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Ideation Center insight

Preparing for the digital era

The state of digitalization in GCC businesses

Contacts

Abu Dhabi

Sevag Papazian
Principal
+971-2-699-2400
sevag.papazian
@strategyand.ae.pwc.com

Beirut

Rawia Abdel Samad
Director, Ideation Center
+961-1-985-655
rawia.abdelsamad
@strategyand.ae.pwc.com

Dubai

Samer Bohsali
Partner
+971-4-436-3000
samer.bohsali
@strategyand.ae.pwc.com

About the authors

Strategy&

Samer Bohsali is a thought leader with Strategy&, part of the PwC network. He is a partner based in Dubai and the leader of the firm's digital business and technology practice and the digitization platform in the Middle East. He also serves on the leadership team of the firm's global digital services community. He has over 20 years of strategy consulting and industry experience, serving clients in the Middle East. Before joining Strategy&, he cofounded and was the COO of Cyberia, one of the first Internet service providers in the region.

Rawia Abdel Samad is the director of the Ideation Center, the leading think tank for Strategy& in the Middle East. She was previously a manager with Strategy& in Beirut and a member of the communications, media, and technology practice in the Middle East. She has extensive experience in information and communications technology policies, sector strategies, and impact assessment.

Sevag Papazian is a senior principal with Strategy&. He is based out of Abu Dhabi and is a member of the digital business and technology practice in the Middle East. He is a recognized innovator in national digitization strategies and governance models, corporate digital strategies, and large-scale technology-enabled transformations. His areas of interest include the latest developments in technology and their implications for economies and societies.

Osama Eid is a manager with Strategy&. He is based in Beirut and is a member of the digital business and technology practice in the Middle East. He specializes in developing national and company-specific digitization strategies, and taking the lead on technology-enabled business transformations across multiple sectors.

Siemens

Benjamin Schroeder is the head of communications for Siemens in the Middle East, based in Abu Dhabi, and is driving digital transformation for Siemens in the region. He was formerly responsible for business development, marketing and strategy for the company's Drives Technology business in China, before heading marketing and communications for the Industry sector in North East Asia, headquartered in Beijing.

Katharina Hatz is a strategy consultant at Siemens. She is based in Abu Dhabi and is a member of the business development department responsible for the Middle East region. She was previously a member of the global Siemens AG digitalization strategy team in Munich, Germany. She is now driving the digitalization and innovation strategy for Siemens in the United Arab Emirates (UAE) and across the Middle East.

About the Ideation Center

The Ideation Center is the leading think tank for Strategy& in the Middle East. We aim to promote sustainable growth in the region by helping leaders across sectors translate socioeconomic trends into actions and better business decisions. Combining innovative research, analysis, and dialogue with hands-on expertise from the professional community in the private and public sectors, the Ideation Center delivers impactful ideas through our publications, website, and forums. The end result is one that inspires, enriches, and rewards. The Ideation Center upholds Strategy&'s mission to develop practical strategies and turn ideas into action. At the Ideation Center, we enjoy the full support of all practices in the Middle East. Together we bring unsurpassed commitment to the goal of advancing the interests of the Middle East region. Find out more by visiting www.ideationcenter.com. The Ideation Center team that produced this paper comprised Samer Bohsali, Rawia Abdel Samad, Sevag Papazian, and Osama Eid from Strategy&, along with Benjamin Schroeder and Katharina Hatz from Siemens. Melissa Rizk, Yara Itani, and Michael Palmer also contributed to this report. Rabih El Chaar, Marwan Bejjani, Shihab Elborai, and Fares Saade contributed the industry profiles to this report.

About Siemens

Siemens is a global technology powerhouse that has stood for engineering excellence, innovation, quality, reliability and internationality for more than 165 years. The company is active in more than 200 countries, focusing on the areas of electrification, automation and digitalization. One of the world's largest producers of energy-efficient, resource-saving technologies, Siemens is a leading supplier of efficient power generation and power transmission solutions and a pioneer in infrastructure solutions as well as automation, drive and software solutions for industry.

Siemens is at the forefront of digitalization, using its engineering, domain and digital know-how to generate performance improvements for the future of manufacturing, sustainable energy, intelligent infrastructure, digital services and cyber security. The company leverages its digitalization technology and experience to merge the physical and virtual worlds, driving a competitive advantage for customers by turning big data into smart data. For more information on Digitalization at Siemens, please visit www.siemens.com/digitalization

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Foreword by Dietmar Siersdorfer, CEO, Siemens Middle East and UAE

Our world is becoming ever more digitalized. Billions of devices and machines are generating massive amounts of data; the real and virtual worlds are merging. The ability to capture this data, analyze it and use it to drive real value will shape the future of globally competitive business, industry, and infrastructure in the Gulf Cooperation Council (GCC) countries.

At Siemens, this is our future. We believe that digitalization is a catalyst for new business models and optimized processes. It will drive significant change in markets and strategy. Identifying the right digital applications with appropriate implementation strategies will enable companies, industries, and countries to reach the next level of productivity, and therefore competitiveness.

There are tremendous opportunities. The GCC is taking great strides toward economic diversification. Knowledge, industrialization, and sustainable energy are in focus. Cities are becoming smarter, infrastructure increasingly connected, and efficiency gains are being sought across all sectors. Digitalization is driving these transformations.

But it is a long journey, and it won't happen overnight.

Our intention is that this report, by Siemens and Strategy&, serves to highlight the opportunities, address the challenges, and give a clear picture of the status of digitalization in the GCC. It is for our customers and partners to inspire reflection on their own businesses, and for us to help understand how we can use our technology and experience to best support the transition to a digital future in the GCC.

Dietmar Siersdorfer,
CEO, Siemens Middle East and UAE

Executive summary



Executives in the GCC¹ are excited by digital. They recognize its benefits, such as stronger customer orientation and increased efficiency — vital in an era of budget constraints. However, GCC usage of digital technology and the implementation of strategic digital initiatives generally is not at the same level as some other parts of the world.

The process of going digital is often considered simply the adoption of a specific technology, rather than a transformation journey. Similarly, there is a gap between aspiration and implementation, with outdated technology and a talent shortage hampering progress. Many organizations are gradually building technology capabilities. However, they lack vision and the leadership to drive digital transformation and a nascent national digital ecosystem —insufficient infrastructure, inadequate regulation, a lack of digital skills — restrains them.

Instead of simply importing best digital practices and technology, GCC organizations should approach this challenge holistically by creating the building blocks for digital transformation. First, organizations need a business strategy for the digital era. This requires assessing digitalization's impact on their industry and its fit with their ambitions. Second, they must identify those areas of their business where digitalization can help the most, and how. Third, digital change requires senior sponsorship and proper governance. Digitalization should be an organization-wide collaborative effort, not the sole preserve of information technology (IT) or marketing. Fourth, they must develop digital skills, in IT and across the organization. Fifth, they should collaborate with stakeholders across the ecosystem, embracing open innovation, learning from international players, and reaping benefits from various government initiatives. Sixth, they should invest more wisely, as opposed to spending more, thereby mitigating investment risk.

These steps can bring GCC industries up to speed in digitalization, and enable them to become global leaders. Manufacturing, for example, with its skilled labor and willingness for diversification, could become a leader in Industry 4.0 (the new wave of intelligent automation).

The GCC digitalization imperative

Digitalization harnesses the power of technology to solve problems, reimagines the customer experience, inspires trust, accelerates change, and reinvents business models. Going digital has thus become a key differentiator for companies when competing in today's industries.

The last two decades have witnessed phenomenal growth in digitalization, illustrating its central position in the modern economy. At the end of 1995, the market capitalization of the top 15 public Internet companies was US\$16.7 billion.² By May 2016, the valuation of the equivalent top 15 companies had increased more than 125 times and mushroomed to \$2.1 trillion.³

Digital companies have usurped the energy sector's previous dominance in the global economy. Five of the top 10 companies worldwide, in terms of market capitalization, are digital companies (Apple, Alphabet, Microsoft, Amazon, and Facebook). Just 10 years ago, only one digital company (Microsoft) appeared in that same list, which was dominated by oil and gas companies. Moreover, even businesses in traditional industries are going digital.

Governments in the GCC region have acknowledged the economic and social benefits that going digital can bring, and have developed ambitious plans and strategies. Examples include Saudi Arabia's Vision 2030 and National Transformation Plan 2020 (which covers the digital space), Smart Dubai, Qatar's Connect 2020 ICT Policy, and Oman's digital strategy (e-Oman). The Global Manufacturing and Industrialisation Summit, hosted by the UAE Ministry of Economy, is evidence of the perceived importance of digital technologies within the manufacturing industry.

Governments in the GCC region have acknowledged the economic and social benefits that going digital can bring, and have developed ambitious plans and strategies.

As for companies, digitalization can bring myriad benefits. It can allow them to become more efficient in their operations and decision making, a major advantage given current budget constraints in the region. It can enable them to grow their business by adding digital products and services to their portfolio, or selling existing products and services through digital channels. This benefit is particularly relevant for GCC countries, where consumers are among the most tech-savvy in the world, and demand much more personalization and customization in their products and experiences. Bahrain, Qatar, and the UAE have more than 100 percent smartphone penetration. Young people in the GCC are particularly keen on such personalization and customization, seek to influence the design of new technologies, and are famously early adopters. Finally, digitalization can open up opportunities for companies to enter new business areas where value is being created within or outside their industry, while defending their business from disruption.

However, as this report shows, many companies in the region have not been as quick to seize the potential of digitalization as their governments and their sophisticated customers. A limited understanding of digital transformation has run in tandem with a similarly restricted perception of its potential benefits.

The current digital landscape: Interest outstrips understanding

GCC executives, just like C-suite leaders around the world, show great enthusiasm for going digital, yet many in the region are still coming to grips with its full meaning and potential. Such understanding varies by company size, location, and sector, and according to the seniority and role of the leader. In general, however, executives too often believe that going digital merely involves the adoption of a specific technology. This narrow definition ignores the many far-reaching benefits that moving toward digital can bring: harnessing the power of technology to solve problems, reinvent business models, reimagine the customer experience, inspire trust, and accelerate change.

The fact that many organizations have a partial understanding restrains the uptake of digital technology and obstructs the formulation of effective strategies. As a result, there is a significant gap between theoretical aspiration and practical implementation.

Definition and awareness

Almost 45 percent of the respondents in a survey conducted by Siemens in 2016 (see “*Siemens survey methodology*,” page 49) consider themselves to be familiar with the concept of digitalization (see *Exhibit 1*). Familiarity with digital transformation is higher among senior managers (57 percent) than among technical staff (42 percent). Meanwhile, 47 percent of middle managers said they were well acquainted with the concept.

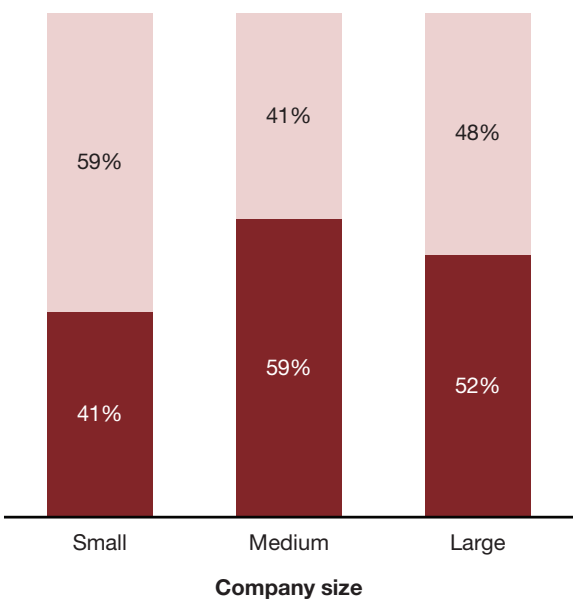
Many may claim familiarity with the concept of digitalization, but when pressed to be specific, more than three in four companies associate it merely with the adoption of one specific technology. This leaves a minority who think of digitalization much more broadly, along a spectrum of activities ranging from realizing efficiencies in operations, to growing an existing business model, to completely reimagining and disrupting an industry.

There is a significant gap between theoretical aspiration and practical implementation.

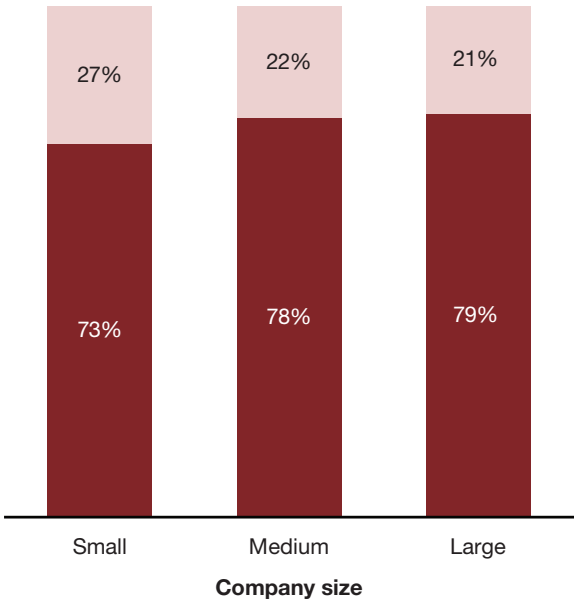
Exhibit 1

Most companies surveyed associate digitalization with a specific technology

Familiarity of respondents with digitalization concept¹



Understanding of digitalization²



Note: Small = fewer than 50 employees, Medium = 50 to 1,000 employees, Large = over 1,000 employees.

¹ Survey question: “How familiar are you with the concept of digitalization in general?” (on a scale of 1 to 5). “Familiar” is the percentage of respondents who replied with a 4 or a 5, “Not familiar” is those who replied with 0 to 3.

² Survey question: “What does the term ‘digitalization’ mean to you?” Categories are based on mapping qualitative survey responses to digitalization definition spectrum.

Source: Siemens survey; Strategy& analysis

There was significant variation in the responses across industries to a request for definitions. For example, only 15 percent of executives in the oil and gas sector see digitalization within this more ambitious spectrum, compared to 32 percent in the transportation industry, which tends also to have a higher rate of digital transformation globally (*see page 39*).⁴ Interestingly, senior managers (40 percent) are significantly more likely to see the broader potential of going digital than technicians (19 percent) and middle managers (23 percent).

