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# 10 Application Modernization Principles that Enhance the Digital Journey

The COVID-19 crisis has made experience-centricity and IT agility paramount to nearly every business. But getting there with ancient applications infrastructure is easier said than done. Here's how organizations can overhaul heritage applications to meet customers' lofty digital experience and service expectations.

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# Executive Summary

It goes without saying that in the post-COVID world, businesses need superior digital enablement to ensure continuity, customer satisfaction and their competitive edge. Experience-centricity is an essential lever to drive business outcomes, and has become the top priority of many CXOs. Experience-centricity, however, is not limited to creating new digital products and channels. It encompasses every aspect of software that can enhance an organization's ability to solve business challenges and harness opportunities through digital solutions that are meaningful and delight end users – both inside and outside the four walls.

Existing applications must deliver more value in today's digital business age. Historically, IT organizations have modernized heritage applications to unlock trapped value while freeing up capital to invest in innovation and growth. As such, these principles address perpetual issues of the IT application landscape, including:

- **Delayed, infrequent and error-prone production releases resulting in lost opportunities.**
- **Duplicate and redundant environments leading to suboptimal utilization of IT resources.**
- **Messy, inflexible and technology-debt-ridden heritage software with inherent design issues leading to maintenance nightmares, including high overhead.**

According to a study we conducted in 2019[1] among roughly 2,600 business and technology leaders across North America, Europe and the Asia-Pacific region, nearly all respondents (94%) acknowledge that software engineering is important or critical to their company's future. Migration of applications from outdated architecture to cloud-based architecture is a top consideration for 98% of our survey respondents.

This white paper presents 10 principles of application modernization, and also offers a set of key considerations to enhance the effectiveness of any organization's digital journey.

## The modern software engineering imperative

Businesses' growing dependency on the internet and strategic intent to eliminate redundant applications (some of which are the results of ever-increasing merger and acquisition activity) have caused many a sleepless night for CIOs who are already struggling to optimize application maintenance overhead, avoid unexpected application outages, and apply advanced technology to enhance business value and delight end users. These challenges inhibit businesses from redefining or enhancing their competitive edge and delivering top-notch experiences and services.

Amidst rapid digitization (accelerated by the ongoing COVID-19 pandemic), companies are doing everything they can to transform how they interact and transact with customers to meet evolving market requirements. Historically, the consumption of IT applications has expanded from organizations' employees to the world of internet users.

In retailing, for example, self-checkout kiosks enhance the end-user experience through shopper self-empowerment and speed. They also enhance shoppers' safety and well-being during the pandemic via contactless transactions. In today's digital world, modern businesses need device-agnostic ways to serve customers consistently across channels. In addition, they need to modernize their application portfolios to continuously improve user experience, flexibility, performance, security and turnaround through short, frequent and sustainable release cycles for greater agility. Application modernization therefore is hypercritical in the post-pandemic world.

Companies that identify and effectively manage these challenges are winning big when it comes to growth and market positioning. As the business world continually globalizes, IT agility and experience-centricity carry immense potential to help organizations invent new models and expand their market presence.

Application modernization requires a comprehensive approach, involving both the front and back ends of an application, as well as refreshing the data (both its integrity and formatting), and then re-architecting the underlying code – as befits a modern digital business. Modernizing commercial off-the-shelf (COTS) enterprise applications may require a total overhaul or a gradual replacement of code. It could also take a duct tape approach, i.e., making small fixes with new technology.[2] In addition, tightening IT-business alignment and embracing Agile, DevOps and Lean Startup principles, while transcending traditional project management disciplines by incorporating product-centric approaches, are critical for creating an effective, digitally enhanced business.[3]

