What Business Executives are Learning about Software Development and How it is Helping Achieve KPIs

A Frost & Sullivan White Paper

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50 Years of Growth, Innovation and Leadership

EXECUTIVE SUMMARY

A recent Frost & Sullivan survey commissioned by CA Technologies revealed that business executives around the world are taking an active role in decisions about software development and acquisition.

The study examined how modern application architecture components and development practices relate to key performance indicators (KPIs) and found numerous benefits. Organizations with more mature programs are:

- Eight times more likely to declare that applications are very good at supporting the achievement of business KPIs;

- Seven times more likely to say their apps are completely integrated to enable functionality, data sharing, authentication, and security; and

- Able to achieve two times' higher profit growth.

But challenges exist. Modern application architectures are introducing new risks, and the pressure to release new applications is affecting app quality and security. Business executives see agile, DevOps, and DevSecOps practices as the path forward to mitigate these risks.
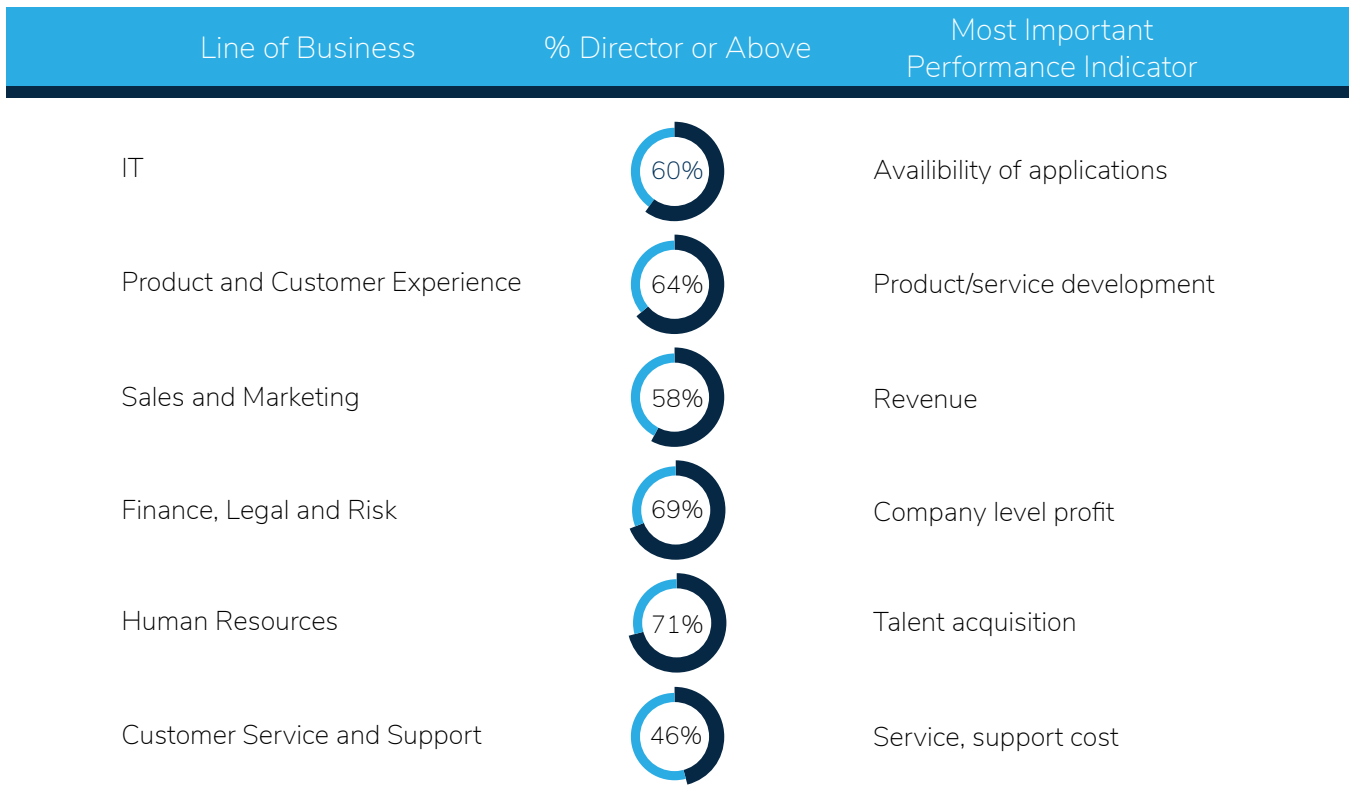
- Three out of four executives interviewed believe DevOps practices help them get new apps to market faster and improve the quality and security of their applications.

