

White Paper

Building Cloud-Native Applications in a Hybrid Multicloud World

Sponsored by: IBM

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EXECUTIVE SUMMARY

In today's modern enterprise, optimizing the application cycle is critical. It can help companies keep up with consumer expectations, keep business operations agile, and speed the pace of innovation. Companies that focus on innovating their customer experience are quick to see the value of adopting the cloud-native development model. There are both app-specific and deployment-related motivations for adopting cloud-native development.

Enterprises looking to transform their applications are the ones that look at cloud native for development and deployment of their most critical workloads. They are typically businesses that are already on a digital journey and need "scale" and new business model-led engagements in growth markets (IoT, blockchain, artificial intelligence [AI], Big Data, etc.) or businesses with significant legacy technology footprints like IBM Mainframe.

Cloud-native application development is crucial for digital transformation and innovation. Enterprises that adopt cloud-native application development see a marked increase in efficiency, scalability, and productivity, as well as improved user experience.

Cloud-native application development allows enterprises to capitalize on the full power of cloud by delivering faster time to market, increased scalability, improved flexibility, and better consumer experiences – all while reducing cost.

Cloud-native application development in a multicloud environment enables organizations to develop and deploy applications faster. It also helps organizations achieve business agility and improve their responsiveness to change. Cost savings and efficiency have initially been the primary drivers for using cloud-native application development, but more recently, the impetus has been the need for increasing speed and agility with application delivery to unlock business innovation. Cloud-native application development has also fostered a movement to evolve application delivery methodologies and componentize development and deployment activities through microservices, containers, and APIs. However, while cloud-native development has grown, some organizations have rushed into it without an effective cloud strategy or a sound operational model. As a result, these organizations have stumbled with capturing the benefits they had initially sought.

Enhancing business agility and speed has prompted organizations to explore and use cloud-native application development as a means to enable corporate imperatives. The speed at which information is exchanged and increased competition from newer businesses and cloud-native start-ups are creating pressures for traditional organizations to overhaul their application delivery practices. This IDC white paper examines the business imperatives that organizations are focused on, what effect those imperatives have on the way organizations manage their application portfolios and application delivery methodologies, and the key challenges organizations must overcome as they grapple with change. This white paper also reviews how IBM's cloud application development services and cloud technologies can help organizations build the right cloud-native development strategies. With the right strategy, these organizations will run application development effectively to foster rapid business innovation and elevate business performance and fully harness the benefits that modern application development can offer.

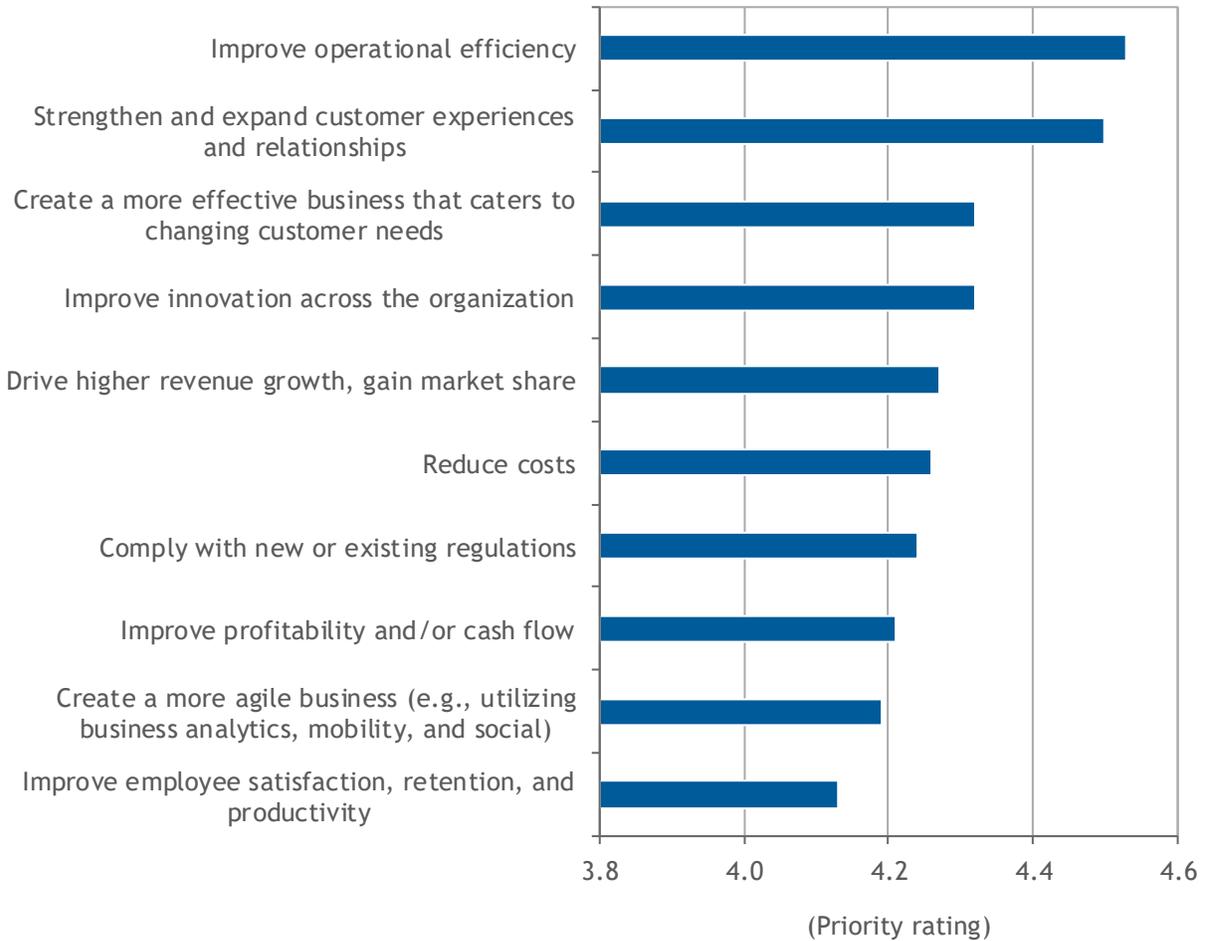
Corporate Imperatives Stimulate More Progressive Application Delivery