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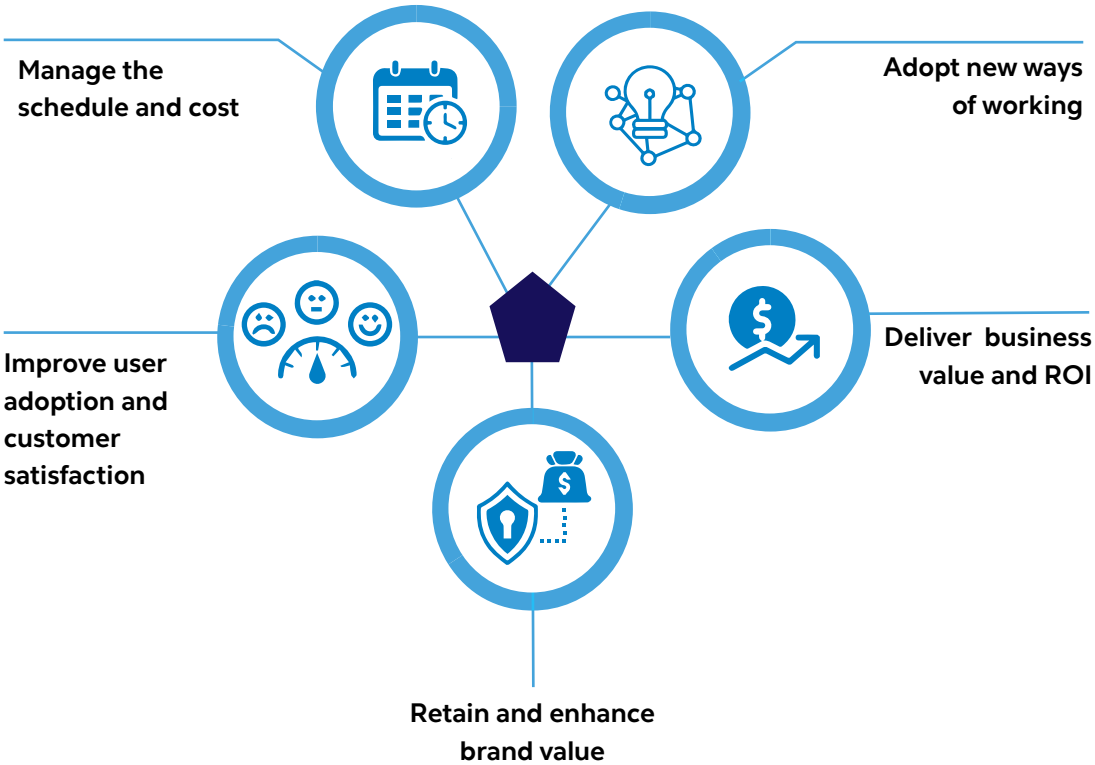
## Application modernization challenges

Application modernization initiatives often cover a majority of IT applications in an organization, which can make them large projects indeed. In addition, they are among numerous other top CXO priorities in the post-pandemic world, given the need of most organizations to digitize nearly everything that they do to succeed in today's volatile and uncertain business environment. Figure 1 lays out the top five obstacles CIOs must anticipate and overcome in modernizing.

### Top five application modernization challenges




Source: Cognizant
Figure 1

1. **Manage the schedule and cost:** This includes both planning and decision-making on program budget and schedule, and then handling timings and outlays. A balanced and pragmatic application portfolio rationalization approach is required[4] to realize cost savings that can be turned into investments to develop new digital products and rewrite strategic IT applications.
2. **Adopt new ways of working:** Collaboration across teams, central governance, dependency management and eliminating redundancies are all important. Cultural change that brings business, IT development and operations teams together as part of Agile and DevOps ways of working can enable an effective BizDevOps model.[5] This includes ensuring security and compliance by implementing security at all levels, including DevSecOps. (Learn more by reading "How DevSecOps Can Help Plug a $6 Trillion Drain.")
3. **Improve user adoption and customer satisfaction:** This requires a focus on customer journey-mapping, user experience, continuous delivery and feedback loops. It represents an opportunity for timely course corrections to delight customers and improve user acceptance.
4. **Deliver business value and ROI:** Thanks to new toolsets, modernizing applications is no longer arduous. The hard part is delivering business value in both B2B and B2C contexts throughout the process.
5. **Retain and enhance brand value:** This is essential for companies to sharpen their competitive edge. Achieving this starts with an ability to keep business operations flowing while swiftly and smoothly delivering releases that offer modern capabilities applications, and then continuously exploring new possibilities that will strengthen the brand.

