3rd Platform disruption — cloud, mobility, big data/analytics, and social business — is causing most businesses to transform how they operate and to search for new revenue streams. While IT organizations have worked hard over the years to learn how to cope with change, the current rate of acceleration and the order-of-magnitude increases in every measure of volume present the CIO with a seemingly impossible challenge. Key trends in cloud computing are illustrative of the changing nature of the skills needed in an IT organization.

High Demand for Next-Generation Business/IT Skills, But Scarce Supply

The ability of IT organizations to acquire workers with a digital transformation mindset is constrained by a shifting set of competencies and a limited talent pool. The ability to combine business and IT skills to transform new technology into successful business outcomes is in high demand today. However, the pool of workers with this combined skill set is growing too slowly to meet business demand and is too concentrated geographically for many enterprises to access, exacerbating the performance gap between thrivers and survivors. The talent identified by CIOs as most urgently needed includes expertise in business intelligence, analytics, mobile and social development, security, and business analysis. These skills are necessary to drive digital transformation and the rapid move to cloud-based computing and include roles unique to cloud environments such as cloud administrators as well as IT security architects and IT generalists.

CIOs and other technology leaders have found these critical skills to be in short supply, particularly when their business is not close to major cities. The trend has been to rely more on cloud-based service providers to substitute for this scarce talent. But the shift to cloud is also impacting the skills the IT organization needs. IDC believes that the availability and skill level of talent have a direct impact on functions as diverse as IT security analysts, cloud brokers, and cloud system engineers. While IT employment worldwide will grow about 4% annually from 2016 to 2021, all that growth will occur in cloud-related positions. By 2021, 38% of IT positions will be cloud related (see Figure 1).

As market shifts and rapidly changing technologies transform businesses, companies that don’t have up-to-date, evolving skill sets in their workforce will fall behind. There is a “war” or at least a “grab” to attract workers with the emerging skill sets needed to excel in digital transformation. The search for talent is shaped and constrained by the way businesses and IT organizations accomplish work. In the long run, the optimization of the slow-growth labor pool argues for cloud computing, and cloud computing requires a change in skills. Currently only 16% of worldwide organizations have in place the skills and processes needed to efficiently manage the evolving cloud environment, according to IDC’s CloudView 2017. Because talent cannot be hired easily, enterprises and IT professionals will need to consider the impact of IT trends and focus on developing skills that will be important in the near future.
IDC's predictions related to multicloud, workload-centric management, and DevOps illustrate the changing skills associated with traditional IT roles and the challenges and opportunities faced by CIOs and IT professionals.

**FIGURE 1**

*Worldwide Demand for Cloud-Related Jobs, 2016-2021*

![Graph showing worldwide demand for cloud-related jobs](image)

Source: IDC's Worldwide IT Employment Model, 2017

**Multicloud Dominating**

*More than 85% of Enterprise IT Organizations Will Commit to Multicloud Architectures by 2018, Driving Up the Rate and Pace of Change in IT Organizations*

Over 85% of enterprises will commit to multicloud architectures encompassing a mix of public cloud services, private clouds, community clouds, and hosted clouds (see Figure 2). Some of these organizations may focus on SaaS solutions for public cloud and rely on private or even noncloud on-premise infrastructure for other workloads. Others will embrace a cloud-first strategy that aggressively shifts a wide range of workloads to the most appropriate mix of public IaaS, PaaS, and SaaS solutions available while continuing to support existing legacy systems as needed to enable mission-critical business requirements.
By the end of 2018, more than 50% of enterprise-class businesses will subscribe to more than five different public cloud services and will continually add, expand, contract, and drop subscriptions based on business needs. IT organizations will be asked to not only provide unified access to these services but also manage contracts, optimize spending, ensure service-level agreements (SLAs), and maintain and audit data management and regulatory compliance policies. Managing the multicloud environment becomes one of the jobs of the modern IT organization.

As the operational complexity of multicloud environments expands to encompass a broad variety of legacy and cloud-native applications, open source infrastructure such as OpenStack, open API–based integrations, mobile and social human interactions, and software-defined hyperconverged infrastructure, IT decision makers will put a premium on processes and tools that can simplify operations, maintain end-to-end service levels, and ensure that resources adapt seamlessly to dynamic changes in workload, processing, storage, and network requirements.

**IT Impact**

- Virtually all enterprise IT organizations will be expected to manage the delivery of consistent end-user experience SLAs and compliance with regulatory and corporate information management requirements and vendor risk management best practices as multicloud architectures become more complex and dynamic.

