



NAVIGATING UNCERTAINTY

**HARVEY
NASH**

The Power of Talent

KPMG

Navigating uncertainty

CIOs are used to change. The technology sector has been busily reinventing itself on a regular basis since the first commercial computers were launched in the 1950s, each time bringing a new opportunity or challenge. Often in equal measure.

But in this year's CIO Survey, technology leaders are telling us that change has reached unprecedented levels, and increasingly it is coming from unexpected corners.

Few would have predicted the amount of energy to be spent discussing and evaluating the recent political change in many Western countries and how it is and potentially could impact business. Few would have predicted how competitors are now co-operating in 'business ecosystems' and the astonishing advances that have been made in data analytics, cloud, or – as this year's survey reveals – automation.

While many things remain uncertain, what is certain is the steadfast focus by many technology executives on helping their organizations become more nimble and digital, to navigate through unpredictable change, and to thrive in an uncertain world. Whether that's taking calculated bets on new innovation, or finding new skills or talent in unexpected places, this year's survey shines a light on important changes being embraced today by CIOs.

Proudly presenting the views of 4,500 technology executives, this year's Harvey Nash/KPMG CIO Survey is the largest IT leadership survey ever undertaken. From board priorities to business relationships to careers, the CIO Survey provides critical insights and guidance about how to succeed in this fast-changing environment.

We hope the unique insights this CIO Survey brings will help you navigate your organization, and your career, through an uncertain world.



Bob Miano
*President & CEO
Harvey Nash USAPAC*



Denis Berry
*KPMG Principal
U.S. CIO Advisory Leader*

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About the Survey

The 2017 Harvey Nash/KPMG CIO Survey is the largest IT leadership survey in the world in terms of number of respondents. The survey of 4,498 CIOs and technology leaders was conducted between 19 December 2016 and 3 April 2017, across 86 countries.

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The Harvey Nash / KPMG CIO Survey is the world's largest IT leadership survey. For almost two decades it has been covering the issues that matter to technology leaders: from board priorities, to technology strategy, to careers.

www.hnkpmgciosurvey.com

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Total number
of respondents:

4,498

CIO PRIORITIES

MANAGING CHANGE

64%

say the political, business and economic **environment** is becoming **more unpredictable**.

Increasingly, uncertain times seem to be correlated with **shifting IT leadership priorities**:

INCREASINGLY important compared with last year:

Delivering consistent and stable IT performance - **UP 21%**

Developing innovative new products and services - **UP 21%**

Saving costs - **UP 8%**

Increasing operational efficiencies - **UP 7%**

DECREASINGLY important compared with last year:

Better engagement with customers/prospects - **DOWN 18%**

Improving the success rate of projects - **DOWN 11%**

TOP RESPONSES TO POLITICAL/BUSINESS/ECONOMIC CHANGE:

1

Creating a more nimble technology platform
52%

2

Working with restricted budgets
49%

3

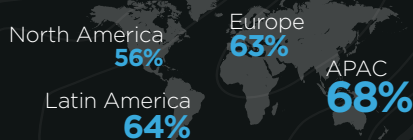
Investing in cyber security
45%

PEOPLE, SKILLS AND TALENT

Six in ten consistently report **technology skills shortage**

2017 (62%), 2016 (65%), 2015 (59%), 2014 (60%)

Skills shortage is unequal across the world:



SKILLS THAT ARE MOST SCARCE:

Big Data/Analytics (42%) - most in demand by large employers

Business Analysis (34%) - most in demand by smaller employers

Enterprise Architecture (34%) - fastest growing - up 26% compared with last year

No progress on women in IT leadership



9% of senior IT leadership are women, *same as last year*

Yet **35%** of organisations have a formal diversity initiative in place
This varies greatly by organisational size:

(28%) smaller

(51%) mid-sized

(72%) larger organisations

Despite slow progress:

more women had salary rises than men (**42%** versus **32%**)

DEALING WITH DIGITAL

Proportion of organisations with **enterprise-wide digital strategy** is **up by 52%** in three years:
2017 **41%**, 2016 **35%**, 2015 **27%**

Biggest impediment to digital success is **resistance to change 43%**.
Only 25% saw lack of budget as a major issue.

TOP TACTICS TO FOSTER DIGITAL INNOVATION ARE TO:

- 1** Dedicate more time for innovation **54%**
- 2** Partner with innovative organisations e.g. academic institutions **52%**
- 3** Ring-fencing innovation budgets **31%**
a distant third



A quarter of organisations (25%) now employ a **Chief Digital Officer**:
2017 **25%**, 2016 **18%**, 2015 **17%**, 2014 **7%**

MANAGING IT

TOP WAYS IT LEADERS ARE LOOKING TO IMPROVE AGILITY AND RESPONSIVENESS:

- 1** Implementing agile methodologies **28%**
- 2** Buying more solutions 'as a service' **19%**
- 3** Taking different approaches with multi-mode IT **15%**



Relentless rise of organisations being subject to '**major**' **cyber attacks** during past four years:
2017 **32%**, 2016 **28%**, 2015 **25%**, 2014 **22%**

IT BUDGETS ARE GROWING:

79% have seen budgets upheld or increased this year
Only one in five IT leaders (21%) have seen **IT budgets cut**

34% OF IT LEADERS ARE ALREADY **INVESTING** OR ARE **PLANNING TO INVEST IN DIGITAL LABOUR** IN 2017:

62% of respondents from **larger organisations** are **investing**, compared with 27% of peers in smaller firms

27% believe **digital labour is most effective** at improving quality, ahead of 24% who value efficiency

CIO CAREERS

The majority of CIOs (58%) can expect to be in the job for **five years or less**:

28% of CIOs at **larger firms** more **likely to move job** this year vs 20% at smaller organisations

CIOs **most likely to move job** this year are in **Charity/Non-Profit**
34% want to change role

CIO job satisfaction has **risen by 18%** since 2015 and is at a three-year high (**39%** rate themselves 'very fulfilled'):



44% of CIOs who sit on their executive management team record the **highest levels of job satisfaction**

Non-Profit CIOs see **12% drop in fulfilment** (likely linked to career restlessness)

33% of CIOs benefited from an **increase in base salary** last year, **62%** of salaries were unchanged

Executive summary



Times are changing?

Last year, many predicted that the slow, steady recovery after the Great Recession would continue and we all rather hoped that economic growth would accelerate. Few saw seismic change on the horizon. How wrong we were. How did CIOs respond? Did we see panic? Not a bit of it. CIOs

are no strangers to rapidly changing environments and perhaps the odd crisis or two. They responded with measured calmness. Our survey results suggest that many decided to wait and see, while they made careful preparations behind the scenes. More than half our respondents told us they are creating more nimble technology platforms to deal with unpredictable circumstances. Also, in times of change it seems that relationships are everything. Many respondents said that they are planning to do more work with familiar long-term partners whom they can trust.

Stability is back on the agenda

As far as operational priorities are concerned, consistent and stable IT rocketed to the top of the priority list. Smaller companies place particular priority on this area. There were, however, interesting differences across sectors. While the Financial Services, Government, Utilities and Retail sectors all placed stability at the top of their priority list, the Manufacturing, Construction and Education sectors all rated business process improvements at the top of theirs. For the Broadcast and Media sector, however, digital disruption appears to have prompted substantial changes for their businesses. Developing new products and services, and driving revenue growth, are now their highest priorities.

CIO strategic influence continues its relentless growth

In recent years, the CIO has progressively become more influential. This year, that trend has continued apace with more than seven in ten respondents telling us that CIO influence is increasing. More

CIOs are also taking a seat at the top table. In 2005, barely 38 per cent of CIOs sat on their executive committee; today that figure has risen to 62 per cent. IT leaders are also increasingly working at board level. More than three-quarters attended a board meeting within the last 12 months. Popular board topics include IT strategy, technology investments, digital transformation and, of course, the ever-present challenge of cyber security. This increased exposure may have led many CIOs to take leading roles in innovating in their organisations.

Projects are as difficult as ever

Last year, we reported that the success rate of projects was falling. A backdrop of increasing complexity and the drive to rapidly implement innovative digital projects may be to blame. This year, we asked about the problem areas. Weak ownership, over-optimism and unclear objectives topped the list; while lack of talent, poor governance and complexity formed a second tranche of challenges. But there was good news for suppliers. A mere 7 per cent of our respondents blamed their failures on their IT supply chains.

Skills shortages as usual

In each of the last four years, around 60 per cent of respondents have reported skills shortages. This is very different to the heady days before the Great Recession when four out of five respondents persistently complained about this problem. Is this the new normal? Big data/analytics, business analysis and enterprise architecture are the most in-demand skills. This year, architecture staged a comeback after several years of decline. Could this demand be related to the increasingly complex project landscape that many organisations find themselves grappling with? In terms of gender diversity, progress remains slow. The improvement we saw last year seems to have petered out. While a third of IT leaders have diversity initiatives in place, there has been little, if any, movement in the last five years. Barely 10 per cent of IT leaders are female.

CDOs are on the march again

A quarter of organisations now have a Chief Digital Officer (CDO). After something of a lull last year, CDO roles are being filled in ever-greater numbers. There are now three times as many CDOs around as there were three years ago. Broadcasting and

Media together with the Advertising sector lead the charge, while the Manufacturing, Energy, Utilities and Education sectors are least populated with CDOs. There is also variation with company size. More than half of the largest companies now have a CDO in place while only a fifth of those with IT budgets of less than \$50m have taken the plunge.

More than just a silver lining?

Cloud technology has received very positive feedback this year. There seems to be something here for everyone. Larger organisations are more likely to report the benefit of cost savings and the improved responsiveness from cloud technologies. Smaller companies are more likely to tell us that they love stability and simplicity, and value the scalability of their cloud solutions. We think that the cloud model has been a good example of the increasing maturity of the industry. Suppliers are providing robust, flexible solutions, while customers are much less 'prima donna' about the uniqueness of their estate, clearing the way for the exploitation of cloud technology.

Dealing with the cyber-crime wave

Confidence in cyber security is at an all-time low. Today, only one in five respondents feel that they are very well prepared to respond to cyber attacks. The relative ease with which hackers seem to be able to ghost their way into apparently well-protected systems creates sleepless nights for any IT leader. Last year, we looked at where the attacks were coming from. Respondents told us that organised cyber crime was their top concern, followed by the amateur hackers. This year, the profile is unchanged although more people are reporting trouble from 'insiders'. Overall, just under a third of respondents reported that they had been subject to a major security incident in the past 24 months. However, larger companies seem to be more at risk. More than half tell us that they have suffered recent attacks. Utilities and Government organisations seem to receive the most attention from hackers, followed by the Education, Telecoms and Pharmaceuticals sectors.

Are the robots coming?

This year, we asked some questions about robotics and digital labour. We learned that IT leaders are starting to make significant investments in this area. The convergence of robotics, machine learning and advanced analytics is certainly a good way of dealing with the challenge of 'big data'. A quarter of respondents are seeing very effective results. Technologies such as cognitive automation, together with both basic and advanced robotic process automation, seem to be areas where increasing numbers of organisations are investing. The robots, it seems, are certainly on their way.

Outsourcing intent unchanged

Outsourcing remains high on everyone's agenda. As in previous years, around half of our respondents are planning to increase their outsourcing commitment while around four in ten are looking to do more offshoring – a trend that has been largely unchanged in recent years. IT leaders tell us that they want to free up their own resources, gain access to new skills and save themselves some money. Hot outsourcing areas include application development, followed by infrastructure and software maintenance.

CIOs love their jobs!

CIOs who told us that they are 'very fulfilled' in their role is at a three-year high. Over the last few years, respondents have gradually been upgrading their preference from 'quite fulfilling' to 'very fulfilling'. And there are plenty of good reasons for this. More than eight out of ten IT leaders are seeing stable or growing budgets. And those on the executive committee seem to be the happiest of them all. We're not sure whether money can buy you happiness, but strategic influence certainly seems to help. In terms of sector differences, this year the happiest CIOs are to be found in the Energy, Professional Services and Education sectors, where nearly nine out of ten tell us that they are having a ball. Happy days!

Dr Jonathan Mitchell

*Non-Executive Chair, Global CIO Practice,
Harvey Nash*

A changing world

64% say the political, business and economic environment is becoming more unpredictable

Less visibility

25% say they are reducing longer-term planning (3 years+)

UNCERTAINTY

Rising cyber threat

45% rise in major cyber attacks over past four years (22% to 32%)

No 'blueprint' for digital

88% feel their business has yet to fully benefit from their digital strategy

Increased complexity

61% say projects more complex, and 58% say more ambitious, than 5 years ago

Increasing agility

52% creating a more nimble platform to respond to change

The 'navigator' CIO

71% say strategic influence of the CIO is growing. 68% attended a main board meeting in last quarter

A focus on stability

63% are focusing on the basics: delivering a stable IT platform

Getting to grips with digital

52% increase in organisations with an enterprise-wide digital strategy in past 2 years (27% to 41%)

NAVIGATING

Fostering innovation

54% dedicating people and time to deliver innovation

The background of the slide is a dark gray topographic map. It features numerous contour lines of varying thickness and shades of gray, representing different elevations. A prominent dashed line, likely representing a river or a boundary, winds across the map from the lower left towards the upper right. The overall aesthetic is technical and minimalist.

1. Global results

1.1 Operational priorities

Hindsight is a wonderful thing. Few could have predicted the extraordinary political, economic and technology changes that have occurred in recent years, and these increasingly uncertain times seem to be correlated with shifting IT leadership priorities. Last year, stable IT performance had dropped down the rankings. Customer engagement seemed to be an increasing priority, suggesting that IT leaders had cracked the difficult task of managing a complex operational environment. But, this year, stable IT

performance has rocketed back to the top of the list along with a similar increase for the need to develop innovative new products and services. These priorities illustrate the difficult landscape in which IT leaders not only have to take risks in implementing business process change with unprecedented levels of technical innovation, but they also have to make sure that these new systems are rock-solid in terms of performance and reliability: a real headache.

Turbulent times call for IT leaders to increase focus on delivering consistency and stability

	2013	2014	2015	2016	2017	Change past 12 months
Delivering consistent and stable IT performance to the business	70%	59%	57%	52%	63%	21%
Increasing operational efficiencies	68%	63%	61%	58%	62%	7%
Improving business processes	60%	60%	58%	57%	59%	3%
Saving costs	71%	57%	54%	50%	54%	8%
Developing innovative new products and services	51%	41%	41%	42%	51%	21%
Delivering business intelligence/analytics	48%	41%	47%	46%	46%	0%
Enabling business change	53%	51%	48%	43%	42%	-2%
Driving revenue growth	42%	45%	42%	40%	40%	0%
Cyber security	NEW IN 2016			41%	40%	-2%
Managing operational risk and compliance	41%	40%	39%	36%	34%	-6%
Better engagement with customers/prospects	33%	36%	38%	38%	31%	-18%
Improving the success rate of projects	36%	30%	29%	26%	23%	-11%
Improving time to market	31%	29%	30%	26%	23%	-11%
Outperforming competitors with new business models	26%	23%	24%	24%	22%	-8%
Enabling mobile commerce	33%	24%	22%	19%	19%	0%
Driving synergies from mergers & acquisitions	17%	17%	15%	13%	11%	-15%
Investing in social media platforms	N/A	10%	9%	7%	7%	0%
Achieving sustainable/green IT	9%	9%	8%	7%	6%	-14%
Reputation management via social media technology	14%	8%	9%	7%	5%	-29%

Table 1: What are the key business issues that your management board is looking for IT to address?

