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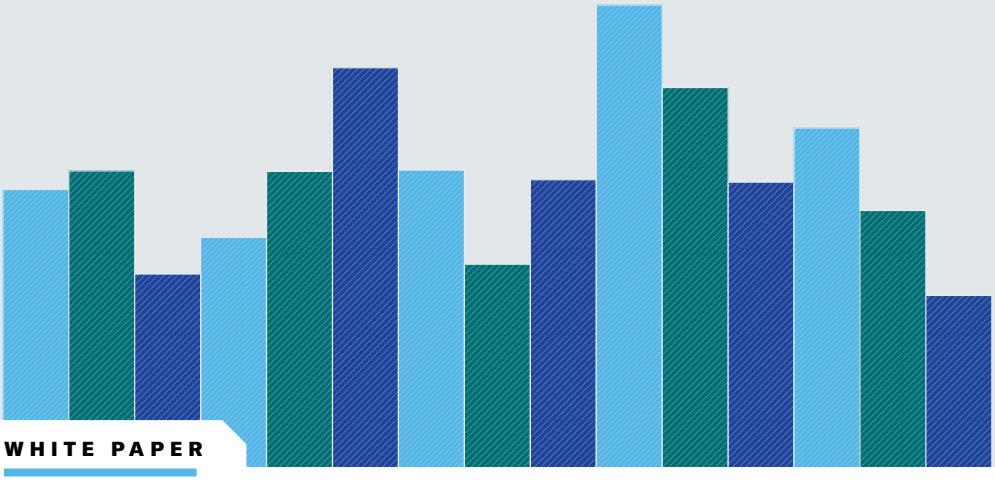

WHITE PAPER

The Business Case for Modernizing Legacy Applications

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Application modernization is not a new imperative. Indeed, most chief information officers and technology leaders would readily say that modernizing aging systems has always been a critical goal for any company trying to reach new customers, improve the bottom line, or delight its current customers. But it's still difficult to plan, execute, and especially measure the impact of modernization when apps, data, and even customers are in a constant state of motion.

The pace of technology innovation has been frantic for decades. Customers have demanded better stability and shiny new experiences since technology has been woven into the fabric of both business and daily life. And the pandemic-driven global supply-and-demand shocks of the past few years have prompted leading organizations to innovate and bring new experiences to market faster than ever before. Yet too often companies struggle to make significant improvements to the core business-critical apps behind those innovations.

Harvard Business Review Analytic Services took stock of the current state of application modernization and dug deeper into how the most successful companies find the budget, the energy, and the motivation to meet the challenge head-on. This report finds that companies can no longer delay the digital transformation of even their most business-critical transaction, record-keeping, or operations systems. These inflexible yet highly capable systems were designed for an earlier tech era and now threaten to close off opportunities to reach new customers, launch new business models, or generate revenue.

It's time for a new approach to legacy modernization, one that goes beyond cost reductions alone and focuses instead on top-line revenue benefits. Tech leaders must justify modernization in business terms. A modernized system must remain stable and cost-efficient, as always, but the true business value today is found in the speed, scalability, security, and staffing benefits unlocked by cloud computing.

At Google Cloud we're committed to helping our customers kick-start their own application modernization programs that quickly yield measurable speed, security, skills, and revenue benefits. We are all-in on cloud-native modernization, which is the way to build and run modern applications that take full advantage of the global scale, pervasive automation, elastic infrastructure, and secure resiliency of the cloud. Google Cloud is dedicated to helping you take the heavy lifting and risk out of app modernization so you can focus on what really matters: your apps, your data, your bottom line, and your customers' experiences. Please get in touch to learn how we can help you every step along the way.

Dave Bartoletti
Senior Outbound Product Manager
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The Business Case for Modernizing Legacy Applications

BEHIND THE MASSIVE DIGITAL TRANSFORMATIONS underway in many organizations is the C-suite's recognition of the core role of the technology platform in facilitating growth. Much of this digital transformation has centered on migrations of applications and infrastructure to the cloud. But business-critical legacy systems, such as back-office applications, have largely been left out of these projects. Modernizing the back-office applications that the customer never sees but are so central to the most important business operations that make differentiating customer experiences possible—like convenience (such as curbside pickup) or speed to market (such as new product releases)—has become more important than ever. While it's often easy to measure the value of a new customer-facing website or mobile app, it can be more difficult to assess the value of modernizing the internal legacy applications at the heart of the business. However, it's these legacy applications that are often the limiting factor preventing those shiny new apps from realizing their full potential to deliver exceptional customer experiences.