- Most enterprise IT teams will need to gain up-to-date insight into the state of critical cloud-related open source standards and be able to evaluate how to best take advantage of these technologies across multicloud architectures during 2017.

- More than half of enterprise IT teams will need to create new cloud management roles by the end of 2017, including cloud architects responsible for building agility into business and IT processes and services; cloud database administrators responsible for cloud data migration as well as database application analysis and optimization; and cloud network and system engineers responsible for implementation and integration of cloud technologies.
Evolving IT Skills Related to Multicloud

Multicloud architectures will change and reprioritize some of the skills required in the IT organization. The IT organization will need to design and orchestrate a full stack of services to support a rapid time to value for new applications and services. It will have to provision infrastructure and multitiered platform and application services across the enterprise service ecosystem. The skilled organization will be able to plan, build, and operate cloud services to reduce management complexity and lower operating costs, which will ultimately reduce risk, increase compliance, and deliver business value.

A diverse set of traditional roles will evolve, including system and network administrators, architects, security analysts, and even database administrators. For instance, cloud architects will require broad skills in infrastructure design and optimization and deep security and privacy capabilities. Cloud security analysts and architects will need increased capability related to data management, cloud infrastructure, and infrastructure integration. Even cloud administrators will evolve and require not only data management and integration skills but also contract and vendor management capabilities.

Workload-Centric Management

By 2017, More than 60% of Enterprise IT Organizations Building Hybrid Clouds Will Have Purchased New or Updated Workload-Centric Cloud Management Solutions

For some time to come, IT organizations will find themselves in a de facto hybrid — or “multicloud” — topology. For most, it was not an entirely conscious decision; rather, it was a decision that crept up on them: Business unit leaders first experimented with, and then rolled out, substantial SaaS services; developers looked to cloud platforms to build and test new applications; and storage managers offloaded data sets from expensive flash and high-maintenance tape to archive/cold storage services in the cloud. During the past few years, as IDC worked with technology buyer clients to develop their comprehensive three- to five-year IT sourcing plans, it has become obvious that important capabilities and assets were spread across a heterogeneous mix of providers, sites, and datacenters. But increasingly providers are delivering the capability for seamless workload portability and automated migration, facilitated by open APIs and container technologies. This is allowing enterprises to quickly shift new or modernized workloads across multiple cloud options with limited downtime or service-level impacts. At the same time, more enterprises will embrace multicloud strategies and become more aggressive about deploying a wide range of development and production workloads onto cloud platforms.

As more and more enterprise workloads are deployed onto some type of cloud, IT organizations are being asked to help their businesses make better choices about which workload goes where. Early experimentation with independent developer and business unit selection and management of cloud resources has created expensive and competing cloud silos that can be difficult to bridge. With most enterprises committed to multicloud strategies, it becomes mission critical to effectively evaluate the needs of individual workloads and consider the available cloud options in terms of cost, performance, security, and contractual agreements.

Once a workload is deployed, its health, security, performance, and resource consumption need to be administered and monitored. By 2017, the level of production workloads deployed into clouds will have forced more than 60% of enterprise IT teams to purchase net-new workload-aware cloud management solutions. Enterprises will seek out solutions to monitor, model, and predict health, security, and performance, as well as to maintain SLAs using automation and orchestration to scale, migrate, patch, and update applications as needed.
**IT Impact**

- Effective management of multicloud architectures requires clear IT service definitions and policies including standard configurations, SLAs, security, and governance to ensure consistent service delivery and service levels regardless of the infrastructure resources supporting the workload. More than 60% of enterprise IT organizations that are implementing hybrid cloud strategies will begin to create standard service definitions, policies, and SLAs by the end of 2017.

- Unified application, middleware, and infrastructure automation and orchestration solutions are critical to supporting rapid, cost-effective workload provisioning, migration, patching, and life-cycle support. Enterprise IT organizations that are implementing multicloud strategies will need to purchase new or updated automation and orchestration software and/or services to enable their plans.

- Unified service catalogs and cloud broker platforms that include service-level monitoring, service cost modeling, and capacity analytics will be needed to manage hybrid cloud environments in near real time. Nearly two-thirds of enterprise IT organizations that are implementing multicloud strategies will invest in workload and application-centric performance analytics and automation by the end of 2017.

**Evolving IT Skills Related to Workload-Centric Management**

Workload-centric management will change and reprioritize some of the skills required in the IT organization. In a workload-centric organization, staff members align with the workloads they serve, which results in a multidisciplinary team for each workload. IT professionals in a workload-centric organization will need to understand application performance analytics and how to respond to changes in application performance. New orchestration and management tools will need to be deployed, changing the tools used by engineers and architects.