What is the single biggest thing keeping you awake at night?



Triona O'Keeffe,
CIO, Direct Line
Group, UK

Creating the right environment and the optimal set of conditions to fuel amazing technology talent to deliver business value over the next 10+ years. I personally have a vision of a world where diverse talent is truly recognised and nurtured, where individuals can manage their individual needs (home and work) and where what you deliver and how you do it is far more important than where or when you do it.



Christian H A Reis,
CIO, VLI Multimodal
S/A, Brazil

At the same time as we are experiencing double-digit growth, we are also transforming the IT model to have it completely focused on our users' and clients' digital experiences. The challenge requires a new mind-set, from the IT team to vendors and business areas. The transition requires careful steps when shifting to the new model as both will coexist for some time until the move is irreversible and contagious.



Fidelma Russo,
CTO, Iron Mountain,
USA

Cyber security and the risk it poses to enterprise are increasingly worrisome, especially as technology becomes more global and is the "secret sauce" differentiating many companies. Cyber attackers only have to be lucky once to have a serious impact.

Operational priorities related to organisation size

IT leaders at smaller and mid-sized organisations are spending more time delivering consistent and stable IT performance compared with respondents at larger organisations, who perhaps have more insulation against changeable political and economic environments. IT leaders at larger organisations seem to be more focused on 'business as usual' IT – saving money and improving efficiencies – rather than on stable systems, while respondents at mid-sized organisations are more focused on enabling business change.

Priorities at larger organisations are evidently different in 2017 compared with smaller organisations

Ranking #	IT budget Smaller <\$50m	IT budget Mid \$50m to \$250m	IT budget Larger \$250m+
1	Consistent and stable IT (63%)	Consistent and stable IT (68%)	Saving costs (65%)
2	Increasing operational efficiencies (63%)	Increasing operational efficiencies (63%)	Increasing operational efficiencies (60%)
3	Improving business processes (62%)	Saving costs (61%)	Consistent and stable IT (57%)
4	Saving costs (52%)	New products and services (56%)	New products and services (53%)
5	New products and services (50%)	Enabling business change (53%)	Business intelligence analytics (47%)

Table 2: What are the key business issues that your management board is looking for IT to address? By size of IT budget.

When we looked into the differences between sectors, we saw some things we expected, but also others that we did not. We were not surprised that Financial Services, Government IT departments, Utilities and Retail businesses all rate stable IT services at the top of their list. Similarly, the presence of analytics in the Healthcare sector as a priority makes perfect sense; this sector has been one of the leading proponents in this area for a decade or more. But there are surprises: the Broadcast and Media sector seems to have completely broken free from its peers in terms of priorities, with a headlong rush into revenue-linked innovation, probably a consequence of digital disruption. The priority in this sector seems to be to generate money and to do it cheaply.

Many sectors share similar top IT priorities, with Media and Tech sectors considered outliers

	#1 Ranked Priority	#2 Ranked Priority	#3 Ranked Priority
Advertising	Operational efficiencies	Business processes	New products & services
Broadcast/Media	New products & services	Driving revenue growth	Saving costs
Charity/Non-Profit	Operational efficiencies	Business processes	Consistent and stable IT
Construction/Engineering	Business processes	Consistent and stable IT	Operational efficiencies
Education	Business processes	Consistent and stable IT	Operational efficiencies
Energy	Operational efficiencies	Saving costs	Business processes
Financial Services	Consistent and stable IT	Saving costs	New products & services
Government	Consistent and stable IT	Operational efficiencies	Business processes
Healthcare	Operational efficiencies	Consistent and stable IT	Business intelligence/analytics
Leisure	Consistent and stable IT	Operational efficiencies	Business intelligence/analytics
Manufacturing	Business processes	Operational efficiencies	Consistent and stable IT
Pharmaceuticals	Operational efficiencies	Business processes	Consistent and stable IT
Professional Services	Operational efficiencies	Business processes	New products & services
Retail	Consistent and stable IT	Operational efficiencies	Business processes
Technology	New product & services	Consistent and stable IT	Driving revenue growth
Telecommunications	Saving costs	Consistent and stable IT	New product & services
Utilities	Consistent and stable IT	Saving costs	Operational efficiencies

Table 3: What are the key business issues that your management board is looking for IT to address? By sector.

Managing change

Almost two-thirds of respondents (64 per cent) say the wider political, business and economic environment has become more unpredictable, and as a result they are adapting their technology strategy and plans. Clearly then, Brexit, Trump and a new era of unpredictability are having an impact on IT leaders. However, as we will see later on, respondents appear quite sanguine about the unpredictable environment in 2017.

In both Asia Pacific (68 per cent) and Latin America (87 per cent), more respondents are actively changing plans to adapt to a more volatile global political, business and economic environment, compared with the global average. Where we have followed up with some IT leaders, they tell us that macro-economic conditions guide their thinking more than domestic political changes; and, despite greater unpredictability, there seems to be cautious optimism about the future.

Almost two-thirds of IT leaders are adapting technology plans due to growing unpredictability

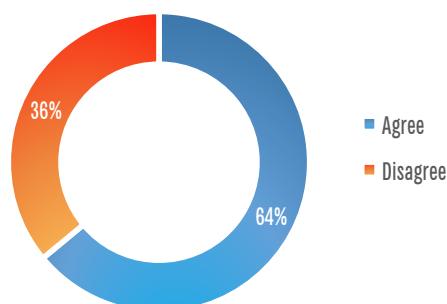


Chart 1: Agree or disagree: The wider/global political, business and economic environment has become more unpredictable, and as a result I have had to adapt my technology strategy and plans.

Most IT leaders across all sectors are actively revising plans to succeed in unpredictable times



Chart 2: Agree or disagree: The wider/global political, business and economic environment has become more unpredictable, and as a result I have had to adapt my technology strategy and plans. Agree.

Ways to manage change

The single most popular response by IT leaders adapting their technology in response to change was to create a more nimble technology platform (52 per cent). It seems that CIOs are addressing uncertainty head on, and the focus is on the end-to-end platform.

Unpredictability is also having an impact on budget planning for almost half of respondents (49 per cent) and driving further investment in cyber security (45 per cent). During unpredictable times, the winners appear to be partners/suppliers with existing long-term relationships with CIOs. Almost four in ten IT leaders plan to do more work with 'trusted' partners this year and have fewer plans to work with new vendors.

Changeable times require more nimble technology

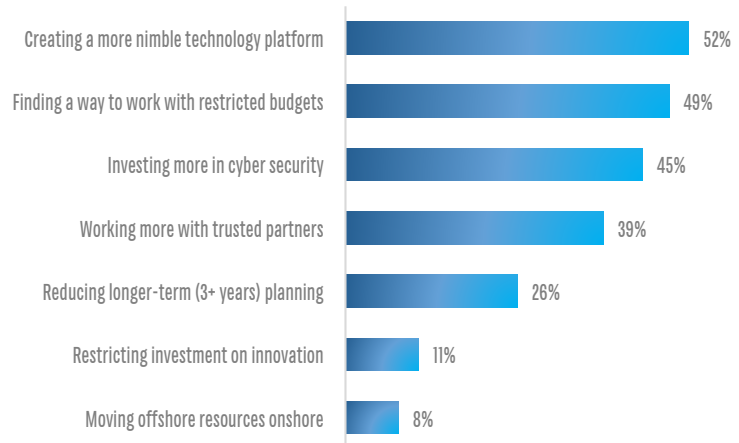


Chart 3: How have you adapted your technology plans to deal with uncertainty?

CIOs at larger organisations are far more likely to invest in cyber security and reposition offshore resources closer to home in response to growing uncertainty, compared with peers at smaller organisations. These represent the most significant differences in approach based on organisation size (see table below), but there is still a strong sense of 'wait and see' by many IT leaders.

CIOs at larger organisations (with resources) can be proactive when responding to change

	IT budget less than \$50m	IT budget \$50m to \$250m	IT budget more than \$250m
Creating a more nimble technology platform to deal with unpredictable circumstances	52%	56%	54%
Finding a way to work with restricted budgets	51%	46%	44%
Investing more in cyber security	43%	55%	53%
Working more with trusted suppliers and partners (fewer new/unknown vendors)	39%	36%	37%
Reducing the amount of longer-term (3+ years) planning	27%	26%	21%
Restricting investment on innovation	12%	8%	13%
Moving offshore resources onshore	7%	8%	15%

Table 4: How have you adapted your technology plans to deal with uncertainty? By size of IT budget.

Strategic influence

In unpredictable times, the strategic influence of the CIO continues to grow. For the first time in a decade, more than seven in ten respondents (71 per cent) believe that the CIO role in their organisation is becoming more strategic. This aligns with the growing proportion of IT leaders who sit on the operational board/executive management team. More than six in ten respondents now do this, the highest level we have recorded and up 9 per cent on last year.

The vast majority of IT leaders have frequent access to the main board. Two-thirds (68 per cent) attended a board meeting within the last quarter, while 85 per cent joined a board meeting within the past 12 months. Only 11 per cent of IT leaders have never been involved in a meeting with the main board.

IT's strategic influence hits new heights as executive board participation continues to grow

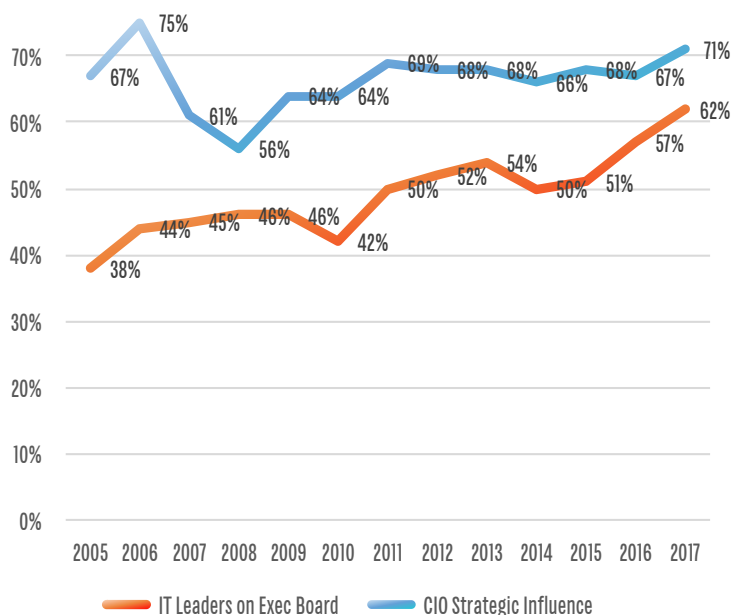


Chart 4: Is the CIO on the executive committee? / Do you believe the CIO influence is growing?

Large majority of IT leaders have frequent access to board members to exert strategic influence

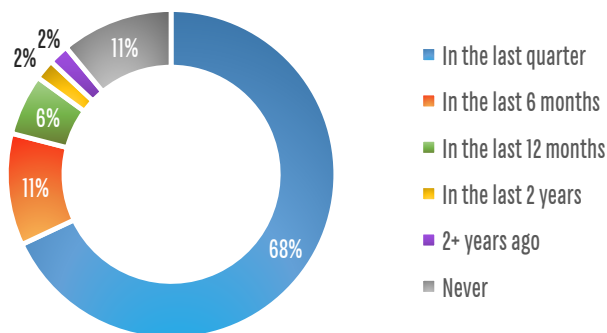


Chart 5: When was the last time you were involved in a meeting with the main board of your organisation?

IT leaders at larger organisations (with annual IT budgets over \$250m) can expect less direct access to the board and are less likely to report to the CEO when compared with their counterparts at small and mid-sized organisations. Under a fifth (17 per cent) of IT leaders report directly to the CEO in large organisations, compared with nearly half (45 per cent) of IT leaders at smaller organisations. IT leaders at smaller organisations also have more direct access to board members compared with peers at larger organisations. Nearly three-quarters of IT leaders (72 per cent) at organisations with an annual IT budget of \$50m or less attended a meeting last quarter, compared with only 45 per cent of respondents at larger organisations.

While many IT leaders have been members of executive management teams for a number of years, there is a trend towards greater involvement with their boards in more recent times. This is hardly surprising given the increasing strategic influence of the IT leader reported by respondents. Non-executive directors of public companies represent the interests of shareholders, and so will be particularly concerned about the strategic direction of IT together with how major risk areas such as cyber security are being dealt with.

Access to board members is most frequent for IT leaders at smaller organisations

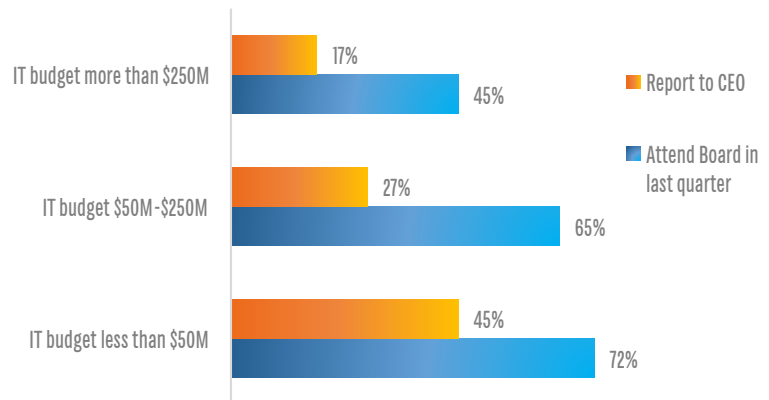


Chart 6: Reporting lines and boardroom attendance, by IT budget

Majority of IT leaders influence strategy and investment decisions during board attendance

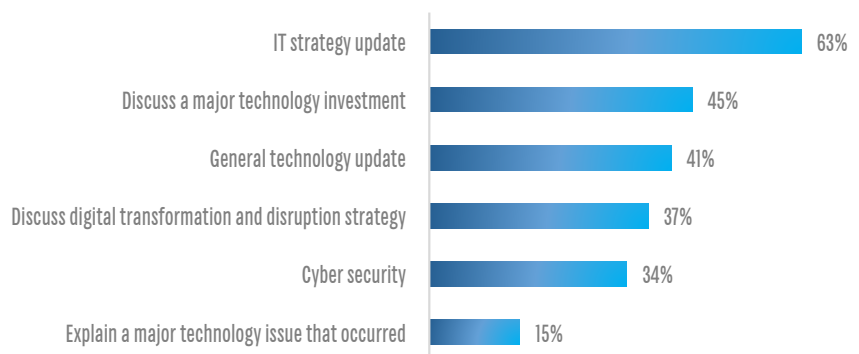


Chart 7: What topics did you address at your most recent board meeting?

Leading innovation

CIOs are fast becoming strategic innovators in their business. At present, only one in four respondents (26 per cent) report that the CIO is currently leading innovation in their organisations, whereas six in ten respondents (60 per cent) believe that the CIO should be taking a greater leadership role in this area.

“Today we are going to innovate”: this always looks good in corporate mission statements, but it is much harder to execute. While some organisations have managed mega-disruptive ‘out of the box’ thinking, it is relatively rare in our experience. Survey responses in recent years suggest that many organisations may be embarking on a voyage of experimental discovery, with technical innovations on a relatively small scale.