The speed at which information travels and is consumed has forced many organizations to reevaluate their business operations. Providing exceptional customer experiences has become a key source of competitive advantage for companies. In addition, possessing abilities to anticipate social, political, and economic change as well as quickly react to changing business objectives and challenges has emerged as key elements that enable organizations to provide exceptional customer experiences and business agility. The way in which organizations provide exceptional experiences is directly tied to how they operate their businesses. As such, organizations are largely focusing their corporate objectives across customer intimacy, financial management, business innovation, and market presence. According to IDC research, key priorities span enhancing financial management, improving customer experiences, and broadening market reach (see Figure 1).

FIGURE 1

Top Business Priorities

Q. How important are each of the following business priorities for your company?



n = 62

Note: Priority ratings are based on a 5-point scale, where 1 is not a priority and 5 is a critical business priority.

Source: IDC's *Global Microsoft Implementation Services Buyer Perception Survey, 2019*

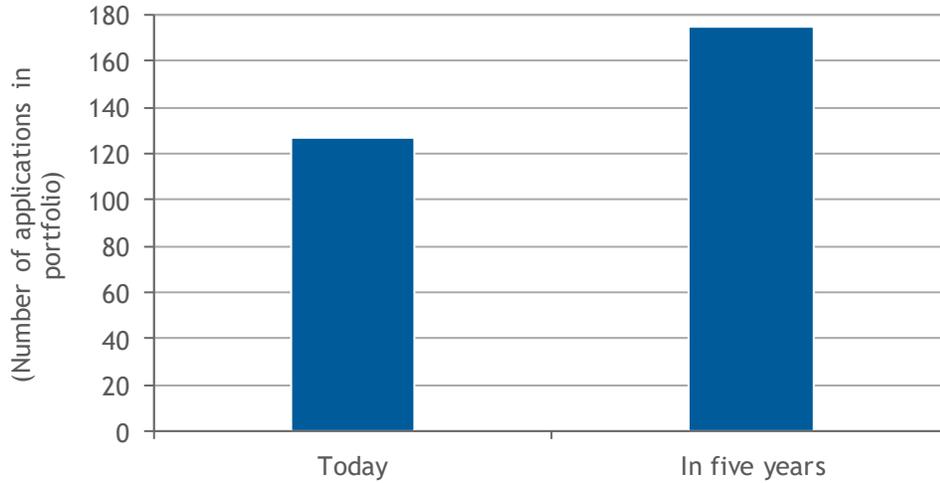
Application Portfolios Will Grow 40% and Spark Cloud-Native Development

Organizations are expanding their application portfolios to bridge business process gaps, enhance knowledge management, and enable stronger communication across various lines of business. In fact, IDC has observed that organizations, on average, have 127 applications in their portfolio and intend to grow their application portfolio nearly 40% over the next five years (see Figure 2). As portfolios grow, organizations seek to build cloud-native applications to not only contain costs and strengthen financial management for application development but also speed application time to value.

FIGURE 2

Application Portfolio Size

Q. *Approximately, how many "distinct/unique" business applications (not instances) does your company have worldwide today, and how many do you estimate it will have in five years?*



n = 501

Source: IDC's *Application Services Survey*, 2019

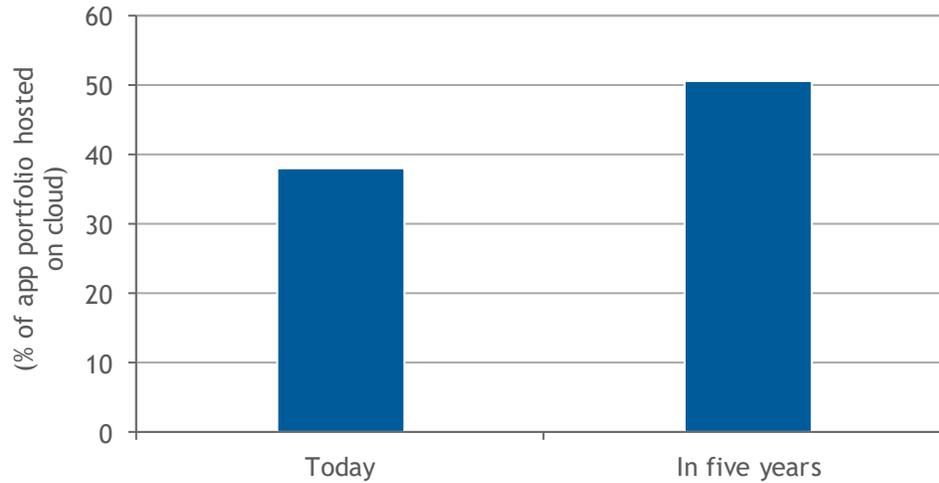
The Number of Applications Hosted on Cloud Will Grow 25%

