision making, and resilience.
- **Context:** Where data delivers value, ensuring its veracity and transforming data into insights are strategic imperatives. In 2020, 64.2ZB of data was created or replicated globally. IDC predicts the Global DataSphere will grow at a CAGR of 23%. But it is not just having more data that matters. Based on IDC's Global DataSphere study, less than 3% of the data currently created is analyzed to affect enterprise intelligence. In an IDC survey of mid- to upper-level managers, 59% say they are overwhelmed by the amount of information available for decision making; however, 45.6% say they don't have enough data and information available for making decisions. Organizations that solve that problem will be the winners of the battle for intelligence.

Digital Ecosystem – Thriving in a Multiplatform World

- **Description:** Understanding, participating in, and provisioning the digital ecosystem that will sustain, advance, and scale business and operations are essential for every business. A digital business platform, the architecture to support the future enterprise, is the assembly of technologies, capabilities, and data upon which digitally enabled organizations run. In the emerging multiplatform world, infrastructure, pervasive compute power, data management, intelligence, and connectivity can all be provided independently as services. The new dynamic is to integrate them at scale to gain control and minimize technical debt while still providing choice. Becoming a digital business requires a shift from traditional, linear processes that start and end in the organization toward platform-based, data-driven value chains that link to external partner ecosystems. The open integration of platforms into those ecosystems plays together better than other models based on closed alliances and facilitates innovation across

the enterprise and across the business ecosystem. This enables the network effect of ecosystem economics to generate new value beyond the organization or technology itself.

- **Context:** The digital economy has spread rapidly throughout the world. Leading organizations are shifting from digital platform thinking to new digital ecosystems to evolve their business models, capture innovation, and manage technology architecture. IDC predicts that by 2023, the need for G2000 companies to access and monetize multipartner solutions will lead to fivefold growth in marketplaces facilitated by SaaS-based ecosystem orchestration platform deployment. And that by 2024, net-new production-grade cloud-native apps will increase to 70% of all apps because of the adoption of technologies such as microservices, containers, dynamic orchestration, and DevOps. This represents a fundamental shift in business strategy – moving beyond product differentiation and pricing toward ecosystem-based value creation and the transformation into digital-native enterprises.

LEARN MORE

Related Research

- *Critical External Drivers Shaping Global IT and Business Planning, 2022* (IDC #US48047121, October 2021)
- *Worldwide Foundational Cloud Services Forecast, 2021-2025: The Base of the Digital-First Economy* (IDC #US46058920, September 2021)
- *Worldwide Whole Cloud Forecast, 2021-2025: The Path Ahead for Cloud in a Digital-First World* (IDC #US47397521, September 2021)
- *Market Analysis Perspective: Worldwide Public Cloud Infrastructure as a Service, 2021* (IDC #US48243421, September 2021)
- *Market Analysis Perspective: Worldwide Platform as a Service, 2021* (IDC #US48223121, September 2021)
- *Market Analysis Perspective: Worldwide Edge Strategies, 2021* (IDC #US48264221, September 2021)
- *Dedicated Cloud Infrastructure as a Service, 2019-2025: Market Trends and Outlook* (IDC #US48005321, June 2021)

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