A research paper produced in collaboration with **SAP**

Unlocking the Cloud

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Introduction

Cloud computing has entered the mainstream of enterprise IT, unleashing an array of new opportunities and changing the way technology is used and business gets done. The first wave of cloud computing services built on basics like software-as-a-service and elastic computing, in which access to computing assets expands to meet demand. The primary issues to be addressed at that time were scale, speed, and cost. The focus today, however, has turned to more complex and robust cloud platforms that enable collaboration, creativity, and customer interaction.

"Build a better platform, and you will have a decided advantage over the competition."

Mark Bonchek and Sangeet Paul Choudary, Harvard Business Review

The need for more agile and flexible IT frameworks drives a variety of cloud services. These in turn enable increasingly strategic uses of the technology by integrating networked resources more holistically into business operations. Yet a mix of ad hoc cloud efforts can increase complexity and create new problems. As a result, there is a growing need for organizations to adopt overarching cloud strategies and focus on building platforms that support broad development and are capable of delivering maximum return on investment.
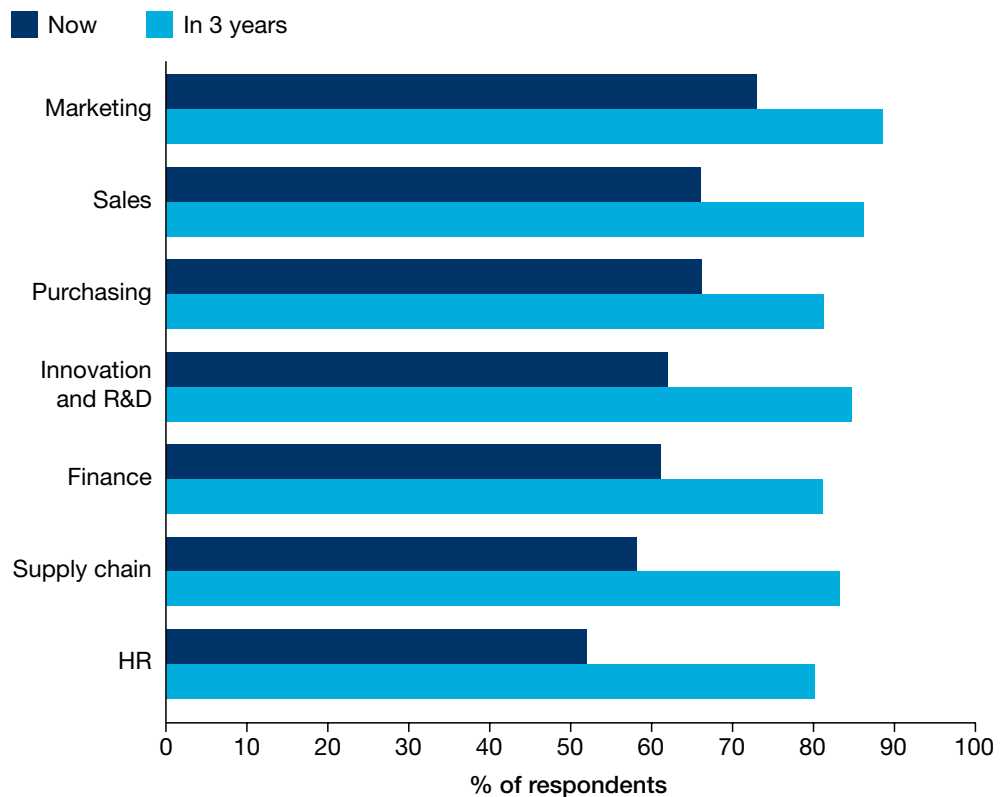
This new wave of cloud platforms is driving a remarkable transformation within IT and across the enterprise. Indeed, platforms of various types, including technology platforms, are emerging as a key element of business strategy in the 21st Century. As Mark Bonchek and Sangeet Paul Choudary wrote recently for *Harvard Business Review*, "Build a better platform, and you will have a decided advantage over the competition."

Cloud platforms, also known as Platform-as-a-Service (PaaS), are allowing organizations and their business units to automate systems, processes, and interactions like never before. They also are helping companies roll out new services that connect all their data—and their partners' data—seamlessly and efficiently. Our global survey of 200 senior business and IT executives shows that this trend includes key functions such as marketing, sales, and R&D—and that adoption will increase rapidly in the next three years across other functions, such as finance, supply chain and HR.

"Everything is part of a single deployment in the cloud," says John Considine, chief technology officer at Verizon Terremark, which provides IT and enterprise cloud services to numerous *Fortune* 2000 companies. Cloud platforms, he says, are rapidly evolving from a "good idea" into a competitive necessity. Businesses and government organizations are combining clouds with co-location services—data centers that rent equipment and bandwidth to clients—in order to build a multi-tiered architecture capable of supporting a level of scalability, dynamism, and mobility that was unimaginable only a few years ago.