Just as organizations' application portfolios are expected to expand, so are the expectations around applications hosted on cloud. IDC research has shown that organizations, on average, estimate that 40% of their application portfolios are hosted on cloud today. In five years, they predict that the percentage will climb to 50%, representing a 25% growth rate in applications hosted on cloud (see Figure 3). This means that as portfolio constitution progresses more to cloud-native hosting technologies, organizations will need to manage how that transformation will affect the toolsets they use, as well as their methods of development.

FIGURE 3

Percentage of Application Portfolio Hosted on Cloud

Q. *What percentage of your organization's application portfolio would you estimate is hosted on cloud today (i.e., AWS, Microsoft Azure, IBM Cloud, Google, Salesforce, Workday, private cloud, hybrid cloud), and what would you estimate that percentage to be in five years?*



n = 501

Source: IDC's *Application Services Survey*, 2019

Growth in Portfolios and Cloud Hosting Pushes Modern Delivery

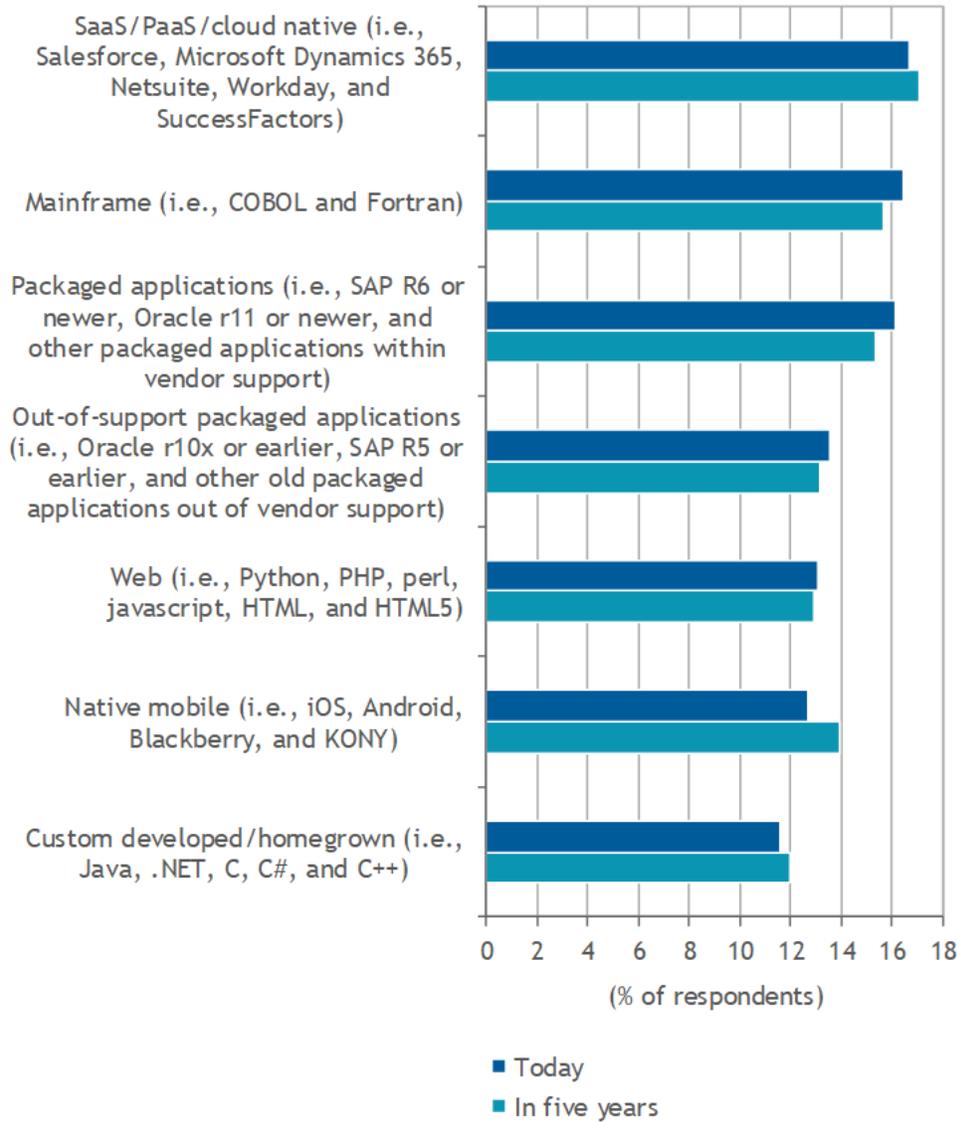
Amid the changes in portfolio size and shifts in percentage of the application portfolio hosted on cloud, organizations are also evolving their application delivery processes and investigating alternative technology platforms for application development. Many organizations have traditionally built and deployed their applications in a waterfall fashion. The traditional approaches centered on amassing requirements, holistically, before progressing to the stages of designing, building, testing, and deploying applications to production. Through a waterfall approach, organizations expected that by the time applications were released, defects would be addressed and resolved before being released into production and application functionality would suit user requirements. However, such conventional approaches for application delivery were vulnerable to building and deploying applications quickly. While waterfall approaches aided with mitigating risk and creating an assembly-line-like model, they tended to be time consuming and inflexible to changing requirements. Using cloud-native development techniques and supporting tools and platforms creates an opportunity for organizations to deliver application deployment speed and scale better and faster than in the past. In this regard, IDC has found that organizations have begun to add more cloud-native applications and tools to their application portfolio and leverage those tools for building applications. In fact, organizations estimate that a little more than 16% of the application portfolio consists of cloud-native applications today, and organizations expect that percentage to grow more than 17% in five years (see Figure 4).