A range of traditional roles would evolve, including system administrators, network engineers, and system engineers. For instance, cloud administrators will need an increased understanding of system and database integration to anticipate impacts on performance as workload priorities are managed and adjusted. Network engineers and system engineers will increasingly rely on infrastructure integration capabilities, advanced networking skills, and infrastructure security to effectively design and upgrade service offerings.

**DevOps Matures**

*As DevOps Scales Up, Over 65% of Enterprises Will Invest in Policy-Driven Self-Service Automation to Power On-Demand Developer Multicloud Access and Utilization by 2018*

DevOps represents the merger of application development, service orchestration, and IT operations at many levels including culture, process workflows, and infrastructure management, as well as application creation, deployment, and delivery. Although most often associated with stateless, cloud-native applications optimized for public cloud infrastructure, DevOps methodologies, tools, automation, and enabling cloud platforms can also be applied to traditional application development. The litmus test for DevOps is fundamentally based on whether an organization has embraced a platform-enabled, collaborative, and business-centric approach to link decision makers, application and API coders, and IT operations and infrastructure to accelerate digital business transformation.

IDC expects that by 2018, enterprises that embrace DevOps processes and enabling technologies will increase the number of annual application and API code releases by 50% — often moving from quarterly or semiannual releases to monthly or even weekly deployments. Microservices-based applications that rely on many microservices to enable a single logical application will be particularly
important to the increase in code releases as developer teams can operate more independently and push forward code updates when ready for each individual microservice.

The ability of developers to self-provision cloud resources on demand will be an increasingly important DevOps enabler. However, as the scale of DevOps usage expands, most organizations will recognize that there continues to be a vital need for IT operations specialists who can architect and implement self-service, multicloud management strategies that facilitate development agility while protecting the information assets and business goals of the company.

**IT Impact**

- Traditional approaches to infrastructure provisioning, application release, and runtime production application monitoring will not be able to keep up with the increased rate and pace of change in application environments.

- Enterprise IT operational processes and staffing skills will need to be updated and streamlined, with greater reliance on machine learning and automated intelligence to constantly monitor, adapt, and react to changes in runtime environments, both on-premise and in public clouds in the near term to midterm.

- Collaborative development, line-of-business, and IT operations teams will need to strategize on how to best define and apply operational, security, and cost management policies that facilitate optimal cloud consumption without hindering business agility.

**Evolving IT Skills Related to DevOps**

DevOps management will change and reprioritize some of the skills required in the IT organization, and a wide range of organizational structures will support DevOps. Some firms have adopted a single "DevOps" organization, responsible for both development and operations, similar to the workload-centric structure. Other organizations have improved the collaboration and coordination between the development and operations teams. There are other variations. But in all cases, skill changes will be required in the IT organization to facilitate the objectives of this trend. Clearly, the cloud architect will need to understand both the development process and the operations process in order to best design an architecture that facilitates coordinated activities. Similarly, both the cloud administrator and the cloud database administrator will need to enhance their skills to support increased participation in the development process, including identifying stakeholder requirements, development skills, and integration skills.

**Essential Guidance and Conclusion**

Cloud continues to be a highly disruptive force, reshaping datacenter and application architectures and transforming the way IT resources and applications are created, bought, and managed. Enterprise IT teams cannot ignore the challenges and opportunities created by cloud in its many shapes and forms. Over the next 24 months, staffing for cloud services will become a strategic driver for the IT organization as new skills and capabilities become increasingly essential to effective IT development, deployment, and governance. These include both IT-heavy skills (such as using agile/DevOps approaches or new orchestration tools) and business-heavy skills (such as compliance or managing the consumption of cloud services in a multicloud model).
IDC expects that over the next four years, there will be a 40% increase in developers who are skilled in model-driven and deployment-centric frameworks and masters of iterative code testing. There will be a commensurate need for developers who are skilled in mobile and commercial code development and familiar with declarative code frameworks and integrated PaaS development and deployment. Over the same period, the population of pure IT operations staff will drop by about 10% in IT organizations as more compute and storage workloads and applications are moved to the cloud. But the cloud will drive an increase in the demand for cloud architects, engineers, administrators, and analysts with the skills necessary to effectively build, deploy, and manage hybrid environments that are managed by workload-centric and DevOps-centric IT organizations. IT professionals can position themselves to be part of this essential shift by identifying the needed skills and preparing themselves in advance to help lead their IT organization on the journey to become more agile, reduce cost, and improve business performance by leveraging multicloud architectures, workload-centric management, and DevOps.

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