Despite these challenges, application modernization remains a key element of an organization's digital journey. Technologies such as cloud, microservices, IoT, blockchain, artificial intelligence/machine learning (AI/ML) and robotic process automation (RPA) enable modern, hyper-connected enterprises that are efficient, flexible, scalable, connected, controlled, secure and transparent.[6] Understanding and adhering to application modernization principles is essential for businesses to remain relevant in these uncertain and dynamic times.

The following 10 application modernization principles can help organizations keep their digital journeys on track.

# A principled approach to application modernization

## 1 Align the application modernization roadmap with prioritized business capabilities.

This is the first and foremost principle of application modernization. To do so, we recommend capability indexing, which entails identifying and prioritizing business capabilities in alignment with business strategy. Capability indexing helps drive application modernization to create business value right away. While doing this, focus on new capabilities that could result in customer-centric digital solutions. This helps propel revenue growth without compromising on technological innovation.

For example, one of our insurance clients had entered into new partnerships and identified claims processing as its highest business capability priority. Its goal was to modernize heritage applications and implement an innovative approach to accident and health claims processing that resulted in a real-time claims adjusting experience for new, digitally acquired customers of large accounts.

In collaboration with the client, we modernized the claims processing applications to include critical insurance coverage areas such as accidents and hospitalization. We digitized services with features such as pay-per-ride options, one-click enrollment and claims payment. In addition, we optimized the claims handling process and enabled straight-through claims processing (STP) for faster claim settlement. Finally, we built an AI-enabled travel assistant for handling high frequency, low claim value while providing customers with a hassle-free experience.

This helped enhance the claims processing experience by reducing processing time from five days to three minutes, and heightened operational efficiency by enabling the organization to handle 50% more travel and property claims originating from new customers acquired through partners.

## 2 In application portfolio rationalization, balance business factors with technology factors.

Application portfolio rationalization (APR) is a key phase of application modernization. It involves categorizing applications and rationalizing them using APR techniques such as contain, maintain and invest (CMI) and 6R Analysis – rehost, replatform, refactor, rewrite, retain and retire. This is a key stage for deciding on how to onboard apps to cloud infrastructure.

A CMI framework and 6R are complementary. In CMI, applications are placed into three categories: contain, maintain and invest. Contain includes applications that qualify for lights-on support. These applications do not require considerable investments but just enough focus on support, minimal enhancements and releases on an as-needed basis. Maintain includes applications that are support-heavy with high volumes of tickets and require continuous attention. These applications need upgrades and major enhancements to sustain. Whereas invest includes applications that are strategic and revenue-generating. Investment in these

A common approach is to categorize applications based on business factors such as number of users, business-criticality, cost of maintenance, backlog of defects, etc. Another method is to perform source code analysis and understand cloud-native compliance based on 12-factor anti-patterns and categorize applications for different treatments such as refactor or rewrite.

applications for rewriting or reengineering results in tangible benefits and ROI. These can be significant drivers or value generators in the digital journey, by dint of leading in the market, entering new markets or introducing new business models.

A common approach is to categorize applications based on business factors such as number of users, business-criticality, cost of maintenance, backlog of defects, etc. Another method is to perform source code analysis and understand cloud-native compliance based on 12-factor anti-patterns and categorize applications for different treatments such as refactor or rewrite. Both approaches should be balanced to arrive at pragmatic decisions.