Digital usage

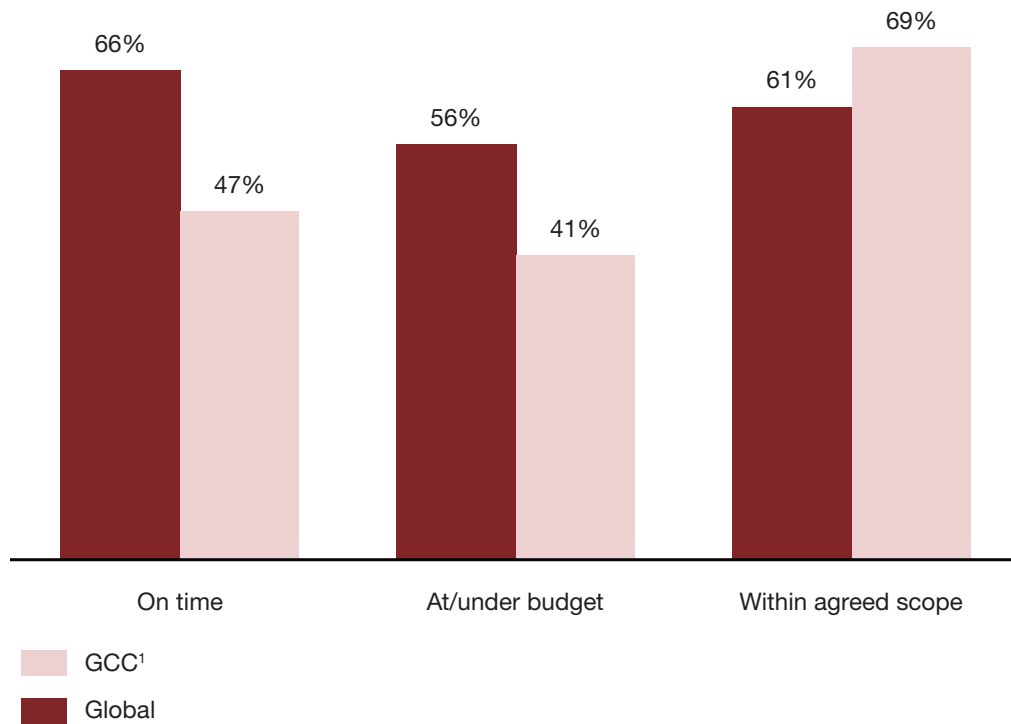
Even within the narrow definition of digitalization, organizations in the GCC still have much practical work to do. Just 3 percent believe they are at an advanced stage in their digital transformation. One-third admit they are in the early stages of development. Among the industries covered in the survey, the government, mining, and utilities sectors are the most advanced in their implementation. These responses may also reflect budget constraints or other priorities in the business that push digitalization down the agenda. Alternatively, as we shall see later, the right people to move digital transformation forward, or to explain its potential clearly, may not be available.

Moreover, according to PwC's 2015 Global Digital IQ® Survey, companies surveyed in Qatar and Saudi Arabia lag behind other regions around the world in their delivery of digital initiatives.⁵ A significantly larger proportion of projects in these countries fail to reach completion on time or within budget because of limited collaboration across departments within GCC organizations. For example, only 47 percent of companies in the region believe that their strategic digital transformation initiatives complete on time compared to a 66 percent global average (*see Exhibit 2*). Our industry profiles (*see page 39*) indicate that a lack of robust governance and leadership in promoting these digitalization initiatives is at least partially responsible for this comparatively poor performance.

Exhibit 2

GCC companies lag behind global players in delivering strategic digital initiatives

Delivery of strategic digital initiatives within agreed-upon time line, budget, and scope (2015–2016) (% of “Always” or “Frequently” responses)



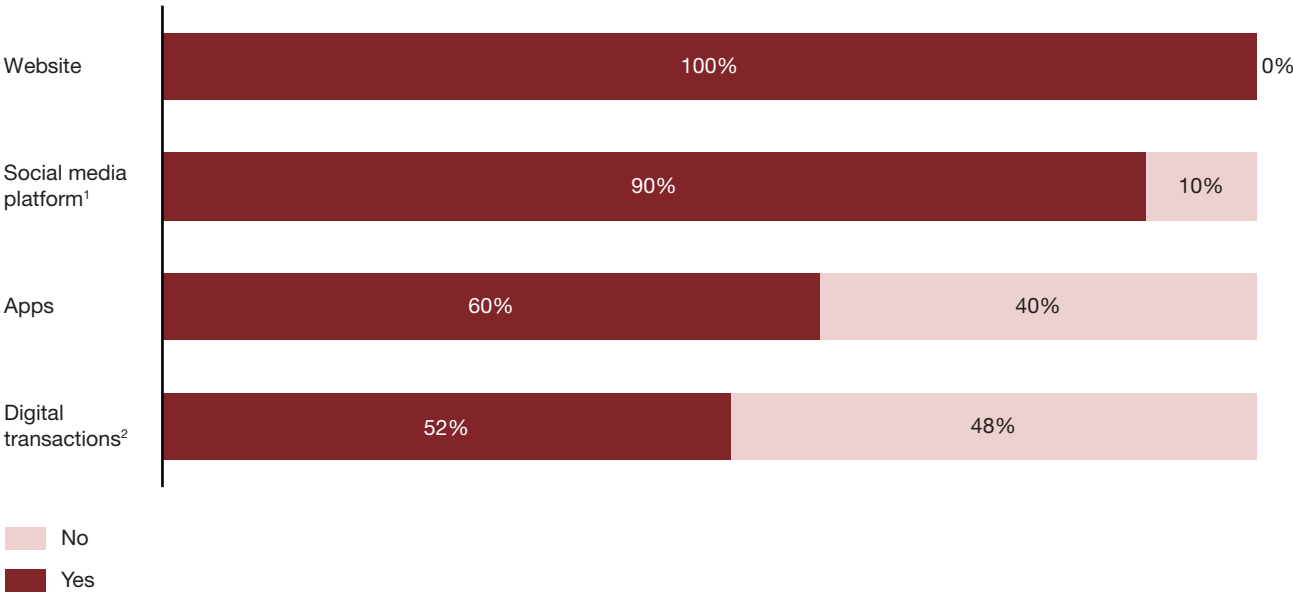
¹ GCC respondents include 32 companies based in Qatar and Saudi Arabia.

Source: Siemens survey for Qatar and UAE; PwC, 2015 Global Digital IQ® Survey; Strategy& analysis

The progress of several specific digital trends was assessed for this report. In terms of digitalization of customer touch points, companies in the region are extensive users of website and social media channels for communicating with stakeholders (*see Exhibit 3*). In a Strategy& assessment of the top 100 publicly listed companies in the GCC, the UAE leads the way in this regard. All leading UAE companies have at least one social media profile, and high percentages use apps or engage in digital transactions, such as online banking, e-commerce, or e-payment, although usage rates differ. Our assessment found that 81 percent of UAE companies use apps, as do 54 percent of their counterparts in Qatar and 44 percent in Saudi Arabia. Meanwhile, 71 percent of companies in the UAE engage in digital transactions, compared to 48 percent in Saudi Arabia and 42 percent in Qatar.

Exhibit 3
Companies are not fully exploiting the potential of digital technology

GCC technology adoption (top 100 publicly listed GCC companies, July 2016)



¹ Includes at least one account on Facebook, Twitter, or LinkedIn.
² Includes online banking, e-commerce, or online payment transactions.
Source: Zawya; Strategy& analysis

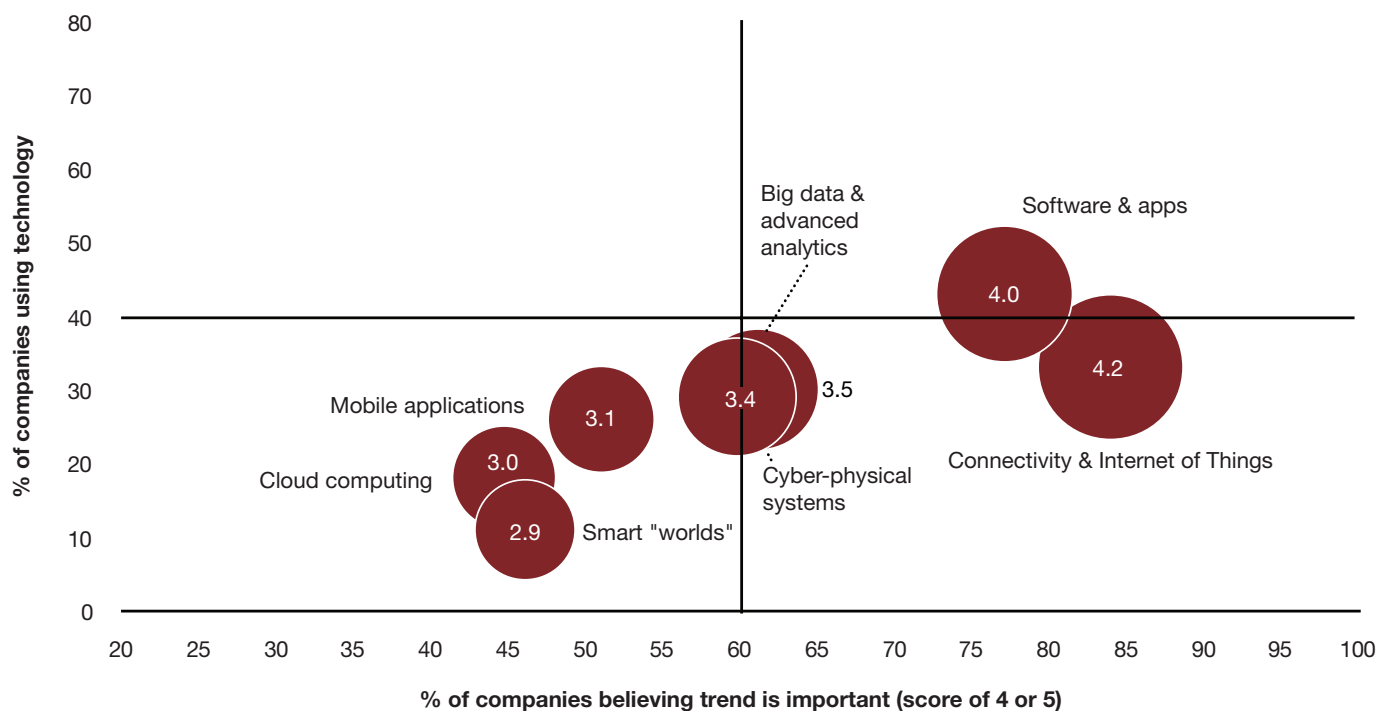
Despite being active in social media, with around half of companies updating their social media profile at least every other day, few companies in the region appear to engage their customers successfully through this channel. For example, of the 100 most-liked Facebook pages of global companies, none is from the GCC, and only a few are among the 100 most-followed global companies on Twitter.

The Internet of Things, the phenomenon of interconnected devices and sensors, is seen in the region as the most important digital trend in terms of its potential (although software and apps are more popular in terms of usage). This is possibly due to the industrial nature of the largest organizations in the region. One of the biggest perceived benefits of the Internet of Things for these industrial companies is the better use of assets. This is because the Internet of Things measures asset performance, while an analytics layer on top provides predictive maintenance and improved configuration of assets (*see Exhibit 4*).

Exhibit 4

GCC companies regard the Internet of Things as the most important digital trend

Perceived importance and adoption of key digital trends



Size of circle is proportional to average importance of trend (score 1–5)

Note: Survey question: "You are, no doubt, already familiar with buzzwords and technologies such as the Internet of Things, big data, and cloud computing. How important do you consider the following trends to be, and what possibilities do you see for applying them in your business environment?" Responses: 1 = not important, 5 = very important.

Source: Siemens survey; Strategy& analysis

Fewer than 20 percent of surveyed companies use cloud computing, and fewer than 50 percent believe it is important. These results come despite the cloud's major potential to transform capital and operational expenditure. Local vendors in this space are often perceived not to be mature enough. Global technology vendors are starting to establish cloud capabilities in the region due to the persistent low trust and limited regulations in hosting data remotely (see *"National enablers of digitalization: Getting the basics right,"* page 26).

More than 60 percent of surveyed companies believe big data and advanced analytics are important. Although this trend has several potential applications, it could be particularly helpful in understanding customers through detailed analysis of structured and unstructured data (such as social media). However, the organization of these initiatives still needs to be made more efficient. They are often led by marketing, with little coordination with IT, therefore underutilizing technology resources. Another impediment is that many organizations in the region face data quality issues, which limits the ability to produce accurate analysis and reports.

Corporate enablers of digitalization: Completing the jigsaw

To understand why digital transformation is still very much in its infancy in the GCC region, we have to examine the factors on which greater usage depends. These include national enablers such as infrastructure and regulation (see “*National enablers of digitalization: Getting the basics right*,” page 26), along with the current status of key corporate enablers such as strategy, organization, skills, collaboration and partnerships across the ecosystem, and investment.

When asked what they would have to achieve internally to enable a shift toward digital, executives were most likely to identify the need for the integration and further training of employees, and for better data security. Medium-sized and large companies emphasized the importance of capable human resources in any push toward digitalization.

Corporate enabler 1: Corporate strategy for the digital age

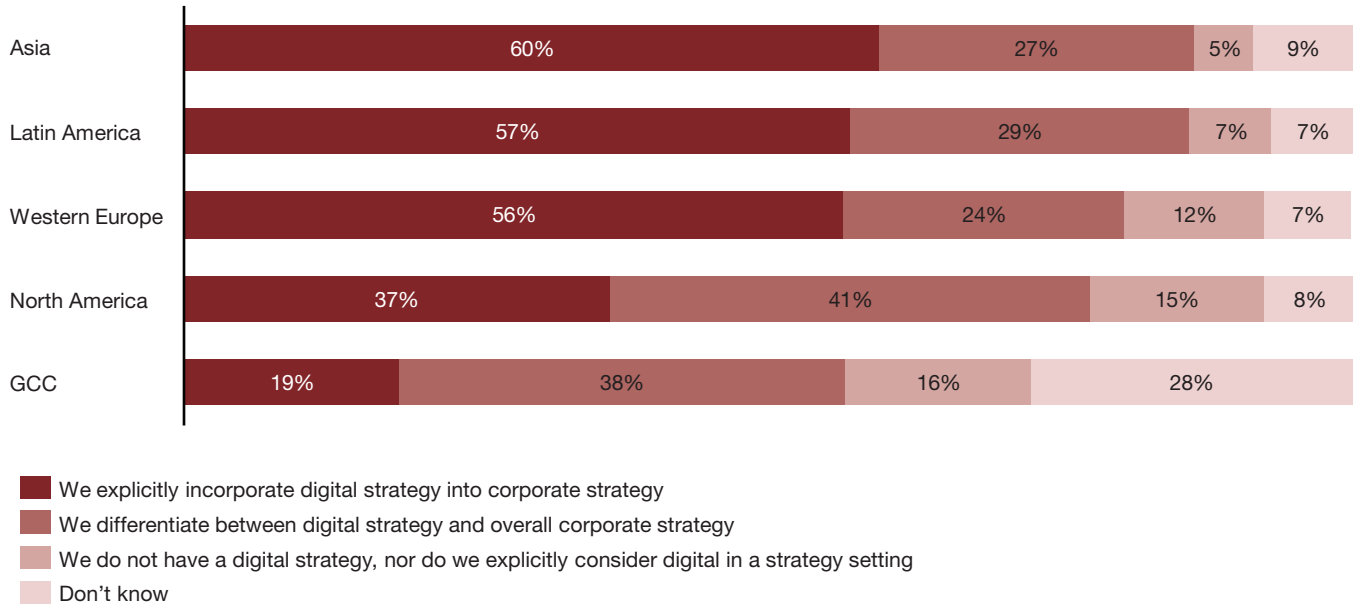
Meanwhile, the need to embed digitalization in the overall corporate strategy was considered substantially less significant as an enabler. This fits with further research undertaken for the 2015 PwC study,⁶ which indicates that GCC companies are much less likely than their counterparts in other regions to incorporate digital strategy into their overall corporate strategy (see *Exhibit 5*).