Organizations often reach a point at which a desired new business model, line of business, product offering, or other value initiative is negatively impacted by the limitations of monolithic legacy applications. But senior management hesitates to endorse digitally transforming older systems for a variety of reasons, including fears about cost, risk, and resource allocation, as well as poor past experiences with large-scale IT projects.

"It's a tricky position to be in, where you've got a boat anchor of existing software," says Dormain Drewitz, vice president, product and solutions marketing for PagerDuty, a software-as-a-service (SaaS) IT incident response software provider based in San Francisco. "You can see what the future requires. But you're so limited in how you're able to move forward with that. The existing software is not without value; it may be powering important and critical parts of your business. So you can't just abandon it."

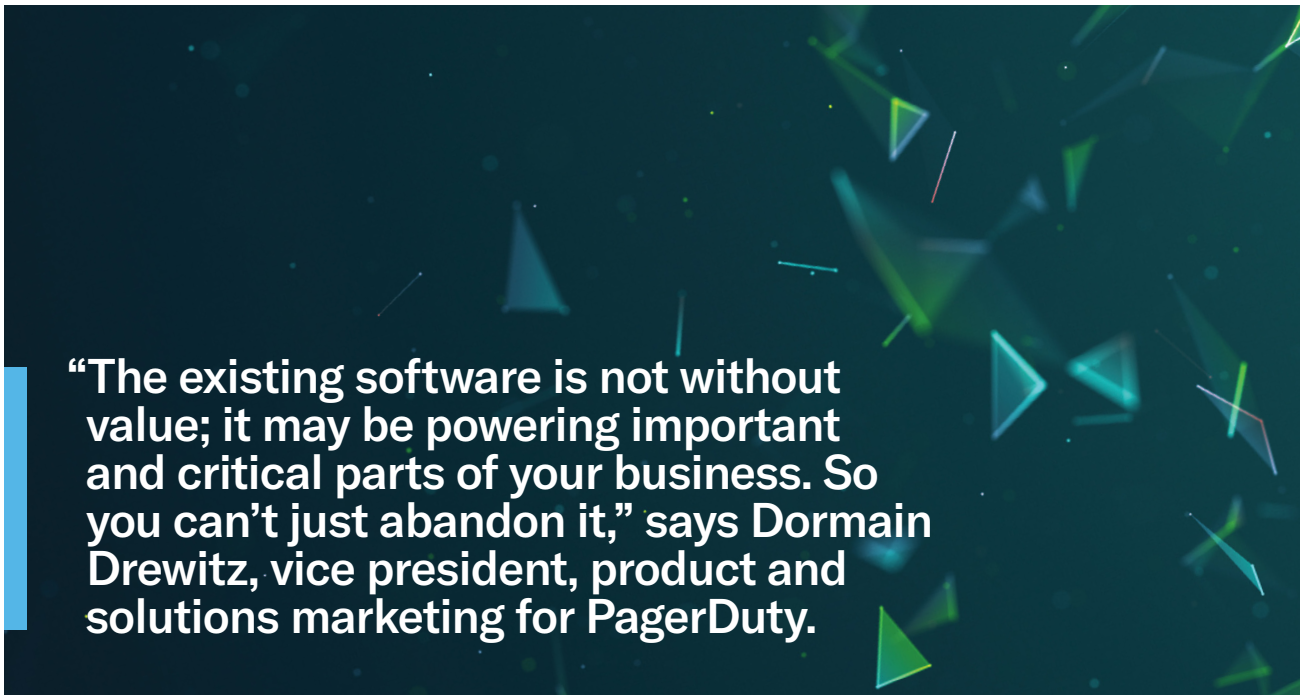
Organizations taking a well-considered approach to application modernization, however, are freeing themselves of the restraints these older business-critical legacy systems impose. They are being rewarded for these efforts with the financial benefits that come with faster time to market,

HIGHLIGHTS

Organizations often reach a point at which a desired new business model, line of business, product offering, or other value initiative is **negatively impacted by the limitations of monolithic legacy applications**.

To build a successful business case for modernizing legacy applications, organizations must **go beyond cost reductions alone and focus on top-line benefits**.

Research shows a **clear link between digital transformation**, for which application modernization is a key enabler, **and robust financial performance**.



higher availability, better scalability, reduced costs, more robust security, and the ability to derive greater value from IT resources. But this business value isn’t always apparent, either because metrics aren’t being used to capture the financial benefits of improved customer satisfaction or because challenges persist with issues such as security, retraining, hiring, and culture. This lack of established metrics makes building a convincing modernization business case challenging.