In fact, 98% of organizations have either adopted DevOps or are exploring a DevOps strategy.

FIGURE 4

Application Portfolio Constitution

Q. Of all the applications in your organization's application portfolio, how would you estimate your organization's applications distribute against the following application types today, and what would you expect that percentage to look like in five years?



n = 400

Source: IDC's *Application Services Survey*, 2019

Organizations Must Overcome Three Key Challenges to Reap Benefits

As organizations increase the number of applications in their portfolios while aiming to transform their application delivery methodologies, they can face stumbling blocks and pitfalls that undermine those objectives. For organizations to gain value with cloud-native developed applications, the business must integrate those applications with other packaged and legacy applications within their portfolio. Most notably organizations can become challenged with:

- **Managing application portfolio and environment complexity as portfolios expand.** Complexity of application portfolio environments increases when more applications are introduced to the portfolio. Applications added to the portfolio often require integration with older systems to leverage data (and value) contained therein. The added levels of integration create increased application management and technical architecture management work. New functionality enhancements that are part of application upgrades as well as new code customizations can have adverse effects on previous application integration efforts and cause applications to go offline. Multiple hosting environments from virtual and nonvirtual on-premises to multiple cloud environments (i.e., private, public, and hybrid) create security, interoperability, and traceability challenges for ongoing application management as well.
- **Where and how to focus and align application development budget.** To make change happen, organizations need to fund it and put resources behind it. Yet budgeting for change can be challenging, especially when organizations center most of their application development budget and resources on maintaining older systems. IDC research has found that 68% of organizations spend 50-75% of their application development budget on legacy applications. With so much budget focus on supporting older legacy technologies, organizations can find it difficult to fund innovation and change in their application technologies and delivery methodologies.
- **Embracing cultural and organizational change.** One of the most significant challenges that organizations wrestle with when evolving their development methodologies is changing organizational culture and leadership. Engrained cultures and values driven by traditional approaches to IT management hamper organizational progression toward methodologies such as DevOps. While traditional IT cultures may center their values on risk aversion and prevention, the trepidations to evolve application delivery methodologies and adopt new technologies can counteract organizations' abilities to innovate and evolve.

How to Start and Get Quick Wins with Cloud-Native Development

Cloud-native application development is more than utilizing existing development skills, competencies, and methodologies and applying those to cloud technologies. Organizations must first build a strategy for cloud-native application development and execution, assess which applications should be built on the cloud or modernized in place, and develop an operational plan for ongoing learning, process, and cultural change management. Through these steps, organizations are well equipped to ensure cloud-native development delivers the benefits that organizations expect. There are four elements organizations should frame their approach around to maximize the value for a successful application delivery transformation. They are discussed in the sections that follow.

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Develop the Right Strategy and Approach Based on Organizational Maturity

The path to modern application delivery begins with formulating the right strategy. Since application portfolios are highly mixed across technologies like mainframes, packaged, SaaS, and native mobile applications, substituting legacy development practices with cloud-native development practices will yield lackluster results. Instead, organizations must be prepared to develop and evolve their cloud-native application development capabilities based on their business goals and assess which applications to build natively on cloud to benefit. In addition, a key element of the transformation involves standardizing on common tooling and devising a flexible IT architecture that promotes portability and multicloud versatility to maximize development utility. Journeys to building competencies and mastery for cloud-native development are different and begin at various starting points with core elements spanning the right talent, technology, and process progression across the maturity stages of:

- **Exploring/starting a strategy.** For organizations just starting out, it's critical to outline and understand the projected road map for maturation with cloud-native development. This includes defining the goals and objectives of moving to cloud-native development; where it will and won't help your organization's application portfolio and lines of business; the talent, leadership, governance, tools, and processes that are required; and what the metrics for monitoring and measuring the success of your organization's transformation are.
- **Developing and piloting capabilities.** For organizations that have begun with piloting cloud-native application development in multicloud environments, it's critical to take the results of those pilots and develop lessons learned to build and improve competencies. At this stage, organizations should start small and focus on testing the models that were initially framed as part of strategy development, experiencing failures and identifying gaps with those models and systems interoperability, and building on successes for future iterations and projects. Developing a cadence for continuous improvement to evolve development processes, leadership and management techniques, and resource training would be the next step.
- **Refining and standardizing capabilities.** For organizations that have progressed beyond strategy development and pilots, it's critical to improve operational models with lessons learned to build scalability and throttle interoperability higher. The focus should be on lean development, building high levels of repeatability to ensure quality as a backdrop and throughput to drive development backlogs down. This can include scaling cloud-native development squads from one (or a few) to several (or many) across the organization as well as broadening the capabilities of the IT organization as cloud-native development projects progress.
- **Synchronizing and coordinating capabilities.** For organizations that have progressed beyond standardization, it's critical to center efforts on velocity and tune the development engine for high levels of speed. This includes elevating operational capabilities for higher velocity to deliver application functionality quickly. It also includes developing and improving competencies to adjust more quickly to evolving business needs and flexibility to change as business conditions evolve.
- **Optimizing capabilities.** For organizations that have progressed to the highest maturity level with modern application development, it's critical to focus efforts on driving more value for lines of business through development initiatives. This can include leveraging site reliability engineering (SRE) techniques to make systems more reliable and scalable, as well as helping lines of business be more innovative through creating application functionality that directly ties to increasing lead pools, enhancing customer experiences, driving conversion rates, and establishing new businesses.

Transform Culture Through Methodologies, Leadership, and Grassroots

Arguably the toughest hurdle organizations must overcome with cloud-native development in multicloud environments is evolving the existing development culture. It's difficult for organizations to drive sustainable change because of traditional processes, ways of working, and habits. Those hurdles can be overcome, and culture can evolve through:

- **Centering transformation as a change management exercise.** Migrating to cloud-native application development from traditional application development is a change management exercise. When the people in an organization do not all agree, there is a clear and compelling need to change (e.g., from waterfall to DevOps) and there is no amount of senior management directive, or consultant initiative, that will make the change happen. Organizations must have the proper incentives to change as well as the leadership and governance capabilities to plan change and shepherd it from one milestone to another. Having the business case to drive change is the catalyst for change management. Couple that with strategy to identify the destination and leadership to guide the organization through change, as well as training and education to help organizations mobilize for change from the grassroots level.
- **Using design thinking to engage business stakeholders differently.** Traditional application delivery practices involved users and stakeholders at early stages of the development life cycle to define requirements and then near the end of application life-cycle management to test solutions that were built before they went to production. Steps that tended to get omitted were involving users in the design and development stages. A classic way to contrast these approaches is to compare the requirement to "design a flower vase" with the task to "design a way for people to enjoy flowers in their homes." Design thinking methods approach user involvement differently than traditional development processes. With design thinking, users are included throughout the entire process of delivery, including stages like user story definition, wireframing, prototyping, testing, and iteration. The involvement of users throughout all facets of delivery helps ensure user needs are met through various cycles and that users have stakes throughout the process.
- **Evolving leadership and governance approaches (including success metrics).** As methodologies evolve, managerial rewards and incentives must evolve for the team members that build and deploy applications. A cornerstone of more progressive application delivery includes greater focus on collaboration. As such, metrics for performance management and application delivery team incentives must switch from individual-centric metrics to team-based achievement metrics that reward collaboration and stimulate and foster communities of practice.

Evolve the Operational Engine and Elevate Focus on Automation

Cloud-native application development in multicloud environments has brought forth modern development tools and practices that help organizations be more efficient with application delivery as well as improve velocity and capacity without adding to resource head count. Key elements of cloud-native application development center on:

- **Containers and microservices.** Componentizing and containerizing codesets through containers and microservices help development teams enhance their flexibility and adaptability to change. The use of containers, like Kubernetes and Docker, creates common tooling and enables portability and versatility across technology and cloud platforms. Use of containers and microservices also promotes intellectual property reusability and operational flexibility to develop solutions once and deploy where needed.

- **DevOps.** The use of agile delivery methods combined with tighter integration and collaboration across different application life-cycle competencies (i.e., infrastructure management, creative design, technical development, quality assurance, and deployment operations) enhances communication and collaboration across resource pools and helps remove barriers that are common impediments to traditional application delivery. Agile and DevOps also speed up delivery of application functionality to users by enabling them to see application enhancements after sprints in demos. This way, users can test applications in weeks once they've been developed, versus months in a more traditional application development.
- **Security.** Foundational to cloud-native development in multicloud is having a robust data security fabric and capability that continuously monitors for threats, prevents wrongful access, and addresses application vulnerabilities, as well as establishes and maintains data protection and data access control via proper authentication and identity access protocols.
- **Automation.** The use of automation through application life-cycle management helps enhance quality, increase release volume, and speed release velocity.