Medium-sized and large companies emphasized the importance of capable human resources in any push toward digitalization.

Exhibit 5

Few GCC companies consider digital in strategy setting compared to their global peers

Digital versus business strategy (% respondents, 2015)



Note: Survey question: "How is digital treated in the context of your business strategy?"

Source: PwC, 2015 Global Digital IQ® Survey; Strategy& analysis

The global corporate trend is moving away from a standalone digital strategy toward developing a business strategy for the digital age. In some industries, boundaries between a digital and a non-digital strategy have blurred or even completely disappeared. Realizing the potential of digital transformation requires understanding how it affects every aspect of a company's business model.

In this respect, in particular, it seems that GCC companies are falling behind. In the 2016 Siemens survey, a little more than a third of companies (37 percent) have developed a comprehensive digital strategy, whether it is embedded in the corporate strategy or not. Just under a half (46 percent) have no digital strategy whatsoever.

The Siemens survey also found limited horizons in the understanding of what digital strategy can constitute. Even among those that have a digital strategy, only a negligible proportion of companies see it as a means to grow their existing business model, and no single company saw digitalization's potential to disrupt its industry. The vast majority restrict digitalization's potential to realizing efficiencies, and in particular, to the application of a specific technology.

It seems that, in the current environment of low economic growth, a focus on cutting costs is taking priority over the development of far-reaching and enterprising digital strategies. As some companies have already understood, the two goals do not need to be conflicting. Digital transformation can lead to greater efficiency, while at the same time laying the platform for growth through improving the quality of services, catering to new market segments, and creating new business models.

However, it does seem that some companies in the region are under the impression that they can achieve quick and effective results in the digital technology sphere without significant financial and time commitment. Such an approach simply leads to a vicious cycle. Haphazard initiatives will most likely fail, reducing executive interest in digital technology, and leading to stagnation.

Within this general picture, responses to the Siemens survey varied depending on the size of the company and its industry. Perhaps indicating their greater nimbleness and agility, almost 60 percent of small businesses have a full or partial digital strategy, in comparison to 55 percent of large businesses and 51 percent of medium-sized businesses. Small and medium-sized companies have been able to act more quickly to adopt a digital strategy, unencumbered by the more bureaucratic decision making and governance that tend to be found in larger enterprises.

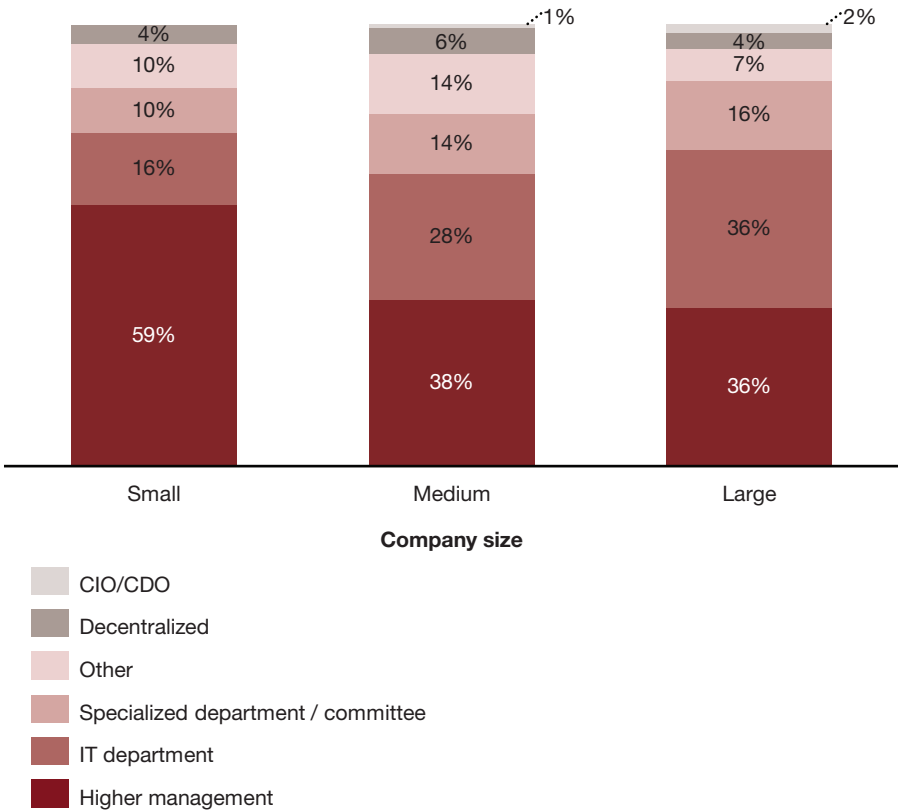
Corporate enabler 2: The digital transformation engine

Digital transformations require major changes in the culture and processes of an organization. Often, when such transformations are initiated, the necessary scrutiny of technology reveals major flaws in the organization, such as poor data quality and insufficiently clear lines of authority. Rectifying such a state of affairs requires strong sponsorship, patience, and resilience.

Principal responsibility for digitalization in the GCC region still predominantly rests with senior management or, particularly in large companies, with the IT department. Too often, IT acts as a service bureau that takes orders, rather than as an enterprising agent of business transformation. IT may also have weak leadership and it is often not represented in the decision-making or governance bodies of the business. This trend applies across all sectors (see Exhibit 6).

Exhibit 6
Top management still plays a key role in promoting digitalization in Qatar and the UAE

Responsibility for digitalization initiatives (in % of total responses)



Note: Small = fewer than 50 employees, Medium = 50 to 1,000 employees, Large = more than 1,000 employees.

Survey question: “Does your company have a position/body that bears central responsibility for these topics and makes decisions regarding a digital strategy?”

Source: Siemens survey; Strategy& analysis

Few companies have designated a chief digital officer (CDO) as a specialist who can champion the digital transformation. Whereas, according to LinkedIn, there are almost 2,000 entries worldwide with the title of CDO, there are only 26 CDOs (or equivalent positions such as vice president/senior vice president of digital or chief information and digital officer) in the GCC countries, the majority of which are in the UAE (primarily in financial services, followed by telecom and media).

Improved data security emerged as the second most important enabler for the digitalization of businesses in the Siemens survey. As the cybersecurity measures of many GCC organizations are undeveloped, this finding is unsurprising. In a survey of 700 executives and IT professionals in the region, conducted in 2016 by IT solutions company GBM, almost half the respondents (49 percent) did not believe that their organization is capable of predicting or preventing cyber-attacks.⁷

Other results from the GBM survey indicate that organizational issues contribute heavily to this lack of confidence. In 40 percent of organizations, there is no dedicated function for governance, risk, and compliance. Exactly 50 percent of organizations do not conduct a third-party assessment of cybersecurity practices, and 70 percent have maintained all cybersecurity operations in-house.

Cybersecurity threats are exacerbated by employee activity that remains uncontrolled by firm policies and processes or through instilling a helpful workplace culture. Up to 40 percent of employees in the GCC are already using less secure but free cloud-based data storage options to store company documents. Employees generally connect to company networks from several devices, which increases the chances of cyber-crimes.

Indeed, in terms of cyber-attacks, the UAE is now one of the most targeted countries in the world. According to one expert estimate from 2016, the UAE is currently the target of 5 percent of the world's cyber-attacks, with the financial services industry the worst affected. These attacks have reportedly increased by 500 percent in the country over the last five years.⁸

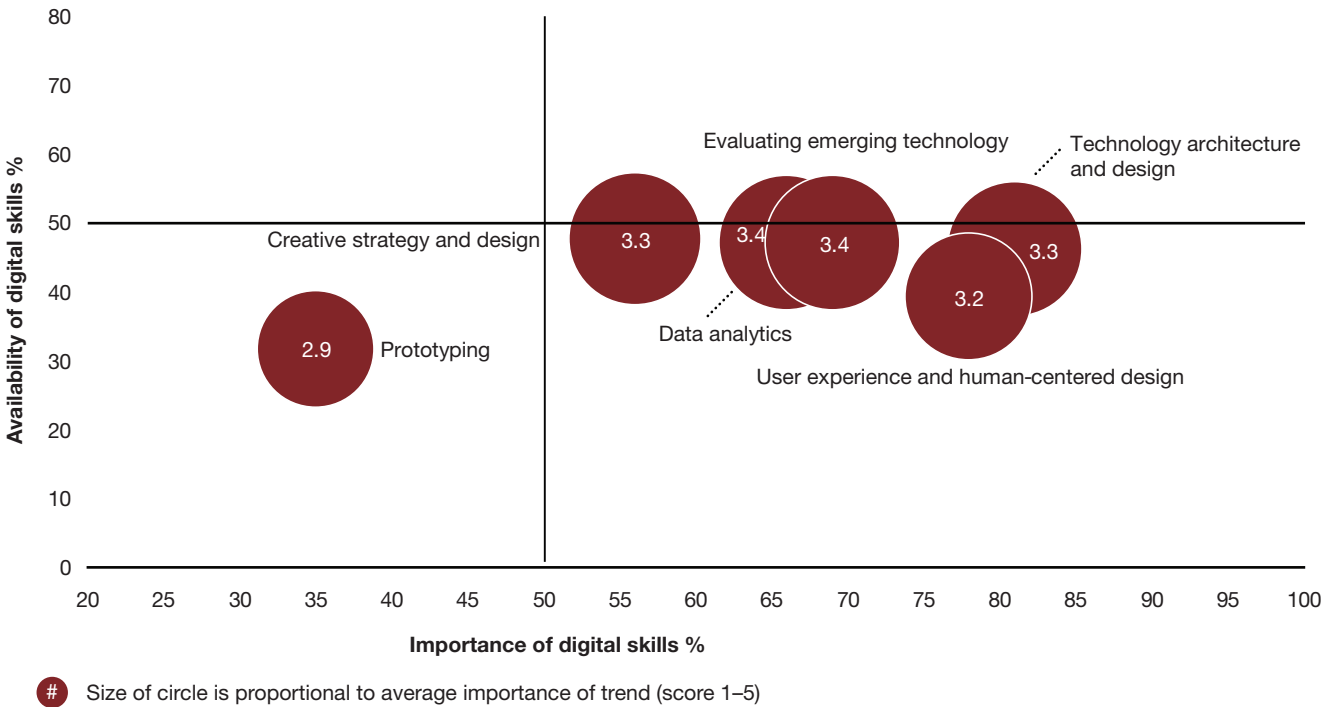
Corporate enabler 3: Skills

Companies in the region readily acknowledge that their digital skills are inadequate. Prototyping is the least available skill, but there are also significant skill deficiencies in areas such as data analytics and human-centered design (*see Exhibit 7*).

Exhibit 7

Companies in the GCC acknowledge the digital skill gap

Availability versus importance of digital skills within companies in the GCC



Note: Survey questions: “How would you rate your organization’s digital skills in terms of its capabilities in the following areas?” (percentages correspond to respondents who replied with a 4 or a 5); “How would you rate the importance of these skills to your business?” (percentage of respondents who answered “quite important” and “highly important.”)

Source: Siemens survey for Qatar and UAE; PwC, 2015 Global Digital IQ® Survey; Strategy& analysis

This shortage of skills is hindering the potential for innovation and digital progress. Indeed, many IT departments are asked to lead digital transformation programs but lack the requisite skills to perform this role effectively.

Despite this state of affairs, investment in digital training remains low. For example, according to a 2015 report from Saudi Arabia's Communications and Information Technology Commission, more than half of all organizations in Saudi Arabia do not have a formal professional training program in information and communications technology (ICT). Nor do they have plans to initiate one.⁹

Rather than training existing employees, many organizations appear to be devoting resources to acquiring talent. A Strategy& analysis of LinkedIn found that almost one in five job postings in Qatar in July 2016 were for digital jobs, a much higher percentage than in the U.S. (7 percent). Many of the job openings in Qatar were in the areas of information security, programming, and user experience (UX) or user interface (UI) design.

Corporate enabler 4: Collaboration and partnerships across the ecosystem

As we have seen, companies cannot rely on in-house skills and capabilities, and need to embrace open innovation. Collaboration with startups and digital disruptors, with academia and other tech players, are increasingly crucial for GCC companies as the rate of digitalization accelerates.

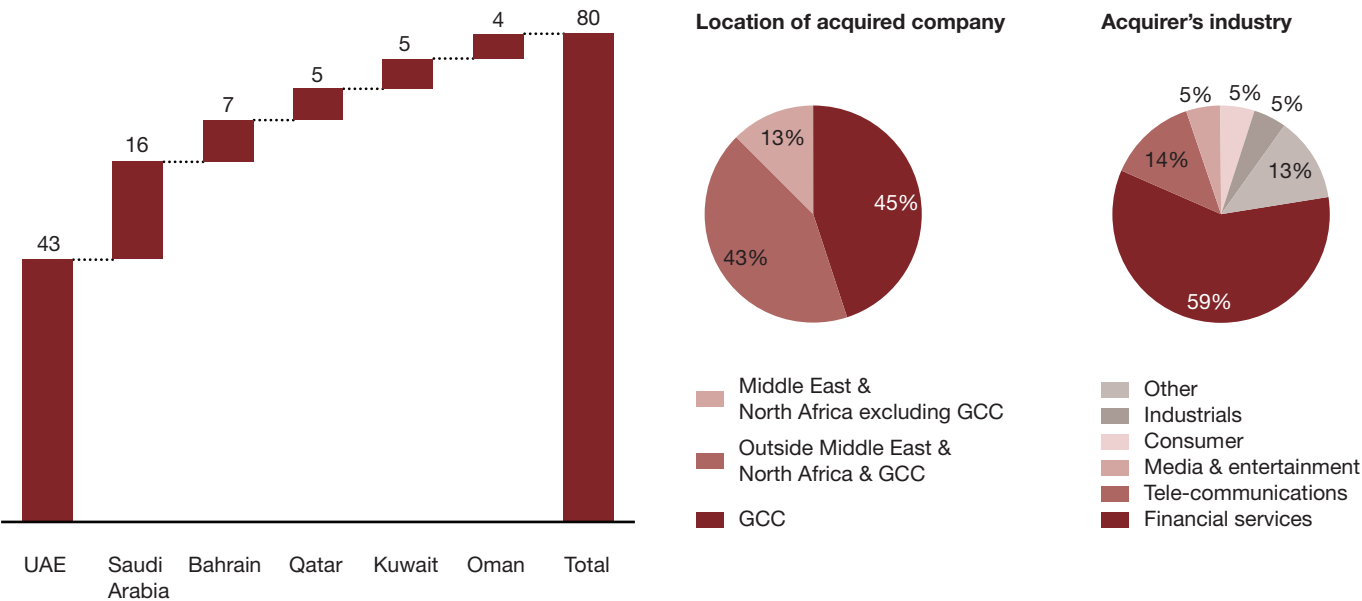
Many companies are setting up corporate venture capital funds to tap into the startup ecosystem. Corporate backers in the region are concentrated in the UAE and Saudi Arabia, and invest mostly in tech or digital startups. Telecom companies are leading the way (such as Mobily Ventures, STC Ventures), followed by media companies (like MBC Ventures). Other companies have partnership stakes in regional venture capital enterprises, such as iMENA (Etisalat) and Turn8 Accelerator (DP World).