Despite its IT-centric name, application modernization is far more than a technical undertaking. Committing to a modernization process is a strategic business decision—one that starts with a clear understanding of the market conditions that are shaping the need for speed, agility, and innovation and includes an honest assessment of the limits that monolithic legacy systems may be placing on achieving these essential levers of growth.

Organizations must work collaboratively to quantify the opportunities, risks, and required investments for application modernization. A cross-disciplinary approach is essential to building a business case that demonstrates the customer satisfaction impact, financial benefits, and business value the modernization process will deliver. The business case should then drive the modernization plan, including how to overcome common hurdles to modernization, and identify the best-fit migration strategies and supporting technologies. With a sustained commitment to change across people, processes, and culture, led by the C-suite and endorsed and embraced across the enterprise, organizations can successfully migrate to modern platforms and modernize legacy applications to accelerate future growth.

“There’s a clear correlation between modernization—digital transformation—and business performance,” says Rebecca Wettemann, principal at Valoir, an Arlington, Va.-based technology analyst firm. “Companies that have advanced along that path have twice the revenue growth, and the ability to grow margins, as well. They have gained not only the ability to increase market share, to create new business models and pricing models, and to create new revenue models, but also the ability to drastically reduce costs.”

Agility for an Uncertain Future

Many organizations had to pivot quickly in the early days of the pandemic lockdowns, whether by enabling remote access to apps for employees working from home, setting up curbside pickup, or shifting from on-site to web-enabled service calls. Business agility quickly became a key metric, driving many to accelerate their digital transformation initiatives. Business analysts resoundingly agree that the future brings even greater uncertainty and risk due to accelerating technology disruption, political volatility, the lingering impacts of the pandemic, and other forces. In this uncertain and risky future, customers and competitors exert pressure on the organization that forces it to keep moving faster, change direction quickly, provide better insights from data, meet new sustainability

goals, and deliver even better customer experiences. Thus, it is more important than ever to remove the barriers to speed, agility, and efficiency that aging legacy systems impose.

"We have to understand our customers more intimately, and that drives changes and decisions that we make around customer engagement systems and how we use data," says Tim Crawford, chief information officer (CIO) and managing director of AVOA, a Los Angeles-based research and advisory firm. "But at the same time, our business operations are also needing to evolve and change," building in increased speed and flexibility to respond to those fast-evolving customer expectations.

Reducing costs is another common modernization priority, and for some, making their organization more marketable is, as well. Islandia, N.Y.-based technology service provider Intrado Corp. had just been acquired by New York private equity firm Apollo Group when it began contemplating across-the-board application modernization. "We were a distressed asset in a leveraged buyout where basically there was a lot of optimization and integration that could be done to be able to extract value out of the business," including eliminating as much as a third of the costs, says Thomas Squeo, then Intrado's global chief technology officer (CTO) and now CTO of communications cloud provider Notified, a business segment of Intrado. Squeo's mandate for application modernization at Intrado was to deliver product roadmaps, establish a hyper-efficient software delivery organization, make decisions that drove value for the business, and eliminate anything that inhibited or created friction in a transaction so newly modernized business units could be integrated or sold off.

The legacy applications standing in the way of business agility perform core functions such as inventory, point of sale, internal accounting, financial reporting, tracking of business operations metrics, enterprise resource planning, and supply chain management. Other legacy-supporting applications such as integration middleware and messaging systems (including enterprise service buses) have also become outdated.

As legacy systems age and atrophy from neglect, they become less secure and more expensive to maintain, because infrastructure overhauls are costly and time consuming. Experienced talent is harder to recruit and retain. Reluctance to modify these core business applications has turned them into roadblocks when it comes to adding new and improved capabilities such as mobile app integration, highly personalized experiences, or improved billing models.

"There's an expectation that, if we change it, we will break it. So don't mess with it," says Miles Ward, CTO at Los Angeles-based IT consultancy SADA. "But if you aren't able to change it, it is currently in a state of broken. And if you need something different than what you have, if you don't already have a proven ability to change it, it is now further broken."

"We have to understand our customers more intimately, and that drives changes and decisions that we make around customer engagement systems and how we use data," says Tim Crawford, CIO and managing director of AVOA.

Building the Business Case for App Modernization

Most organizations put increasing revenue and profitability at the top of their list of goals. But outdated technology, and the costs it incurs, puts those critical goals at risk. This disconnect is driving these organizations to create an effective modernization business case that adds speed and agility benefits to revenue and profitability gains. But gaining C-suite approval for app modernization goes beyond simply getting another IT project approved based on cost reduction alone. Once applications are modernized, the IT department will be able to respond much faster to business needs, so IT and business units will work more closely than ever before. Building a business case collaboratively, with both IT and business goals and costs included, avoids yet another cost-based IT project plan that misses key speed and agility benefits.