When filtering responses based on whether participants are CIOs or non-CIOs, non-CIOs also agree that the CIO should be taking a stronger leadership role on innovation. That said, they are slightly less enthusiastic about this than the CIOs themselves (55 per cent versus 67 per cent).

Respondents believe that the CIO should be taking an increasing leadership role in innovation

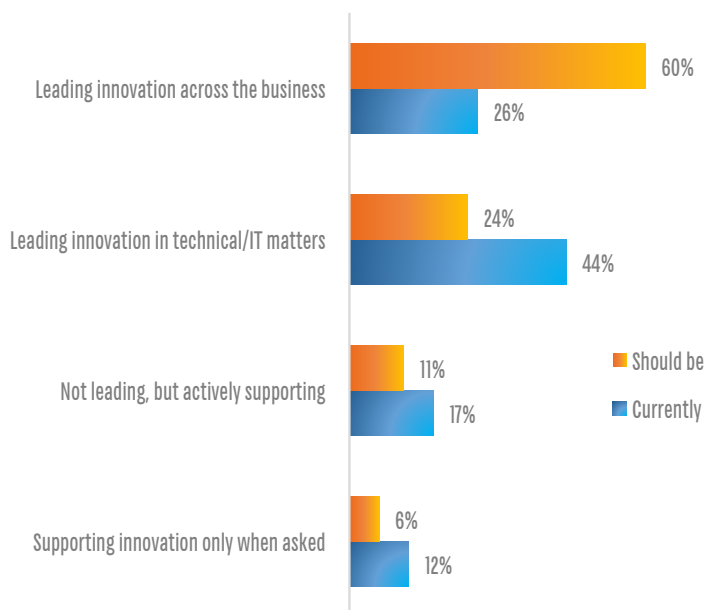


Chart 8: Which of the following do you think best describes the role your organisation's CIO is currently playing, and should be playing, in promoting innovation?

Colleagues and peers are less keen for CIOs to take on innovation leadership role in future

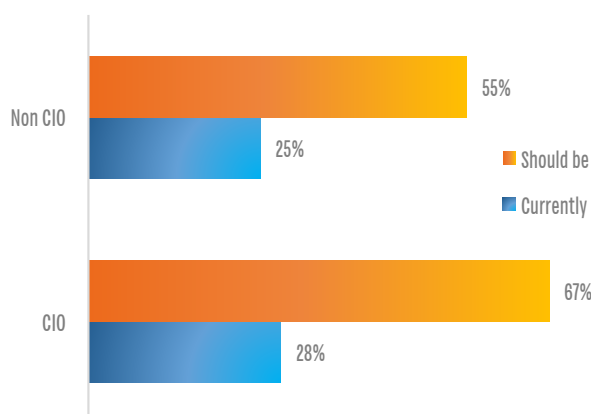


Chart 9: Which of the following do you think best describes the role your organisation's CIO is currently playing, and should be playing, in promoting innovation?

Project performance

Despite the rather dubious track record of IT-enabled change projects over the years, it seems that boundless over-optimism still plagues the industry. According to respondents, the responsibility for project failure rests primarily with 'weak ownership'. Strong credibility at executive level, and projects led by highly disciplined and perhaps even persistently pessimistic project managers, are essential antidotes for any CIO facing these issues.

A drive towards complex, digital solutions that modify and disrupt core business models often results more in bewildering changes in scope as the project evolves, rather than the revolutionary outcome that sponsors had anticipated. CIOs need to be judicious about how they approach these projects, mixing agile and more disciplined waterfall methods to suit the circumstances. Traditionally, IT functions used one outsourcing partner for their project work. Now there are many more specialised 'boutique' providers with specific skills. The trade-off between adding partners to access expertise versus the problems of managing an increasingly complex project landscape will be a continuing headache for IT leaders for the foreseeable future.

Project failure is due to lack of ownership or clear objectives, rather than lack of project talent



Chart 10: What are the main reasons IT projects fail in your organisation?

Projects are likely to be increasingly complex and ambitious compared with five years ago

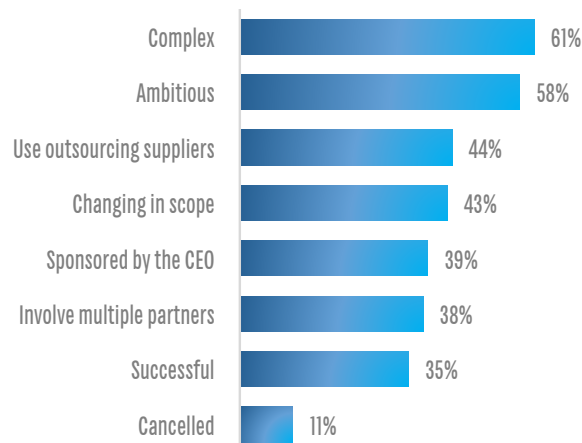


Chart 11: Compared with five years ago, are the projects today more or less likely to have the following characteristics? 'More'.

1.2 People, skills and talent

Women in IT leadership roles

The proportion of women in IT leadership remains broadly the same this year, suggesting that any progress seen in previous years appears to have stalled. In smaller organisations, there are fewer women in IT leadership (8 per cent), compared with mid-sized organisations (11 per cent). Women in large organisations make up to 10 per cent of the leadership in the IT function, in line with the 10 per cent global average rate of women in IT.

IT as an industry is short of skills, and IT leaders constantly bemoan the challenges of finding and retaining skilled personnel. Yet, one entire half of the population is chronically under-represented in the industry. Despite efforts on many fronts, this situation is not changing quickly. Almost half of respondents (44 per cent, Chart 13) are 'happy' with their diversity mix, even though female representation remains poor. Access to diversity programmes varies dramatically by organisation size. Women employed by organisations with an IT budget greater than \$250m are almost three times more likely to have access to formal diversity initiatives compared with peers at smaller organisations (with an IT budget of less than \$50m, Chart 14).

Growth of women in IT leadership roles is slow

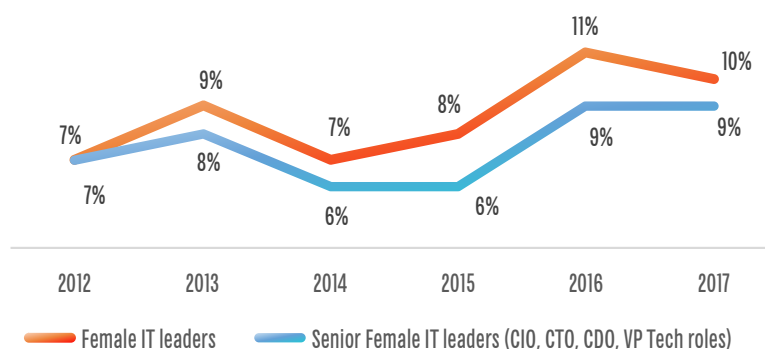


Chart 12: What is your gender? Female.

Only one-third of organisations have diversity initiatives in place

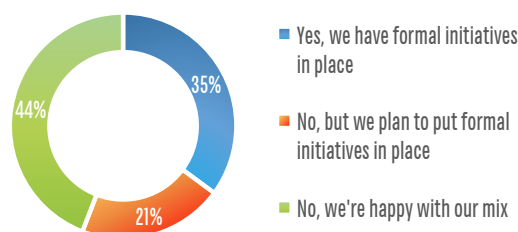


Chart 13: Are you formally promoting a more diverse team?

Larger organisations far more likely to have diversity initiatives



Chart 14: Organisations with formal diversity initiatives in place, by IT budget.

Agree or disagree: hiring managers are too focused on assessing technical skills, and overlook good people as a result



Robyn Randell,
Vice President
IT, Burberry Asia
Limited, Hong Kong

Technical skills don't matter in many roles as they can be taught. The right people often aren't technology people but instead those most curious and passionate about positive change. If you build teams with diverse groups of people having skills across industries, they will often find interesting solutions to challenges. Foster diversity, hire cross-industry, produce results.



Shinya Suda,
Corporate Vice President,
Information Systems,
Astellas Pharma Inc.,
Japan

Experience and technical skills are important in the short term, but what we look for most is the ability to collaborate with stakeholders inside and outside the company, especially as so much of our work is outsourced. It is important that the company's vision and common competencies for all employees are widely understood to ensure the clarity of hiring criteria.



Anastasia Cammaroto,
CIO Consumer Bank,
Westpac Group,
Australia

We have a lot of work to do within the Tech industry to bust myths, change biases and showcase the types of skills and careers we offer in order to address our skills shortage. We need to take active hold of our skills pipeline and work better with governments around education standards to build a smart, innovative, and productive Australia. We need to work with universities around enterprise-ready skills and the private sector overall around sponsoring initiatives with impact.

Technology skills shortages

Once again, around 60 per cent of respondents are reporting skills shortages. Does this now represent the new normal? In the heady times of the run-up to the Great Recession, nearly nine out of ten IT leaders were reporting skills shortages. This is now long past. However, in an industry constantly evolving, so too are the skills needed. Looking back at the past 12 years, there have only been three occasions where less than half of IT leaders were reporting skills shortages, suggesting that finding appropriately skilled talent has become a perennial concern in the sector.

Behind the headlines, there is some asymmetry. In the past few years, organisations based in the Asia Pacific and Latin America reported the most significant shortages. Previously, there appeared to be weaker skills demand in the eurozone compared with the USA. This year, Europe is broadly similar to previous years, but demand in North America seems to be weakening at a faster rate. This might be the beginnings of a real trend, or it may perhaps be related to uncertainty as a result of the the political changes in the USA in recent months.

Six in ten respondents report IT skills shortage – after four years, is this level the new normal?

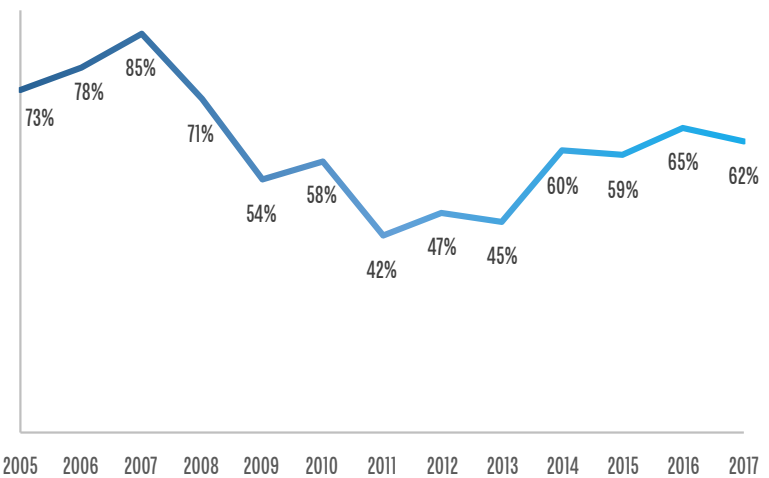


Chart 15: 2005–2017: Proportion of CIOs reporting technology skills shortage.

North America shows significant drop in respondents reporting technology skills shortage

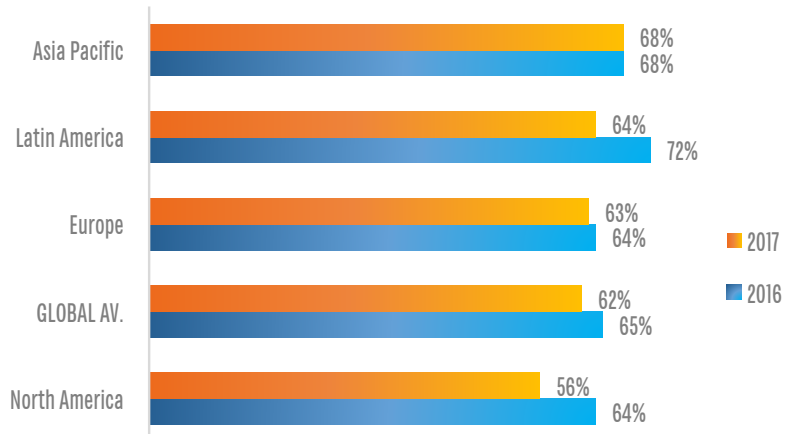


Chart 16: 2016–2017: Does a skills shortage prevent your organisation from keeping up with the pace of change? By region.

Technology skill demands

Big data/analytics remains the most in-demand skill, cited by 42 per cent of respondents, an increase of 8 per cent in the past 12 months. However, the fastest-growing technology skill this year is enterprise architecture, up a massive 26 per cent compared with last year.

Data analytic skills remain most in-demand skill for third year in a row

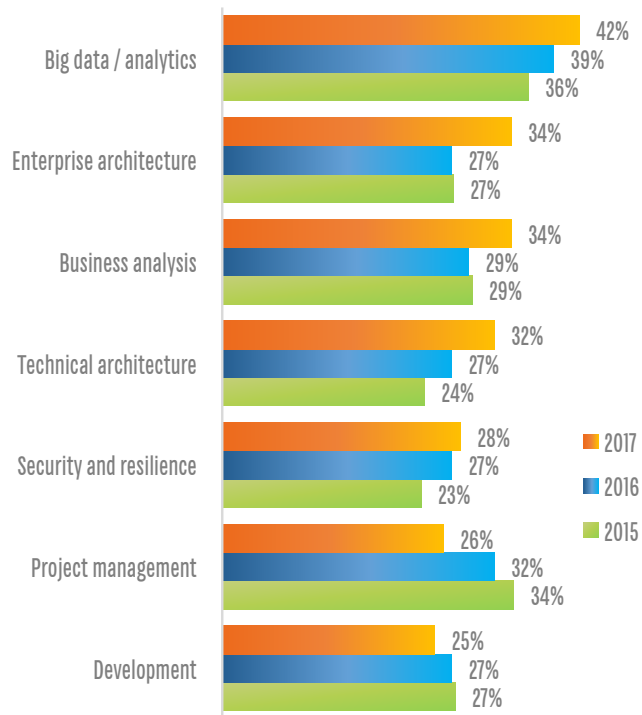


Chart 17: Which functions do you feel suffer from a skills shortage? 2015–2017.

It is a great time to be an architect or an analytics specialist! In recent years, architects have had something of a hard time. Three years ago, demand was dropping and some were whispering that the days of the architects were over. But after a slight recovery in 2016, they are well and truly back. This makes sense given that respondents are telling us that the new digital innovations make for a more complex portfolio landscape and would imply that many organisations are in the process of re-architecting. As for big data, it remains a real hot-spot. Demand for skills varies significantly by organisational size. Mid-sized and larger organisations are experiencing greater skills shortages in digital, security and enterprise architecture, whereas IT leaders at smaller organisations are prioritising skills in business analysis and project management compared with peers at larger organisations.