- Four out of five think agile practices are helping them build what customers really need and improve customer satisfaction.

- Four out of five see continuous app security testing and DevSecOps as critical to the implementation of a modern application architecture.

This white paper provides practical advice on how to harness the benefits of modern application development to generate powerful insights, accelerate time to market, and take advantage of software to achieve KPIs.

Survey Description

The Frost & Sullivan-CA Technologies study was a global survey of IT and business executives designed to better understand the state of software applications and the related development principles and practices. In-depth interviews supplemented the survey. We only surveyed top management with specific application knowledge in large organizations, such as those with annual revenue of at least $1 billion in the case of US companies. This was done to make the results all the more compelling because large organizations have traditionally been slower to adapt and more conservative in their approach to digital technology application. About 62% of the business executives who participated were C-level executives, vice presidents, or directors. The remaining participants were senior managers or managers.

Exhibit 1: Respondent Seniority by Line of Business

Line of Business	% Director or Above	Most Important Performance Indicator
IT	60%	Availibility of applications
Product and Customer Experience	64%	Product/service development
Sales and Marketing	58%	Revenue
Finance, Legal and Risk	69%	Company level profit
Human Resources	71%	Talent acquisition
Customer Service and Support	46%	Service, support cost

Base: All respondents (n=1,087)
S5. Which of the following job titles best represents your position within your organization? One answer only.

*Base: All industries except Public Sector (n=934)*
Q3. Please rank the following performance indicators in rank order from the most important to the least important.

BUSINESS LEADERS FOCUS ON SOFTWARE DEVELOPMENT TO DRIVE RESULTS

One of the survey's most surprising findings was that more than a quarter of applications (28%) were developed in-house by a specific department outside of the IT organization. External vendors provided about a third and in-house IT departments provide the rest, as shown in Exhibit 2.

Exhibit 2: Application Development by Source

34%
External vendors

39%
In house:
IT Department

28%
In house:
Own department
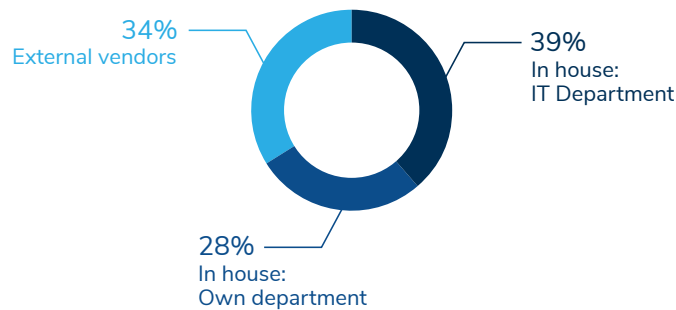
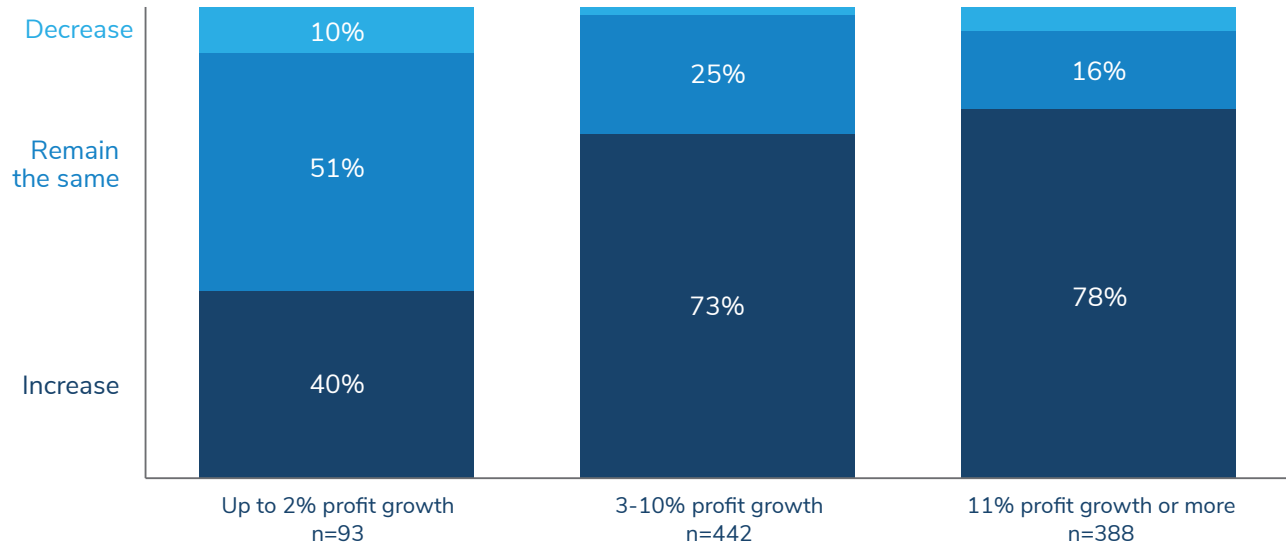*Base: All lines of business except IT (n=768)*
Q12. What percent of the applications your department uses or provides to your clients are developed in the following ways?