Figure 1: Into the cloud
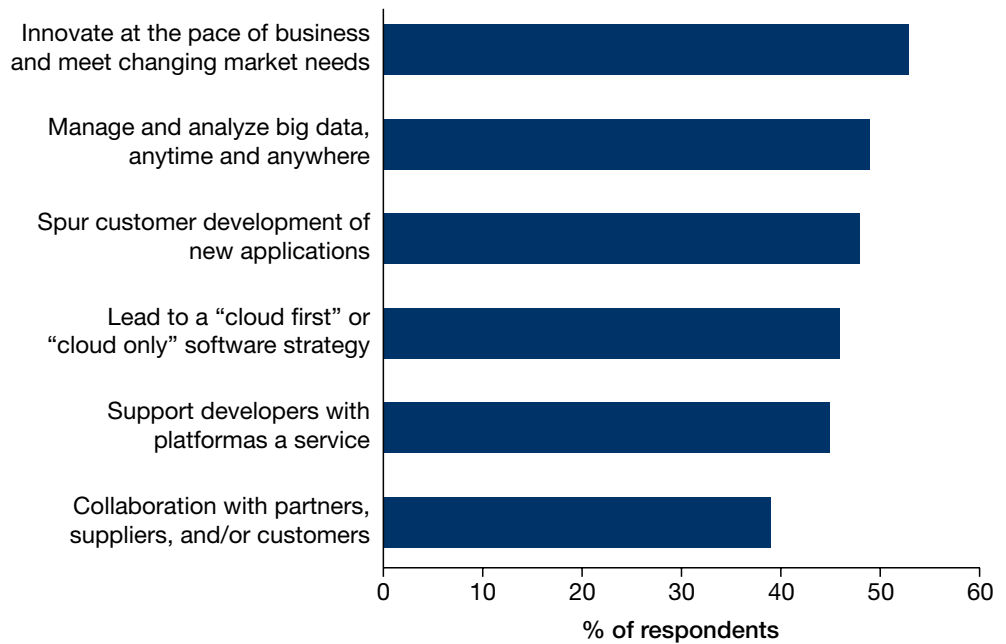
Which functions are substantially cloud based?

Business leaders are investing heavily in cloud platforms to achieve a wide range of strategic objectives. They want to accelerate IT and business cycles through a fast-track approach to development, spur customer development of applications, and ultimately lead to a strictly cloud-driven software strategy. Our survey also shows that many organizations are turning to the cloud to ratchet up big data and real-time analytics capabilities. "We are witnessing a major shift in the way computers and IT are used," says Feargal O'Sullivan, Head of Sales, Americas, at NYSE Technologies, the technology division of the NYSE Euronext stock exchange company. "Clouds offer a remarkable value proposition."

What is a cloud platform?

At its most basic, a cloud platform—also known as Platform-as-a-Service (PaaS)—is a system that delivers over the internet (and as a utility) the infrastructure and services needed to develop, prepare, and run applications, as well as other services, including application integration and portals. The pre-built infrastructure unlocks the key benefit of these platforms, which is to remove the considerable developer time and bandwidth traditionally required to make applications ready for use (e.g., server administration, managing OS patches, managing upgrades) with on-premise alternatives. Instead, cloud platforms enable developers to focus solely on coding innovative applications. Cloud software typically works in "stacks," with Infrastructure-as-a-Service (IaaS) sitting at the bottom, Platform-as-a-Service (PaaS) in the middle, and Software as a Service (SaaS) positioned on top.

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Figure 2: Cloud strategies and objectives

Cloud platforms enable users to…

Category	%
Innovate at the pace of business and meet changing market needs	~53
Manage and analyze big data, anytime and anywhere	~49
Spur customer development of new applications	~48
Lead to a "cloud first" or "cloud only" software strategy	~46
Support developers with platformas a service	~45
Collaboration with partners, suppliers, and/or customers	~39

% of respondents

But the potential gains aren't without challenges. Integrating clouds with on-premise applications, leveraging business networks and deploying strong security present prominent obstacles (these challenges, along with the opportunities for mobile applications, will be addressed in depth in a series of papers to follow). Ultimately, there is no simple path to the rewards promised by the cloud. But those rewards are real. Business and IT executives must invest in understanding the essentials of these powerful new technologies to tap into cloud platforms effectively.
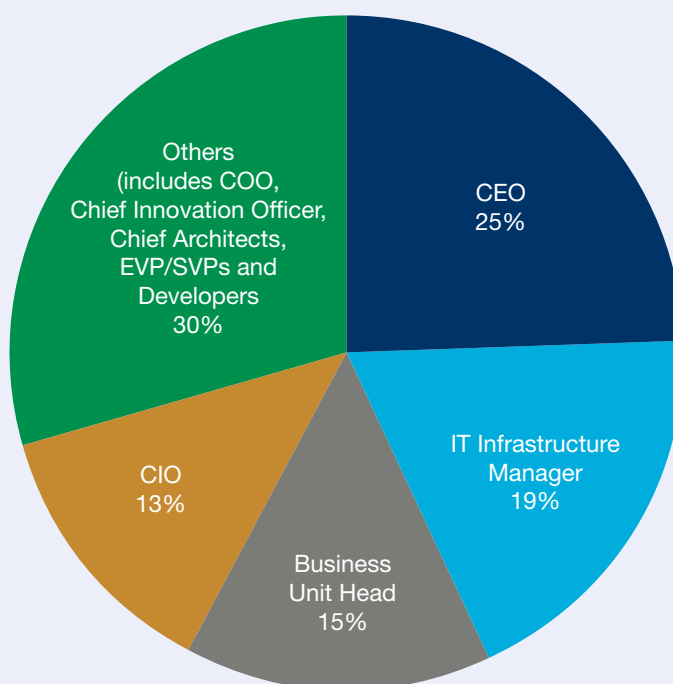
Who took the survey?

