

# Continuous Modernization

Blockchain, cognitive computing, artificial intelligence (AI) and virtual reality are revolutionizing the way people work. The evolution of these emerging technologies is largely due to the adoption of the disruptive technologies of the past—namely, cloud, analytics, mobile and social. While cloud adoption initially began with a desire to reduce the cost of computing and storage, organizations now see the cloud as a catalyst for innovation and as a platform that enables new customer experiences. Cloud computing has evolved from an innovation to an integral part of business enablement. “Cloud computing is now a substantial part of new IT spend, expected to grow more than [US] \$195 billion in 2020.”<sup>1</sup>

## Hybrid Cloud

Though cloud adoption is maturing, nearly half of application workloads are expected to remain as on-premise dedicated server infrastructure. The impact of the cloud is magnified when organizations extend their on-premise traditional

platforms, connecting data and applications across public and private clouds. A hybrid cloud model enables organizations to redefine customer service, keeping the advantages of existing applications. The cloud has evolved from a technological innovation to an integral part of business enablement. Ninety-two percent of surveyed executives said their most successful cloud initiative enabled creation and support of new business models.<sup>2</sup>

To remain at the top of their industries, organizations must adapt emerging technologies, innovate rapidly, deliver unique customer experiences, and leverage their knowledge of customers and the marketplace. Cloud-based systems are the next revolutionary step toward addressing the demands of a digital world. A future architecture needs to integrate core systems and existing processes with converged technologies that instill deeper insights, augment human intelligence and are agile enough to support continuous business changes.

### Vinay Parisa, IBM Certified IT Architect

Is a cloud strategy architect for IBM's Cloud Application Migration Services, Migration Factory practice in India. Parisa has 15 years of IT industry experience, spanning customer relationship management (CRM) implementation, software development, application architecture, cloud computing and migration analytics. Parisa specializes in design and development of modernization analytics for digital modernization and cloud modernization services and has several patents in the areas of application modernization to the cloud. Parisa has written for several international journal publications. He can be reached at [vinay.parisa@in.ibm.com](mailto:vinay.parisa@in.ibm.com).

### Biswajit Mohapatra, IBM Certified Executive Consultant

Is the global integrated delivery leader for IBM's Cloud Application Migration Services, Cloud Adoption Services and Migration Factory practice. Mohapatra heads offering incubation, solutioning, capability development, and delivery of digital modernization and cloud migration engagements in IBM Client Innovation Center. He is passionate about evangelizing leading-edge frameworks to shape customers' choices of solutions and technology for cloud enablement. Mohapatra is a known thought leader in the Indian IT community for leading cloud modernization initiatives driving industry-academia collaboration from concept to realization. He has written for several international journal publications on cloud modernization. He can be reached at [biswajit.mohapatra@in.ibm.com](mailto:biswajit.mohapatra@in.ibm.com).

### Srividya Vinod, IBM Certified Consultant

Is an application modernization consultant for IBM's Cloud Application Migration Services. Vinod has 15 years of IT industry experience with specialization in cloud strategy, enterprise architecture, application modernization and business analytics. She is experienced in developing architectural roadmaps and designing hybrid cloud solutions using IBM technologies and methods. She currently leads the continuous modernization program within the Migration Factory Practice. She can be reached at [srividya.vinod@in.ibm.com](mailto:srividya.vinod@in.ibm.com).

The convergence of these disruptive technologies is creating new business models and is driving new business requirements. Organizations rely on industry trends that matter and provide them with solutions to not only keep them in the game but also empower them to thrive. Organizations are also looking for opportunities to reinvent themselves and be disruptive in their industries.

### Trending Architectures and Processes

The advent of the digital revolution has changed the role of IT infrastructure from back-office integrator into a core component of business strategy. Emerging technologies are going to transform the way people live and work. IT strategy plays a pivotal role in embracing these technologies. Some trending architectures and processes include:

“CONTAINERS FORM THE BASIS FOR THE NEXT EVOLUTION IN THE APPLICATION DEVELOPMENT—SERVERLESS COMPUTING.”

- **Hardware accelerators and AI**—AI has led to innovation in chip design, leading to the development of a variety of chips. IBM's brain-inspired SyNAPSE chip (cognitive chip), Google's tensor processing unit (TPU) or Microsoft's Field Programmable Gateway Arrays (FGPA) are making their way into data centers. Microsoft has been deploying FPGAs in every Azure server, creating a cloud that can be reconfigured to optimize a diverse set of applications and functions. Amazon Web Services (AWS) F1 instances enable users to create custom hardware acceleration for their applications. From



time to time, new types of applications emerge that demand deeper intelligence, and these are best addressed by custom hardware. Cloud platforms now equip developers with hardware development kits to meet these specific requirements.