Leverage Lessons Learned to Steer Clear of Pitfalls

Many organizations have gone through transformations in their development organizations. They have progressed with cloud-native application development maturity through lessons learned along the way. Some key lessons learned for transformation that organizations have leveraged span management areas like:

- **Strategy.** Key strategy-centric lessons learned have centered on evolving and advancing analytics and using business value to justify change initiatives. By ensuring initiatives are rooted in business value, organizations can prove how cloud-native application development can generate cash that organizations can use, in turn, to self-fund innovation. By evolving analytics as organizations mature with cloud-native development, maturity road maps will advance productivity and optimize their capabilities.
- **Governance.** A few lessons learned on governance that organizations can leverage center on using grassroots to kick-start change fused with leadership support; devising the right organizational structure, governance model, and roles and responsibilities; and ensuring all parties have visibility and a stake in success criteria. By using grassroots, change can be cultivated from within and not by leadership imposing it on to team members. Setting up the right organizational structure is also key for success so that development teams have proper escalation paths and procedures to follow for issues management and can improve coordination across team members through clearer accountability standards.
- **People.** Lessons learned from a talent perspective center on embracing change through communities of practice, making sure you have the right talent for the job, and emphasizing focus for ongoing training and education. Similar to many change management initiatives, success depends on the mindsets of the people that are involved. Skills, training, and ongoing educational development are cornerstones to ensure that talent is equipped with the right tools to overcome change challenges. Moreover, by establishing a culture that promotes communities of practice, organizations can enact change at the grassroots level to build groundswell momentum from the bottom up.

IBM's Solution

IBM offers a wide range of services and software solutions that quickly enable organizations to innovate and transform their application delivery practices. Its end-to-end services approach meets clients wherever they are on their cloud journey and helps organizations drive application development to align IT resources to deliver against business needs via delivery speed, reduced operational costs, and culture change. IBM's services and technologies aid organizations with the architecture and execution of the right strategies for cloud-native application development and development optimization for the future. The offering consists of services that help organizations understand the strengths and weaknesses with existing development processes, tools, talent, and governance; analyze the business case for change and abilities to change; and plan, execute, and evolve a road map for continued transformation. The following components constitute the services and software portfolio:

- Application design and development
- Agile integration
- Process, method, and tools
- Security
- IBM Cloud
- IBM Cloud Paks

Application Design and Development

The IBM approach associated with application design and development helps organizations establish scalable development components that can be used and reused over time. The method by which IBM approaches application design and development is gradual and nondisruptive to business continuity. From an application layer perspective, application components are designed and built per architectural guidance and scale for reusability. From a data layer perspective, data models are architected with microservices in mind for a minimum viable product (MVP) that enable scale and flexibility. Using a design-and-build coexistence integration layer and API, IBM's application design and development approach enables inter- and intra-application development. The approach enables organizations to gradually decommission legacy applications that are no longer required as part of the portfolio once newly developed applications and functionalities are created. IBM deploys a DevSecOps toolchain for identified microservices that enables and fosters new pipelines for newly developed microservices. IBM also sets up a cloud platform flexible for growth as operations scale and new services are required. Security controls are embedded throughout the end-to-end architecture to support continuous security assessments and updates. Underpinning all of these application design and development services are transformation governance services for program management, digital change, design authority, process definition, and knowledge transfer.

Agile Integration

A more agile approach to integration is foundational to connecting and unlocking data and services to accelerate digital initiatives. Traditional integration architectures that are more centralized can't keep up with the speed and volume of integrations required to digitally transform. Agile integration provides speed, flexibility, security, and scale and allows businesses to leverage their existing investments – all while lowering costs. IBM's approach to agile integration addresses people, process, and the technology required. It addresses people and process by supporting decentralized ownership, allowing extended team members to contribute in more ways and develop new skills that remove bottlenecks and reduce dependency on specialized resources. Architecture supports more fine-grained deployment, helping improve build independence and increase production velocity. Technology requires the adoption

of a hybrid integration platform such as Cloud Pak for Integration, supporting an expanding range of integration styles coupled with an open hybrid cloud approach leveraging cloud-native containerization and portable integration software.

Process, Method, and Tools

IBM Garage Method for Cloud is the company's innovative application delivery methodology that enables enterprises to quickly start up modern application development competencies and rapidly scale them across the enterprise. Enterprises have innovation goals and customer expectations that compete with the reality of their current infrastructure and skills. IBM Garage Method for Cloud is a comprehensive approach to innovation and transformation that fuses designers and developers together with an organization's business and IT stakeholders to swiftly create and scale new ideas that can dramatically impact business performance and results. With IBM Garage Method for Cloud organizations can:

- **Innovate with expert guides and experiment with confidence and minimal risk.** The IBM Garage methodology is a seamless set of proven agile practices that integrates user experience, implementation, and cultural change to guide solutions from idea to enterprise-scale adoption. IBM Garage is a catalyst in igniting an organization's workforce to be the driving force of change and a model for exceptional collaboration and ongoing success.
- **Modernize enterprise IT by strengthening existing IT investments.** The IBM Garage methodology brings existing technology assets together with an open strategy and a multidisciplinary team that understands both mature and leading-edge technologies. Through IBM Garage practices, organizations can unlock new insights from their data and use AI to become a smarter business.
- **Scale for the enterprise, right from the start.** Designing for speed, scale, and security from the very beginning, IBM's Garage services help organizations make rightsize architectural decisions at every stage and expand solutions across platforms, customer channels, geographies, and teams while managing risk and optimizing operations.