For example, an application categorized under refactor through CMI and 6R could require a complete rewrite because of the current state of the source code. Balancing both business and technology factors is essential to perform an effective application portfolio rationalization.

We modernized the policy administration system of a large North American insurance company that sought to move a tightly coupled monolithic environment to a cloud-native, microservices architecture. To do so, we implemented new workflows and reduced application dependencies to improve speed-to-market and workflow efficiency (which cut technical debt) by embracing DevOps continuous integration and delivery methods.

With this client, we analyzed and balanced both business and technology factors to arrive at a suitable modernization approach. Working closely with the company, we implemented microservices in a cloud-native environment that was based on domain and business capabilities that leveraged other enterprise data and services. This approach not only enriched application data but also reduced manual data entry. It helped to digitize customer engagement across multiple channels (web, mobile, etc.), accelerate the processing of applications with minimal underwriter intervention, reduce release cycles, enhance data analytics and improve speed-to-market.

## 3 Enable and transform: Enable the workforce on emerging technologies; adopt Agile/DevOps and transform into new ways of working.

Modern technologies such as cloud and microservices, and the principles of Agile, DevOps and Lean Startup, warrant a strategic focus on workforce enablement to adopt new ways of working.

Cloud adoption and cloud-native development require investments in adequately skilled engineering teams. Application modernization is about updating portfolios to ensure frequent and short releases with DevOps tool chains and continuous delivery methods. This requires workforces to adopt new ways of working based on Agile principles and DevOps culture and techniques. Workforce enablement and cultural change are cornerstones that influence team productivity and mindset.

For a telecommunications client, we helped accelerate its modernization journey to deliver new customer experiences by adopting new ways of working and delivering cloud-native solutions.

For application modernization to succeed, architecture, design and coding need to be vendor-neutral, maintain open standards and be security-compliant with measurable KPIs and IT outcomes.

In addition to proposing a customized Agile model aligned to the client's vision, we enabled the workforce in new ways of functioning based on early delivery of a minimum viable product through value-driven iterative delivery with Lean and Agile engineering practices such as pair programming, test drive development, continuous integration/delivery (CI/CD) and regular customer-validated outputs.

Our approach resulted in annual cost savings of over $10 million. Order processing capability increased 20-fold, resulting in better client experience and easier access to product portfolio across channels. Meanwhile, the adoption of Agile and DevOps practices ensured 60% fewer bugs post-production.

## 4 Establish an engineering culture with a focus on software craftsmanship and mastery.

An engineering culture is about investing in engineering capabilities as well as nurturing the right mindset in project teams. For application modernization to succeed, architecture, design and coding need to be vendor-neutral, maintain open standards and be security-compliant with measurable KPIs and IT outcomes.

Use integration middleware to connect applications, data and devices for creating efficient and agile information systems. Consider a common platform for a seamless implementation of integrated process and tools. Make the architecture simpler and make the modernized applications nimble and adaptable to future requirements.

Application modernization initiatives span a year or two and require an engineering culture that values modernizing the business value streams rather than just addressing specific applications. In addition, engineering teams need to understand and master software craftsmanship by adopting extreme programming practices such as refactoring, test-driven development, CI/CD and the principles of cloud-native development. Focusing on user experience is essential for delivering elegant software products. These together are the foundation to effectively manage technical debt and deliver intuitive, flexible and extensible software.

## 5 Streamline processes to identify and eliminate redundant functionalities and invest in new features.

Application modernization is not limited to technology upgrading and the adoption of new ways of working. It is an opportunity to eliminate redundancies and invest in new features based on human-centric design principles. This requires a systematic approach or process to identify and eliminate redundant functionalities early in the game. The benefit of this principle is about optimizing modernization efforts toward meaningful new features and user experiences, resulting in a long-term increase in the value of application portfolios.