Greater demand for data analytics, digital and enterprise architecture skills exists at large organisations

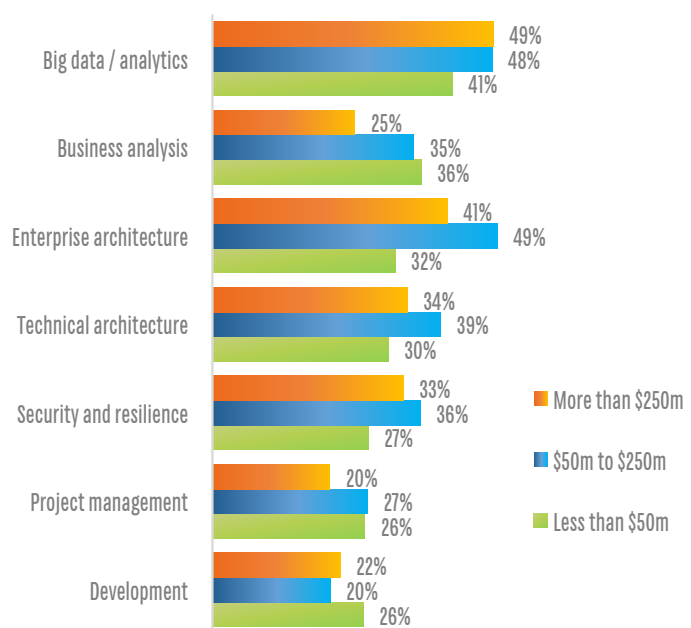


Chart 18: Which functions do you feel suffer from a skills shortage? By IT budget.

Headcount

IT departments seem to be getting bigger. Hiring intent remains broadly positive and, in line with previous years, more than four in ten respondents (44 per cent) plan to increase their technology headcount in 2017, essentially unchanged since 2015. This continues the positive hiring progress that has continued for the past seven years.

CIOs continue positive trend in technology recruitment intent

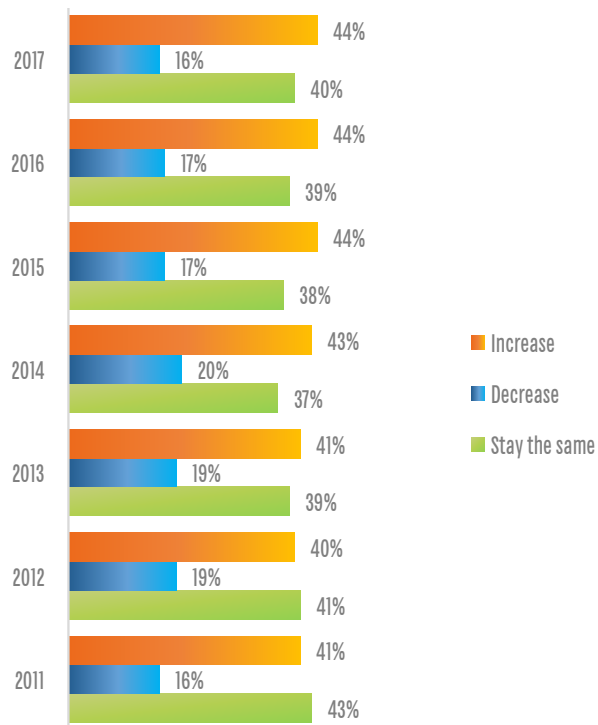


Chart 19: 2011–2017: Over the next year how do you expect your IT/Technology headcount to change?

Most IT leaders prefer hiring full-time employees. For 72 per cent of respondents their contingent staff make up less than 25 per cent of hires – and for the largest proportion of organisations (43 per cent) flexible workers account for less than one in ten staff. We believe contingent hires are mostly used to satisfy ‘burst’ demand.

However, there is a small group of IT leaders who continue to invest heavily in flexible contingent labour for more than half of their technology team. During the past three years, the size of this group has remained almost entirely unchanged at a significant 12 per cent of all respondents.

Full-time employees are preferred over contingent staff for more than 70 per cent of roles

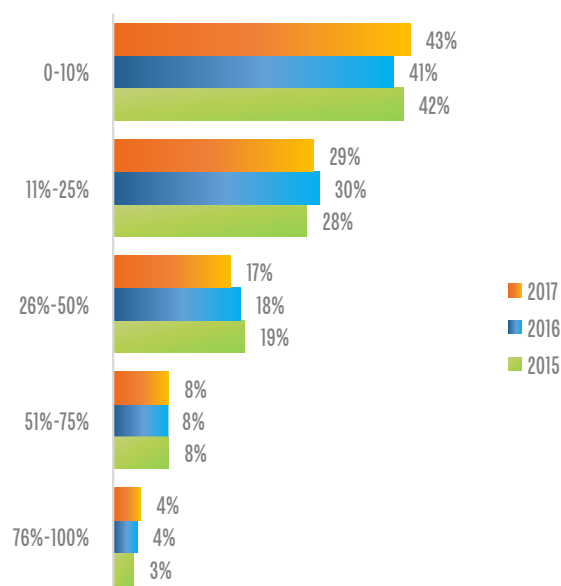


Chart 20: What proportion of your IT department is flexible/contingent labour? 2015–2017.

1.3 Dealing with digital

Digital strategy

Many more organisations are addressing digital at a strategic level. In the past 24 months, there has been a 52 per cent increase in the proportion of organisations with an enterprise-wide digital strategy in place. Four in ten respondents take a leading role in this activity and many present digital strategies to the main organisational board. A further one in five respondents have digital plans for individual business units. IT leaders at smaller organisations are less likely to have implemented an enterprise-wide digital strategy – 39 per cent have done so – compared with peers at mid-sized (42 per cent) and large (53 per cent) organisations.

Significant ongoing progress by IT leaders deploying digital strategies enterprise-wide in 2017

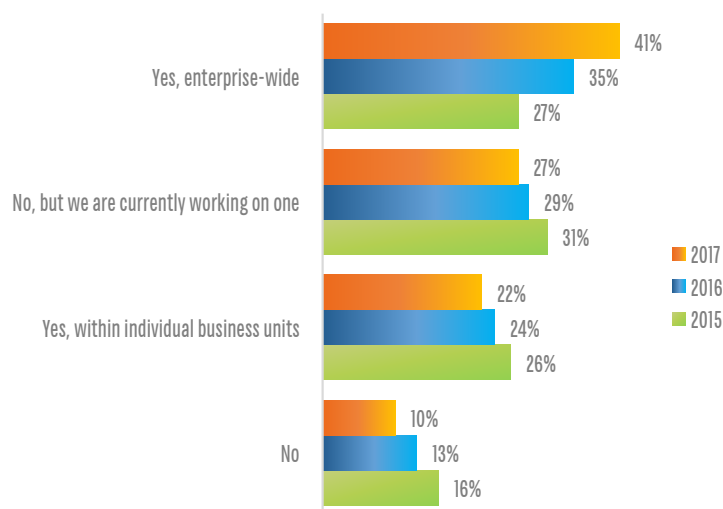


Chart 21: Does your organisation have a clear digital business vision and strategy?

How do you promote innovation in your organisation?



Karl Hoods,
Save the Children,
UK

Within the IT team we have run hackathons and similar initiatives as well as providing time to research emerging technology and how that might help support the work we do. Using examples of disruption or innovation in different sectors has been useful in encouraging others to innovate.



Robyn Randell,
Vice President IT,
Burberry Asia Limited,
Hong Kong

The challenge is not how do you innovate, if you innovate or if you bring disruptive thinking to your business. It's, "What if you don't?" Give people space to innovate whether you call it 'innovation' or not. Test 'bright ideas'...in low-cost and low-risk ways. Challenge politics, evolve established practices and find future-facing internal leaders to partner with.



Yuri Aguiar, Global
Director of Innovation
and Transformation,
Ogilvy & Mather
Worldwide, USA

Most organisations are not going to create the next Space-X rocket or electric car, but companies that create an 'atmosphere of innovation' in their workforce, with a laser focus on their business strategy, will become the disruptors - not the disrupted.

Broadcasting/Media, Technology and Telecommunications companies are outliers when it comes to the creation and implementation of company-wide digital strategies. There is clear blue water between them and the rest of the pack. We might have expected the Manufacturing, Utilities and Construction sectors to be slower to respond, as indeed they have. The pressures on their businesses are rather different. But there are some interesting anomalies in the data. Enterprise-wide digital strategies in the Education sector have nearly doubled since last year. Such marked increases are very rare in our experience. We followed up with some CIOs in the Higher Education sector. They tell us that their leaders are pushing hard to improve the student experience and are demanding innovation in this area.

Almost all sectors show growing adoption of enterprise-wide digital strategy

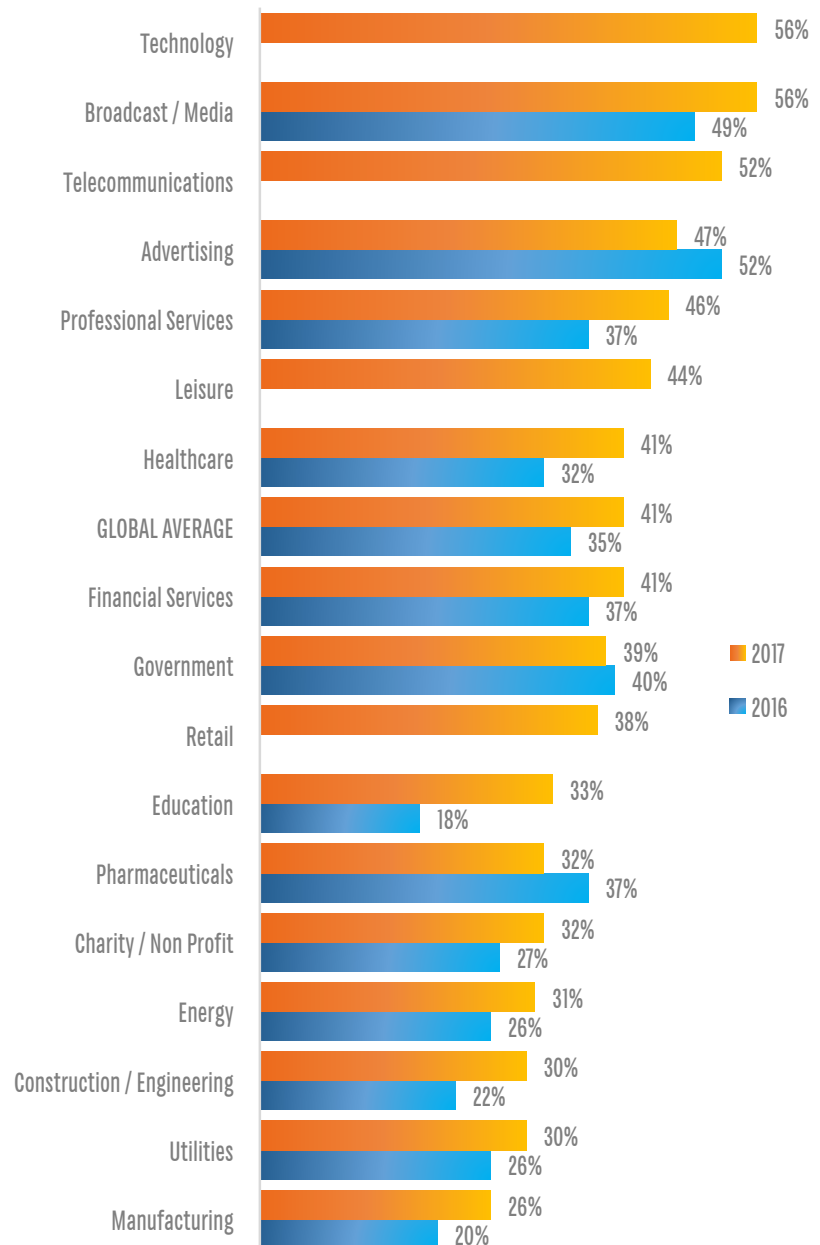


Chart 22: Does your organisation have a clear digital business vision and strategy? Yes, enterprise-wide.

This year we changed some of the sector categorisations. Year-on-year comparisons are not always possible.

The proportion of respondents (18 per cent) who believe their organisation is 'very effective' in using digital technologies to advance their business strategies is modest, both in absolute terms and compared with the other capabilities on which we measured digital effectiveness. This suggests that digital incorporation is relatively immature for most organisations, with lots of opportunity ahead to learn and improve.

The larger the organisation, the more bullish respondents are about their effective use of digital to advance business strategy. IT leaders at small and mid-sized organisations are slightly less likely than the global average to believe that their organisation is 'very effective' at using digital to influence business strategy.

The Chief Digital Officer

One in four respondents now report that their organisation has hired a Chief Digital Officer (CDO) or someone serving in that capacity. Given the extent of enterprise-wide digital planning, it is likely that, in addition to increased hiring of the CDO, a range of technology leaders may now also be responsible for digital. This also reflects the large proportion of the almost 70 per cent of organisations who report not yet having a CDO currently in place, with no immediate plans to hire into the role.

Less than one in five 'very' effective in using digital technology to advance business strategy

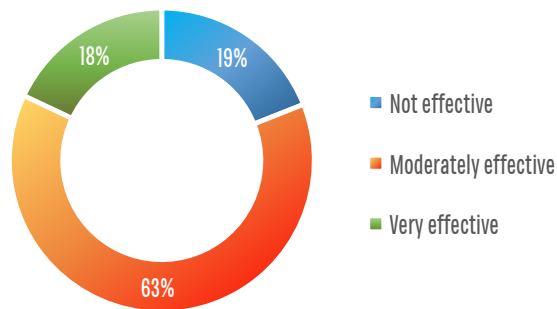


Chart 23: How effective has your organisation been in using digital technologies to advance its business strategy?

CIOs at large organisations are much more assured on 'very effective' digital abilities

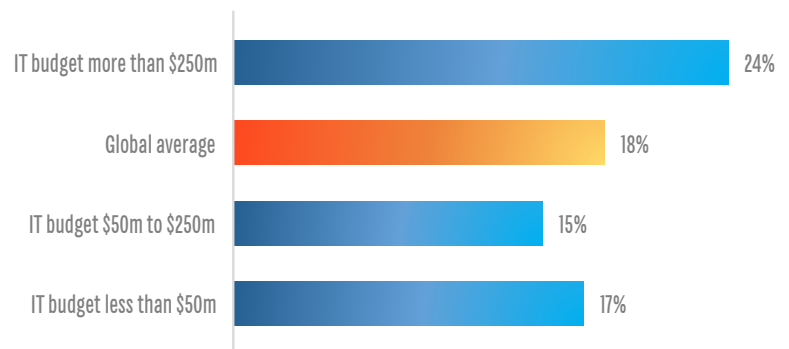


Chart 24: How effective has your organisation been in using digital technologies to advance its business strategy? Very. By IT budget

Three-quarters of organisations have not yet hired a Chief Digital Officer

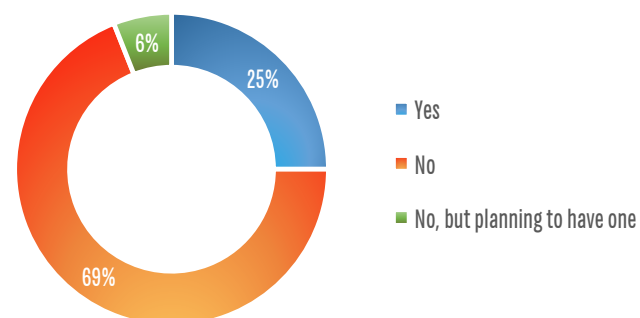


Chart 25: Does your organisation have a Chief Digital Officer or someone serving in that capacity?