This recent shift has brought about many positive changes for businesses. Departments have become less dependent on a central IT team for application development, and business executives are better suited to develop or acquire software that will enable them to meet their goals and have begun relying on modern application architectures to build the right functionality, quality, and security to get it to market faster.

The lack of competition between large organizations' IT departments and the functional groups they support suggests that shadow IT is a thing of the past and that chief information officers are assuming a strategic role of seeking harmony.

The survey found that two-thirds of large organizations plan to increase their software acquisition and development budgets, as shown in Exhibit 3. These increases are higher than the IT budget growth in general and reflect that application development no longer has to compete for a share of a central IT budget. Business executives can fund their own priority initiatives.

**Exhibit 3: Expected Change to the Software Acquisition and Development Budget
(Next 12 Months) by Organizations' Year-Over-Year Profit Growth**

Decrease

Remain
the same

Increase

	Up to 2% profit growth n=93	3-10% profit growth n=442	11% profit growth or more n=388
Decrease	10%	25%	16%
Remain the same	51%		
Increase	40%	73%	78%

Base: All companies, except Public Sector (n=923)

Q38. In the next 12 months, will your department increase, decrease or leave unchanged the budget allocated to software acquisition and development?

THE EVOLVING ROLE OF BUSINESS EXECUTIVES

In some companies, business executives see themselves as relatively self-sufficient in software development, although they still acknowledge the value of getting the IT department's support for changes to shared infrastructure/resources.

Business executives and IT directors are equally likely to be influencers and decision-makers in application development and acquisition. This is a positive change: while the IT department is still the most likely initiator of organization-wide IT infrastructure development, if, for example, the customer service department wanted a single customer view of orders and complaints, it is able to more naturally be an initiator.

Software is Key to Achieving KPIs

Considering that each department is trying to achieve different KPIs, as shown in Exhibit 4, it is impressive that more than eight in ten business executives consistently rank software as critical to achieving their goals.

Exhibit 4: KPIs Crucial to Business Functions

IT	Product and Customer Experience	Sales and Marketing	Finance, Legal, and Risk	Human Resources	Customer Service and Support
Availability of applications	Product/service development	Revenue	Company level profit	Talent acquisition	Service, support cost
Overall cycle times	Quality	Sales performance	Cash/liquidity management	Talent development	Efficiency and quality of customer experience delivery
Critical application responsiveness	Product/service management	Lead generating efficiency	Cash flow generation	Talent satisfaction and retention	Type of post-sale customer interaction

Base: All industries except Public Sector (n=934)
Q3. Please rank the following performance indicators in rank order from the most important to the least important.
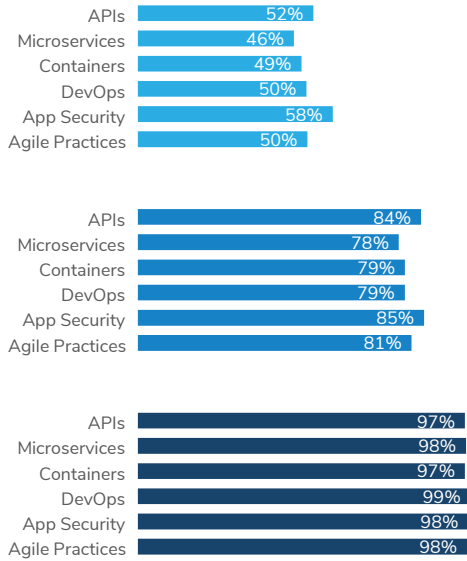
An impressive 84% of executives say their success depends on modernizing application development and delivery. While on the surface they are satisfied with their current software applications, this indicates that they are aware that more opportunities and challenges lie ahead and that they will need to keep up.