IT executives who have had success with this collaborative process recommend adopting several best practices to build a successful app modernization business case.

"The best business case is simple," in that it should focus on three to four benefits, says Valoir's Wettemann. Avoid the temptation to include a laundry list of potential gains, she suggests. "That's great if I'm just trying to justify budget; horrible if I'm trying to understand not just what the business case is but where I need to focus my efforts to make sure I'm successful."

IT executives may also need to set aside some classic project justification habits as they build the business case. For example, don't focus on cost reduction alone. Lead with app modernization's measurable impact on customer experience or revenue from reaching a new market or launching a new line of business.

"IT users and operators often are bludgeoned about the head, neck, and shoulders to stay focused on the cost dimensions associated with these projects, because that's

how their leaders are principally goaled," says SADA's Ward. "They end up missing the other benefits." Pilots can be an excellent way to prove not just the business value of a larger effort but that the team can execute the project within budget and cost controls, he adds.

Another bad habit: failing to gain input from key business stakeholders that are better equipped than the IT department to quantify true business value.

The sales department, for example, is best positioned to quantify the impact if it takes six months, rather than a few weeks, to deploy a new app that will open a new market or power a new service. "Modernization should always be a partnership, because at the end of the day, it's not IT that wins or loses. It's the company that wins or loses," says AVOA's Crawford.

Organizations should also try to avoid the tendency to delay decision making while waiting for overly precise data or forecasts. IT typically takes a binary approach to outcomes, says Wettemann, and will do such things as conduct a time and motion study of, say, 42 users, and project a productivity outcome of 7.72%. Such precision shouldn't be the objective. "In reality, business doesn't work that way," she says. It's more effective to create scenarios with an expected range of results, much the way a factory construction project plan would include a range of projected costs because of the uncertainty of oil or building material prices. "That's the way the CFO makes decisions all the time," she explains. "They never have perfect data. They get the best data they can, and they make decisions based on [the] expected worst case and what the likely variability is and [possible] results."

Best Practices to Consider

In addition to leaving classic IT budgeting conventions behind, organizations should consider these best practices that have helped other IT executives win C-suite support:

Speak purely in business terms with the C-suite. Notified's Squeo says he truly became a C-level IT executive when he learned to speak the language of finance. When building the app modernization business case for Intrado, he tapped ideas from a third-party IT consultant and based the case on labor arbitrage and staff reductions, service contract optimization, and savings from retiring hardware to meet executives' expectations for cost reduction.

Quantify the impact of modernization on a key business objective. Organizations should consider risk reduction, such as the reduced time it takes to remediate when a data security vulnerability emerges; software innovation speed, including how the modernization will reduce time to market for new features and fixes, because the organization can develop and release updates multiple times a day versus a few times a year; or faster rollout of new features, such as being able to offer a compelling new promotion like a free streaming service subscription on Tuesdays because the company is now able to easily integrate it into the billing system.

"Once you're able to articulate the upside associated with a given project, like if we were able to cut the response time to our customers for support asks down by a factor of 10, you can quantify in dollars the revenue implications of that," says Ward.