This report, the first in a series of papers that analyze the strategic adoption of cloud computing, is based upon a global survey of 200 senior business and IT executives, conducted in December 2012 and January 2013. The largest group of respondents (16%) came from the US, followed by Brazil, India, Mexico, and the UK (13% each); Germany (10%); Canada (9%); China (6%); Japan (4%); Australia (3%); and Saudi Arabia (3%). Respondents came from five industries: retail (29%), consumer products (28%), banking (25%), telecommunications (13%), and capital markets (7%). More than one-quarter of respondent companies had sales between $1 billion and $4.9 billion. Larger companies made a significant showing, with 10% of respondents reporting sales between $5 billion and $9.9 billion, and 12% over $10 billion. Small and mid-size firms also were well represented: Nearly one in five respondents had sales of $25 million to $99 million, while 18% had sales between $100 million and $499 million, and 14% weighed in between $500 million and $999 million. Chief Executive Officers made up the largest group of respondents (25%), followed by IT infrastructure managers (19%), business unit heads (15%), and Chief Intelligence Officers (13%). Other titles included Chief Operating Officers (8%) and Chief Innovation Officers (7%), along with Developers, Chief Architects, and EVP/SVP of Technology, Operations, and Marketing.

In addition to the quantitative survey, we conducted interviews with executives at Mövenpick Hotels & Resorts Management, NYSE Euronext, and Verizon Terremark. We thank everyone who participated in the research.

Figure 3: Survey respondents

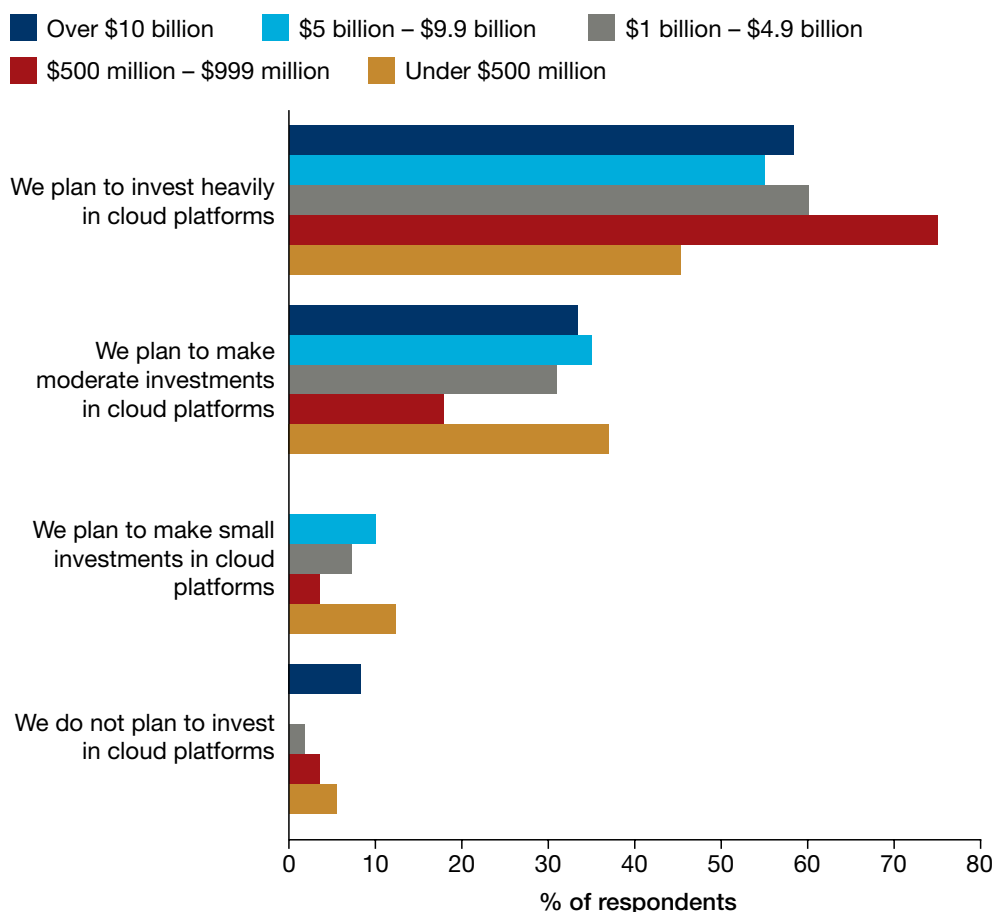Survey demographics: What is your job title?

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Tapping into cloud platforms

The impact of clouds across a broad range of business functions and relationships is significant, and growing. The technology helps businesses meet the challenges of a globalized economy by allowing them to build more agile business frameworks that can boost innovation.

It is an appealing approach for many organizations. Our survey finds that 56% of respondents plan to invest heavily in cloud technology over the next three years, with midsize companies—those with revenues between $500 million and $1 billion—leading the way. Altogether, 79% of respondents expect to achieve significant improvements in productivity from cloud investments, and over two-thirds predict speed and innovation gains as a result of leveraging clouds across the enterprise. In fact, many organizations report that they have already achieved substantial benefits from cloud initiatives, and expectations are high over the next three years.