Frost & Sullivan defines a mature organization as one that has widely adopted many modern application architecture components (e.g., application programming interfaces (APIs), microservices, containers) and practices (DevOps, agile, security). According to this definition, 27% of organizations are mature, as shown in Exhibit 5.
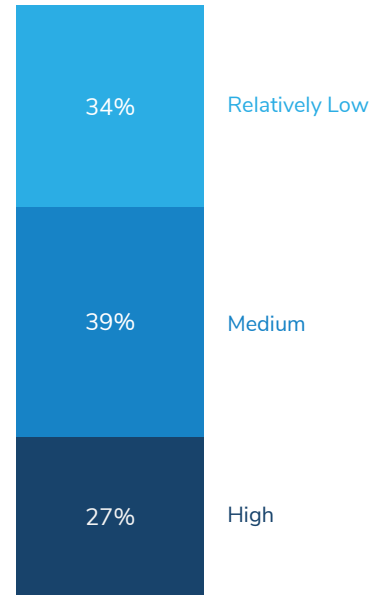
Exhibit 5: Modern Application Development Levels
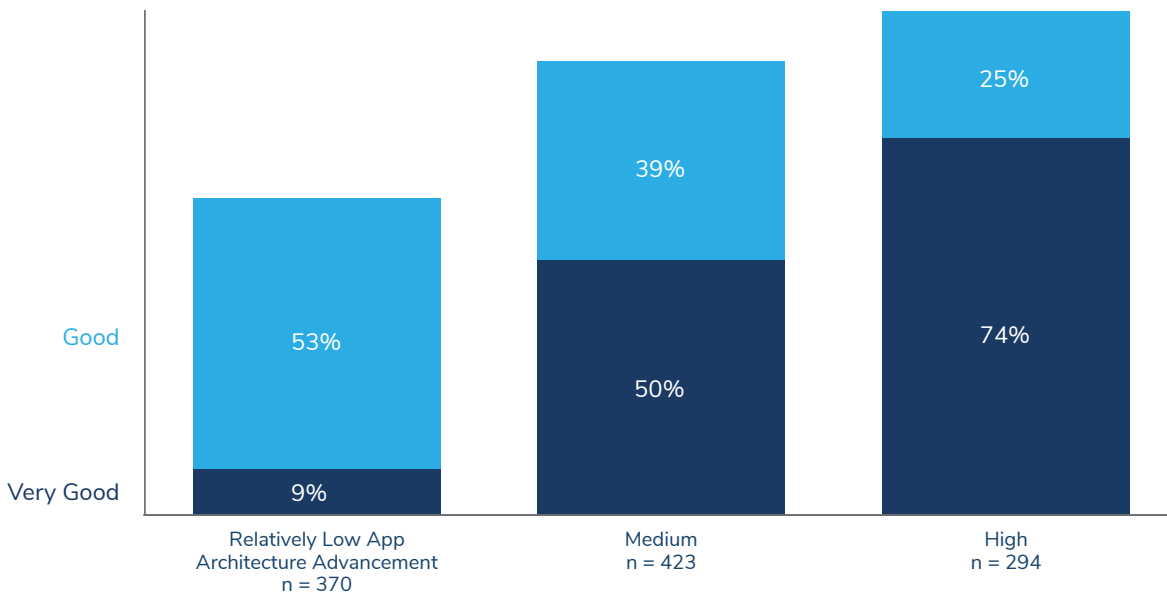
Use of Modern Application Development Components

Component	%
APIs	52%
Microservices	46%
Containers	49%
DevOps	50%
App Security	58%
Agile Practices	50%

Component	%
APIs	84%
Microservices	78%
Containers	79%
DevOps	79%
App Security	85%
Agile Practices	81%

Component	%
APIs	97%
Microservices	98%
Containers	97%
DevOps	99%
App Security	98%
Agile Practices	98%

Modern Application Development Maturity Level

Level	%
Relatively Low	34%
Medium	39%
High	27%

Base: All respondents (n=1,087)
Q16. How familiar are you with the following terms with regards to developing and deploying applications?
*Classification based on questions Q17-Q23.