The year 2017 has emerged as another 'big-leap' year for the Chief Digital Officer. The proportion of organisations with a CDO in place has more than tripled in three years, suggesting a positive correlation between CDOs, the adoption of enterprise-wide digital strategy, and very effective digital capabilities reported in 2017. After exploding onto the scene in 2014/15, the pace of CDO appointments levelled out somewhat in 2016, but the speed of CDO hiring has picked up again, with a 39 per cent growth compared with last year.

More than half of large companies have a CDO in post. This is more than twice the global average and is growing at the fastest pace compared with organisations of other sizes. We think that large organisations recognise the need to co-ordinate digital activities across the enterprise to avoid duplication, leverage skills and experience, and exploit synergies. Smaller companies, on the other hand, are much less formalised in their approach. Barely one in five have appointed a CDO. We suspect that they rely on their inherent nimbleness to address their digital challenges.

A wide range of industry sectors have witnessed rapid growth in Chief Digital Officer hiring during the past 12 months. Even in the sectors where absolute CDO numbers are relatively low, there have been big year-on-year jumps – Utilities, Education, Energy and Manufacturing all increased their CDO hires by over 50 per cent. The Government sector did not see movement in CDO hiring in 2017, possibly because they were ahead of the CDO hiring curve in 2016.

One anomaly is Advertising, which has seen a decline in CDOs. In this sector, where digital is both a product and source of disruption, it is possible that the role of the CDO is evolving differently.

Proportion of organisations with Chief Digital Officer has tripled in two years: now one in four

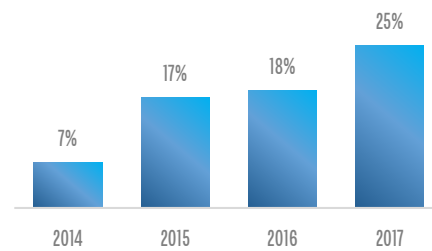


Chart 26: Does your organisation have a Chief Digital Officer or someone serving in that capacity? Yes.

Half of all large firms now have a Chief Digital Officer in role, and fastest pace of hiring CDOs

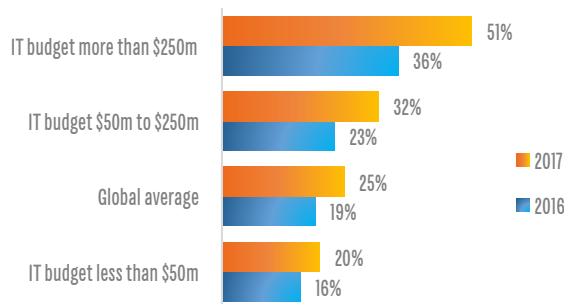


Chart 27: Does your organisation have a Chief Digital Officer or someone serving in that capacity? Yes – by size of IT budget.

CDO appointments grow, but spread unevenly across sectors

	2016	2017
Broadcast / Media	30%	46%
Advertising	43%	35%
Retail	-	32%
Telecommunications	-	31%
Financial Services	25%	28%
Professional Services	20%	26%
Technology	19%	26%
Pharmaceuticals	27%	25%
Global average	18%	25%
Government	24%	24%
Leisure	-	23%
Construction / Engineering	17%	21%
Healthcare	17%	19%
Charity / Non Profit	20%	18%
Manufacturing	11%	18%
Energy	11%	18%
Education	9%	18%
Utilities	11%	16%

Table 5: Does your organisation have a Chief Digital Officer or someone serving in that capacity? Yes. This year we changed some of the sector categorisations. Year-on-year comparisons are not always possible.

Fostering digital innovation

For more than half of our respondents, the top two most popular methods to help foster digital innovation are to dedicate more time for innovation (54 per cent) and to partner with innovative organisations such as academic institutions (52 per cent). Ring-fencing innovation budgets is a distant third option used by three in ten (31 per cent), while hiring a Chief Innovation Officer is a strategy adopted by only one in ten organisations (12 per cent).

Larger organisations are increasingly using their networks and their relationships with academic partners to foster innovation; perhaps mindful of the notion that large is often considered cumbersome, they may feel they need to place their bets in a number of areas. The smaller organisations, on the other hand, rely heavily on making time for innovation. Their workforce are likely to feel much closer to their customers and their products or services, as they do not have to carry the large people-infrastructures of multinational corporations.

Time and relationships more important than money and hiring for digital innovation

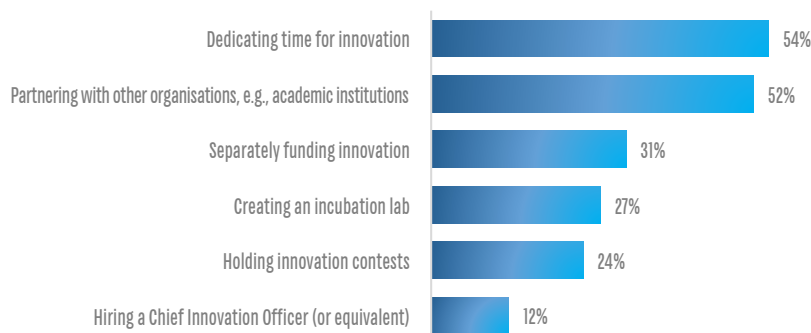


Chart 28: In which of the following ways is your organisation fostering innovation?

IT leaders at smaller organisations spend more time – and less money – to help foster innovation

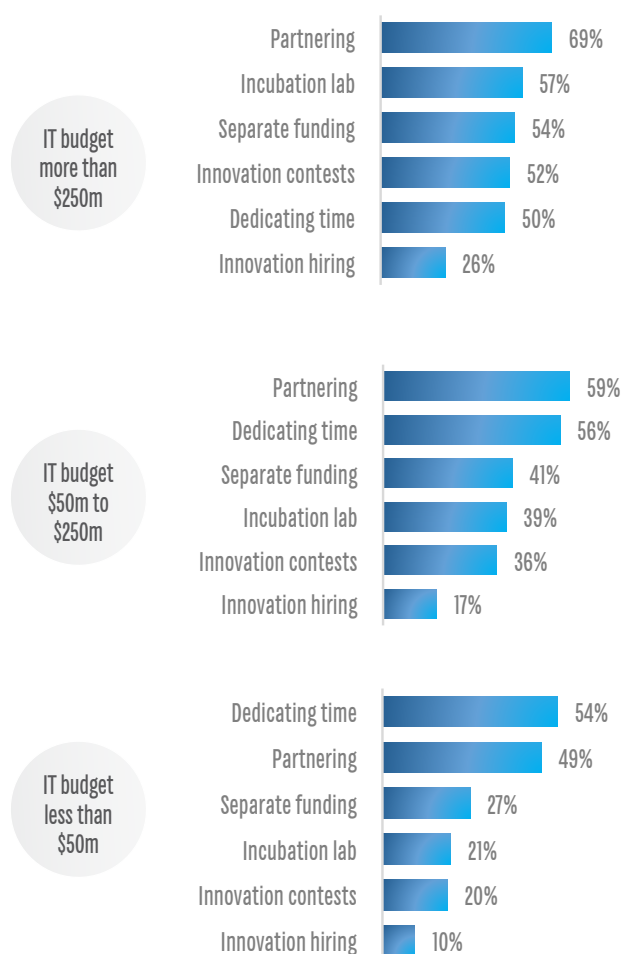


Chart 29: In which of the following ways is your organisation fostering innovation?

Digital innovation challenges

Cultural resistance to change has been a perennial problem for IT leaders. Unlike other enterprise-wide functions such as HR or Finance, IT affects the business in a unique way. New processes and computer systems can radically alter core business processes.

Overcoming resistance to change (43 per cent) is almost twice as likely to prevent respondents achieving innovation success compared with securing financial resources (25 per cent). While there is a 'burning platform' of sorts where business leaders want to innovate quickly, workforces generally do not like change and certainly do not like it when it affects them adversely.

Even if IT organisations can get past this hurdle, new technologies seem to be as difficult to implement as they always have been. It is difficult enough to innovate without having to surmount these very real obstacles.

Culture, not capital, is the biggest impediment to digital success

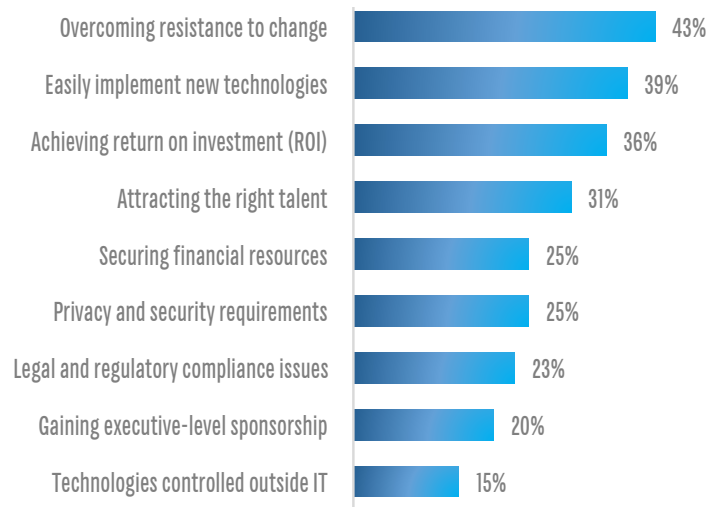


Chart 30: Which of the following represent the greatest challenges to your organisation's successful implementation of digital capabilities?

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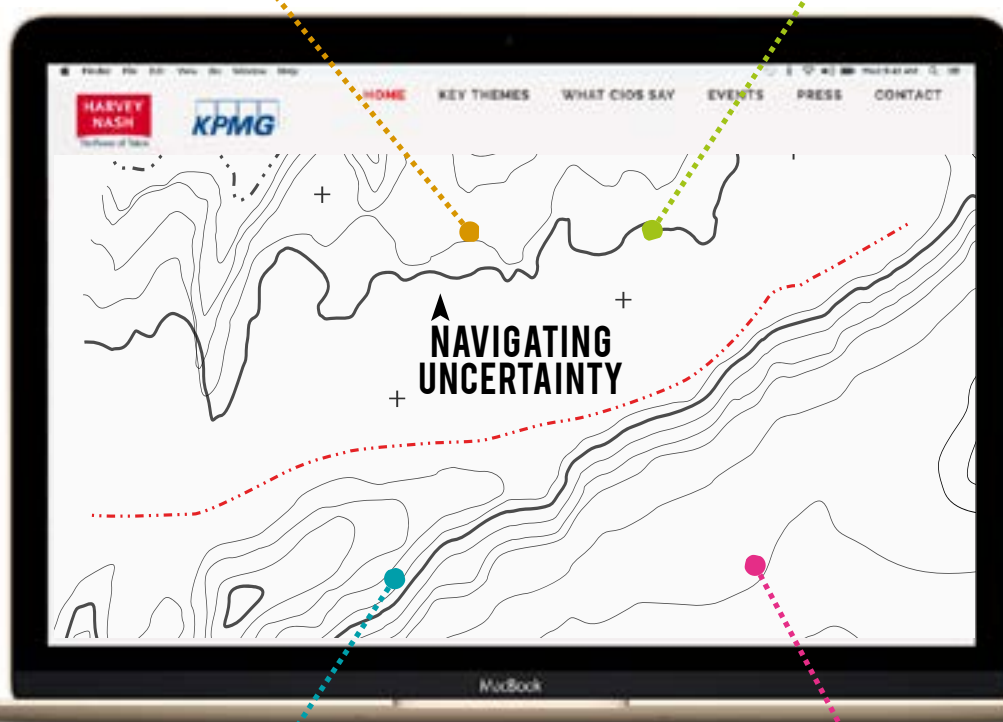
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Are you a digital leader? KPMG



Gone are the days when digital disruption was something you read about or planned for. Now, it's here. Digital transformation has become a strategic imperative for

most organisations and a matter of survival for some. KPMG professionals' experience shows that digital transformation starts with a board-driven, enterprise-wide digital vision and strategy and requires substantial technology enablement to bring it to fruition. Yes, short-term gains can be achieved with point solutions like mobile apps or social media engagement, but sustainable competitive advantage only comes when organisations go beyond restructuring operations in customer-facing functions and fully integrate across the front, middle and back offices to create a truly digital enterprise. CIOs and the IT function need to play a key role in delivering technology-enabled innovation. However, data from this year's survey reveals that many CIOs need to take a more aggressive approach to engage business stakeholders to enable it to happen.

In line with this, the results are surprising when asking about the key business issues that the management board is looking for IT to address. When asked to rank the issues based on importance, those directly correlated with being a leader in digital transformation did not move to the top of the list. Instead, the top spots are taken up with issues that drive traditional priorities and investments for IT, i.e. delivering consistent and stable IT performance to the business, increasing operational efficiencies, improving business processes, and saving costs.

The evidence is clear, then, that many organisations have a way to go if they are to successfully implement digital transformation. The good news though is that, through asking additional questions related to digital transformation execution and effectiveness, we have been able to identify 18 per cent of respondents as organisations that are digital leaders. We give a snapshot of what KPMG professionals believe characterises a digital leader here – so that organisations can assess where they are against these attributes.

The early survey findings indicate that digital leaders appear to be:

Better at aligning IT and business strategy

One of the perennial challenges for CIOs is to work closely with business stakeholders to ensure that IT strategy is closely aligned with business strategy. This is even more critical when it comes to digital transformation where business strategies are driving new digital business models, new avenues to connect with customers and employees, and new ways to drive a step change in the cost of business operations. It's no surprise that firms identified as digital leaders are more than twice as likely as the others to be very effective at aligning IT and business strategy.

Focused on innovation and growth

When it comes to key business issues, digital leaders are more focused on innovation and growth. For them, developing innovative new products and services is the number one priority. When addressing a board meeting they are most likely to be discussing digital transformation and disruption strategy – rather than just providing an 'IT strategy update'. And, as might be expected, they are more than twice as likely to have an enterprise-wide digital business vision and strategy.

Digital business is all about innovation, whether that's on-demand business models, digital streaming services, or engaging customers with social media or mobile apps. All of this innovation requires some form of technology enablement. With a deep understanding of technology and internal business processes, coupled with a cross-enterprise perspective, CIOs can play a key role in driving such innovation – as is borne out in the survey data where CIOs and digital leaders are almost twice as likely to be leading innovation across the business.

Making aggressive investments in disruptive digital technologies

Cloud serves as the underpinning foundation for much digital disruption because of its quick time to provision, scalability, resilience and favourable economics. As you might expect, digital leaders are currently making significant investments in cloud across all three delivery models (IaaS, PaaS and SaaS) at rates that are two to three times higher than others; and they can be expected to maintain their investment lead over the next one to three years as

others try to catch up. Another area where digital leaders are making aggressive investments is in automating processes across the enterprise – what KPMG calls digital labour. For example, using robotic process automation (RPA), they are automating repetitive manual processes, like claims processing and data entry, as well as more advanced knowledge-based implementations using cognitive automation (CA), such as personal shopping assistants. According to the survey results, digital leaders are currently investing at four times the rate of others. What's more, they are also implementing digital labour solutions across the enterprise, in some cases at twice the rate of everyone else, and are more effective at realising benefits including optimising processes, improving quality and reducing costs.