A life and annuity insurer wanted to modernize its heritage print system. The system involved several manual processes, and we focused on eliminating redundancies and consolidating the print solution and templates across subsidiaries. In addition, we identified new features related to reprinting and processing ad hoc print requests and the enablement of future e-delivery capabilities through an intuitive user interface (UI) for print page selections and sorting.

Our approach helped unify the print solution, which resulted in a reduction in maintenance costs, standardization of forms and templates, less form and template design effort, automation of print cycles and fewer manual interventions. This resulted in a 20% performance improvement compared to the existing print cycle, a 50% reduction in the duration for new product rollouts and seamlessly swift integration with newly introduced products.

## 6 Identify performance baselines and KPIs to measure outcomes.

Application modernization initiatives involve investment in workforce enablement, business revitalization, application portfolio assessment and uplifting code to modern platforms. Measuring the IT outcomes of such initiatives is best accomplished by using performance baselines of heritage systems to inform the modernization efforts. In addition, performance indicators must be aligned with digital business goals. Examples include number of active users, user segments, geographies, revenue impacts, customer satisfaction scores, scalability, uptime or availability, etc.

In addition, problem areas and challenges that necessitate application modernization must be identified and then mapped to goals that are clear, specific and measurable. This approach helps inform cost-benefit analysis, as well as goal-specific monitoring of the modernization program progress and timely course corrections.

## 7 Define a maturity path to measure and upgrade application modernization initiatives.

Among the key principles of application modernization is to define a maturity path to measure the influence level of application renovation initiatives. This helps determine whether application modernization programs align with and positively reinforce the CXO's digital strategy. For example, an application modernization program may begin at a basic initial level and then mature to higher levels as follows:

- Level 1: Solve problems specific to LOBs.
- Level 2: Solve problems at organizational level.
- Level 3: Enter new markets.
- Level 4: Launch new business models.

Defining a maturity path helps to identify new opportunities and maximize the ROI of application modernization programs.

## 8 Modernize data. Data modernization is an essential aspect of application modernization.

Data modernization is one of the most important facets of application modernization. It involves several key dimensions including modernizing the data architecture, certifying data security, redesigning schema, eliminating data redundancy, resolving data quality issues and tuning performance. In addition, data modernization enables a robust data foundation that facilitates data analysis and leads to business insights and intelligence. Data analytics is key for timely decision-making and business agility.

Focus on data modernization for greater flexibility and opportunities for data mining and business insights that can add value.

Our client, a global digital agency, experienced challenges with its existing customer engagement platform on several fronts, including an inability to handle large volumes and varieties of data, high license and operating costs, scalability and robustness, all of which forced it to take a customization route. This extended the timelines for new product rollouts and didn't support real-time use cases or the ability to add customers from new industry verticals.

We built a platform that provided a 360-degree view of customers to deliver personalization services in real time. This SaaS platform uses a modern architecture that is multi-tenant, secure, highly scalable, high performance, configurable and simple to operate. It pivots around a real-time data hub with modernized data to distribute consumer profiles anywhere, i.e., across touchpoints, products or devices. It features a data processing engine with secure APIs and a logging and monitoring component to reduce operational cost. We ensured faster time-to-market with continuous DevOps integration and deployment capabilities.

(Learn more by reading "Tackling customer churn with machine learning and predictive analytics.")

## 9 Unlock business value: Elevate systems of record to systems of engagement or systems of insight, thus creating opportunities to kick-start new business models.

Application modernization initiatives provide an opportunity to identify systems of record that may have the potential to become systems of engagement. Likewise, a system of engagement application may have the potential to result in a system of insight application or product. These are opportunities to unlock business value.

For one of our healthcare customers, we created a virtual healthcare product. In this example, we elevated a system of record of a 100+-year traditional leader into a system of engagement that resulted in a digital product. The goal was to provide the best care to members – whether at home or abroad – in a convenient and cost-effective way from doctors whom they trust. We collaborated with our client to build this product ecosystem which is a mobile app with server components and data in the back-end systems. Members who want to subscribe to this service can download the app, complete registration, log in, book appointments, share their medical records and hold a video consultation with one of the doctors from their region.