Although this is a growing trend, corporate investors have only contributed to 4 percent of the number of digital investments in the Middle East and North Africa region. This is significantly lower than the 16 percent global average.¹⁰

Besides venture capital investments, other companies in the region are buying tech companies, with the number of acquisitions in this sector reaching 80 since 2009. More than half of these direct acquisitions are by UAE-based companies, mostly from the financial services industry (see Exhibit 8).

Exhibit 8
The financial services industry in the UAE leads in buying digital businesses

Digital acquisitions by GCC companies (non-tech companies buying tech companies, 2009–Q2 2016)



Source: Zawya Thomson Reuters; Strategy& analysis

Countries in the region have not performed strongly in terms of partnerships between corporates and academia, with Qatar ranking the highest at 27th globally. This poor showing relates strongly to the region's poor investment in research and development (R&D). According to the Strategy& Global Innovation 1000 report from 2016, only one company in the region (SABIC) boasted R&D spending large enough to rank among the top 1,000 publicly traded R&D spenders in the world.¹¹

However, there have been notable initiatives, including the partnerships between Saudi giants (Saudi Aramco, SABIC, and the Saudi Electricity Company [SEC]) and King Fahd University of Petroleum and Minerals (KFUPM) in the Dhahran Techno-Valley.

Corporate enabler 5: Investment

GCC companies may not have made digital the centerpiece of corporate strategy, or appointed a dedicated digital champion, but investment is still rising. Almost two-thirds of companies (62 percent) in Qatar and the UAE have increased investment in digitalization projects over the past year (*see country profiles, page 47*). Around 20 percent state that such spending has increased significantly.

As one might expect, investment is particularly strong among those companies with a fully formed digital strategy. Almost half of companies with such a strategy put more than 10 percent of their overall corporate investment into digital initiatives.

Statistics indicating a rise in investment must come with the proviso that such increases start from a comparatively low base in the region. Not only has investment been patchy, but it has also often lacked purpose and direction, leading to unutilized technology. Companies may now have to spend more than originally envisaged to reap the potential benefits of their original investment. However, our studies of key sectors indicate that the environment of low growth is currently inhibiting such increased investment.

Although it is true that IT teams are often held responsible for digitalization initiatives, the authority to make relevant investment decisions rests with them only in 15 percent of companies, according to the Siemens survey. Chief executive officers are by some distance the primary decision makers for investment in technology in the GCC region — 41 percent of companies say that the top executive is responsible (*see Exhibit 9*).

Exhibit 9

CEOs are the primary technology investment decision makers in the GCC

Roles authorizing technology decisions	Number of decision makers	Qatar & UAE	Global
CEO	124	41%	24%
CIO	47	15%	7%
Business area management	29	9%	20%
Other	26	8%	4%
COO	23	8%	5%
CFO	18	6%	18%
Senior committee including CEO	13	4%	
CDO	7	2%	
Senior committee	5	2%	
CMO	4	1%	
CEO and CFO	3	1%	
Junior committee of IT and Business Managers	2	0.5%	3%
CIO and COO	2	0.5%	
CFO and COO	2	0.45%	
CEO and COO	1	0%	
CIO and CFO	0	0%	20%

Survey question: "Which executive is ultimately responsible for digital enterprise investments in your company?"

Source: 2015 Gartner FEI Study; Siemens survey for Qatar and the UAE; Strategy& analysis

A survey undertaken by Gartner in 2015 suggests that the CEO is a more dominant figure in investment decisions in the GCC than in other regions. According to Gartner, only 24 percent of CEOs worldwide are the primary decision makers for technology decisions. Steering committees of IT and business area executives have equivalent authority in almost the same number of companies (20 percent).¹² In other regions, it seems that many organizations are moving investment decisions back to the business units, particularly in the light of cloud applications led by business area executives.

The comparatively high level of involvement for CEOs in GCC countries reflects a regional tendency to invest excessive power in the CEO, and withhold authority from IT and business unit executives. This is perhaps a result of the dominance of family-owned businesses in the region. Indeed, the proportion of CEOs in charge of investment decisions is, unsurprisingly, higher in smaller companies.

National enablers of digitalization: Getting the basics right

Organizations in the region are reliant on their surrounding environment as well as internal factors. They do not operate in a vacuum.

When pressed on external obstacles that are preventing greater use of digital technologies and processes, GCC executives cited several considerations. The greatest challenge, in their view, relates to cybersecurity. It seems that there is a general lack of trust in a still-nascent and often unclear regulatory system for the protection of data. It is a system still grappling with the cloud, security, and data privacy concepts. There is also limited trust in available suppliers that could potentially be privy to highly sensitive internal information. This fear of outsourcing data distracts companies from their core business and forces them to invest in internal operations that should be unnecessary.

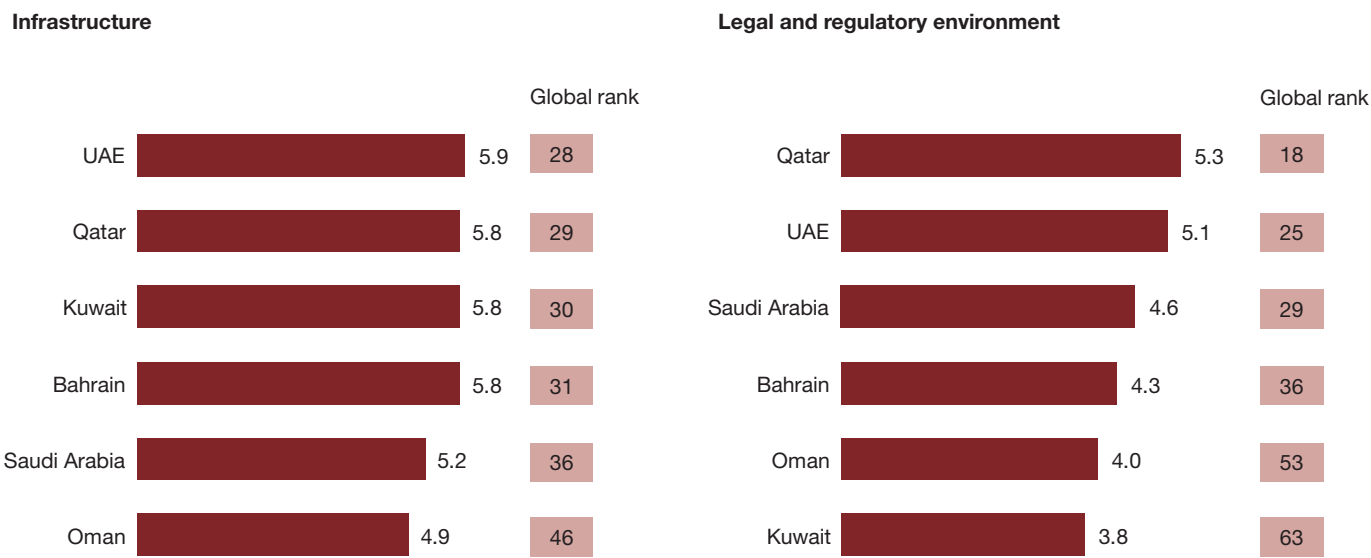
The other barriers that executives alluded to all relate to the surrounding ecosystem — such as insufficient technical standardization. These include underdeveloped industry associations, and a scarcity of suitable partners to provide implementation and follow-on support.

According to the World Economic Forum's Global Information Technology Report in 2016,¹³ the GCC region has fallen behind many countries in the developed world in terms of both infrastructure and the legal and regulatory environment (*see Exhibit 10*). Regulating the cloud to enable GCC countries to host data both within and outside their countries, and tightening cybersecurity regulations, remain urgent priorities.

An underdeveloped digital workforce also hinders progress. Young nationals are drawn to secure and well-paid public-sector jobs, which means they do not seek digital careers. More than 80 percent of nationals in Qatar and the UAE are employed in the public sector. Even those graduates who do have digital ambitions often emerge from university without the requisite skills. Many ICT courses in the region are too generic and sometimes outdated, with insufficient focus on emerging and transformational technologies.¹⁴

This fear of outsourcing data distracts companies from their core business and forces them to invest in internal operations that should be unnecessary.

Exhibit 10
GCC countries are behind in terms of infrastructure and the legal and regulatory environment



Note: 1 = not developed at all to 7 = extremely well developed.
 Source: Networked Readiness Index, World Economic Forum, 2016; Strategy& analysis

A lack of both organizational and educational emphasis on technology inevitably results in low representation of digital employees within the overall workforce. In Kuwait and Saudi Arabia, for example, only 1 percent and 0.4 percent of the respective working populations of nationals are employed in ICT.¹⁵ This compares to 4.3 percent of the overall workforce in the U.K. and 3.8 percent in the U.S., according to the latest figures from the Organisation for Economic Co-operation and Development.¹⁶ With local talent sparse, organizations often look to expatriates to plug skills gaps. This is especially true in the UAE, which ranks third in the world for countries that gain technology skills primarily through expatriates.

Meanwhile, the available market of digital suppliers is still nascent, and still mostly dominated by international companies with sales offices in the region. Local suppliers, for their part, are small and fragmented. They often lack capabilities, with their business focused on IT services or consulting, with few fresh offerings. Unsurprisingly, not one of the top 100 companies in the GCC region is from the IT industry.

To compound matters, the general startup environment is hardly conducive to innovation. There is not one GCC location among the top 20 cities in the Global Startup Ecosystem Ranking by digital analyst Compass.¹⁷ The requisite components of a startup environment — such as investment, skills, and mentorship — are all lacking.

GCC countries are putting in place national ICT strategies in an attempt to overcome some of these challenges. The 2015 Qatar National Strategy aims to advance the digital agenda and create a leading knowledge-based economy by adopting a multipronged approach: improving connectivity, boosting capacity, fostering economic development, enhancing public service delivery, and advancing the societal benefits of digitalization. For its part, the Digital Strategy of Oman involves six strategic pillars: society and human capital development; enhanced e-government and e-services; ICT industry development, governance, standards, and regulations; national infrastructure development; promotion; and awareness. Meanwhile, Smart Dubai was established to “deliver world-class smart services and infrastructure to create happiness.” To achieve its goals, Smart Dubai seeks to introduce initiatives and develop partnerships to contribute to the strategy’s various dimensions: smart economy, smart living, smart governance, smart environment, smart people, and smart mobility.

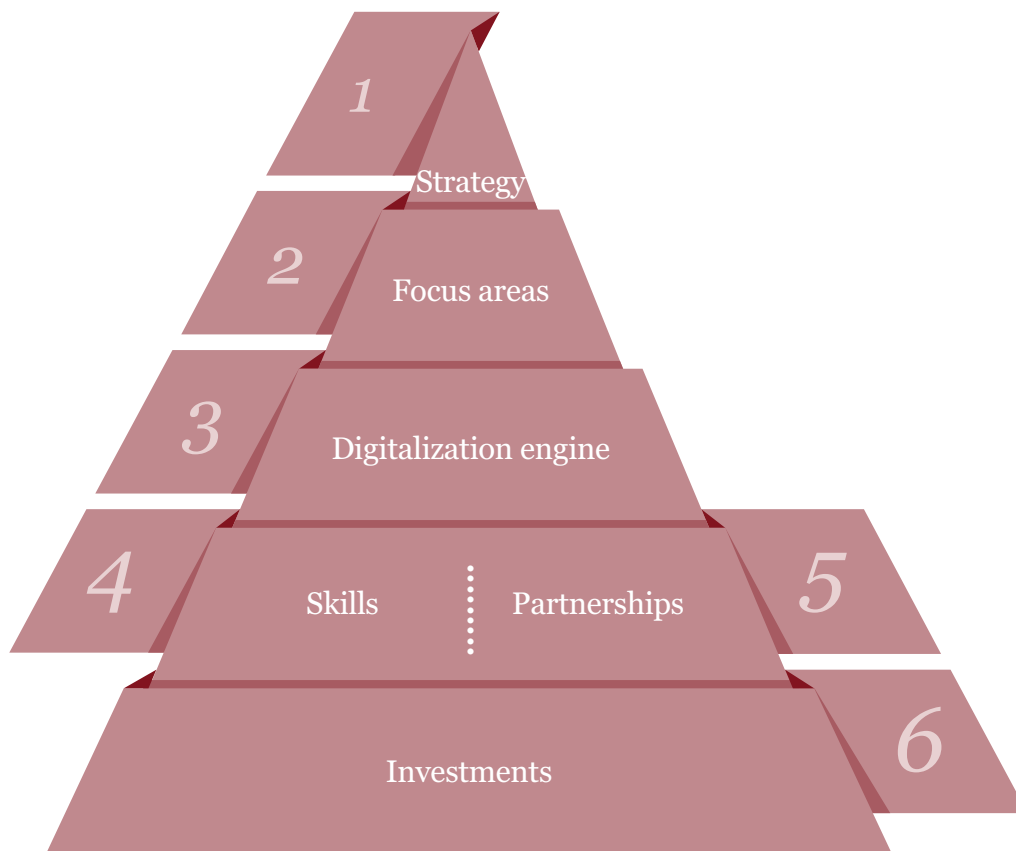
The requisite components of a startup environment — such as investment, skills, and mentorship — are all lacking.

The way forward: Structure and action

Although executives often know these challenges well, the question is, how do they move forward practically with digitalization? There are six key building blocks upon which any transformation is based, whether it is focused on realizing efficiencies, on growing an existing model, or on an altogether more radical digital transformation (*see Exhibit 11*).

Exhibit 11

Digital transformation consists of six building blocks



Source: Strategy&

Companies need first to **articulate a corporate strategy for the digital age**. This means assessing exactly how digital affects their industry and how advanced they want to be in terms of digitalization. It means closely integrating digital ambitions with their overall business goals. The company must ask itself: Does it want to recover lost ground with competitors? Does it want to lead the industry in digital? Does it want to disrupt the industry? How can it identify and enter business areas, both inside and outside its industry, where value is being created?

As a basic framework, digital strategy could center either on realizing efficiencies, on increasing revenues, or on reimagining the entire business or industry. Companies could even devise a strategy that encompasses all three aspects of this framework.