The finding that applications support the achievement of business objectives is not surprising in itself, but the strength of the correlation between mature organizations and the support of applications in achieving KPIs is remarkable, as shown in Exhibit 6.

Exhibit 6: Higher Achievement of Core KPIs by Executives Relies on Modern Application Development Practices

|	Relatively Low App Architecture Advancement n = 370	Medium n = 423	High n = 294
Good	53%	39%	25%
Very Good	9%	50%	74%

Base: All respondents (n=1,087)
Q5. How would you rate your software applications in supporting the achievement of your department's performance indicators?

Perhaps the most important finding of this study is that mature organizations with high adoption rates of modern architecture components grow twice as fast as those with relatively low maturity, as shown in Exhibit 7. While this could mean either that they grow faster because of their modern application development practice or that they invest in modern application development practices because they grow faster, the positive correlation is striking.
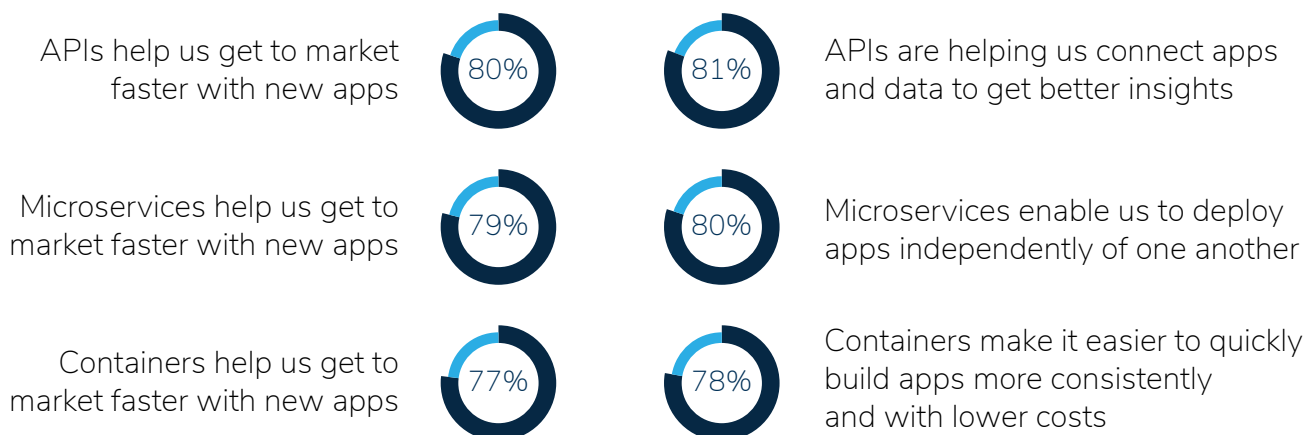
Exhibit 7: Profit Growth YoY 2016–2017
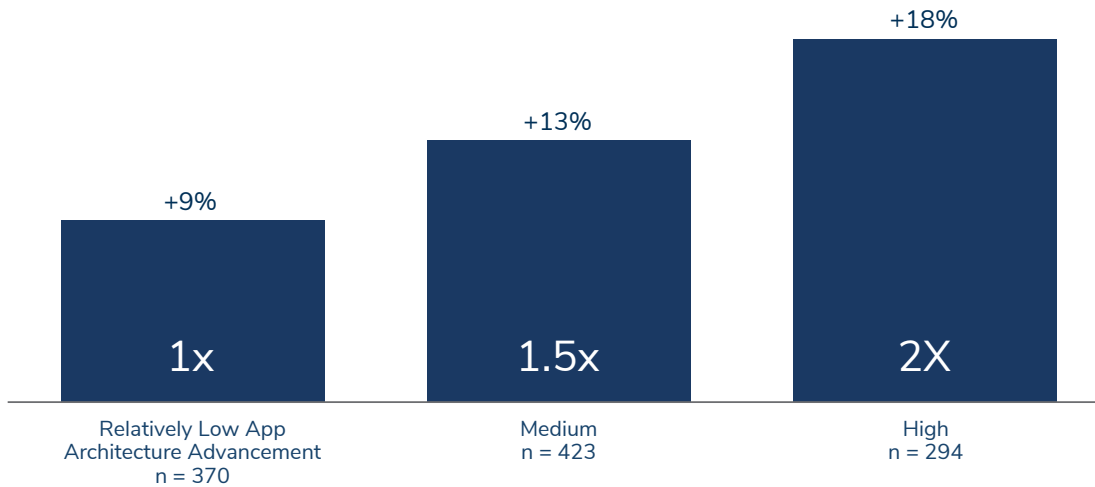
Base: All companies (n=1,087)
Q37. How did your organization's profit change in 2017 compared to 2016?