IBM Garage focuses on outcomes first, applies advanced technologies with a purpose, and de-risks innovation to achieve real business value fast.

IBM Garage's worldwide locations are purpose built to cultivate innovation and collaboration, and its technology and expertise span the entirety of IBM's portfolio.

Security

IBM provides integrated and end-to-end security services as part of all its application services. The services are geared to address security from eight different domains with an overarching security orchestration and analytics capability. The eight areas are as follows:

- Data – data protection and data access control
- Identity and access – privileged user management, identity governance and administration, access management, IDaaS, and mainframe security
- Advanced fraud – fraud protection and criminal detection
- Network – firewalls and intrusion prevention, network forensics and threat management, and network visibility and segmentation
- Threat intel – threat sharing and IoCs
- Endpoint – endpoint detection and response, endpoint patching and management, and malware protection

- Mobile – transaction protection, device management, and content security
- Applications – application scanning and application security management

Application security services are enforced via DevSecOps including code scans, authentication and authorization, API endpoint security, application image scans, vulnerability assessment, and penetration testing.

IBM Cloud

While most enterprises have focused initially on migrating relatively simple applications and workloads to public cloud, they are ready to migrate, modernize, and build more sophisticated mission-critical applications on public cloud to drive innovation and productivity. You need a public cloud that not only allows you to drive innovation through open source technologies but also meets your requirements of compliance, security, and automated management while meeting you where you are in your hybrid cloud journey.

IBM's public cloud is battle tested, trusted, and proven to deliver secure solutions for running your core business. It provides an ideal extension of your hybrid cloud strategy to leverage your existing investment and drive innovation with open source technology, security leadership, and battle-tested enterprise-grade cloud, backed by deep industry expertise.

IBM Cloud Paks

IBM Cloud Paks are AI-powered containerized software that can help you build, modernize, and manage applications securely across any cloud with confidence. They allow you to develop and run new cloud-native applications with speed, agility, scale, and performance as well as reduce the cost of existing applications while extending their value.

Built on Red Hat OpenShift, an open source, enterprise-grade hybrid cloud platform, IBM Cloud Paks allow you to develop applications once and seamlessly deploy them across any cloud environment to meet hybrid and multicloud business needs, driving consistency and greater economies of scale. They deliver better outcomes and reduce cybersecurity risks by using a single intelligent control plane with built-in security and multicloud management tools. Furthermore, they have a common set of foundational services that enable modularity, customization, plug-and-play and ease of deployment, integration, and management.

IBM Cloud Paks software solutions are designed to help you modernize, predict, automate, and secure your business by unlocking the intelligence of AI and agility of hybrid cloud. They include:

- **IBM Cloud Pak for Data** is a solution that helps unify and simplify the collection, organization, and analysis of data. Enterprises can turn data into insights through an integrated cloud-native architecture. IBM Cloud Pak for Data is extensible and easily customized to unique client data and AI landscapes through an integrated catalog of IBM, open source and third-party microservices add-ons.
- **IBM Cloud Pak for Business Automation** is a solution that helps achieve better business performance by applying intelligent automation to transform core operations. Built for any hybrid cloud, this modular set of integrated software quickly solves your toughest operational challenges. It includes the broadest set of AI-powered automation capabilities in the market – content, capture, decisions, workflows, and RPA – with a flexible model that lets you start small and scale up as your needs evolve.

- **IBM Cloud Pak for Watson AIOps** is an AIOps solution that lets you deploy advanced, explainable AI across the ITOps toolchain to confidently assess, diagnose, and resolve incidents across mission-critical workloads. It's a unique application-centric approach to ITOps that helps you automate labor-intensive IT processes and proactively mitigate high-impact events. With IBM Cloud Pak for Watson AIOps, you can improve responsiveness and reduce risk with AI at the core of your IT operations mission.
- **IBM Cloud Pak for Integration** is a solution that helps deliver a new, AI-accelerated approach to integration. This approach enables extended teams to create integrations, leverages a complete set of integration styles, and embeds AI and automation across the integration life cycle. Organizations can meet escalating demand, help reduce costs, and increase operational agility with capabilities including API management, application and data integration, messaging and events, high-speed transfer, and end-to-end security through IBM Cloud Pak for Integration.
- **IBM Cloud Pak for Network Automation** is a solution that enables the automation of network operations so communications service providers (SPs) can transform their networks, evolve to zero-touch operations, reduce opex, and deliver services faster. Communications SPs gain a range of enhanced capabilities, such as normalized life-cycle modeling, intent-driven orchestration, service design and testing, dynamic service assurance, and closed-loop operations.
- **IBM Cloud Pak for Security** is a solution that helps uncover threats, make informed decisions about the risks, and respond faster to those threats while leaving data where it is. Customers can integrate tools and connect workflows across hybrid, multicloud environments using a security platform that runs anywhere.