Figure 4: Investment plans

Cloud investment plans by size of company

Altogether, 79% of respondents expect to achieve significant improvements in productivity from cloud investments, and over two-thirds predict speed and innovation gains as a result of leveraging clouds across the enterprise.
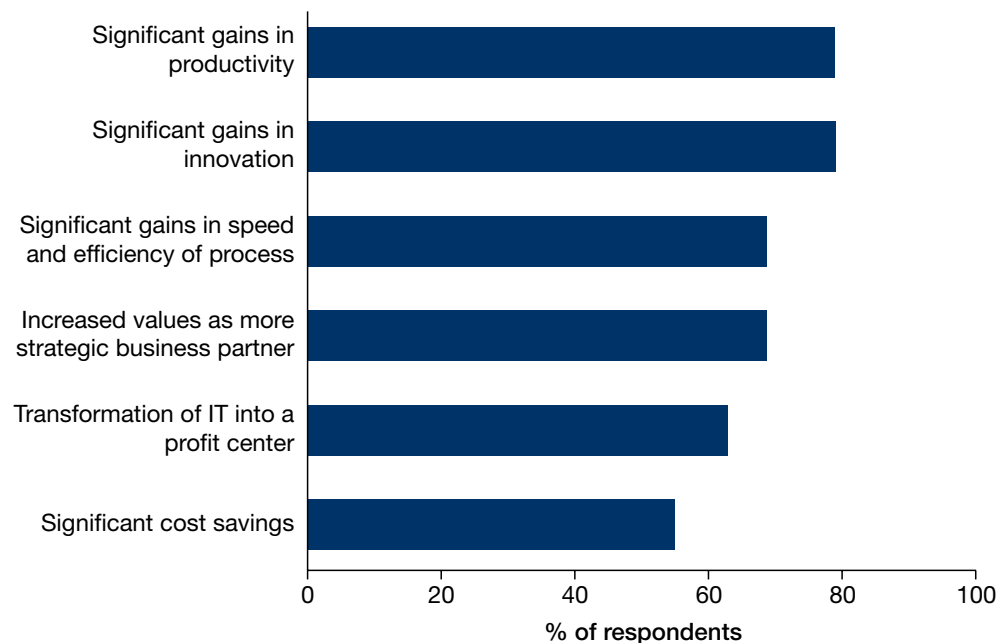
This focus on value beyond software and services is changing the role of the IT department. By fostering innovation and collaboration, cloud platforms are helping IT departments up-level their focus: Over two-thirds of respondents indicate that cloud platforms have turned IT into a more strategic business partner. The ability to focus on core business issues rather than the task of keeping all the various systems running—often referred to as "keeping the lights on"—can have a profound impact on how an enterprise operates.

Verizon Terremark's Mr. Considine says this is the moment to make IT more strategic. "CMOs, HR directors, and others don't want to make technology decisions," he says. By championing the technology and helping the organization develop a focused strategy, IT can both promote cloud computing and elevate its own role.

Business and IT leaders recognize that cloud adoption has a significant positive impact across a range of business activities, particularly on productivity, innovation, and process efficiency. In fact, four out of five respondents expect a high or significant level of improvement in a number of areas. For example: The ability to use a cloud platform for collaboration makes it far simpler to create a central data repository that is easily synced with various devices, including laptops, tablets, and smartphones that are carried into the field and out to client sites. Ultimately, this allows real-time data to stream across the organization in a point-to-point way. It transforms static and linear processes into a dynamic model.

Figure 5: Return on investment

Expected benefits of cloud investments

% of respondents

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A marketing cloud, for instance, allows organizations to plug in data on the fly and measure things such as trending sentiment or how a particular message or pitch influences customer behavior. As organizations attempt to wrap their arms around massive amounts of structured and unstructured data—including audio, video, and social media streams—the ability to understand behavior and spot opportunities is paramount. Big data and analytics are particularly valuable in customer service, where it is critical to evaluate how customers use systems, which channels are most effective, and how an organization can allocate internal resources most effectively.

This new channel for digital interaction and collaboration is luring a growing number of organizations into collaborative ventures and basic marketplace platforms. Nearly two-thirds of respondents are building their own business networks, and about half participate in networks set up by technology providers and by partners. In addition, more than one-third of organizations participate in business networks that allow users to create new apps and services.

NYSE Technologies: The vertical cloud

NYSE Technologies provides advanced software and data services for the financial services industry, including brokerage companies, market research firms, hedge funds, and investment banks. The firm, which grew out of the fabled New York Stock Exchange and later became a division of NYSE Euronext, launched a major cloud initiative in June 2011. Feargal O'Sullivan, Head of Sales, Americas, for the firm, describes the organization's approach as a "vertically oriented cloud." The company focuses on a broad scope of services enabled through clouds, which must be delivered on demand within an agile and flexible IT and business framework. "We need the environment to operate within the operating budget rather than the capital budget; as a moderate recurring cost instead of a large up-front capital expense," he says.