Application development must not simply be delegated to the IT department and forgotten; it can lay the foundation for the agility and flexibility needed to endure in the hypercompetitive, real-time business space. The more advanced an organization is in regard to modern application development, the more likely it is to have a competitive advantage.

WHY MODERN APPLICATION ARCHITECTURE DEVELOPMENT IS CRITICAL TO SUCCESS

Modern application architectures increase the connectivity, scalability, and security levels of any digital business, allowing convenient access to billions of users across different networks and devices and delivering a much more valuable experience to customers, partners, suppliers, and employees. Business executives agree that modern application architectures provide an easier path for software development while generating powerful insights and accelerating time to market, as shown in Exhibit 8.

Exhibit 8: Modern Application Development Success Factors

APIs help us get to market faster with new apps — 80%

81% — APIs are helping us connect apps and data to get better insights

Microservices help us get to market faster with new apps — 79%

80% — Microservices enable us to deploy apps independently of one another

Containers help us get to market faster with new apps — 77%

78% — Containers make it easier to quickly build apps more consistently and with lower costs

Base: All lines of business except IT (n=768)
Q17-Q19. How much do you agree or disagree with the following statement?

Software stacks have evolved into monolithic applications that are difficult to access, lock away insightful customer and product data, and create barriers to digital transformation. They inhibit the development of mobile, cloud, or Internet of Things apps, and they are expensive to set up and maintain—especially for organizations using experimentation to innovate. This is why architectures that combine APIs, microservices, and containers with a coherent digital strategy are crucial to success in today's business environment.

> "With APIs, we have been able to develop very rich applications without needing much documentation. APIs are self-explanatory, so even a business person can go and create an application using the APIs. As a whole, our engagement with customers is much better, processes are much more streamlined, and we are making fewer mistakes."

Director, product management and customer experience, leading US bank

APIs, microservices, and containers are the key to business agility:

- They break down silos and open data, providing reusable interfaces to accelerate development and connectivity to billions of devices and people.
- They provide omnichannel experiences by connecting data across platforms, systems of record, business units, and locations to deliver compelling experiences across the web, mobile devices, and the Internet of Things.
- They extend digital reach by enabling ecosystems of developers, partners, suppliers, and customers to quickly integrate and transact.
- They provide an integration mechanism to more scalably connect new technologies, such as artificial intelligence, predictive analytics, voice, and image recognition, to existing platforms.
- They drive developer innovation by accelerating experimentation and iterations at a much lower cost to the business, creating an agile and more resilient environment.

> "Microservices provide the ability to update a portion of the technology stack without having to take the whole system down. We might take the systems down two to three times a year, typically when we have the least amount of calls, but having the ability to fix one area of the application and not to take the whole thing down definitely has its benefits."
>
> **Director, customer service and support, US retailer**

Modern Application Architectures Improve Integration

Modern application architectures support a key theme among business and IT executives: the ability to integrate or connect applications and data. The digital projects of business functions and central IT departments may be different in their goals, but they frequently have one thing in common: they aim to enhance integration. This is not surprising, because connectivity across business functions delivers comprehensive insights. The survey findings emphasize the criticality of integration in that all business functions have at least two integration-related projects in their top three digital initiatives.

There is a clear correlation between an organization's modern application development maturity and the importance it attaches to integration. The majority of IT departments in mature organizations perceive the connection of business systems using APIs and enterprise platforms for all business units as absolutely crucial. However, IT departments in organizations with medium or relatively low maturity are far more concerned with the modernization of the overall IT infrastructure.

Mature organizations' integration advantage is astonishing: 84% consider their software applications to be completely integrated in terms of functionality, data sharing, authentication, and security. Only 12% of organizations with relatively low development maturity enjoy the same level of integration, as shown in Exhibit 9.