- **Containerization and serverless computing**—Containerization is the latest technological trend in cloud computing. Containerization ensures continuous delivery of applications and services while reducing the overall cost of IT operations. By containerizing the applications, organizations address the portability of applications between multiple clouds/IT environments. As containerization gathers momentum, enterprises are taking on microservices, an architecture for distributed applications composed of smaller, individual processes within an application delivered through containers and connected via application programming interfaces (APIs). Containers form the basis for the next evolution in the application development—serverless computing. Nearly all commercial clouds offer container services, and with the introduction of ready-to-use, on-premise container platforms such as IBM Cloud Private/Azure Stack, and the increased adoption of DevOps, the industry is geared to deploy more containers than virtual machines over the next few years.

- **Security and blockchain**—2017 was the worst year for cyberbreaches. “Cyber incidents targeting businesses nearly doubled from 82,000 in 2016 to 159,700 in 2017,”<sup>3</sup> driven by ransomware and new attack methods. The announcement of vulnerabilities, namely Spectre and Meltdown, which impact every modern processor, sent shock waves across the industry. With the enforcement of the EU’s General Data Protection Regulation (GDPR), all organizations—regardless of their location—could face stiff fines for noncompliance based on how they handle customer data of EU citizens. Many cloud vendors offer GxP/GDPR-compliant cloud and technological solutions such as blockchain, targeting the US Health Insurance Portability and Accountability Act of 1996 (HIPAA), the US Health Information Technology for Economic and Clinical Health (HITECH), and other security and compliance concerns. With the help of blockchain, a security system used in an organization can leverage a distributed public key infrastructure (PKI) for authenticating devices and users and eliminating central authority (single point of failure).
- **Cognitive computing and Internet of Things (IoT)**—Cognitive IoT is the use of cognitive computing technologies in combination with data generated by connected devices and the actions those devices can perform. Cognitive computing contextualizes the information generated by the IoT by allowing more and different data to be integrated and analyzed. The convergence of cognitive computing and IoT is improving the accuracy and efficiency of complex, sensor-driven systems through learning and infusing more human awareness into the devices and environments with which people interact. IDC now predicts that by 2020, the IoT network will consist of more than 29 billion connected devices,<sup>4</sup> and experts are estimating that the data from these devices will yield insights that drive the economic value of more than US \$11 trillion by 2025.<sup>5</sup> However, without cognitive computing, the usefulness of this information would be limited by its own complexity and scale.<sup>6</sup>

## Modernization Triggers

Industry trends create new business challenges. There are several business and technological events that can trigger modernization opportunities. Some of the primary reasons that compel business leaders to modernize their enterprise include:

- End of life/end of support of hardware and software
- Business continuity/contracts and licenses up for renewal
- Mergers, acquisitions or divestitures
- To support new business opportunities/deliver next-generation applications
- Rise of modern security threats

## Need for Continuous Modernization

The current market trends show that clients want business partners who are interactive versus reactive. Gaining new clients is becoming increasingly more expensive, buying patterns are changing and renewals are down, citing a lack of innovation.

Organizations are taking proactive positions in the digital revolution; however, such transformation requires clear vision, the right skills and analytics-driven decisions across the enterprise. The big bang approach to modernization is usually centered around one initiative, but adopting a continuous modernization strategy is key to leveraging the full potential of disruptive technologies. Continuous modernization is a strategy to progressively and continuously evolve the existing architecture to incorporate emerging technologies in the core business operating model.

The goals of continuous modernization are:

- **Cost reductions**—Improving the organization’s cost efficiency by enhancing resource usage and reducing operational costs that improve the return on investment with better consumption and cost management

- **Increased efficiency**—Simplifying, consolidating, and optimizing the IT ecosystem and operations benefit from the cloud's ability to provide analytical services such as machine learning and AI, and rationalizing legacy applications to identify the right first moves
- **Risk mitigation**—Addressing issues such as high operating costs, technological redundancy, skills attrition, security, regulatory and compliance
- **Strategy alignment**—Realizing value quickly and understanding how an overall cloud transformation approach supports longer-term business and technology vision
- Apply predictive analytics to IT operations to predict and identify potential problems and proactively take measures to modernize them. Mitigate the risk of possible business disruption by coalescing IT and business guiding principles through an enterprise governance model to support decision processes around modernization. Strengthen service portfolio management for the new hybrid environment with industry best practices and internal disciplines.
- Make security and compliance the top driver for modernization. Unsupported platforms are too risky and are susceptible to ransomware attacks. Applications that use old middleware components are prone to security threats. Even if the application's code is designed and implemented in a secure manner, the middleware or third-party code may contain vulnerabilities that may eventually affect the application and lead to data loss. Modernize vulnerable applications as a top priority to mitigate risk and prevent loss of revenue and reputation.