In fact, the NYSE Technologies Capital Markets Community Platform is the first financial services cloud to deliver platform services to the capital markets community. The approach is designed to provide a highly flexible and low-latency IT and development environment that helps reduce costs for market participants. The cloud, which creates a more modular approach to services, also delivers streamlined access to a wide variety of trading and support applications that, among other things, provision services rapidly for hedge-fund traders and provide large volumes of market data for reporting and analysis. The benefits, Mr. O'Sullivan says, include faster time to market, a highly scalable IT infrastructure, simplified access to a broad array of services, lower costs, and far more robust security than most small to mid-sized firms can afford. In addition, the organization can build flexible solutions for different clients and market requirements on a rapid basis.

It's no small feat. NYSE Technologies serves more than 2,000 firms and publishes over eight gigabits of updates per second at peak load. "We have a direct relationship with every one of these companies," Mr. O'Sullivan says. For instance, one customer—"an integral part of our community from a trading perspective"—required an application and infrastructure that in the past would have taken months to build. Instead, the cloud platform sliced through the complexity, and NYSE Technologies had the service up and running within one month. "We were able to deliver enormous value by supporting them through the entire process," Mr. O'Sullivan says. "Clouds allow us to remove a lot of the heavy lifting and deploy systems faster and better than ever before."

Putting cloud platforms to work

Clouds can only be transformative if they are created and used in the right way. Meeting the challenges of a globalized digital business environment requires sound strategy, engagement in ongoing planning, and discussions across multiple business units. There is also a need to focus on transforming underlying workflows and processes—all while keeping systems and data secure.

The payoffs can be significant. Fast-track development, for example, can eviscerate the inefficiencies associated with linear work processes (tasks performed one at a time in sequence, rather than concurrently) and asynchronous communication (messages that do not depend on simultaneous participation by all parties, such as email). The idea is to create to a real-time data environment with no latency or delays. A well-designed cloud platform can deliver updates and new features more quickly and in a more targeted manner than older alternatives. As consumers and employees become accustomed to mobile devices and apps—and as the underlying technology framework matures—there is a growing expectation that organizations will update apps regularly.
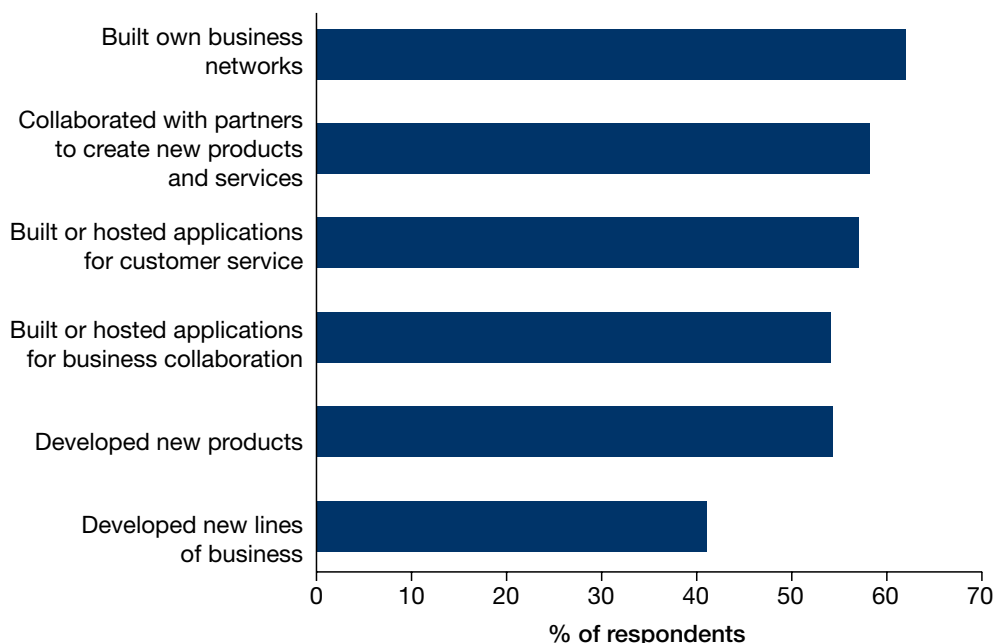
This approach is at the center of business strategy for NYSE Technologies. "There are tremendous advantages to having a cloud that specifically focuses on the needs of clients," says Mr. O'Sullivan. This vertical cloud, as he calls it, has allowed NYSE Technologies to compress application development cycles from several months to a couple of weeks. It has also reduced the number of physical servers used for software development from 2,000 to 200.

For Roger MacFarlaine, Vice President, Technology & Systems at Mövenpick Hotels & Resorts Management, which operates 71 hotels in 25 countries, cloud platforms have become essential infrastructure. "The beauty about third-party cloud vendors and services is they provide a high level of scalability," he says. "This allows us to quickly add services at a reasonable cost to match our organization's specific business needs." Mövenpick relies on a combination of internal and external clouds for e-mail, data services, human resources functions, and other business applications. It also uses a cloud to support a mobile customer service app.

The need for fast and efficient infrastructure and software development spills over into virtually every aspect of business operations. Key areas of focus revealed by the survey include creating new products and services (58%); building and hosting applications for customer service (57%); and building and hosting applications for business collaboration (54%).

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Figure 6: The cloud at work

How firms are putting clouds to work

% of respondents

Cloud platforms allow organizations—particularly those operating in information-intensive fields such as healthcare, engineering, and financial services—to combine data in faster and more seamless ways to meet real-time market needs. And there is great potential for further development. For example, as the "internet of things" takes hold and data streams in from RFID tags, machines with embedded sensors, smartphones, and other devices, the need for rapid development cycles, real-time analytics, and dynamic decision-making will only expand further.