**Exhibit 9: Level of Application Integration by Modern Application Development Level**
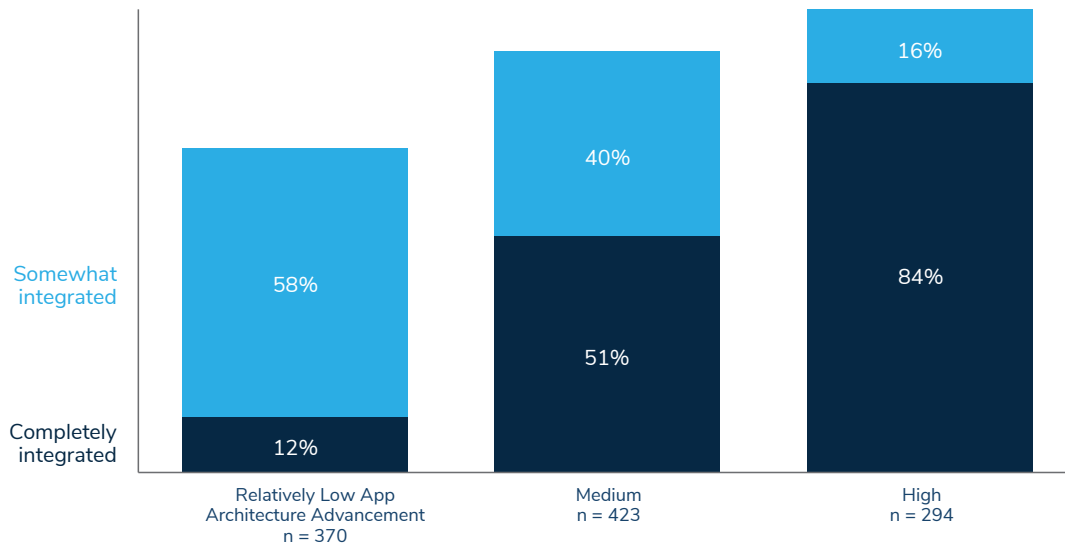
Q7. Would you consider the software applications your department uses or provides to be well integrated in terms of functionality, data sharing, authentication and security? Would you say that your software applications are...?

BUSINESS-CRITICAL APPLICATIONS AND MODERN APPLICATION ARCHITECTURES PRESENT NEW CHALLENGES

While business executives are generally satisfied with software application functionality and release speed, the latter comes at a price. More than two-thirds of survey respondents feel that the pressure to release new applications or application updates quickly is negatively affecting quality and security, as shown in Exhibit 10.

Exhibit 10: Speed of Releasing New Applications and Updates and the Consequences on Quality and Security

We are releasing new apps or updates fast enough to satisfy the demands of the market
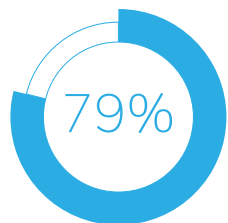
The pressure to release new apps or app updates quickly is negatively affecting quality and security
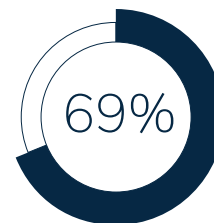
Q9. How much do you agree or disagree with the following statement?

Organizations that experience rapid profit and revenue growth are particularly likely to strongly agree with the negative effects of pressure for speed on quality and security. The top reasons why applications have negatively affected KPIs are security flaws or vulnerabilities (54% of respondents), insufficient testing that has led to quality or performance issues (52%), and software applications lacking features that customers need (48%).

Alarmingly, only IT departments (not a single business function) recognize cybersecurity as a key challenge. This underscores that business executives perceive challenges intuitively as what is visible to them and affects day-to-day operations. Security tends to be more of a latent challenge—something that is off the radar unless an adverse event, such as a security breach, occurs.

Exhibit 11: Cybersecurity a Top Challenge for Organizations by Business Function

35%

IT
n=319

16%

Business Executives
n=768
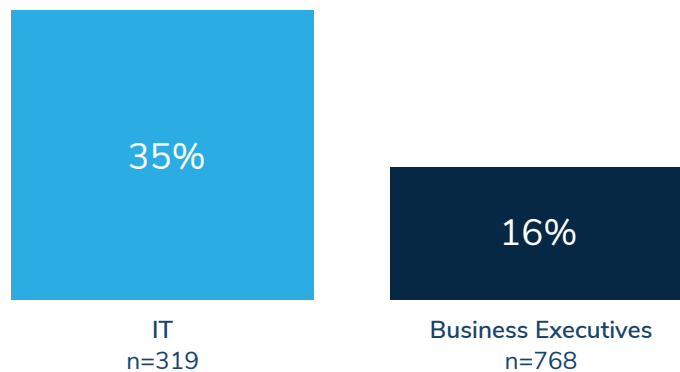
Base: All respondents (n=1087)
Q1. What are the three main challenges your organization is currently facing?