This resulted in 76% avoidance of further care, savings of an average of two and a half hours per consultation, and an increase in doctor ratings to 4.7 on a scale of 5 with a net promoter score of >70. In addition, the product has the potential to be a subscription-based model for international markets.

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### Identify white spaces and build new digital products.

Business capabilities map to value streams, which provide an end-to-end business flow enabled by one or more applications aligning in a sequence and delivering value to stakeholders. Mapping each business capability provides an opportunity to identify redundant applications as well as white spaces that require new digital products to optimize and strengthen the value stream. Application modernization is not limited to updating existing applications; it also must focus on identifying white spaces that could result in new "killer" digital products that even yield new business models.

Value-stream-mapping of each business capability provides an opportunity to identify white spaces that require experience-driven digital products to optimize and further strengthen the value stream.

## Categorization is key

We organize our 10 application modernization principles into four categories: business-centric, platform-centric, process-centric and people-centric.

- **Business-centric principles:** These help to prioritize and manage business capabilities and unlock business value in existing applications.
- **Platform-centric principles:** These assist with harnessing the power of technology to the fullest, maximizing the impact of application modernization.
- **Process-centric principles:** These seek to modernize by following well-thought-out and defined processes.
- **People-centric principles:** These focus on enabling the workforce, establishing an engineering culture and mastering software craftsmanship.

Adopting these principles results in positive consequences in terms of improving revenue and profits, reducing costs, improving staff productivity and customer experience, enhancing scalability and accessibility, improving speed and security, enhancing application agility, improving digital readiness, and establishing the right culture to modernize and run digital applications. Conversely, a failure to adopt these principles would lead to consequences such as delayed ROI, limited market share and innovation, high costs, low productivity, mediocre customer experience, sub-optimal maintenance overheads and other undesirable outcomes.

In addition, these principles help business leaders to identify new business capabilities and transformative models.

## Principles of application modernization


Figure 2
Source: Cognizant

# Looking ahead: The lasting impact of application modernization done right

Each principle discussed in this white paper has the potential to drive application modernization programs in a direction that benefits the business (see Figure 3).

| PRINCIPLE | IMPACT OF COMPLIANCE | IMPACT OF NONCOMPLIANCE |
|---|---|---|
| 1 Align application modernization roadmap. | ▪ Improved revenue and market share.<br>▪ Early ROI. | ▪ Delayed ROI.<br>▪ Limited market share.<br>▪ Opportunities lost to competition. |
| 2 Balance business & technology factors. | ▪ Optimal decisions on budgeting and cost savings.<br>▪ Speed-to-market. | ▪ Sub-optimal modernization.<br>▪ Slow-to-market. |
| 3 Enable & transform the workforce. | ▪ Visibility, predictability and higher probability of project success.<br>▪ Right culture and bonding. | ▪ Demotivated workforce.<br>▪ Delayed projects. |
| 4 Establish an engineering culture. | ▪ Delivery maturity.<br>▪ Customer delight. | ▪ Technical debt.<br>▪ Low rate of adoption. |
| 5 Streamline processes. | ▪ Effort and cost optimization.<br>▪ Speed-to-market.<br>▪ Customer delight. | ▪ Cost overruns.<br>▪ Low rate of adoption.<br>▪ Program failure. |
| 6 Identify performance baselines and KPIs to measure outcomes. | ▪ Effective program management.<br>▪ Ability to validate results.<br>▪ Realistic ROI. | ▪ Lack of validation points.<br>▪ Ineffective stakeholder management.<br>▪ Program failure. |
| 7 Define a maturity path. | ▪ Focus and clarity.<br>▪ Effective stakeholder management.<br>▪ Identification of new revenue streams or business models. | ▪ Limited focus and clarity.<br>▪ Missed opportunities and revenue streams. |
| 8 Modernize data. | ▪ Holistic modernization.<br>▪ Insights mining.<br>▪ Cost optimization. | ▪ Unresolved data issues.<br>▪ Bad customer experience.<br>▪ Untapped insights. |
| 9 Unlock business value: Elevate systems of record to systems of engagement or insight. | ▪ New digital products with new revenue channels or business models.<br>▪ Customer delight.<br>▪ Market share. | ▪ Hidden value in heritage applications.<br>▪ Reducing customer share.<br>▪ Lost opportunities. |
| 10 Identify white spaces & build new digital products. | ▪ Innovative digital products.<br>▪ Pivoting into new business models.<br>▪ Market share and revenue. | ▪ Sub-optimal value streams.<br>▪ Customer dissatisfaction. |