For many companies in the region, the purpose of going digital is simply to get the basics right or to fix outstanding issues. Realizing these efficiencies involves the improvement of business operations, through reducing costs or time, or by honing decision making. Increasing revenues entails growing the market share and/or the market size of the company through digitalization, by offering better customer experience or digital products and services. Reimagining a business or an industry means refocusing on the essence of what a company does, and re-creating the industry or business model.

Despite the importance of strategy, it should not dominate execution. As the whole area of digitalization is moving so quickly, excessive procrastination will result in ideas becoming outdated. An agile approach, putting concepts into practice, viewing the outcome, and making any necessary changes, is vital.

Second, once the essential strategy is formulated, the organization must therefore **determine digital focus areas**, and specify the tools and platforms to be used.

For merely realizing efficiencies, the focus areas might include enterprise resource planning (ERP) implementation, process automation, or industry-specific tools, such as 3D printing in the manufacturing industry, or drones in construction. For growing the existing business model, such focus areas might include digital payment platforms or customer care channels. If the aim is to disrupt the prevailing industry model, then innovation labs or units, and experimental pilot projects, could be more apposite. In the region, companies would benefit from focusing on three priorities in terms of digitalization: using big data and analytics, moving to the cloud, and digitalizing customer experience (*see Exhibit 12*).

Exhibit 12

Digital focus areas and questions companies must ask

Data and analytics

How do we improve data quality?

- Automate data creation as much as possible
- Implement Master Data Management
- Establish data governance and ownership

How do we benefit from our data?

- Implement integration platforms to link data
- Use a fit for purpose analytics engine
- Use an agile approach to develop reports and dashboards

How do we protect sensitive data?

- Establish cybersecurity practices, including management and technical controls
- Ensure controls don't hinder innovation
- Drive behavioral change

Moving to the cloud

What technology should we move to the cloud?

- Assess technology readiness for the cloud, including vendor maturity
- Understand the road map of specific vendors, as some might not offer on-premises solutions anymore
- Evaluate implications on the enterprise architecture, including integration across applications
- Consider Total Cost of Migration

Which service provider do we choose?

- Ensure security and privacy arrangements meet regulatory/business requirements
- Investigate technical support capabilities
- Assess pricing model and flexibility

Digitalizing customer experience

Which customer journeys should we digitalize?

- Evaluate journeys that represent the critical pain points or offer biggest efficiency gains

How can we design the journey?

- Conduct immersion sessions with all stakeholders involved in specific journeys
- Adopt the customer's perspective
- Do not think about digitalizing products or processes but journeys
- Ensure omni-channel experience

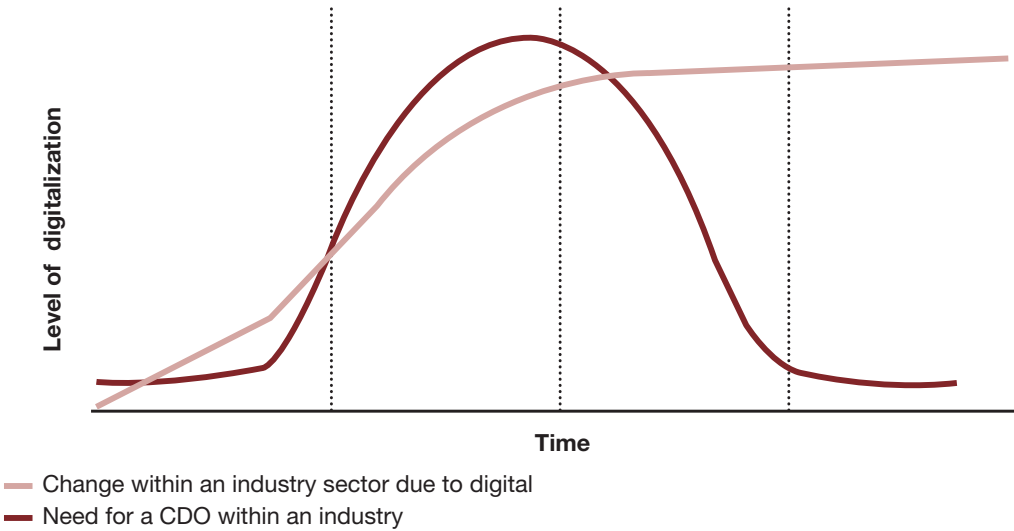
How can we implement the digital journey?

- Drive effort using agile cross-functional teams
- Test design with users on a regular basis
- Pursue continuous development and improvement

Source: Strategy&

The third building block is to **create an engine to drive digitalization**. Companies must assess whether there is a need for a CDO to lead the digital transformation. This decision normally rests on the extent of the organization’s digital progress (see *Exhibit 13*). In some cases, if an organization is still in nascent stages of its digital transformation journey, a CDO position might be premature. In other cases, some companies may have already gone past the point where they require a single executive with the authority to advance and oversee digital strategy, and can instead advance with a larger number of managers and committees driving change.

Exhibit 13
The need for a CDO within a company depends on its level of digitalization



Source: Strategy&

If a CDO is deemed necessary, then the organization must determine the particular characteristics he or she should possess according to its current digital requirements. Even if the organization resolves to press ahead without a dedicated CDO, a senior sponsor is nevertheless essential, with the authority and motivation to bring people together to devise solutions for the entire organization.

Formal governance processes should also be instituted, ensuring that business units and the IT department collaborate closely, and are working in the same direction. For example, a committee comprising both business unit and technology representatives could be established to decide on important digital initiatives. Both parties should set aside their own self-interest and focus on digital business objectives for the organization as a whole. Some companies have even introduced incentives to aid this process, with measurement of an individual's ability and willingness to collaborate introduced into personal assessments.

Closer collaboration between business units and IT is, in our view, inevitable. Indeed, we envisage that when organizations reach higher levels of maturity, digital will become embedded within business units and departments, removing any distinction between IT and the business as a whole. The role of the IT department will shift to become a Center of Excellence, providing best practices and promoting innovation. Commoditized IT services, which now occupy most of the time of technology departments, will be outsourced.

Another key aspect in organizing for digital is setting up a robust cybersecurity model, aimed at protecting the business's most critical assets, processes, and information. GCC companies need to develop cybersecurity capabilities in three critical areas: prevention, detection, and response. They can achieve this aim by introducing changes in their management and organizational practices, processes, and technology.

Even with these structures in place, no sustainable progress can be made if the culture within the organization is not conducive to experimentation and change, or does not respect cybersecurity measures and practices. Employees should be encouraged to take risks that lead to breakthrough products. Initiatives to raise the chances of this eventuality include rewards for risk-taking or even failures, and an ideation platform for capturing and developing ideas from within or outside the organization.

More generally, organizations will have to find the right balance between innovation and control. The rise of digital raises the risk of cyber-threats. But introducing too many controls will inhibit innovation, and might inadvertently induce opposite behaviors, with employees potentially seeking to bypass overly stringent procedures.

The move toward digital can only succeed with the right people. Companies need digital **skills**, the fourth building block, which they can obtain by developing deep expertise and capabilities aligned with their strategy and focus areas. They should start by identifying their future skills requirements and assessing the gaps. After this initial step, they should then attempt to bridge the skills gap in two ways. They should certainly invest in the digital training of employees, through social learning platforms or employee exchange programs with technology companies. Procter & Gamble, for example, has launched an employee exchange program with Google to develop the digital skills of its workers.

The second approach is to source digital talent externally. Employers should start by digitalizing the recruitment process to engage and attract digital talent. They could use innovative hiring approaches that use social media, big data, and gamification techniques to maximize the chances of finding the right fit. For example, PwC's Hungary office used a business simulation game called Multipoly to engage with candidates and assess how ready they are to work at PwC.

The fifth building block — **partnerships with digital players, academia, or government entities** — is also crucial in this effort. Every company and every line of business within a company can benefit from looking outside its organizational boundaries for innovative business ideas, for collaboration in developing those ideas, and for validation of those ideas in the real world of consumers.¹⁸

We have seen that some companies in the region are already setting up corporate venture capital companies and incubators, while others are fully acquiring tech players. This trend needs to continue if

companies are to ensure that they are contributing to the budding innovation ecosystem in the region, while at the same time maximizing their chances of benefiting from external ideas. GCC companies should also examine partnerships with international technology players as a means to build the organizational and talent capabilities required for digital transformation, without taking on investment risks. Creative partnership models with these international players could include public–private partnerships that would serve the interests of all participants and align relevant incentives. For example, defined goals could incorporate both the realization of the relevant government policy and the fulfillment of private companies’ growth targets.

GCC companies could also consider opening innovation centers close to global technology hubs, in this way being physically close to cutting edge ideas as they develop, and increasing the likelihood that GCC companies will benefit. Partnerships with academic institutions are also important for developing and sourcing talent, and for innovation.

Various government-sponsored initiatives to promote digital transformation could benefit companies. Indeed, partnerships with government entities that take advantage of their ambitious digital-related plans, such as Dubai’s 3D printing and driverless car initiatives, could be invaluable.

However, companies must also see to it that they have the right processes in place to find, capture, and commercialize business ideas, together with a corporate culture that promotes collaboration and open innovation.

Ambitious organizations clearly need to **invest in digital**, the sixth building block. For a number of reasons, however, this is an often problematic process for executives. In many cases, companies can reduce spend on commoditized IT services through outsourcing, cloud computing, and through “virtualization” — using software to simulate costlier hardware. They can use the savings to build core differentiating digital capabilities.

Many companies struggle to assess the future qualitative and quantitative impact of a digital transformation, inevitably affecting their willingness to invest a given sum because they do not have a clear sense of the potential return. When the potential benefits, through reducing capital and operational expenditure, growing revenues, or realizing currently forfeited income (such as through more accurate billing) are indeed quantifiable, this omission can be difficult to comprehend. At other times, companies insist on framing the decision in terms of return on investment, even when the benefits of a particular transformation are non-tangible, but nevertheless invaluable, such as improving control, collaboration, decision making, data quality, or transparency.

Long-term decisions are also fraught with risk because rapidly developing technologies often have an uncertain future. Furthermore, the widespread existence of silos within companies militates against digital investments whose potential benefits are often geared toward the organization as a whole, rather than specifically toward individual departments. Finally, a basic lack of understanding of digital technology terms increases caution among executives, particularly when they don’t have the right technology experts to advise them. If they don’t grasp something fully, how can they be expected to back it with large sums of money?

To make the investment decision-making process less painful and prone to delay, organizations can usefully divide potential projects into two categories. There are standard maintenance investments, essential for running the business, such as security updates and regulatory compliance requirements. The goals of such investments are clear up front, and can be measured against traditional project metrics such as conformance to budget, schedule, and quality.

Then there are investments in riskier, emerging technologies with more transformative objectives. For these, organizations should adopt an approach in the mode of a venture capitalist — making small investments in a variety of ideas, and then evaluating their potential through pilot schemes. As such far-reaching investments often have an organization-wide impact, they should not be sourced from the budget of one department or administered by a leader of a business unit. A top-down approach is required, with the project equipped with central funding, and usually led by the CEO.

Any investment should of course be properly considered. It should represent an integral feature of the chosen strategy, not a one-off project in isolation from it. Moreover, unless everything is in place within the organization to support its implementation in the desired direction, then the money will be wasted, and executive faith in digitalization will suffer a blow. The key is not necessarily to invest more, but to invest more wisely.

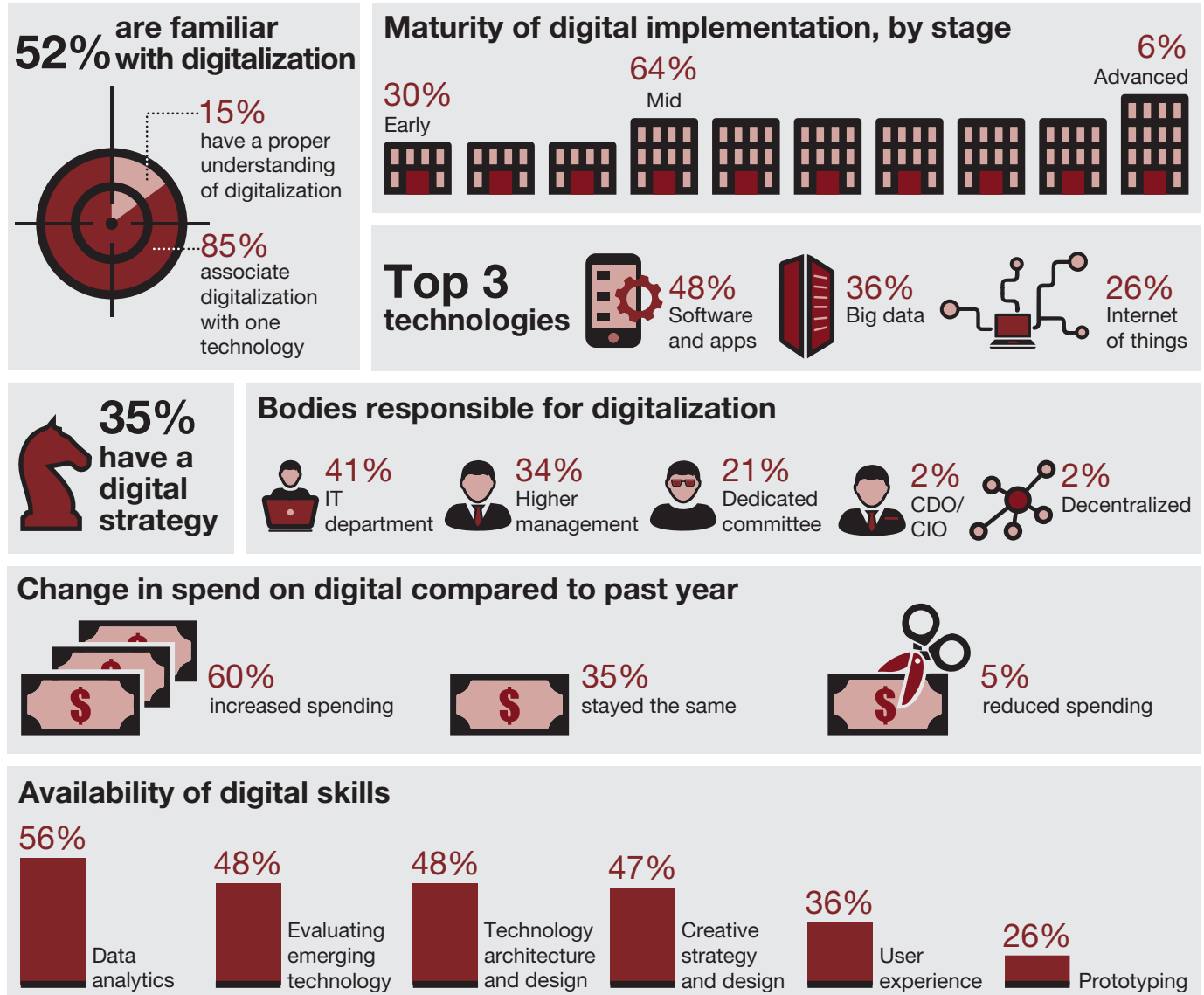
Conclusion

Executives in the GCC understand the value of digitalization. Practical steps forward, however, can often be beset by internal obstacles, be they cultural, organizational, people-related, or financial. An unhelpful external environment can also put a brake on the best of intentions.