More likely to see IT budget growth

When it comes to technology budgets, digital leaders are spending more. Almost half of digital leaders' CIOs have enjoyed a budget increase over the last year versus only a third of other companies. They are also more optimistic about the next 12 months, with significantly more digital leaders expecting their budgets to increase than their counterparts. At the same time, digital leaders are controlling or managing more of the technology spend outside the IT organisation, indicating that the business is more involved in making decisions and investing in digital capabilities.

More attractive for CIOs

CIOs and digital leaders are playing key roles driving innovation and technology enablement to transform

their organisations into digital businesses and in return are finding more fulfilment and staying in their jobs longer than others. As digital leaders, twice as many respondents find their current role very fulfilling and more than four in ten plan on staying with their current employer for five or more years – versus less than a quarter for everyone else.

While digital leaders are more likely to have a CDO or someone acting in that capacity than non-leaders, they still remain a minority. So the opportunity is there for CIOs as non-leaders to take a more active role helping their organisations become one.

The bottom line is that the survey shows a clear divergence between organisations that are effective at digital transformation and those that are not. Digital leaders have more closely aligned IT and business strategies, are more focused on innovation and growth, and are investing more in digital technologies.

In the coming months, we will take a still deeper dive into the data and identify in more detail what KPMG specialists believe constitutes a digital leader, the implications for CIOs and recommendations on leading practices. In the meantime, as a CIO are you doing your part to understand and communicate the opportunities, challenges and digital capabilities needed to help your organisation get there?

Marc E. Snyder

*Technology Global Center of Excellence
KPMG in the US*

1.4 Managing the technology function

Agility and responsiveness

Some organisations have struggled to implement large-scale, complex cultural and process change initiatives through rapid prototyping, while others have steadfastly stuck to their rigid industrial methodologies and comprehensively failed to deliver small apps quickly in a fast-moving environment. Many IT leaders are feeling their way with DevOps. Some value the swiftness by which apps can be enhanced and deployed globally, while others fret about changes setting off a chain reaction that could ripple through their complex inter-related application estate.

Multi-mode IT and DevOps are internal approaches, often preferred by larger organisations that can manage these processes in-house. The use of partnerships, contracting external resources and buying Software as a Service (SaaS) solutions are used most by smaller organisations, probably because these approaches require fewer internal resources and are less expensive (certainly in the short term) than other options.

IT leaders remain open to best approach for achieving agility and responsiveness

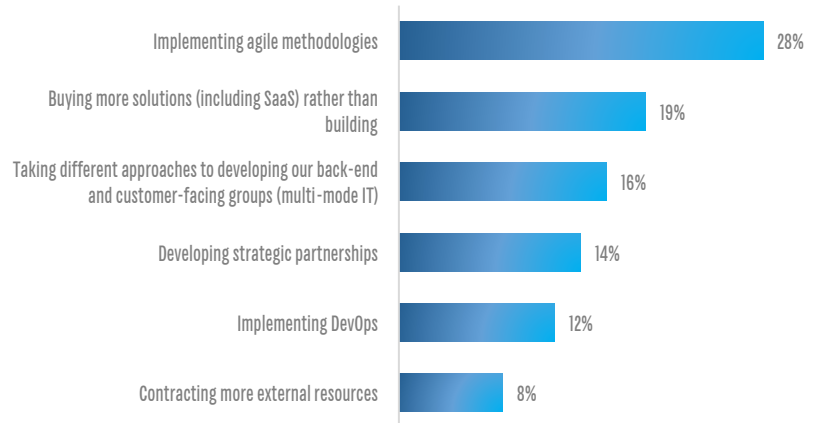


Chart 31: What is the most important step you are taking to become more agile and responsive in the development and delivery of IT services?

IT leaders at smaller organisations buy in support, compared with building in-house

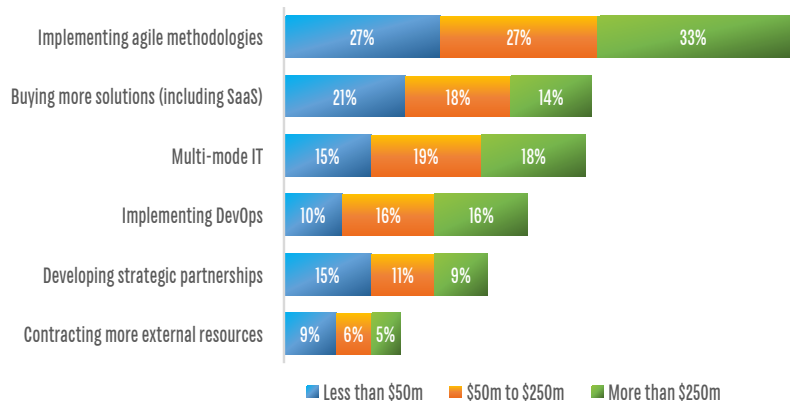


Chart 32: Most important step you are taking to become more agile and responsive – by size of IT budget.

If your technology budget was doubled, what would you spend it on?



Karl Hoods,
CIO, Save the
Children, UK

Accelerating our blockchain pilots through to operation, embedding DevOps and increasing the team so we can deliver more of our demand pipeline and ultimately have a greater impact for children.



Robyn Randell,
Vice President IT,
Burberry Asia Limited,
Hong Kong

Unless it was to deliver a specific piece of costed work, I would give 95% back. Some of the best results come from challenging teams on budgets and resources. Spending double the money never produces double the results. I'd take 5% and challenge a small group of people to find completely new ways to do IT by learning from start-ups and other industries.



William Payne,
CIO, Boral, Australia

The role of the CIO is to extract value for the business, its customers and shareholders. Increasing IT investment must directly relate to increasing value and this is where it should be spent. We must stop talking budgets and start thinking returns.

Effectiveness

The highs and lows of the effectiveness chart are unlikely to surprise most people. IT leaders would expect their organisations to be well-aligned with the business strategy and to pick the right technology for the enterprise. The surprising data point is the confidence in executing projects, which seems at odds with the success rates of IT-enabled projects. Both historical feedback from this survey and academic research suggest that successful project delivery is rather more elusive than IT leaders might like to think.

IT leaders are most comfortable with core systems, most concerned about data and digital

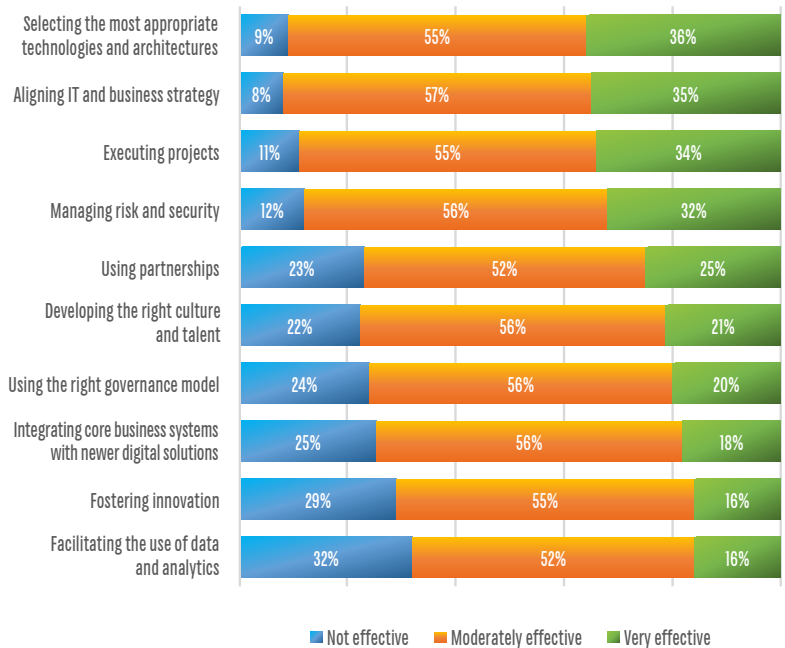


Chart 33: How effective is your IT organisation in each of the following capabilities?

It appears that respondents are pursuing a reasonably restrained approach when investing in the 'as a Service' model in 2017. There is an increase in 'Moderate investment' and a decrease in 'Minimal/No investment' compared with last year, but the proportion of 'Significant investment' is relatively unchanged.

IT leaders continue to invest in the 'as a service' model

	2016			2017		
	Minimal / No Investment	Moderate Investment	Significant Investment	Minimal / No Investment	Moderate Investment	Significant Investment
Current year investment Infrastructure as a Service (IaaS)	46%	30%	23%	38%	39%	23%
Current year investment Platform as a Service (PaaS)	53%	29%	18%	44%	41%	16%
Current year investment Software as a Service (SaaS)	32%	38%	30%	23%	50%	27%
Next 1–3 years investment Infrastructure as a Service (IaaS)	28%	36%	36%	17%	45%	38%
Next 1–3 years Investment Platform as a Service (PaaS)	31%	36%	33%	18%	49%	33%
Next 1–3 years investment Software as a Service (SaaS)	18%	36%	46%	9%	42%	49%

Table 6: Innovation investment plans 'as a service' models for current year and next 1 to 3 years

Cloud technology

Cloud computing has been something of a bright spot in recent years. This trend has continued during the past year, with respondents investing in cloud less to save money, and more because IT leaders value the reliability, agility and responsiveness that these services bring.

IT leaders continue to prioritise cloud resiliency and responsiveness

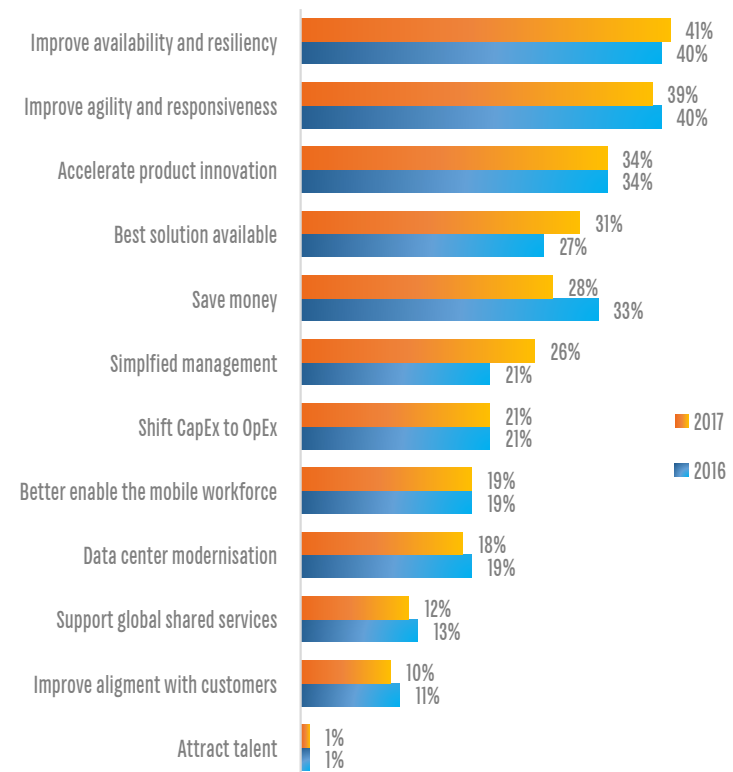


Chart 34: If you are currently investing in cloud, what are your top three reasons?

Many smaller organisations are turning to the cloud in order to access enhanced stability and resilience compared with in-house operations. Larger organisations, however, more often see the cloud as a means of performance enhancement to improve their agility and responsiveness.

Resiliency is a priority for smaller organisations, responsiveness preferred by mid and larger organisations

	IT budget less than \$50m	IT budget \$50m to \$250m	IT budget more than \$250m
Improve availability and resiliency	43%	37%	31%
Improve agility and responsiveness	37%	50%	47%
Best solution available	32%	29%	28%
Accelerate product development/innovation	32%	41%	42%
Simplified management	29%	17%	13%
Save money	28%	30%	33%
Support global shared services	11%	14%	13%
Shift CapEx to OpEx	21%	19%	25%
Better enable the mobile workforce	20%	14%	14%
Data centre modernisation/legacy renewal	17%	23%	25%
Improve alignment with customers/partners	10%	8%	12%
Attract talent	2%	1%	1%

Table 7: If you are currently investing in cloud, what are your top three reasons? By size of IT budget.

Intelligent automation

More than a third of all respondents (34 per cent) are already investing in, or are planning to invest in, digital labour, including robotic process automation and cognitive automation. This proportion increases to more than six in ten respondents at larger organisations (62 per cent), and half of respondents at mid-sized organisations (52 per cent) are already investing or planning to invest.

IT leaders in the Manufacturing sector are most likely to be investing or planning to invest in robotic process and cognitive automation. More than four in ten respondents (45 per cent) will do so. Higher proportions of respondents within process-orientated sectors like Utilities, Transport, Telecommunications and Pharmaceuticals are leading innovation in this area, while respondents in Financial Services, Broadcast/Media, Professional Services and Technology have an above-average propensity to invest. At this stage, less than one in five IT leaders in Education (12 per cent), Charity/Non-Profit (17 per cent) and Leisure (14 per cent) are experimenting with digital labour.

A third of all respondents are already exploring robotics and automation

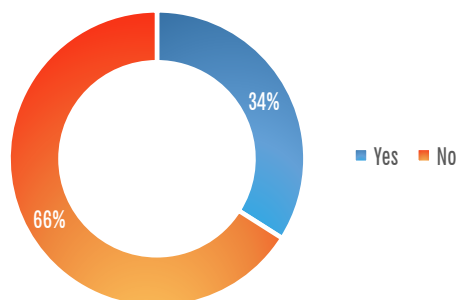


Chart 35: Is your organisation currently investing in, or planning to invest in, digital labour?

Majority of respondents at large and mid-sized organisations are already investing or planning to invest in digital labour

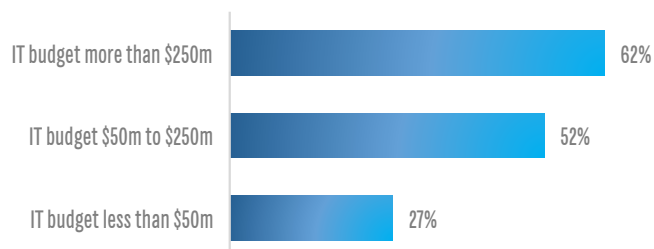


Chart 36: Is your organisation currently investing in, or planning to invest in, digital labour?

Manufacturing leads the way, with almost 50 per cent currently investing or planning to invest in digital labour

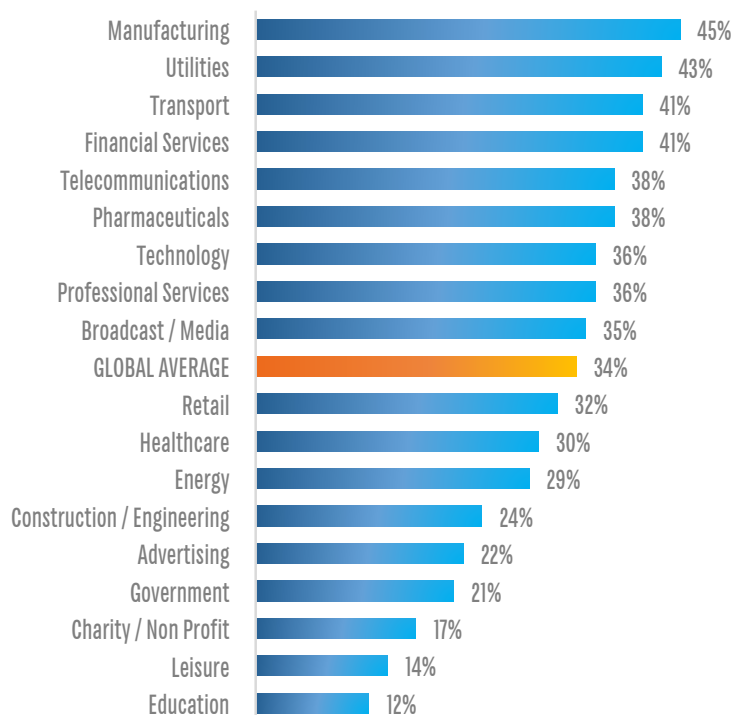


Chart 37: Is your organisation currently investing in, or planning to invest in, digital labour? By sector.