Figure 3

By following these 10 application modernization principles, organizations can improve revenue and profits, reduce costs, improve staff productivity and customer experience, enhance scalability and accessibility, improve speed and security, extend IT agility and arm the workforce with the right culture to succeed in application modernization. Not following these principles could lead to delayed ROI, limiting market share and innovation, high-end costs, low productivity, bad customer experience, limited application capabilities, difficult maintenance or program failure.

Application modernization is critical to many well-established businesses. Doing it right can help them to sustain and win, despite the deep-seated organizational, technological and business challenges resulting from the COVID-19 pandemic. By following the principles detailed above, enterprises can create human-centric modern digital products and services that deliver compelling and meaningful user experiences.  A systematic approach to application portfolio assessment that scales across the extended enterprise, embraces emerging technologies, and taps Agile/DevOps-infused ways of continuously developing, deploying and improving software can create a solid foundation for making good on these objectives.

# Endnotes


1 Allen Shaheen, "Becoming a Software-Centric Business: Best Path Forward in an Uncertain Post-COVID-19 World," Cognizant, May 2020; https://www.cognizant.com/whitepapers/becoming-a-software-centric-business-best-path-forward-in-an-uncertain-post-covid-19-world-codex5451.pdf

2 Souvik Roychoudhury, "Legacy Enterprise Systems Modernization: Five Ways of Responding to Market Forces," Cognizant, July 2015; https://www.cognizant.com/whitepapers/legacy-enterprise-systems-modernization-five-ways-of-responding-to-market-forces-codex1377.pdf

3 Raja Bavani, "17 Must-Do's to Create a Product-Centric IT Organization," Cognizant, July 2019; https://www.cognizant.com/whitepapers/17-must-do-s-to-create-a-product-centric-it-organization-codex4674.pdf

4 Srinivasan Thiagarajan and Nagarajan Ramamoorthy, "Tiered Application Management: Meeting the Need for Speed and Reliability," Cognizant, July 2019; https://www.cognizant.com/whitepapers/tiered-application-management-meeting-the-need-for-speed-and-reliability-codex4780.pdf

5 Eveline Oehrlich, "What is BizDevOps?" The Enterprisers Project, Sept. 9, 2019; https://enterprisersproject.com/article/2019/9/devops-what-is-bizdevops

6 Dilshad Kunnumal and Sasmita Panda, "Four Ways that Technology Is Remolding the Digital Supply Chain," Cognizant, December 2019; https://www.cognizant.com/whitepapers/four-ways-that-technology-is-remolding-the-digital-supply-chain-codex5036.pdf


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## About Cognizant Digital Business

We help clients build digital businesses and innovate products that create new value – by using sensing, insights, software and experience to deliver on what customers demand in the digital age. Through IoT we connect the digital and physical worlds to make smart, efficient and safe products, operations and enterprises. Leveraging data, analytics and AI we drive intelligent decisions and anticipate where markets and customers are going next. Then we use those insights, combining design and software to deliver the experiences that consumers expect of their brands. Learn more about how we're engineering the modern enterprise at cognizant.com/digitalbusiness.

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