Integration is the key to success—especially as organizations attempt to build mobile apps and connect to mobile devices. Accordingly, well over half of survey respondents have already purchased integration tools. An equal number have established a dedicated team that focuses on cloud integration, while 52% use integration-service providers. One-quarter of respondents work only with cloud-based service providers with built-in connectivity to other cloud-based services, and 13% outsource integration to third-party vendors.

Participation in cloud-based business networks delivers a variety of benefits. A strong majority of executives surveyed rank identifying new opportunities for partnership as one of the top three payoffs, with more than one-third rating it the most valuable reward. Other rewards include enhancing the performance of specific functions such as supply chain, purchasing, and payments; taking advantage of new apps and services created by cloud network partners; reaching new markets and customers via cloud partnerships; and sharing processes with network partners.

Says Mövenpick's Mr. MacFarlaine: "Cloud platforms represent the IT framework of the future, but they already align with today's business needs and provide significant returns."

Mövenpick Hotels & Resorts Management travels into the cloud

Few industries encounter IT challenges as steep as those faced by global hospitality firms. Hotel sites in different countries face IT and bandwidth constraints, and many franchise owners have different ideas about how best to approach these issues. This makes collecting, managing, and sharing data difficult. At Swiss-based Mövenpick Hotels & Resorts Management, Roger MacFarlaine, Vice President, Technology and Systems, says the answer is a cloud platform that simplifies IT administration and data sharing while also trimming costs and building a more strategic IT department. "We try to take a holistic approach and avoid application silos," Mr. MacFarlaine explains.

The company currently operates clouds that support worldwide e-mail, virtual private networking administration, and a SaaS model for handling accounting in Europe. It also has internal clouds in place for guest videoconferencing services, forums, its operating standards manual (OSM), an HR talent management system, a media database, a loyalty program, and a property management system in Europe. Among other things, the cloud allows MH&R to scale sites and add unlimited images, lets individual hotels update promotions on the fly, and accommodates guest comments in a controlled environment (rather than unmanaged on the internet at TripAdvisor or another site).

MH&R's cloud platform has also eliminated the need for hotels to use expensive long-distance leased lines, and it has enabled IT support for a unified network down to the PC desktop level. Mr. MacFarlaine says that the company will soon add a global property management system— "so we do not have to duplicate the system and replicate the data at all the hotels"—and plans to add sophisticated data collection tools as well.
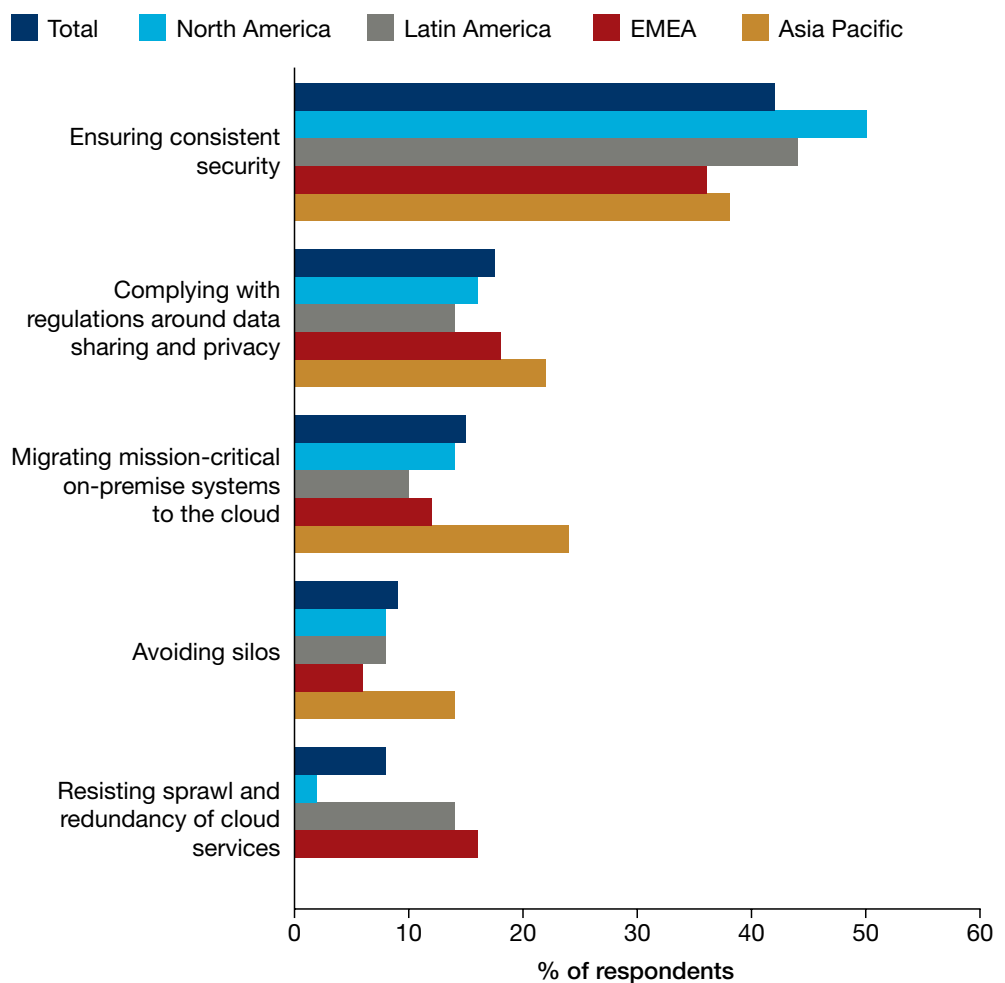
Mr. MacFarlaine is working with hotel owners and others to build understanding around opportunities that can be realized in the cloud. "Some hotel owners tell us they don't want their data viewed by others in the organization, including competing owners in the same city," he explains. "We have to educate them that all the data is kept secure and no other hotel can access their database. The psychological issues and change-management challenges are as important as the technical concerns."