While the benefits of leveraging a modern application architecture are clear, there also are new challenges. Even when organizations have reached maturity, digital success is not ensured. New platforms may provide the connectivity, scalability, and agility needed for success, but they also add new layers of complexity. In fact, 90% of high-development organizations say it is challenging to manage and monitor APIs, microservices, and containers and that APIs and microservices are adding new risks to the organization. As the research shows, reliance on a modern application architecture can significantly improve business performance, but this also magnifies the impact of any problems. For instance:

- Organizations must seamlessly and repeatably update, test, and deploy microservices and APIs across any cloud or on-premises environment to ensure development speed while maintaining availability for the billions of connections that rely on APIs.

- Security and regulatory compliance are major concerns because data is exposed through new microservices front-ended by APIs. Exposed data must be protected while user and app access control must be frictionless.

- Because APIs are widely deployed across large organizations, support for a high volume of transactions and connections is a must to meet the demands of apps, developers, and strategic partners.

- The sheer number and combinations of APIs and microservices can overwhelm integration, monitoring, and analytics processes. New approaches and technologies are needed to manage this scale.

Modern Development Practices Mitigate Software Challenges

While modern application architectures can yield impressive results, the survey found a correlation between those who were widely harnessing architecture components and those who have embraced agile, DevOps, and DevSecOps practices.

The agile methodology is a framework for best practices, integration, interoperability, and streamlining the software development process. It can be used to bridge the divide between network and IT practices, personnel, and technologies and eliminate the silos that inhibit smooth business operation.

> " "[Agile] has [sped] up the delivery cycle in terms of [being] much more focused on component-wise development, bringing [applications] to market [and] bringing them to a live environment. [...] It certainly changed [the way] of thinking."

Director, product management and customer experience, UK financial services organization

IT professionals and business executives overwhelmingly agree that their organizations would benefit from agile practices in delivering customer-centric applications that improve user satisfaction. For more than two-thirds of IT and business executives, agile practices are a critical element in implementing a modern application architecture. Four out of five respondents think that agile practices are helping them build what customers really need and improve customer satisfaction.

DevOps is designed to provide a similar solution for the divide that exists between software development and operation. However, DevOps harnesses techniques that are not yet found in agile practices. DevOps uses a continuous integration and continuous deployment process that shortens the development life cycle and, more importantly, ensures that integration, performance, and compatibility are maintained as new software releases and capabilities are developed.

> " "Everybody is on the same page [...] so when you go live you are not spending time on training because the [word is] already out."

Director, customer service and support, US retail/eCommerce organization

These approaches are essential independently but are perhaps better when integrated into all three operations environments: network, IT, and development. However, even that is not enough to ensure maximum operational efficiency and flexibility. Networks, applications, and software development are at increasing risk of malicious attacks. Eight out of ten executives view continuous application security testing and DevSecOps as critical elements in implementing a modern application architecture.

> " "DevSecOps has improved the process and security, improved time to market, and [reduced] bugs in production."

Director, product management and customer experience, US financial services organization

CONCLUSION AND RECOMMENDATIONS

The ancient Greek philosophy that "there is nothing permanent except change" carries more weight than ever in the increasingly digital economy. As flexibility and adaptability become key to the success of all organizations, modern application architecture makes software fit for these higher expectations.

The acceptance of modern application architectures helps organizations keep up with change and lays the foundation for more flexible and agile software to be a competitive advantage and driver of organizational success.

Microservices and APIs are the next steps in delivering a truly modern application architecture—one that allows monolithic, legacy applications to be broken into more flexible units that are easier to manage and scale. To ensure success in digital transformation, business leaders must:

1. Be sure to collaborate with IT early and often. Make sure IT executives understand short- and long-term digital business requirements and why a modern application architecture is critical to success.

2. Provide specific KPIs to ensure that platform development is oriented to meeting integration, app development, insight, and experience goals.

3. Have a seat at the table when it comes to assessing technology or vendor selection to ensure that business goals are met.

4. Choose technology that can support large-scale API throughput and management, has strong security, and offers a broad enough portfolio to take into account the practices that are required for success and the software development tooling needed to ensure agility far into the future.

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