With so many challenges, decision makers can easily feel paralyzed, no matter how much they believe in the potential benefits of digital. However, the situation offers great opportunity. The GCC is in a position to fully embrace the disruptive potential of digitalization across all sectors, driving the transition toward Industry 4.0, globally competitive businesses, and next-generation smart cities. By following the structured way forward set out in this report, decision makers can take control, track specific steps in a measured way, and see those benefits coming one by one to fruition.

Industry profiles: Oil and gas

Key survey insights



Expert insights

Oil and gas companies in the GCC have in general neglected the digitalization imperative, instead focusing their attention on growing production. As a result, they have fallen behind other industries in the region, as well as rival energy companies elsewhere in the world.

There have been exceptions, however. One example of a digitalization initiative is by RasGas, a supplier of liquefied natural gas (LNG), based in Qatar. RasGas has started the “effective integration” of big data and advanced analytics in the cloud, in the belief that this will support process optimization across its operations.

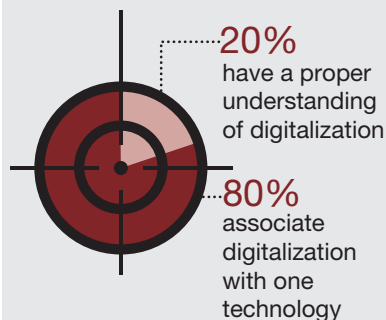
In general, certain factors have hindered progress. IT teams within the industry are often weak. Investment in innovative technologies has been inhibited by the fact that oil companies maintain critical and highly confidential data of national security importance.

Regional oil and gas companies are now focusing on cutting costs. This development could either increase, or detract from, digitalization initiatives. On the one hand, companies could use such initiatives to bolster efficiencies. However, it could also lead to underinvestment in critical IT infrastructure.

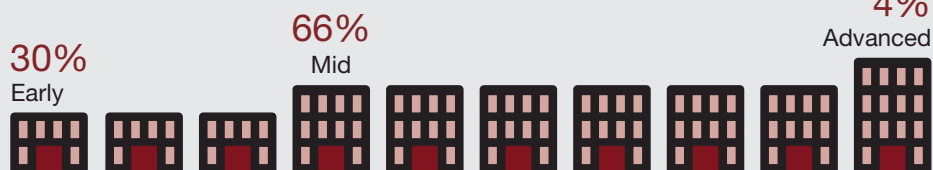
Utilities

Key survey insights

49% are familiar with digitalization



Maturity of digital implementation, by stage



Top 3 technologies

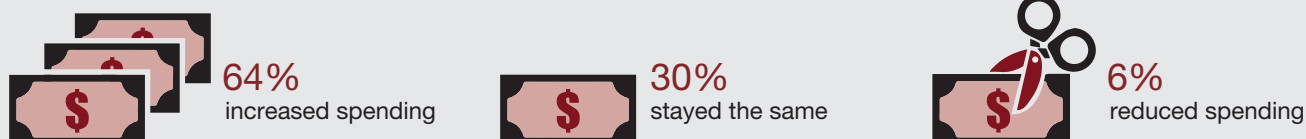


43% have a digital strategy

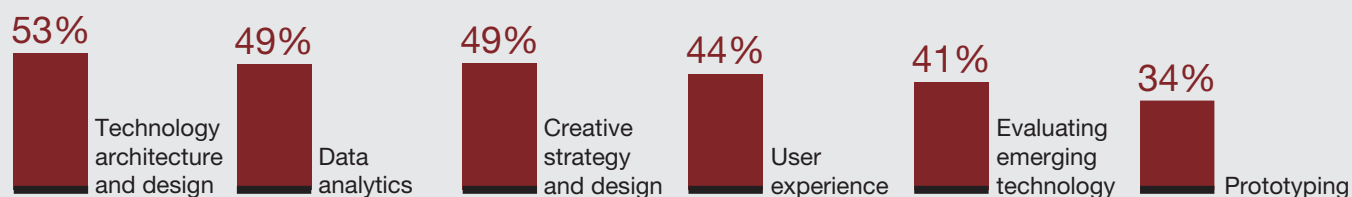
Bodies responsible for digitalization



Change in spend on digital compared to past year



Availability of digital skills



Expert insights

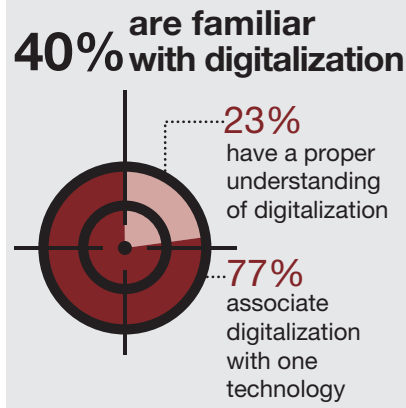
Among utility companies, the level of digitalization is still low. One exception is the Dubai Electricity and Water Authority (DEWA), which uses drones to conduct topographic surveys, thermal inspection, photovoltaic panel maintenance, and early detection, using thermal imaging to identify overhead power lines.

General cost-cutting could restrict investments in the digital space. Moreover, significant government controls on the use of data will also impede progress.

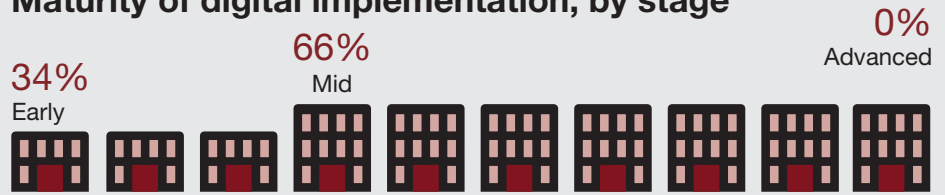
However, there are positive signs. Companies already use data analytics to effectively forecast resources available for meeting demand, and have developed apps, and online or mobile payment systems. Others have initiated plans to further expand their use of analytics, with some planning to use more-sophisticated technologies such as smart meters.

Construction

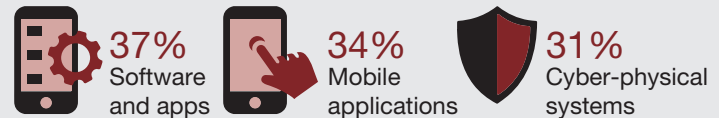
Key survey insights



Maturity of digital implementation, by stage



Top 3 technologies

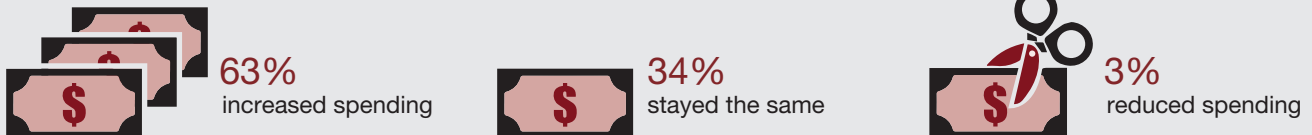


34% have a digital strategy

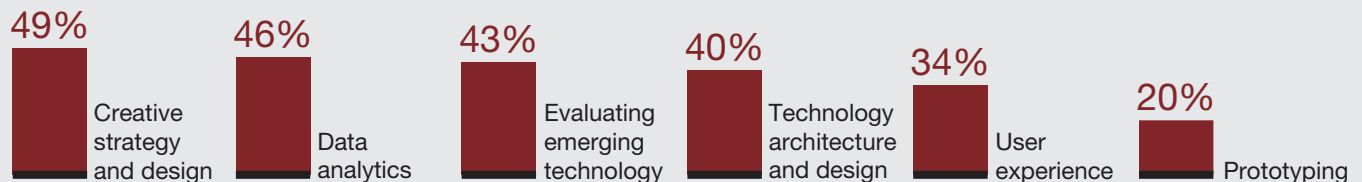
Bodies responsible for digitalization



Change in spend on digital compared to past year



Availability of digital skills



Expert insights

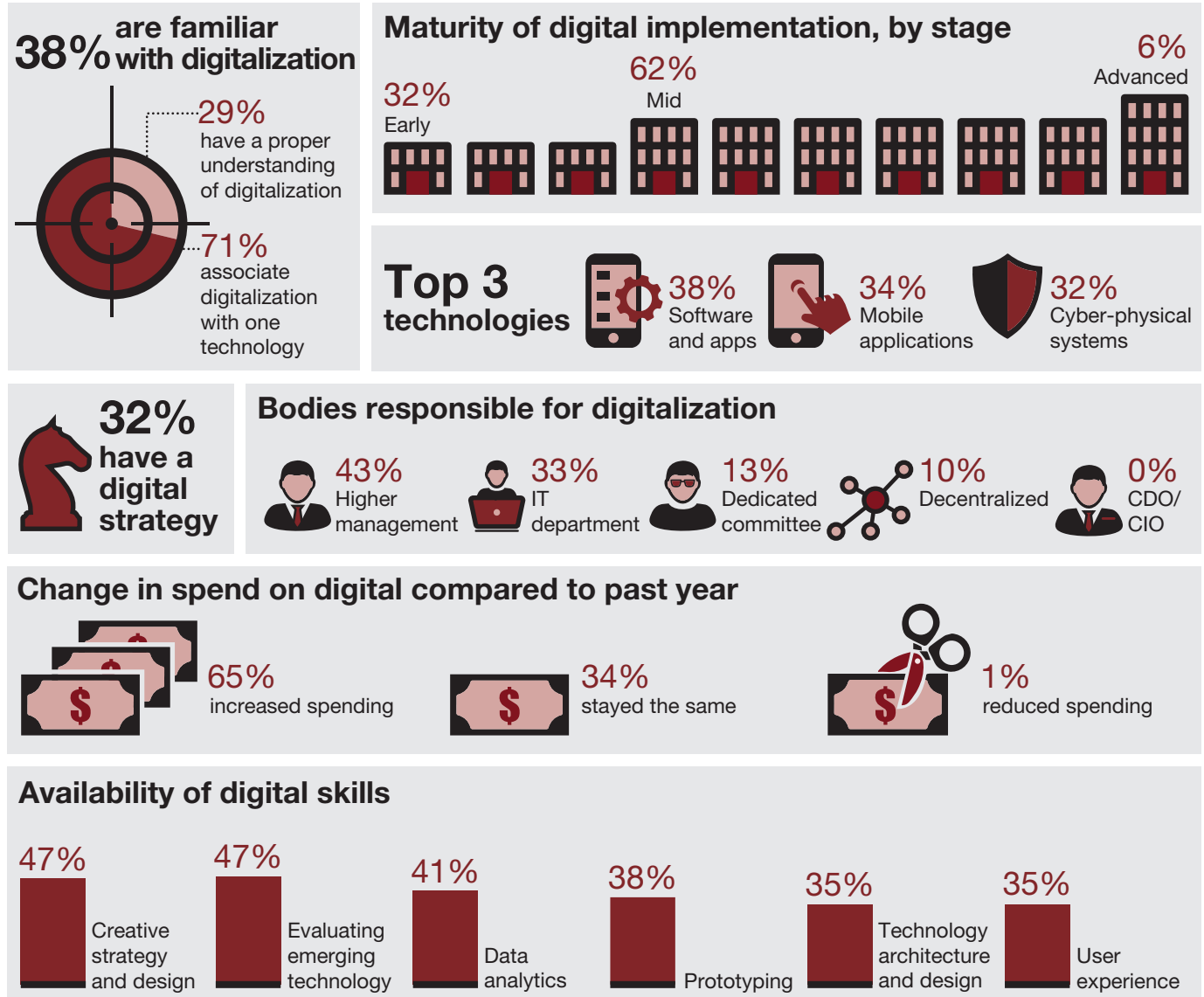
The construction industry has been generally slow to adopt new technologies. Digital progress could be held back by a fall in demand and the resulting impact on investment. However, major opportunities are there to be taken.

Contractors can use drones for remote monitoring, as well as the Internet of Things to capture performance information.

Engineering firms can adopt Next-Generation Building Information Modelling tools. Already in use is the technology to virtually model a building in 3D before it is built. These firms can also make use of 3D printing. Indeed, Dubai aims to have 25 percent of its buildings 3D-printed by 2030.¹⁹ In 2016, the world's first fully 3D-printed office building, the Office of the Future, was inaugurated in Dubai.

There is an increasing use of technology to drive efficiency in buildings. Integrated building management platforms allow monitoring and control of infrastructure, and have been widely implemented across the region.

Key survey insights



Expert insights

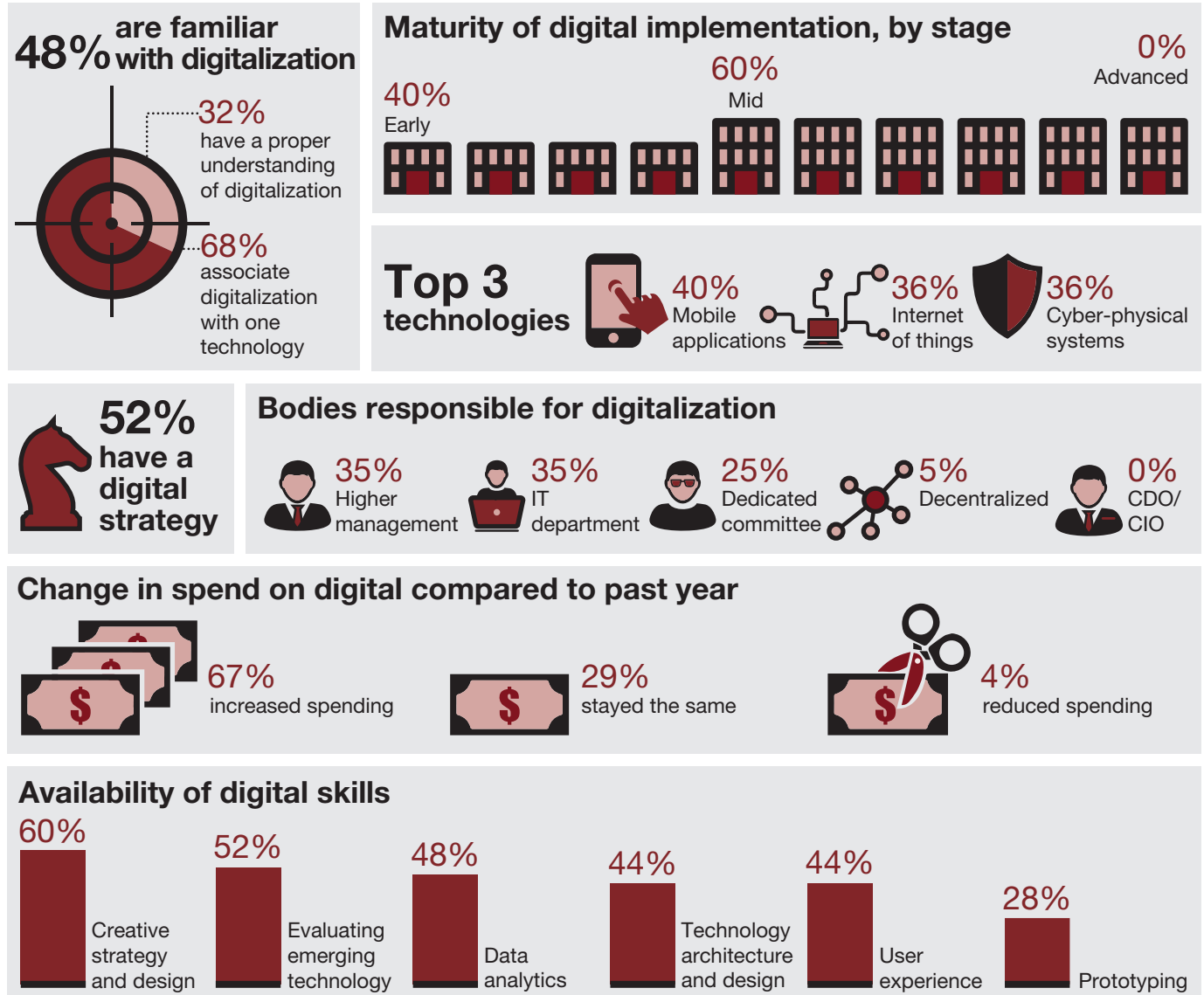
The industry's global efforts to transform the way it interacts with consumers have not kept pace with some other industries. In the GCC region, most IT organizations are sales representatives for global companies or services companies. Therefore, most digital innovation within the industry occurs outside the region.