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Building a best-practice approach

Cloud computing presents a variety of obstacles and challenges. About 40% of survey respondents indicate that security is their top-of-mind concern. Other key issues include regulatory compliance and migration of data, along with avoiding silos and redundant data. The weight of these issues varies by the location of respondents, as well as their size. A number of other factors also enter into the picture, including a lack of qualified, interested partners (cited by more than one-quarter of respondents), lack of expertise or direction in-house, and internal resistance to change.

Figure 7: Regional variation in cloud challenges

Biggest cloud challenges by region

Furthermore, while platforms help organizations manage data and put it to use in a more holistic way, Verizon's Mr. Considine says the ease with which infrastructure, applications, and other services can be added to a cloud platform is both an opportunity and a potential problem. When anyone with a credit card can procure services at any given moment, it is crucial for IT and business functions to manage the process and ensure a high level of integration among the moving parts.

Users can address these challenges by focusing on several key issues:

- **Developing a strong governance framework.** It is essential to build robust rules and controls to reduce risks and build effective workflows. A standardized approach to technology translates into more efficient and cost-effective buying decisions.

- **Building consistent IT and data security.** Because cloud platforms often route data across multiple locations or organizations, it is critical to include strong security controls into systems and across technologies. This may include firewalls, VPNs, mobile device management services, mobile application management tools, file encryption, IP protection tools, and endpoint security. It is crucial to check with vendors and understand what protections they provide in order to effectively leverage their established security services.

- **Building a cloud environment that enables the type of applications required for today's business needs.** Make sure applications meet business requirements and certify that they are designed for real-world conditions. These platforms must support mobile devices, social media, and big data—making it simpler for both employees and clients to use apps and tools and ultimately increase the odds of success.

- **Supporting rapid innovation and application development in a mobile framework.** Development cycles are increasingly compressed, and the demands of clients and the overall market change rapidly. A cloud platform must support data exchange that matches a 24x7 global environment.

- **Building end-to-end processes.** Most organizations are heavily dependent on routing data to the correct place. For example, hiring a new employee is primarily an HR function, but it triggers activities in payroll, IT, and other departments. Developers must build end-to-end automation into business applications and ensure that the underlying data is routed through the cloud in an efficient way.

- **Selecting the right cloud platform to ensure maximum performance.** Developers must work with cloud platforms that enable them to fit their applications natively into customer business processes.

- **Forging partnerships and building an enhanced supply chain.** It is important to understand how a cloud platform enables connections to other organizations and customer bases. Partnerships are key to success, and cloud platforms can make these connections broader and deeper.

Organizations that take a holistic approach to the cloud are more likely to achieve a competitive advantage.
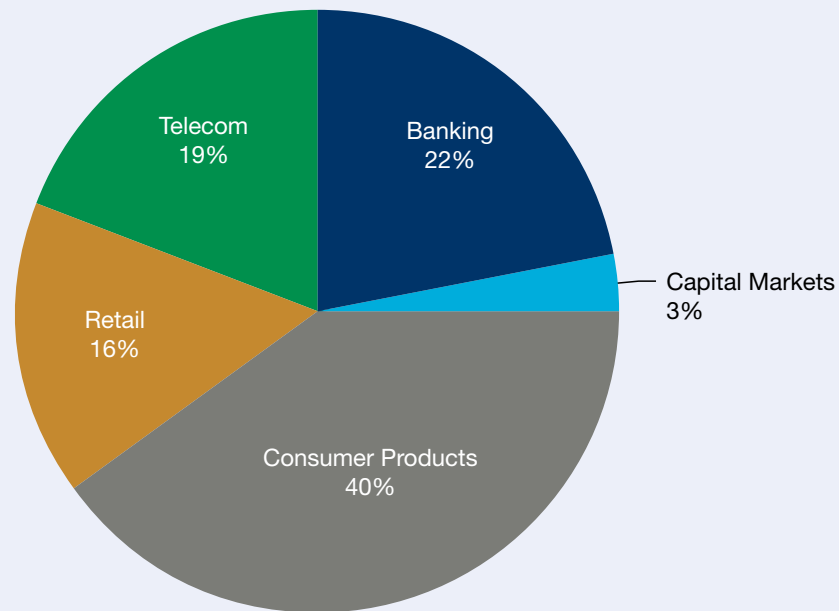
Several factors play a key role in determining the success of a cloud initiative. Most successful organizations have established clearly defined cloud strategies and are committed to significant investments in cloud infrastructure. These firms also have pushed adoption across multiple business functions, and have devoted attention and resources to risks and security. In addition, many of these firms prioritize virtual collaboration as a core element of a mobile strategy, and institute Bring Your Own Device (BYOD) policies as well as using Mobile Device Management (MDM) and other tools that boost oversight and reduce risk.