The growth in cognitive automation should not be a revelation. The convergence of robotic, machine learning and advanced analytics would seem to be a natural consequence of the rise in demand for 'big data'.

Just looking at those respondents who are investing in, or plan to invest in, robotics/automation, it is remarkable to see the anticipated investment growth planned for the next three years. Currently, most of these respondents are making 'minimal' or 'moderate' investments in automation. That pattern dramatically alters when looking one to three years ahead, with nearly four in ten respondents expecting to be making 'significant' investments in cognitive automation and basic robotic process automation.

Widespread media coverage of automation innovation, such as the installation of automated ordering kiosks in fast food outlets, is contributing to greater awareness of this issue. What is certain is that IT leaders need to keep up with this fast-moving area and how it could deliver value for their organisation.

Most CIOs currently making 'minimal' or 'moderate' bets on automation

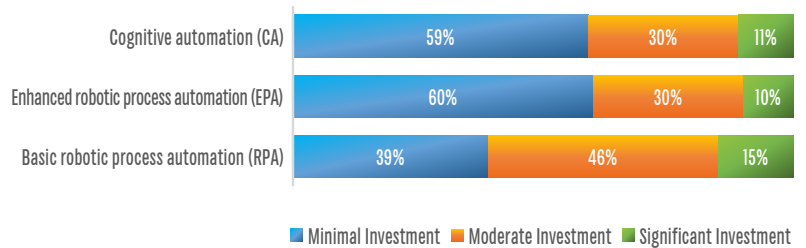


Chart 38: Investment current year – only respondents who are investing in, or plan to invest in, robotics/automation.

Within three years, large growth is expected in IT leaders planning to make 'significant' investments

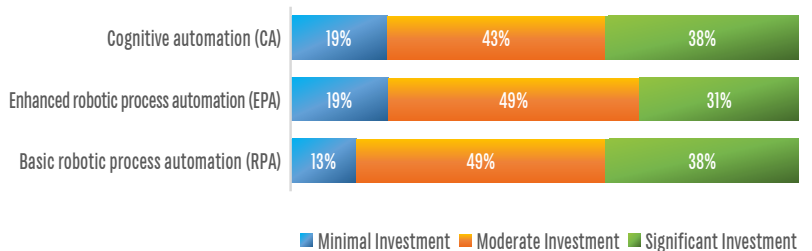


Chart 39: Investment plans next 1–3 years – only respondents who are investing in, or plan to invest in, robotics/automation.

Digital labour effectiveness

IT leaders believe that digital labour is most effective at improving quality. More than one in four respondents have seen 'very effective' results in this area, as well as scaling more efficiently and reducing cost. For such a nascent technology, these success rates seem high and are actually similar to traditional IT project success rates.

However, one area where success rates are less good is in increasing morale through the elimination of mundane tasks. In jobs where automation can be both a benefit and a threat to employees, clearly more needs to be done to position and develop this technology.

IT leaders at smaller organisations report more 'very effective' results from digital labour projects compared with peers in mid-sized and larger organisations. Certainly, smaller organisations may be implementing on a smaller scale, and are likely to be working off a lower base level of performance so have more room to improve. The most value appears to be generated by improving quality and scaling more efficiently for all IT leaders but especially for those at smaller organisations.

Processes rather than people are early winners in digital labour projects

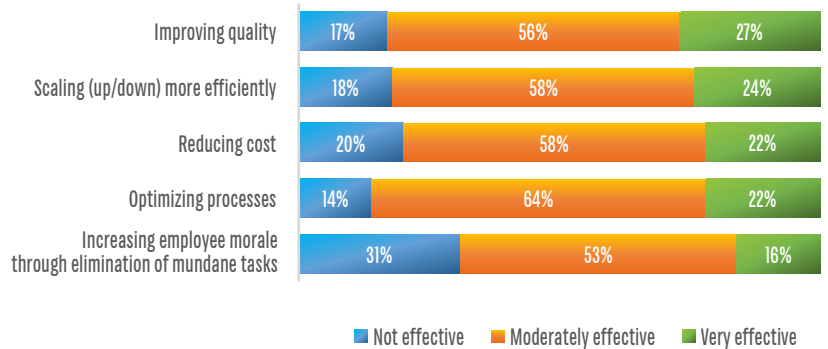


Chart 40: Taken as a whole, how effective have your digital labour projects been in delivering the following benefits? Only respondents who are investing in, or plan to invest in, robotics/automation.

Digital labour produces outsized results for IT leaders at smaller organisations

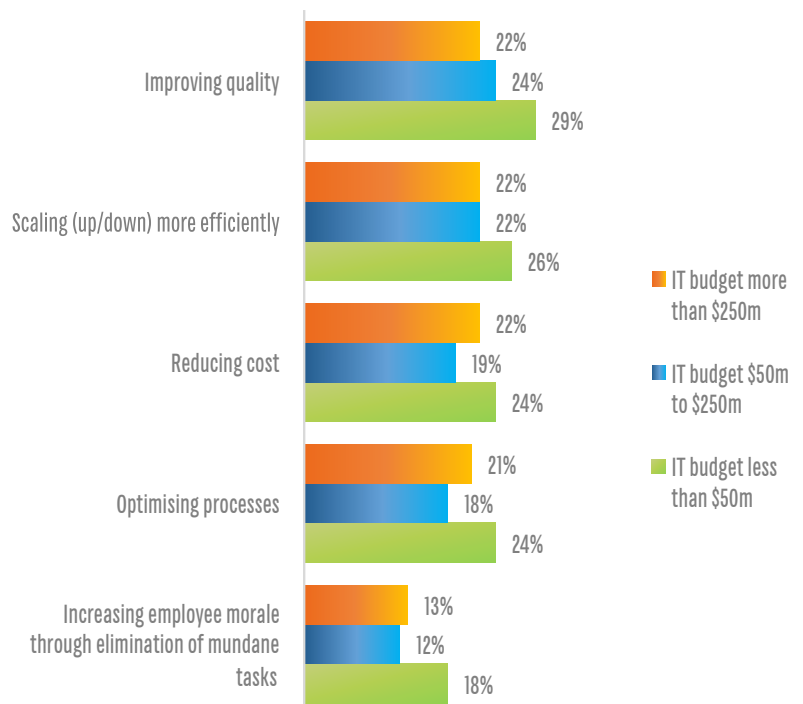


Chart 41: How effective have your digital labour projects been in delivering the following benefits? 'Very effective' - only respondents who are investing in, or plan to invest in, robotics/automation.

Cyber security

Everyone is talking about cyber security. Organisational leaders are fretting while hackers seem to be able to ghost their way effortlessly into their systems to steal emails and secrets. Over the last few years, we have seen confidence steadily decline as the number of serious attacks increases. On the positive side, executive boards have been very supportive to IT leaders struggling to keep their gateways secure and resources are being made available.

However, this heightened state of awareness is not translating into preparedness, which remains stubbornly low. Only one in five IT leaders (21 per cent) commit to being 'very well' positioned to identify and deal with a current or near future cyber attack. This is down 4 per cent on last year, and down 28 per cent in the past four years.

IT leaders are awakening to threat of cyber attack by insiders, but still concerned by external factors

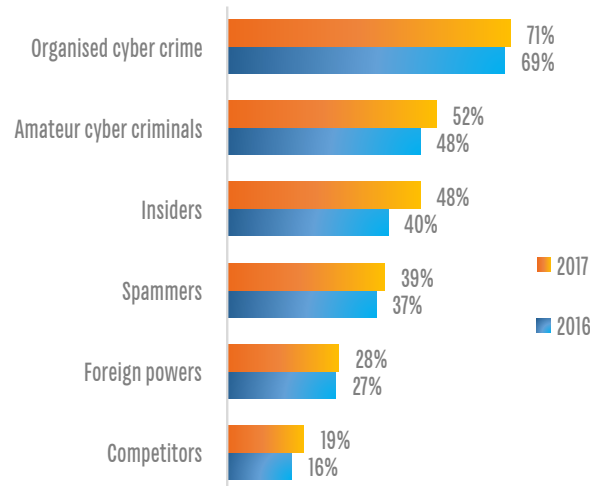


Chart 42: Which types of threat give you most cause for concern in terms of a cyber attack?

Proportion of IT leaders 'very well' prepared to respond to cyber attack continues to fall

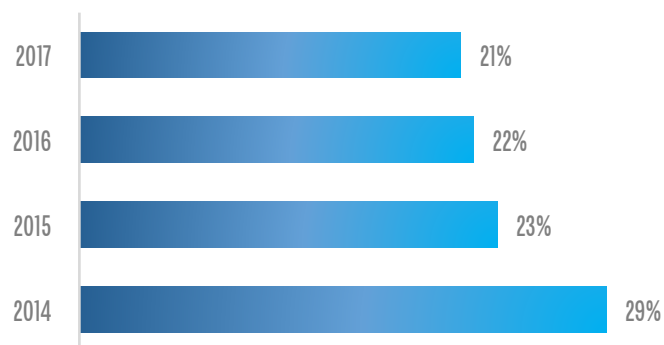


Chart 43: To what extent do you feel your organisation is positioned to identify and deal with current and near future IT security/cyber attacks? Very well.

Almost a third of respondents (32 per cent) reported that their organisation had been subject to a major IT security incident or cyber attack during the past 24 months, representing a 14 per cent increase compared with the previous year, and up 45 per cent in the last four years. In this environment, awareness may not be enough to prevent real and reputational damage to organisations, brands, and personal reputations.

Large organisations seem to be particularly at risk. More than half tell us that they have suffered a serious attack in the past two years. Smaller organisations may be less vigilant, or less adept at detecting attacks. Worryingly, the Government and Utilities sectors report the highest levels of attack, which may suggest a degree of state involvement rather than the attention of common cyber criminals. Least affected are the Charity and Advertising sectors, but even here more than one in five reported a major incident in the past two years.

Relentless rise of organisations being subjected to 'major' cyber attacks during past two years

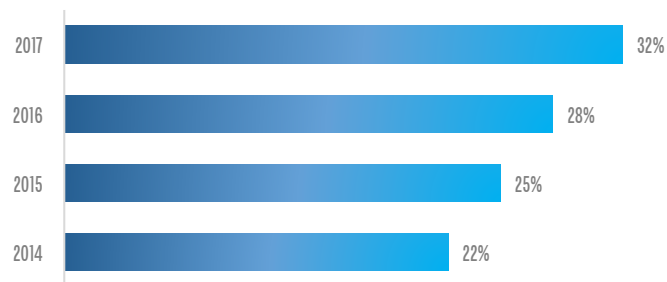


Chart 44: Has your organisation been subjected to any major IT security or cyber attacks in the past two years?

More than half of large organisations have been subjected to cyber attack in past two years

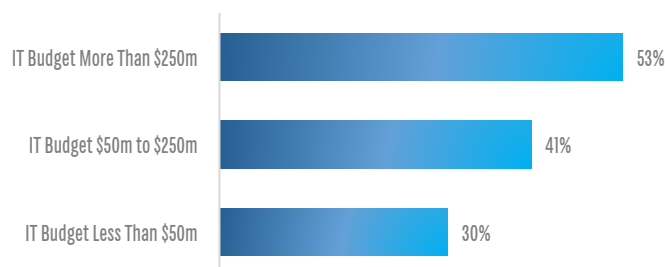


Chart 45: Has your organisation been subjected to any major IT security or cyber attacks in the past two years? By IT budget.

Cyber attacks in high-target sectors show Utilities and Government most at risk

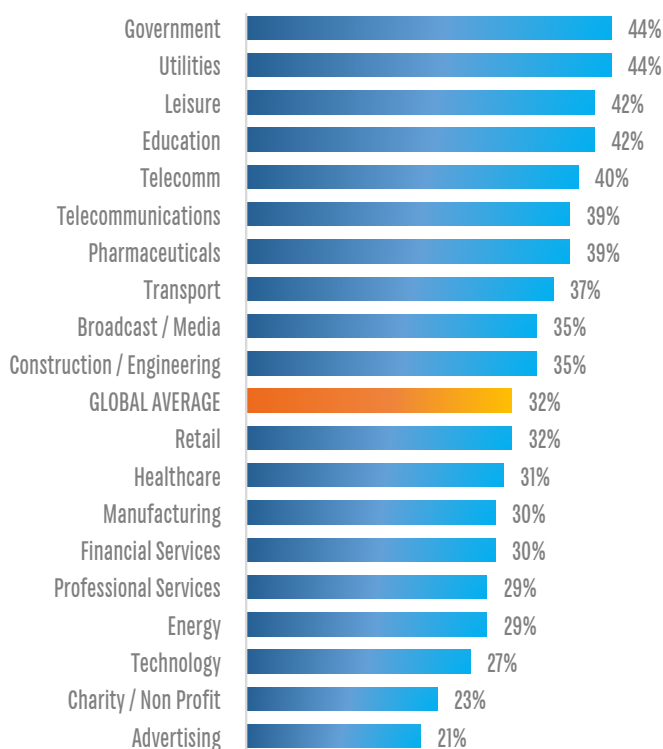


Chart 46: Has your organisation been subjected to any major IT security or cyber attacks in the past two years? By sector.

IT budget

IT budgets are growing. With nearly half of departments predicting an increase next year and less than one in five fearing a decrease, IT investment is on the up. Eight in ten (79 per cent) IT leaders have seen budgets upheld or increased this year, and only one in five (21 per cent) have seen IT budgets cut. This positive trend looks likely to continue, with a similar proportion of respondents (46 per cent) anticipating IT budget increases in 2018.

Shadow IT, where costs are controlled outside the IT function, is a small but growing part of the spending landscape. This reflects an ongoing trend witnessed during the past four years where IT leaders have – willingly or unwillingly – given up a proportion of IT budget decision-making to other leaders within the organisation. In response, IT leaders have indicated in previous reports a growing importance placed on skills associated with effective relationship management to continue influencing budgets not directly under their control.

IT budget growth remains stable, with eight in ten respondents enjoying stable or growing finances

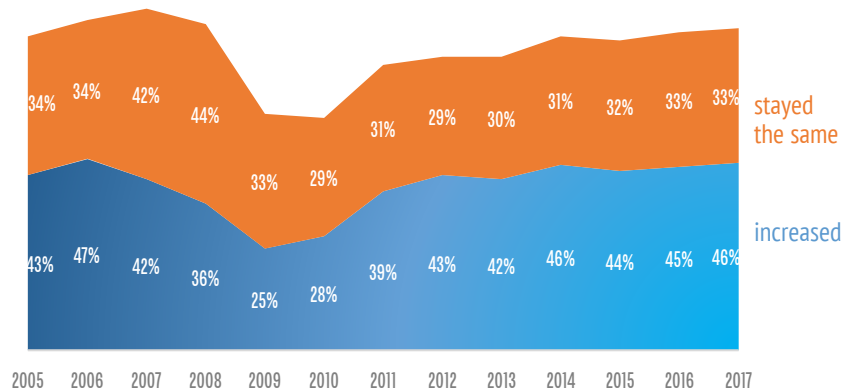


Chart 47: 2005–2017: Over the last year, please indicate if your IT budget has: increased, stayed the same.