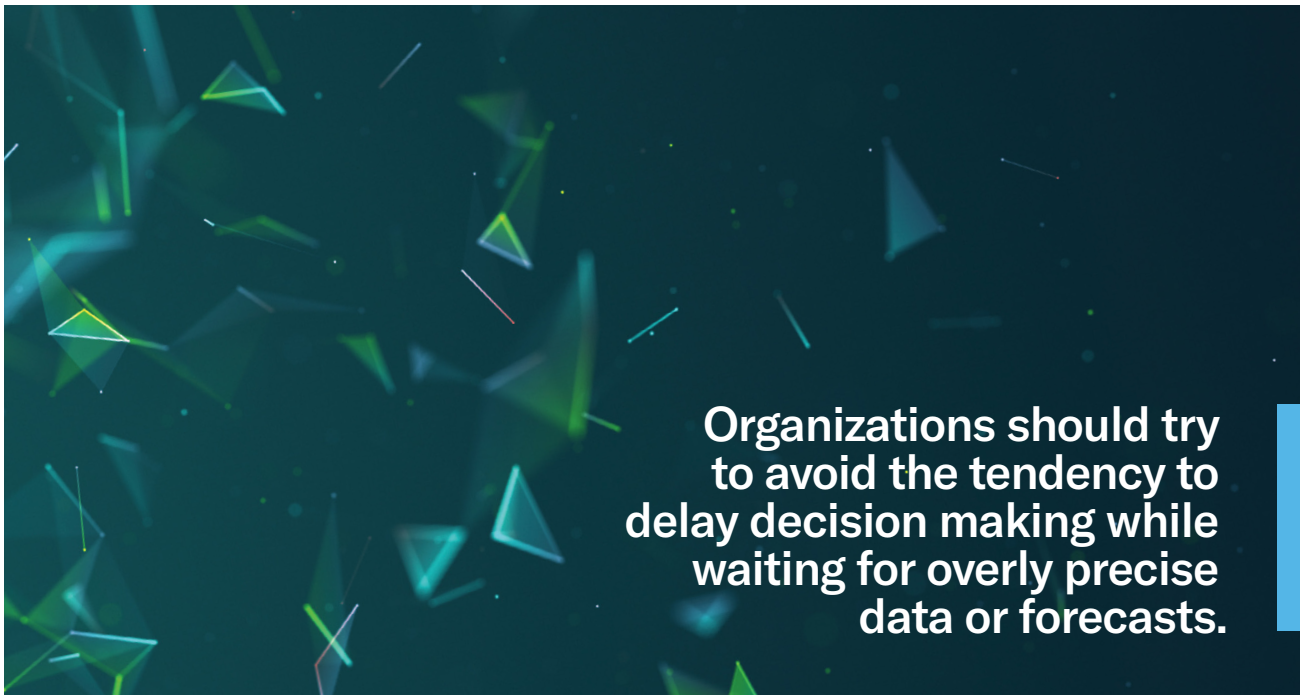
Identify metrics that will indicate whether the project has been successful. Metrics tied to business goals not only ensure the modernization work stays on track but also provide guardrails to guide new ways of taking advantage of modernized platforms moving forward. At Major League Baseball (MLB), for example, transitioning apps into the cloud was quickly followed by movement toward next-generation technologies and then to more emerging technologies. MLB's IT organization could prioritize that work based on how it supports business goals. "We're constantly innovating; we're constantly iterating based on what the metrics dictate," says Felipe Negron, vice president of infrastructure engineering for MLB in New York City.

Explain how today's application modernization is different from how the organization might have updated systems in the past. Modernization now leverages globally distributed cloud computing services, on-demand infrastructure, innovative data platforms, ubiquitous network connectivity, and powerful integration technologies, among other things, offering many ways to modernize that are often new to senior executives or IT organizations. Organizations must overcome concerns that this is "just another IT project" by addressing any concerns about cloud computing early.

If stakeholders have concerns that cloud computing is less secure, might not cost less than existing infrastructure, or will be difficult to learn and manage, address those concerns early and directly. Cloud technologies move quickly, but they are not new and they are certainly proven at scale for enterprises of all sizes, from small and medium-sized businesses to the largest global industry leaders. Senior executives may also need help in learning to view IT as a revenue driver instead of a cost center.

Use app modernization to demonstrate that IT teams and technology solutions can be true drivers of business value. In other words, the process is helping improve such things as revenue, customer satisfaction, agility, and cost reduction. It is not simply a cost center.

"The businesses that are by far the most successful in technology are the ones that see themselves as making money by way of technology and account for it in that way," says Ward. "The ones that call this 'an IT problem, and it has to be solved in a cost-plus kind of a way,' I think they always end up in a situation where they're underinvested given the relative opportunity."



Creating the App Migration and Modernization Plan

Every modernization plan in the cloud computing era is a combination of migration and modernization. For each application, project leaders will need to plan for migration (whether, where, and how an app will be moved) and modernization (what changes and updates will be made to code, integrations, data, and more). The plan must start with discovery and triage, documenting the structure and dependencies of current applications. But don't get bogged down in this step, warns PagerDuty's Drewitz. By the time a meticulous 18-month assessment is complete, technology, markets, and the applications themselves will all have changed.

With a more rapidly completed assessment in hand, it's time to consider dispositions and migration strategies. There are five possible dispositions for any given legacy application, says Ward. The first three are replacing it with a SaaS solution, turning it off and getting rid of it because the functionality it delivers isn't worth the investment, or identifying an open-source community or consortium with which to co-develop replacement software. "Your hope is to have as many things go down those three lanes as you possibly can," he says. The fourth option is "lift and shift," or rehosting—moving the existing app mostly as is to the cloud, which does not improve the application itself but may reduce costs, be easier to support, or make it easier to reach global clients. The fifth option is "move and improve," in which the app is moved to the cloud and rewritten to some degree to leverage cloud services. Many app modernization projects will use most or all of these approaches, with individual decisions based on factors such as prioritization, whether the software is off the shelf or customized, and the value to be gained from each path.