## Continuous Modernization Framework

The following are a few recommendations to establish a continuous modernization framework:

- Establish dedicated modernization teams to work with business and align the business strategy with modernization goals. It is imperative that the teams are not operating in silos and are not focused on just one modernization initiative, but are part of well-rounded teams and provide recommendations to overall strategy. Identify key business stakeholders of modernization initiatives, select target improvement areas and establish a current performance baseline for comparison.
- Adopt consumable technology by establishing a hybrid cloud. The hybrid cloud is a crucible for digital revolution. Organizations drive innovation by building new cloud-native applications. Cloud-based microservices enable faster application development and access to advanced technologies (e.g., blockchain, IoT and AI) to help developers deliver the new capabilities that keep their organizations competitive.
- Establish application portfolio rationalization capability to bridge the gap between the IT organization and business organization. This capability will help IT to establish IT application patterns; provide recommendations faster; and optimize the business portfolio by the elimination of redundant applications, consolidation of similar functionalities, and, most importantly, avoiding reinvention and enforcing reuse. This capability should be a continuous effort.
- Classify information/data according to the stipulated regulatory, audit and compliance requirements and secure data. These are not trivial exercises and require considerable effort. The modern infrastructure ecosystem is portable, and by establishing a data classification program at the data level, organizations can bring the necessary agility at the data level and benefit when regulations such as GDPR are introduced. Use a hybrid cloud to evaluate the options available to keep the sensitive data on-premise and store the less-sensitive data in the cloud. A hybrid cloud allows organizations to achieve the desired level of resiliency and cost savings while still maintaining compliance.
- Decide what IT functions can be delivered through the cloud and what functions will be retained on-premise. Legacy applications often run on platforms that do not support modern ecosystems; however, the data and functions in legacy applications are key to digital business initiatives. Take a gradual approach to modernizing legacy applications. Containerization and microservices are the key patterns in breaking down monoliths to

composable services. However, be cognizant of the fact that not all monoliths need to be broken down. Minimize the effort of modernization by adopting a hybrid of Agile and traditional methodologies. Focus heavily on the delta between the current state and future state of operations, and prioritize the efforts accordingly. Modernization is a continuous effort, and it is important to strike a balance between short-term gains and long-term goals.

- Adopt DevOps. Technical debt is a concept in IT that reflects the implied cost of additional rework caused by choosing an easy solution now, instead of using a better approach that would take longer. While it is true that there is no development methodology that can completely eliminate technical debt, DevOps is often pitched as a solution to the technical debt problem. Application modernization driven by DevOps (continuous integration/continuous delivery) helps reduce the time required to inject new capabilities into applications, thus improving IT support for business operations. Automating application updates via continuous integration (CI)/continuous delivery (CD) sets up effective consideration of the other key modernization initiatives: containerization and hybrid cloud adoption.
- Adopt AI tooling and machine learning platforms. Intelligent use of data is key to finding new business opportunities. As businesses establish teams to build applications using AI, adopting AI tools and machine learning platforms are going to make data scientists more productive. For successful big data projects, there is a great need for scalable AI solutions.
- Align budgets and spending with the deliverable actions that focus on results. Many organizations are unwilling or unable to accept the risk, costs, time requirements, and general impact of large “rip and replace” modernization programs. Capital expenditure and operating expenditure should reflect the business imperatives essential to drive business outcomes. Control the full throttle of the IT engine to effect speed and trajectory. Accomplish this by measuring near-term and sustainable value realization.

## Conclusion

In every industry, business leaders have realized customer expectations have created tremendous pressure to change the way they set their strategies and run their organizations. And, due to the requirements to manage existing, often traditional, offerings and operations, new requirements to incorporate information and interactivity quickly drive up costs and complexity. The path to digital transformation will vary by industry, as will customer adoption and an organization’s legacy environment. However, every industry is under pressure to change, and every organization needs to have a plan in place. Continuous modernization helps alleviate some of these pressures.

“MODERNIZATION IS A CONTINUOUS EFFORT, AND IT IS IMPORTANT TO STRIKE A BALANCE BETWEEN SHORT-TERM GAINS AND LONG-TERM GOALS.”

## Acknowledgments

The authors wish to acknowledge and thank IBM for its leadership in analytics and for innovation and supporting various modernization engagements.

## Endnotes

- 1 Findling, S.; J. Pucciarelli; M. Jennett; M. Strohlein; *IDC FutureScape: Worldwide CIO Agenda 2018 Predictions*, IDC, October 2017, <https://www.idc.com/getdoc.jsp?containerId=US41789117>
- 2 Freese, R.; A. Karimi; J. Schuneman; M. Venkat; “Tailoring Hybrid Cloud,” IBM, [www-935.ibm.com/services/us/gbs/thoughtleadership/tailored/hybrid/](http://www-935.ibm.com/services/us/gbs/thoughtleadership/tailored/hybrid/)



- 3 Online Trust Alliance, "Online Trust Alliance Reports Doubling of Cyber Incidents in 2017," 25 January 2018, <https://otalliance.org/news-events/press-releases/online-trust-alliance-reports-doubling-cyber-incidents-2017-0>
- 4 BusinessWire, "The Internet of Things Is Poised to Change Everything, Says IDC," 3 October 2013, <https://www.businesswire.com/news/home/20131003005687/en/Internet-Poised-Change-IDC>
- 5 Manyika, J.; M. Chui; P. Bisson; J. Woetzel; R. Dobbs; J. Bughin; D. Aharon; *Unlocking the Potential of the Internet of Things*, McKinsey Global Institute, June 2015, <https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/the-internet-of-things-the-value-of-digitizing-the-physical-world>
- 6 *Ibid.*