Cloud Application Development and DevOps

IBM Services provides a journey to cloud native assisted with reference architectures, assets, tools, methods, virtual delivery models, and industry solutions, supporting multicloud environments. Through IBM's cloud application development and DevOps services, organizations can:

- **Execute with speed.** Build and enable the cloud application portfolio of the future leveraging prebuilt solution components, accelerators, and DevSecOps principles to improve your time to market.
- **Lower application cost.** Optimize the application development process utilizing IBM's automated tools for testing and deployment and reducing your total cost to develop new applications.
- **Seamless execution.** Provide uninterrupted and rapid execution of application development services by engaging IBM experts and agile DevOps concepts for rapid delivery with virtual collaboration tools.

CHALLENGES AND OPPORTUNITIES

Changes in business and technology environments are imposing greater pressures on service providers to perform exceptional service delivery, and client expectation levels on application services performance have elevated. IDC research has found that application environments for application delivery are becoming more complex and the growing variety of environments and platforms to help streamline service delivery can increase that complexity. Infrastructure environments are extending from on premises to host based and hybrid clouds and edge computing, and these levels of complexity have created new sets of challenges for services providers to manage. Given these circumstances, IBM must not only ensure application functionality, continuity, and performance amid varied hosting

and infrastructure environments but also be well equipped to support evolving change management requirements that progressive application delivery may pose for its clients. Continued investment and focus on source code management and orchestration within IBM's cloud-native development services, combined with tightly integrated training and change management programs as part of cloud-native application development services delivery, helps IBM support an increasing range of varied client requirements and improve support for transformations.

SUMMARY AND CONCLUSION

Using DevSecOps methodologies including cloud-native application development in multicloud environments can enable organizations to generate competitive advantages by putting tools into the hands of users faster and enabling those users to make more informed and timelier decisions. Successful and rapid transformation to cloud-native application development involves building and cultivating a partner ecosystem. And while challenges will inevitably emerge through process transformations, organizations can circumvent those challenges by following several key steps for establishing a strong partner ecosystem. Most notably, IDC believes organizations should:

- **Assess readiness and capability to change.** Organizations need to assess their readiness and capability to change, in this case from a waterfall to a DevSecOps method of operations, both at an individual level and the entire organization. IDC research has found that the greatest stumbling blocks organizations have encountered through change management initiatives have centered on evolving cultures. Organizations must objectively assess what and how much change they're able to absorb in a major change initiative. Once they have assessed it, they can generate plans on how to tactically overcome change challenges through incentives, rewards, and restructuring.
- **Make cultural fit a priority.** In IDC's discussions with companies that underwent application delivery transformation initiatives, a top criterion for partner selection has been the application services provider's ability to mesh with the business and IT teams. Many large organizations tend to integrate service providers as part of their overall IT operations. It becomes critical for a business to partner with a service provider that works well with its business and IT teams for continuous delivery. This ensures that the value of modern application delivery delivers the benefits that organizations expect.
- **Think about application service provider relationships over the long haul.** In conversations with IDC about DevOps transformation initiatives, many buyers noted that their progressive application delivery transformation journeys are ongoing. Their DevOps initiatives involve a road map of activities and initiatives spanning multiple years and milestones. Application services buyers shouldn't approach the strategy and selection process as a one-time exercise. Instead, they should think about the relationship and service provider positioning as a long-term asset.
- **Ensure security is embedded in all facets of application delivery.** Making the transition to native cloud development not only requires changes to traditional application delivery approaches and methodologies but also requires changes to security and security management. While IDC research has shown that organizations host nearly 40% of their applications on cloud today, more than 85% of organizations that host a portion of their applications on public cloud want to repatriate those applications because of security and performance drivers. Because of this, organizations must be aware of and sensitive to data security requirements before moving to and accelerating cloud-native development.

- **Align application delivery needs with provider strengths.** The key to ensuring a successful transformation to cloud-native application development is understanding the organization's long-term vision for business transformation and how applications will play a part in future operations. Decide on business goals and objectives before developing the first application. Define and dissect deeper-level requirements to achieve business goals and then understand how applications will need to support the future state of the organization. Start with a requirements framework forged with input from lines of business and IT to outline synergies, dependencies, and complexities. From there, organizations can determine where they may have capabilities to execute against their goals and where they may need to complement those capabilities with third-party expertise. It is essential to partner with a services provider that possesses innovation capabilities built through intellectual property, methodologies, and experience in making other organizations successful. Partnering with such a provider can quickly immerse your organization in a new way of working and accelerate your team's abilities to develop and leverage new skills.

MESSAGE FROM THE SPONSOR

IBM is a leading hybrid cloud and AI solutions company and trusted by thousands of enterprises across 20 industries. IBM offers end-to-end solutions to help modernize your enterprise with cloud-native technology. Whether you are migrating workloads or refactoring as microservices, you can benefit from [IBM Services](#) together with our [IBM Cloud](#) platform and infrastructure, Red Hat OpenShift, [IBM Cloud Paks software](#). To get started, we offer [IBM Garage](#) as a way to complement your skills by partnering with technical and business experts to innovate the way you develop and deliver user-centric products and services to meet changing customer demands. All of our capabilities come from years of experience in helping industry-leading companies integrate and secure apps across their multicloud environments. Learn more about how IBM can help you build cloud native.

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