MLB used multiple approaches for its migration. The lift-and-shift approach, Negron says, "got us to the cloud quickly, but it gave us a lot of technical debt"—creating more work later to compensate for the fast move. For other apps, MLB modernized the applications before bringing them to the cloud, which took longer than other approaches but made the improvements available from day one after migration. The largest group of applications was improved enough to move to the cloud, such as automating how these apps were provisioned and improving on build-and-release components, but not yet modernized. "This was the most widely used across our migrations," Negron says. "It allowed us to move many applications quickly, and by moving these to the cloud, we improved, where reasonable, SLAs [service-level agreements] from these services. We weren't quite yet leveraging next-gen technologies, but we were now ready to move fast."

In addition to leveraging the cloud, application modernization should tap the best existing and emerging technologies, such as modern mobile platforms, databases, data analytics, artificial intelligence (AI), machine learning (ML), and real-time messaging systems.

Attention must be paid to mobile and web apps, especially how frequently they can be updated and enhanced with new features. Organizations should explore agile development

A key tenet of app modernization is constant evolution rather than periodic updates between long stretches of stasis. But continuous evolution still demands project management rigor.

methods to automate clunky dev processes and help dev teams deliver frequent updates and upgrades to keep pace with rapidly advancing mobile device platforms, mobile and web operating system enhancements, and especially mobile development platforms. Also, companies will want to consider how to infuse applications with much deeper data-driven insights from AI and ML tools and services. For example, organizations should evaluate how each legacy app connects to data sources and how to refactor it to expose interfaces to AI and ML tools.

"How is it using data?" asks Drewitz. "Is it really tightly coupled to a data monolith? Or can it make use of an external data service that is given one job, which is to run data through a particular machine learning model and provide that output? There's an imperative to modernization in order to be able to make better use of those machine learning services."

The most successful app modernization efforts are not one-off projects but ongoing programs. "Any sort of project-based thinking should be dead on arrival because it's too structured," says Crawford. "You need program- or product-based thinking about where the product is that you're delivering. It's constantly evolving, and at some point, we may" make it obsolete because it's no longer a fit.

A key tenet of app modernization is constant evolution rather than periodic updates between long stretches of stasis. But continuous evolution still demands project management rigor. "You still need project goals," says Ward. "You still want to budget. It should still have a timeline. You should still hold people accountable. I think the function of procurement management remains just as salient as it has ever been."

Finally, IT professionals should always make sure to define clear phases with realistic timelines and deadlines, which will likely be longer than previous IT projects. It's not uncommon for organizations to set out 18-to-24-month migration plans even for large initiatives, but this time frame can be overly optimistic. MLB's migration took three to four years, and, according to Drewitz, Netflix's took seven years—despite it being just 10 years old when the migration started.

Modernizing More than Apps

App modernization is not just about gaining new application capabilities. It requires rethinking how the organization will design and build software, train new and existing staff in modern methods, and organize for success, and how leadership will encourage and reward application modernization efforts.

During the transition, IT organizations typically adopt or increase their immersion in agile, a more flexible and collaborative way to develop software, and DevOps, a set of practices for software development and IT operations intended to continually develop high-quality software and shorten the systems development life cycle. This transition requires change management as part of the app migration process, both within the IT organization and across the larger enterprise. Non-IT departments need to start to think of, and work with, IT in new ways, such as collaborating closely on needs and adapting processes to meet the software rather than demanding endless customizations.

Conversely, adopting agile and DevOps development styles requires IT staff to learn to work differently with non-IT staff in business units, as well. Moving forward, Wettemann says, low code will play a key role here, enabling business units to do up to 80% of the work to develop a new capability and working with IT to manage the rest. It's imperative to set governance and processes around low-code applications and data, she says, to ensure someone who understands the interdependencies between different sets of data is building things that don't break.

Staffing and skill development are key considerations. Many organizations turn to third-party systems integrators to help manage app modernization. But while the experience and methodologies they bring are often helpful, experts urge IT leaders to avoid the temptation to turn over all the technical work to a vendor. Instead, use those resources to "augment or backfill those staff to keep the old systems going, and give your staff something new to work on," says Crawford. "Then they have buy-in and incentive to make the change." The integrator can also educate and guide internal staff through the modernization process.

Instead of traditional training modes, however, Wettemann urges organizations to adopt experiential and in-the-moment learning as part of the modernization initiative, as well as tech-supported mentoring and coaching for employees at all levels. "It's helping employees plot that career path as they think about what the new process and the new organization looks like and enabling them to access the training they want and need to build those skills," she says. The investment

in modernization also becomes an exercise in recruiting, retaining, and nurturing talent. Intrado used a center of excellence model, putting teams that had already migrated alongside less experienced staff to help them learn.