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The seven habits of cloud leaders

Our study shows that certain attributes are common to organizations that have assumed a leadership position in adopting and exploiting cloud technologies. These respondents were identified based on planned investment in cloud computing, adoption of cloud platforms by a majority of their business functions, and their approach to managing cloud risk.

Figure 8: Cloud leaders

What is your firm's industry segment?

This leadership cohort makes up 16% of respondents. Leaders are:

- More likely to be in the consumer products and telecommunications industries, and less likely to be in retail.

- Well represented in Mexico, Brazil, and the UK, and underweighted in China, Germany, and the US.

- Strong among SMEs, especially firms with revenue in the $100 million–$500 million range, but also among companies with revenues of $10 billion or more.

- More bullish than their peers on the cloud's potential to drive revenue and cut costs, and more likely to use the cloud to innovate at the pace of business and meet rapidly changing market needs in real time.

- More likely to say cloud platforms have transformed IT into a profit center, and more likely to participate in networks set up by technology providers.

- More likely to emphasize concerns about operational risk and less likely to focus on concerns about data security/IP risk.

- More likely to prioritize virtual collaboration as a goal of mobile strategy, to have instituted a BYOD policy, to have launched a managed service offering, and to use a cloud-based mobile app platform in production.

Conclusion

Organizations that take a holistic approach to the cloud and focus on building flexible, agile, and extensible platforms are more likely to achieve a competitive advantage than those that take a piecemeal approach. The leaders are better equipped to address the realities of global business because they manage the multiple issues at the heart of building a successful cloud platform. Key takeaways from our research include:

- **Embrace the opportunities afforded by cloud networks.** While cultural skepticism persists about the benefits of cloud computing, cloud leaders are more inclined to say that cloud platforms have transformed IT into a profit center, and are more likely to participate in networks set up by technology providers. They are also prone to rely on the cloud to innovate at the pace of business and meet rapidly changing market needs in real time.

- **Organizations that achieve the best results engage in substantial planning when they select providers and build a platform.** They understand that a cloud environment must enable end-to-end processes and allow developers to reach the customer base. And they engineer high levels of security without being paralyzed by a very real array of threats.

- **Cloud platforms represent a different—and far more efficient—way to collect, manage, store, share, and use data.** As mobility, social media, and big data converge in the cloud, new ways of unlocking the value of data emerge. Customer-facing services, applications, and business processes are at the center of this new approach. Clouds allow organizations to standardize applications and workflows. Yet they also create a platform that supports innovation and fast-track development.

- **Successful organizations acknowledge the changes needed in IT and enterprise culture.** They find talent—in some cases people with knowledge and skills from outside the traditional realm of IT—to build out the IT framework for the future. Mövenpick's Mr. MacFarlaine says, "There's a need to be a business technologist and understand how to deliver greater value to the organization and its clients or customers. It's all about plugging in technology that enables the business."

Oxford Economics and SAP will explore cloud platforms further in three forthcoming thought leadership papers that focus on mobility, business networks and network integration, and security.

As mobility, social media, and big data converge into the cloud, entirely new ways of unlocking the value of data emerge.

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Key regional differences

- Latin American firms are significantly more likely than other regions to have Finance and HR functions in the cloud (40% and 28%, respectively).

- Respondents from Asia/Pacific are significantly more likely than other regions to have access to customer information anytime, anywhere for their internal mobile cloud strategy (80% vs. 56% overall) and to focus on smart-phone adoption trends (76% vs. 54% overall).

- Respondents from Latin America and EMEA are significantly more likely than those in North America and Asia Pacific to believe that sprawl and redundancy of cloud services are a top-three challenge to cloud computing (38% vs. 24%).

- Respondents from Asia/Pacific and EMEA are significantly more likely than those in the Americas to build and host applications for business collaboration (68% vs. 41%).

- Respondents from Latin America are significantly less likely to be concerned about either data security/IP risk or financial risk with regard to cloud computing (36% and 18%, respectively).

- Respondents from North America are significantly less likely to have developed new cloud-based offerings for mobile applications (45% vs. 66% elsewhere) and to have focused on the proliferation of apps for mobile cloud computing (38% vs. 63% elsewhere).

OXFORD
Abbey House, 121 St Aldates
Oxford, OX1 1HB, UK
Tel: +44 1865 268900

LONDON
Broadwall House, 21 Broadwall
London, SE1 9PL, UK
Tel: +44 207 803 1400

BELFAST
Lagan House, Sackville Street
Lisburn, BT27 4AB, UK
Tel: +44 28 9266 0669

NEW YORK
5 Hanover Square, 19th Floor
New York, NY 10004, USA
Tel: +1 (646) 786 1879

PHILADELPHIA
303 Lancaster Avenue, Suite 1b
Wayne PA 19087, USA
Tel: +1 610 995 9600

SINGAPORE
Singapore Land Tower, 37th Floor
50 Raffles Place
Singapore 048623
Tel: +65 6829 7068

PARIS
9 rue Huysmans
75006 Paris, France
Tel: + 33 6 79 900 846

email: mailbox@oxfordeconomics.com

www.oxfordeconomics.com