For many companies, complex legacy architecture and systems, and legacy products and services, stand in the way of meaningful efforts in the digitalization sphere.

However, there are positive signs. For example, some companies are building a personalized multichannel experience for customers. Others, especially services companies, are automating resource management. It is also likely that IT companies in the region that are associated with global companies will gradually adopt their more developed digital tools and platforms.

Transportation

Key survey insights



Expert insights

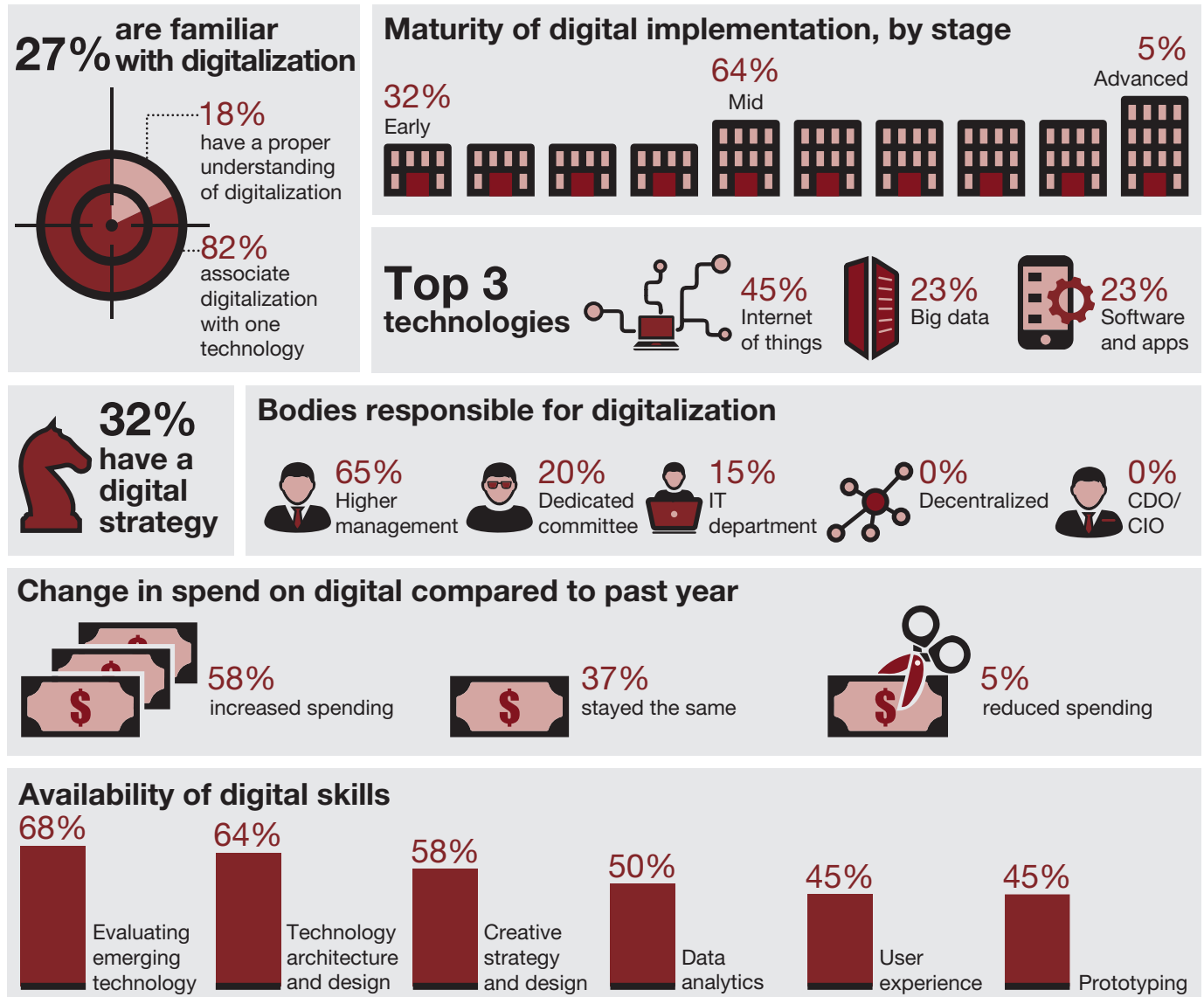
The picture in the transportation industry varies widely. Some subsectors, such as aviation, have made significant progress in digitalizing their front-office operations. Other subsectors, such as taxis, have been severely disrupted by digital business models. Several ride-sharing companies have also emerged.

Certain positive developments are in the pipeline. The Dubai driverless car strategy aims to have 25 percent of trips in Dubai conducted through driverless cars by 2030.²⁰ New transport projects, such as within the rail network, are not restricted by legacy thinking and can adopt state-of-the-art systems.

In order to facilitate progress, however, the public and private sectors must collaborate to fund the necessary modifications in infrastructure. Although the authorities recognize this need, little concrete action has ensued.

Manufacturing

Key survey insights



Expert insights

Manufacturing is witnessing a digital transformation known as Industry 4.0, the current trend of automation and data exchange, which includes cyber-physical systems, the Internet of Things, and the cloud.

Although the majority of manufacturers in the region are not prepared for this change, others have adapted with greater success. Damas, the jewellery retailer, has a factory in Dubai that employs 3D printing in the design and manufacturing process. Julphar, the region's first pharmaceutical manufacturer, is using digital manufacturing technology to automate and control the process of making up to 40 million vials of insulin crystals per year.

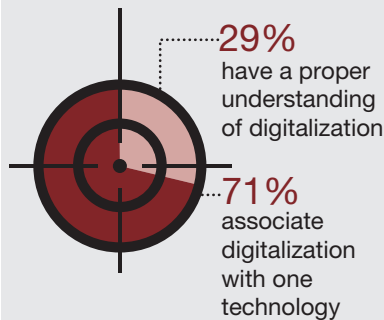
Challenges remain. The IT infrastructure is not ready to support this digital transformation and many manufacturers fear the increase of cyber-risk from going digital.

At the same time, there is great potential for progress especially with the government-sponsored initiatives to promote localized industrial manufacturing in the region.

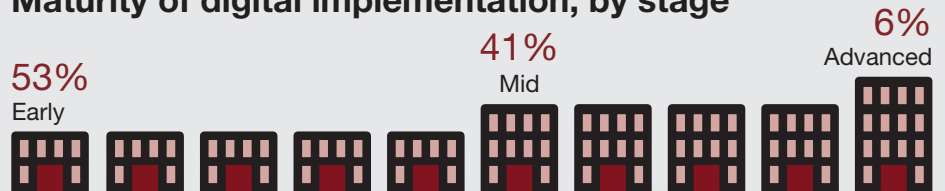
Mining

Key survey insights

41% are familiar with digitalization



Maturity of digital implementation, by stage



Top 3 technologies



41% have a digital strategy

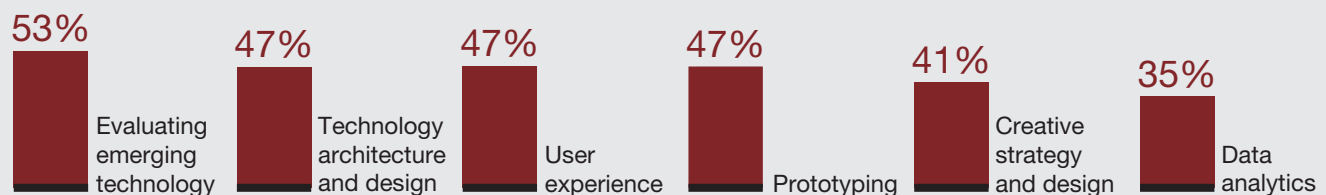
Bodies responsible for digitalization



Change in spend on digital compared to past year



Availability of digital skills



Expert insights

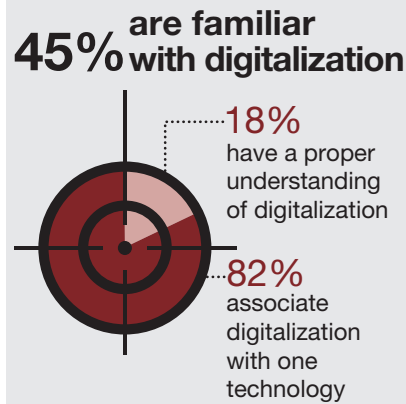
The mining industry differs from other industries because of its high level of variability. Meanwhile, the industry has been witnessing declining productivity in its operations.

Several specific opportunities are apparent. The Internet of Things and connectivity allow mining companies to create a large volume of data from sensors. Data analytics can help companies to turn such data into insights that have the potential to increase efficiency and accuracy. Smart goggles can provide workers with instructions on the job. In the robotics sphere, fully autonomous equipment is becoming increasingly common.

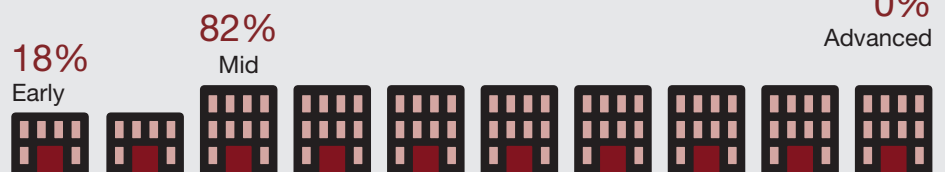
Although the industry has reduced its capital spending significantly, digital technologies are gradually being adopted as a means to manage variability and enhance productivity.

Government

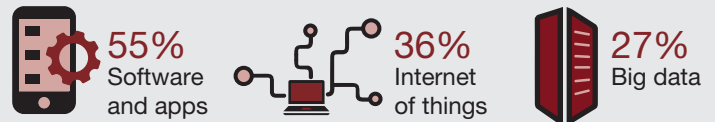
Key survey insights



Maturity of digital implementation, by stage

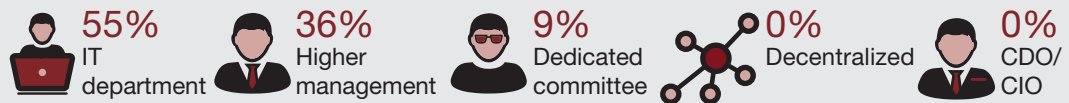


Top 3 technologies



36% have a digital strategy

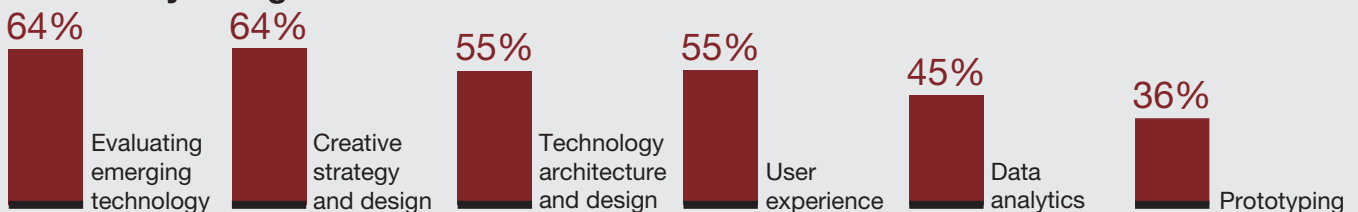
Bodies responsible for digitalization



Change in spend on digital compared to past year



Availability of digital skills



Expert insights

Governments in GCC countries have introduced digital technologies in several waves. However, governments are not yet “smart,” and customer experience often still falls short. Digitalization initiatives are too often undertaken on an ad hoc basis, rather than as part of a coherent strategy.

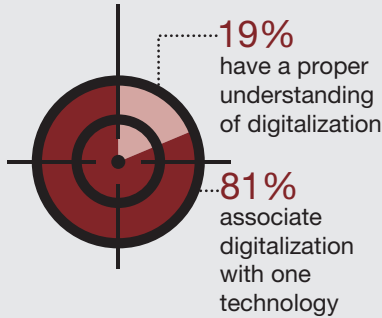
There has been limited back-end digitalization, with a lack of shared services and outsourcing. Data across government is not standardized, with control dispersed across several departments, and often not electronic.

Although further progress has to be made, there have been a number of positive developments. The vast majority (90 percent) of Qatar government services will be made available online through its enhanced e-government portal by 2016. Abu Dhabi also has an e-government portal that offers various government services for residents and businesses. Most GCC governments are starting to use ERP systems. Indeed, governments’ cost-cutting agendas could drive digitalization efforts to promote efficiency.