Strong leadership is key throughout the modernization process. Organizations that are outperformers in migrating apps to the cloud are 17 percentage points more likely to ensure a high degree of CEO involvement in the initiative, according to a survey of nearly 450 CIOs and IT decision makers conducted in 2020 and 2021 and featured in "Cloud-Migration Opportunity: Business Value Grows, but Missteps Abound," an October 12, 2021 article on the McKinsey & Co. website. **FIGURE 1** They are also 9 percentage points more likely to hire for next-generation cloud skills, and 8 percentage points more likely to lay out an end-to-end migration strategy and roadmap up front.

"The biggest challenges to modernization are about politics and lack of leadership," says Wettemann. In addition to addressing the impact of this change on careers and daily working styles, it's important to consider the shortcomings that app modernization can expose, such as how good the sales organization really is at forecasting, as well as sensitivities over ownership of data. "Think about how sharing or exposing where [you] may not have the best data today may be uncomfortable and how [you] can insulate against damage in that process," she recommends.

Documenting Tangible Benefits from App Modernization

Organizations that have successfully undertaken modernization of their legacy applications have often been rewarded for their efforts.

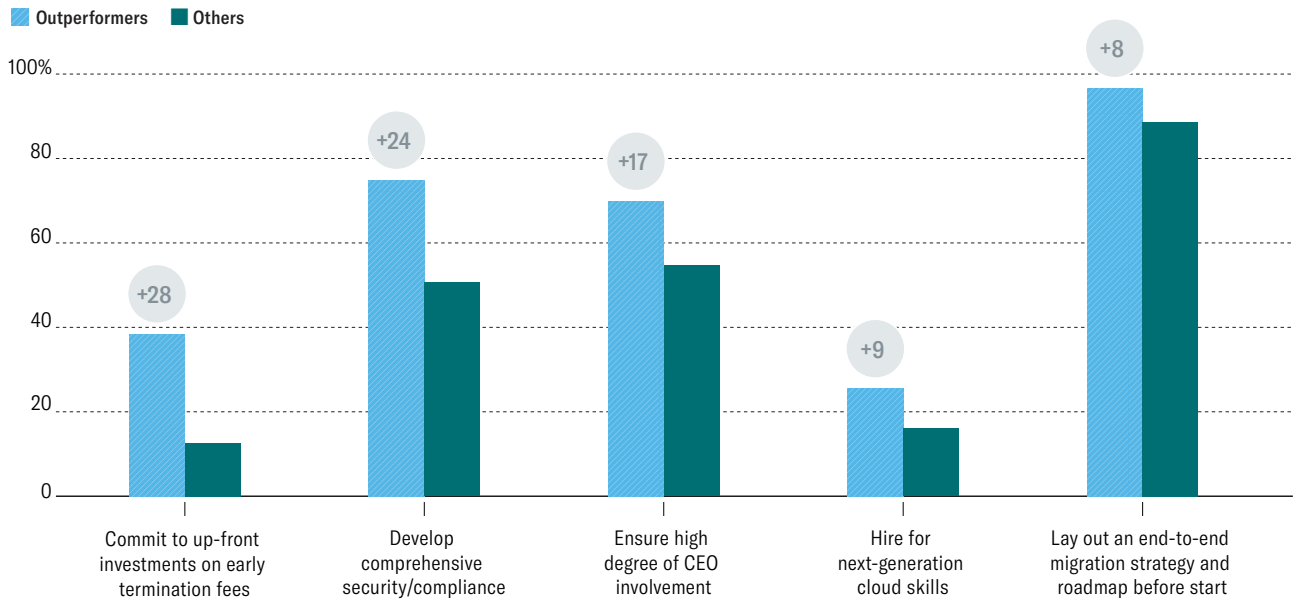
Negron points to the MLB IT organization's enhanced ability to contribute to the bottom line through new capabilities, such as frictionless entry into ballparks, automatic scanning of field play, or bringing technology to the dugouts so managers and ballplayers can analyze game play in real time. "We have a lot of technology that allows us to continue to innovate and provide a rich experience to our fans," he says. "We've enhanced the game of baseball on the field and how it's consumed. [We've gained] visibility into how our products are used, how they perform, and where we can improve. And we've created a strategic partnership with technology companies that support and invest in the next-generation technologies that we use to continue to innovate."