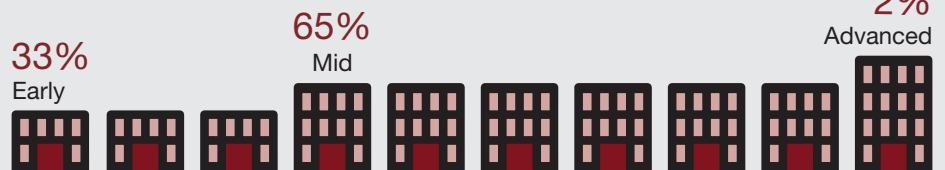
Country profiles: Qatar

Key survey insights

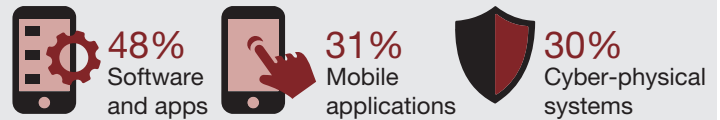
34% are familiar with digitalization



Maturity of digital implementation, by stage



Top 3 technologies

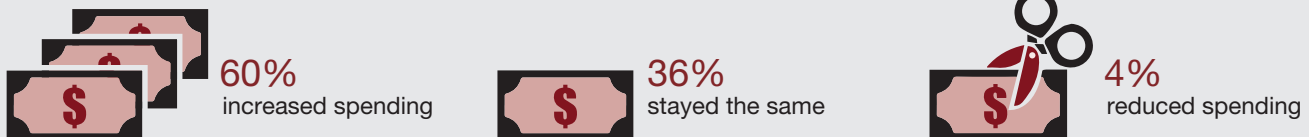


31% have a digital strategy

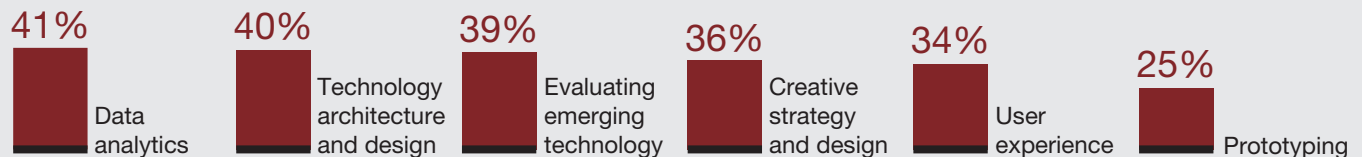
Bodies responsible for digitalization



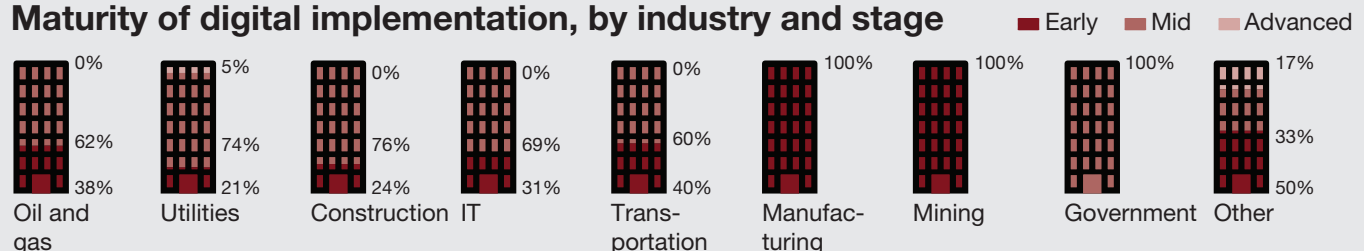
Change in spend on digital compared to past year



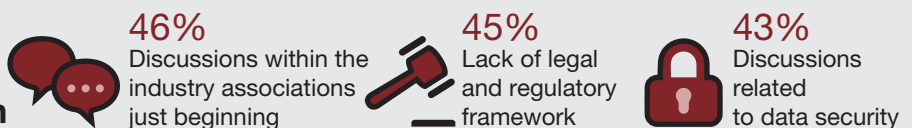
Availability of digital skills



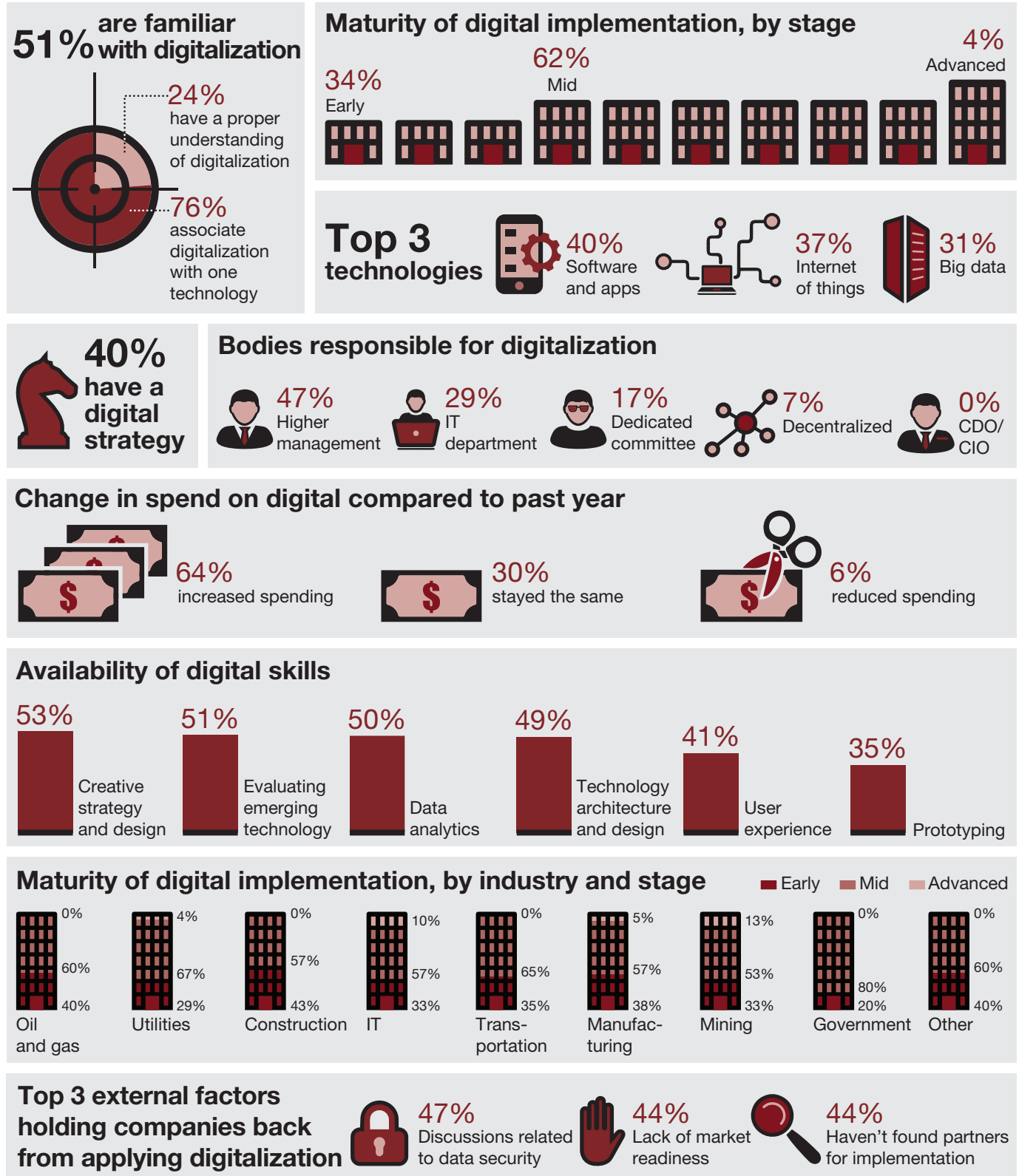
Maturity of digital implementation, by industry and stage



Top 3 external factors holding companies back from applying digitalization



Key survey insights

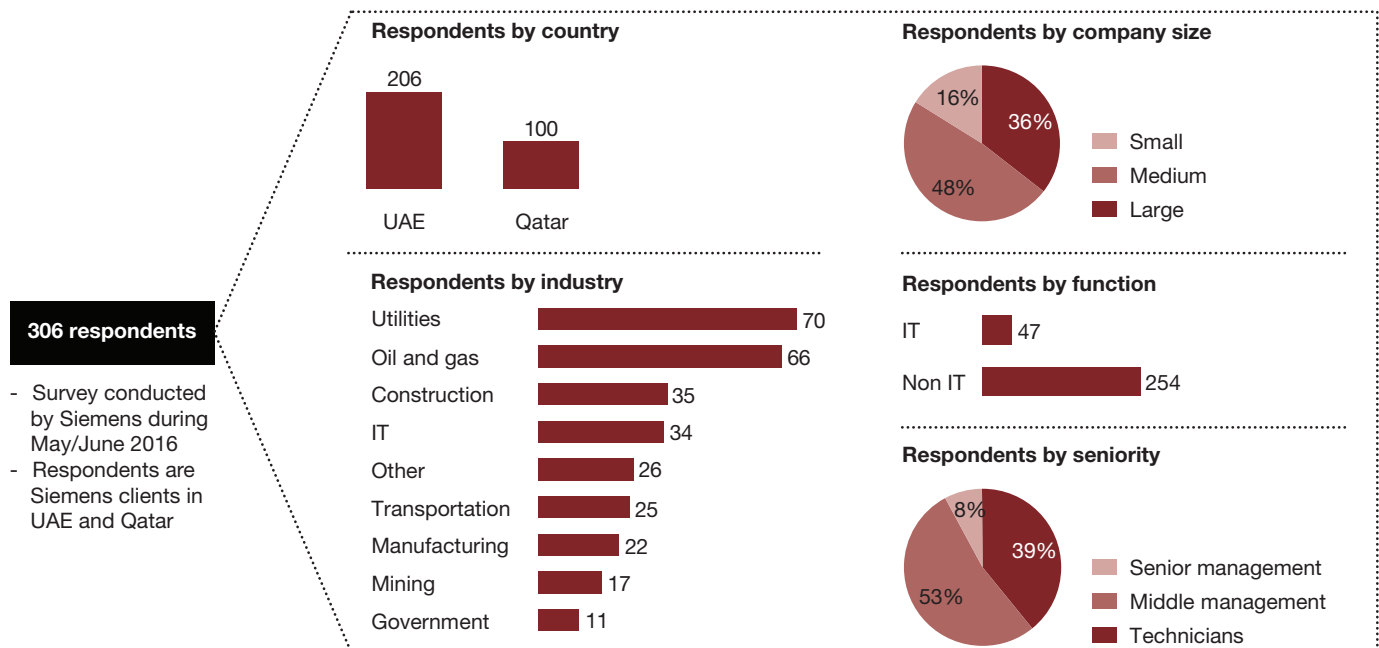


Siemens survey methodology

In May and June 2016, Siemens Global Marketing Services led a survey of 306 executives, asking them questions concerning digitalization at their companies. Of these executives, 206 were located in the UAE, and 100 in Qatar. Almost half (48 percent) were from medium-sized companies. Meanwhile, 36 percent of the executives were from large companies, and 16 percent from small companies. Respondents were also split along industry lines, with executives interviewed from the utilities, oil and gas, construction, IT, transportation, manufacturing, and mining industries, among others, and also from government. More than half of the interviewees were middle managers (53 percent), technicians represented 39 percent, and 8 percent were senior managers (*see Exhibit 14*).

Exhibit 14

Siemens survey breakdown



Source: Siemens survey

Endnotes

- ¹ The GCC countries are Bahrain, Kuwait, Qatar, Oman, Saudi Arabia, and the United Arab Emirates.
- ² Bahjat El-Darwiche, Mathias Herzog, Milind Singh, Rawia Abdel Samad, Jad El Mir, Roshni Goel, “Connecting the world: Ten mechanisms for global inclusion,” Strategy& 2016, page 12 (<http://www.strategyand.pwc.com/media/file/Connecting-the-world.pdf#page=12>).
- ³ Statista, “Market capitalization of the biggest internet companies worldwide as of May 2016 (in billion U.S. dollars),” 2016 (<https://www.statista.com/statistics/277483/market-value-of-the-largest-internet-companies-worldwide/>).
- ⁴ Survey respondents were from the utilities, oil and gas, construction, IT, transportation, manufacturing, and mining industries, among others, and also from government.
- ⁵ PwC, 2015 Global Digital IQ® Survey (<http://www.pwc.com/gx/en/services/advisory/2015-global-digital-iq-survey.html>).
- ⁶ PwC, 2015 Global Digital IQ® Survey; “Lessons from digital leaders: 10 attributes driving stronger performance,” September 2015 (<http://www.pwc.com/gx/en/advisory-services/digital-iq-survey-2015/campaign-site/digital-iq-survey-2015.pdf>).
- ⁷ GBM Annual Security Survey 2016 (<http://tinyurl.com/jse38eh>).
- ⁸ Nada Altaher, “UAE a target of 5 per cent of global cyber attacks,” *Gulf News*, May 12, 2016 (<http://gulfnews.com/news/uae/crime/uae-a-target-of-5-per-cent-of-global-cyber-attacks-1.1826610>).
- ⁹ Communications and Information Technology Commission, “ICT Report: ICT workforce in the Kingdom of Saudi Arabia,” 2015 (http://www.citc.gov.sa/en/reportsandstudies/Reports/Documents/ICTWorkforce_en.pdf).
- ¹⁰ Arabnet, “The State of Digital Investments in MENA,” 2016 (<http://infive.ae/wp-content/uploads/2014/08/The-State-of-Digital-Investments-in-MENA-Report1.pdf#page=27>).
- ¹¹ Per-Ola Karlsson and Abdullah Jefri, “Study shows Middle East companies lag in R&D spending,” *The National*, February 21, 2016 (<http://www.thenational.ae/business/economy/study-shows-middle-east-companies-lag-in-rd-spending>).

¹² Gartner Financial Executives International CFO Technology Study (2015) (<https://www.gartner.com/doc/3114318/survey-analysis-critical-cfo-technology>).

¹³ Silja Baller, Soumitra Dutta, and Bruno Lanvin (eds), “The Global Information Technology Report 2016: Innovating in the Digital Economy,” World Economic Forum, 2016 (http://www3.weforum.org/docs/GITR2016/WEF_GITR_Full_Report.pdf).

¹⁴ Communications and Information Technology Commission, “ICT Report: ICT workforce in the Kingdom of Saudi Arabia,” 2015 (http://www.citc.gov.sa/en/reportsandstudies/Reports/Documents/ICTWorkforce_en.pdf).

¹⁵ National labor force surveys, 2015 (http://www.ilo.org/dyn/lfsurvey/lfsurvey.list?p_lang=en).

¹⁶ OECD, “ICT Employment – 2011” (<https://data.oecd.org/ict/ict-employment.htm>).

¹⁷ Compass, “The 2015 Global Startup Ecosystem Ranking,” July 27, 2015 (<http://blog.compass.co/the-2015-global-startup-ecosystem-ranking-is-live/>).

¹⁸ Barry Jaruzelski and Richard Holman, “The three paths to open innovation,” *strategy + business*, May 23, 2011 (<http://www.strategy-business.com/article/00075?gko=e1727>).

¹⁹ *The National* staff, “25 per cent of Dubai’s construction to be 3-D printed by 2030, Ruler announces,” April 27, 2016 (<http://www.thenational.ae/uae/25-per-cent-of-dubais-construction-to-be-3-d-printed-by-2030-ruler-announces>).

²⁰ Mary Achkhanian, “25% of all transportation in Dubai will be smart and driverless by 2030: Mohammad Bin Rashid,” *Gulf News*, April 25, 2016 (<http://gulfnews.com/news/uae/transport/25-of-all-transportation-in-dubai-will-be-smart-and-driverless-by-2030-mohammad-bin-rashid-1.1810896>).

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