FIGURE 1

Cloud Migration of Applications Has Notable Characteristics

Outperformers have more CEO involvement and hiring strategies associated with the effort

Rank the top challenges you encountered in the migration. To what degree are different CxOs in your organization involved in the cloud-migration journey?



Source: McKinsey & Co. survey, 2020–2021

Squeo credits modernizing its apps with five key benefits for Intrado, including the stability that comes from an otherwise unaffordable distributed geographic footprint of managed cloud facilities, the scalability of being able to spin up and down environments based on needs, and the security of well-managed environments and new software development processes that create better security hygiene. Additionally, Squeo has seen increased speed and staffing benefits, including the ability to hire generalist developers who can be easily reallocated according to business needs and their interests, and the speed with which teams can now develop solutions. For Intrado, says Squeo, application modernization that provides all these benefits "becomes an engine for delivery as opposed to something that's holding us back."

Research shows a clear link between digital transformation, for which application modernization is a key enabler, and robust financial performance. In a survey of digital transformation teams at more than 1,400 companies worldwide conducted in March 2021, Valoir found that organizations whose digital transformation is considered complete, scoring a 10 on a 1-to-10 scale, averaged 22.3% annual revenue growth and 9.9% annual profit margin growth, with lesser levels of completion correlated with lesser levels of growth. **FIGURE 2** The data further showed that companies scoring a 10 had modernized many applications across the key pillars of IT, sales and marketing, and operations and finance. The survey found modernization or replacement of legacy applications was a key part of advancing digital transformation efforts. According to the researchers, "Automation of sales and marketing processes, greater ability to make data-driven decisions in areas such as forecasting and territory management, and the ability to deliver new products or services were three key drivers of revenue increases for organizations at the high end of the spectrum."

The Transformative Effect of Modernizing Legacy Applications

Organizations have never been under greater pressure to grow, such as by quickly implementing a new business model or line of business, and can no longer be held back by the core legacy applications frequently left out of digital transformation initiatives. Modernizing legacy apps can not only remove these barriers but also enable the organization to go beyond iterative improvements in how IT is run to transform how the organization does business.

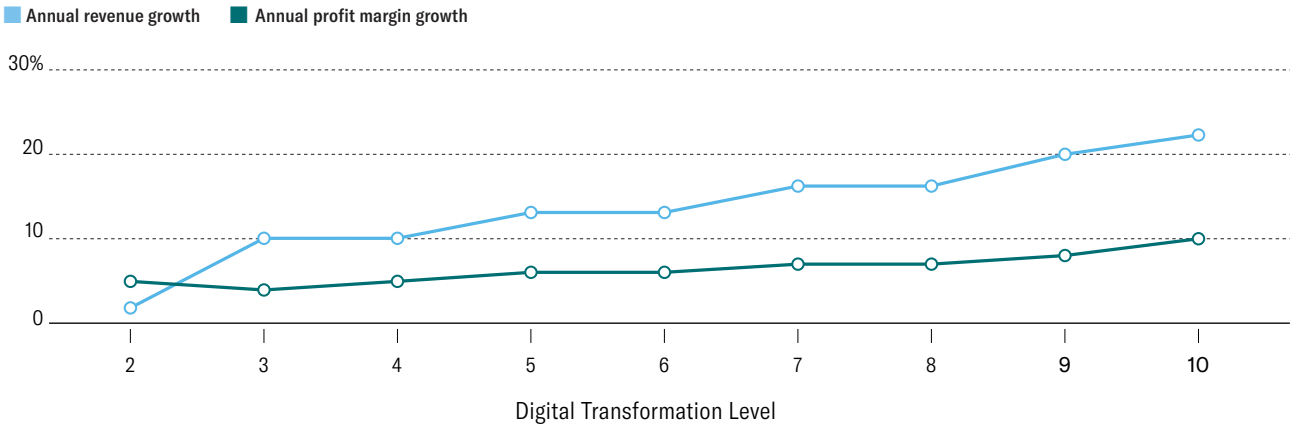
To build a successful business case for modernizing legacy applications, organizations must transcend cost reductions alone and focus on top-line benefits, such as faster time to market, higher availability, better scalability, reduced costs, more robust security, and the ability to derive greater value from IT resources. Organizations that have completed the app migration process have enjoyed significant revenue and profitability increases.

"If you have a successful modernization project that is rooted in direct business objectives, then it's pretty clear there's a direct line between the modernization and business outcomes," says Crawford. "I think modernization is a huge opportunity."

FIGURE 2

Digital Transformation Correlates with Strong Financial Performance

App modernization helped drive revenue increases for the highest-level organizations



Source: Valoir survey, March 2021

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