IT spend is increasingly being controlled by influencers outside the IT function



Chart 48: 2014–2017: What proportion of the overall spend on IT is controlled/managed outside the IT organisation/department? More than 10%.

IT leaders remain bullish about future budget growth, with 46 per cent of respondents globally anticipating an increase next year. Respondents from smaller organisations should be most optimistic; almost half (48 per cent) of respondents with IT budgets less than \$50m predict future budget growth, compared with 40 per cent of respondents at mid-sized organisations and only 29 per cent of peers at larger organisations. Approximately one in five (18 per cent) organisations are preparing to operate with lower IT budgets in 2018. However, twice as many respondents at larger organisations (37 per cent) expect budgets to decrease in the year ahead.

Public sector organisations continue to feel the squeeze on spending and this is likely to continue at least for a while. Leisure, Technology, Healthcare and Professional Services top the list for optimism in this area. Seeing the Retail sector near the top is particularly interesting. Perhaps this suggests that those companies see improvements in consumer confidence and are gearing up to respond to it?

IT leaders at bigger organisations are most cautious about future budget growth

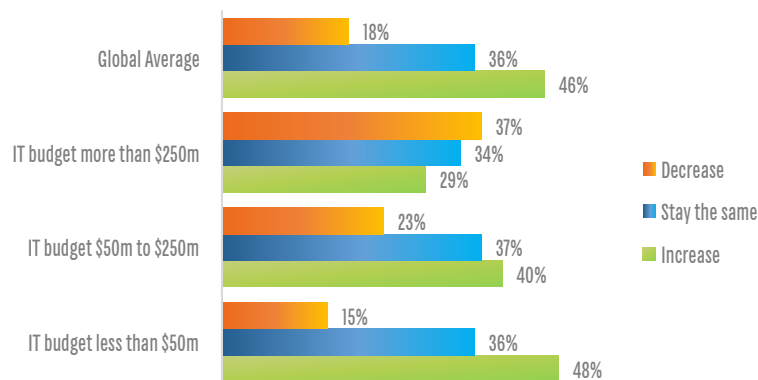


Chart 49: Over the next 12 months, do you expect your IT budget to increase, decrease, or stay the same? By IT budget.

Not all IT budgets will grow equally, with Leisure, Healthcare and Technology sectors the most bullish

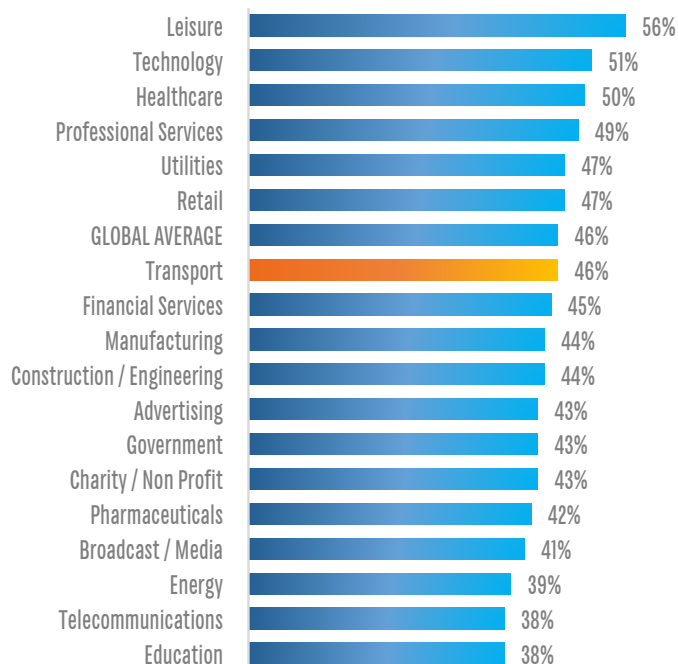


Chart 50: Over the next 12 months, do you expect your IT budget to increase, decrease, or stay the same? By sector.

Outsourcing

The proportion of IT leaders planning to increase future outsourcing and offshoring has fallen slightly, although still remains broadly in line with recent years. The proportion of respondents planning to increase investment in outsourced activity is down by 4 per cent, while IT leaders planning to increase offshore work is down by 9 per cent compared with last year.

Intent to outsource and offshore both anticipated to drop in coming year

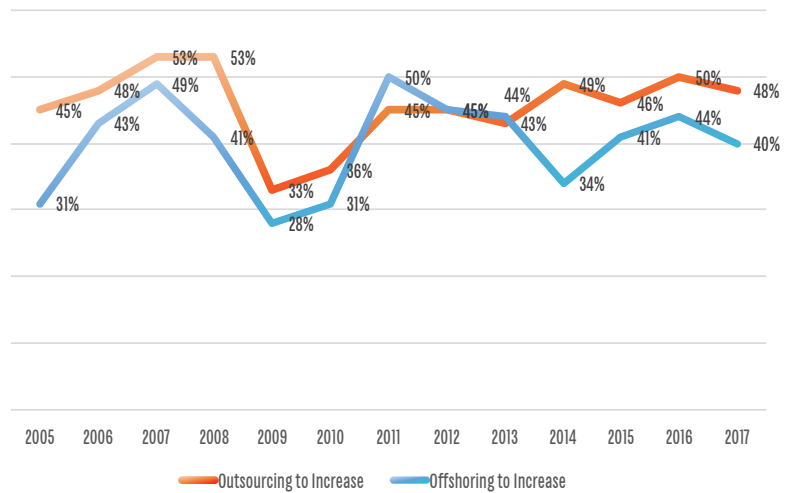


Chart 51: How do you expect your spend on outsourcing and offshoring to change over the next 12 months? 2005–2017.

Increased unpredictability in the wider business environment is also shifting the reasons to outsource. While most respondents still outsource primarily to free up resources for core business (49 per cent), this priority has fallen by 4 per cent compared with last year, whereas reasons more closely linked to managing an unpredictable environment are growing in importance. Improving 'flexibility' is up 11 per cent compared to last year and 'saving money' is up 7 per cent. Over four in ten IT leaders continue to outsource in order to augment skills not available in-house, but this is essentially flat compared with last year, similar to the demand for skills generally.

Improved flexibility for unpredictable time is fastest growing reason to outsource

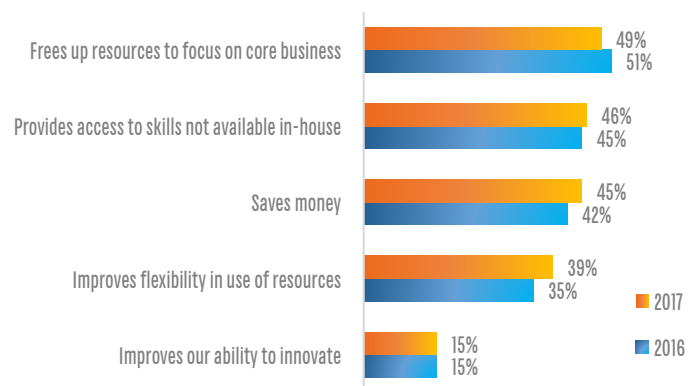


Chart 52: What are the two main reasons you choose to outsource? 2016 vs 2017.

Software development, application maintenance and data centres remain the most favoured outsourcing tasks by respondents who outsource or offshore at least one IT function. Just under a third of respondents (32 per cent) who are actively outsourcing or offshoring are prioritising service desk/help desk functions, while three in ten (29 per cent) have outsourced systems integration projects.

This year, we took a sectoral look at outsourcing. The leadership from the Pharmaceuticals sector came as something of a surprise. Many organisations in this sector are large and have sufficient scale to run their own operations. We are actively planning to explore this trend further with Pharmaceuticals IT leaders at our report launch events around the world to find out more, but it is recognised that many core business units (e.g. clinical trials functions) are heavily outsourced and it might be that this is a natural way of doing business for those companies. Software support has long been an area that many would consider as the prime area for outsourcing, so we were interested to see the dominance of software application development. In follow-ups, it is clear that many are using offshore companies for their agile and small-scale developments.

Most demand for software development and data centres by respondents actively outsourcing

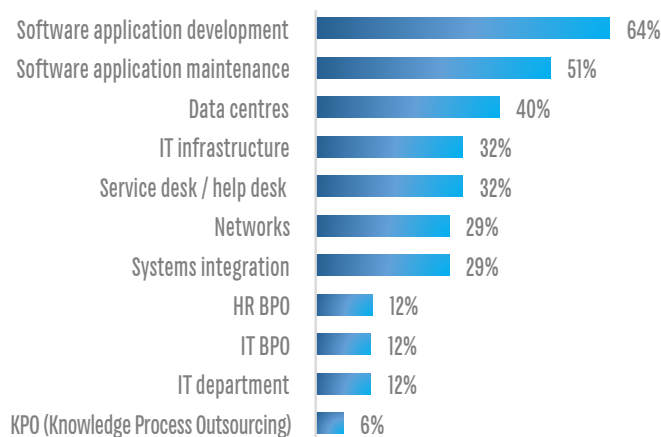


Chart 53: What functions do you outsource or offshore?

Education is the only sector where less than half of respondents are currently outsourcing

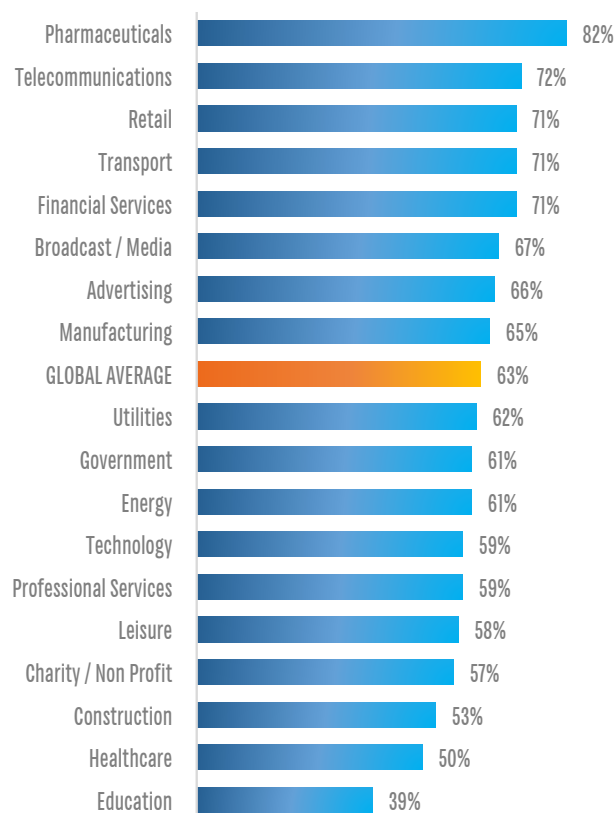


Chart 54: Do you currently outsource or offshore? Yes – by sector.

1.5 CIO careers

CIO life span

The majority of IT leaders (58 per cent) can expect to be in the job for five years or less. This short life expectancy of the CIO should be a continuing concern for aspiring IT leaders, especially given that the data shows that IT leaders want to stay in post longer than this typical life span. Our experience in the recruiting industry, together with external research, suggests that if a CIO wants to extend their shelf life, then it is critical that they pay close attention to their stakeholder relations together with the performance of their major projects. Hygiene factors such as maintaining stable and reliable services are also vital. Nobody wants to talk about strategy when basic IT services are erratic.

The proportion of IT leaders who want to stay in their current role more than five years has increased from 24 per cent in 2015 to 28 per cent in 2017. This perhaps reflects the increasing importance of the CIO role, and that influence is translating into job satisfaction, which – as you will see – is also increasing.

The shelf life of an IT leader is likely to be five years or less

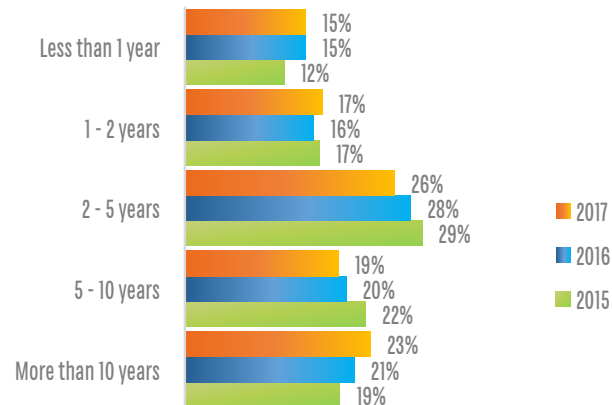


Chart 55: 2015–2017: How long have you worked for your current employer?

Growing proportion of IT leaders yearning to stay in role longer than five years

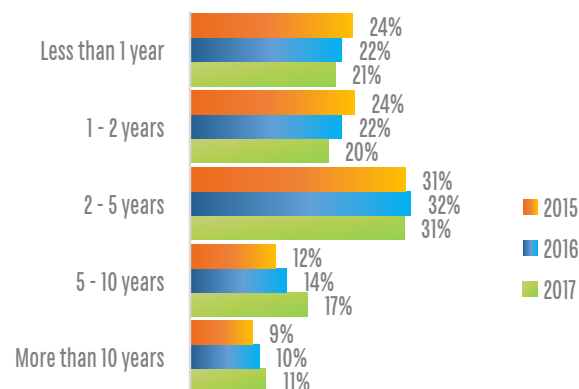


Chart 56: How long, from this point onwards, do you expect to stay with your current employer? 2015–2017.

Imagine it's 2030. Will the CIO role be extinct?



Triona O'Keeffe,
CIO, Direct Line
Group, UK

By 2030, I anticipate "business" and "technology" will be virtually indistinguishable, similar to how "life" and "technology" have blended in so many ways over the past decade. CIO roles will still exist, but there will be much fewer of them and they will be working in less fast-moving businesses or where a CIO is needed to decommission "legacy" technology. Meanwhile, there will be a huge surge of opportunity for ex-CIOs who can use their transferable skillset to be true business leaders. I'm looking forward to it!



Robyn Randell,
Vice President IT,
Burberry Asia Limited,
Hong Kong

The role will be reshaped by highly resilient transparent technology as reliable as electricity. IT at least for brand organisations will no longer be about wires, boxes or speeds but about on-demand capabilities driving competitive advantage. The CIO will finally deploy and manage relevant services at the actual speed of business with far smaller teams.



Yuri Aguiar,
Global Director
of Innovation and
Transformation, Ogilvy
& Mather Worldwide,
USA

The traditional CIO role is already extinct – commoditised infrastructure, apps and specialised delivery platforms as-a-service have become a mainstay for many industries. Today's CIOs must be leaders that can influence the revenue stream and tie their business strategies to solutions in the most secure and cost-effective manner and in the shortest possible time-to-market. Good execution will always be a measure of a successful CIO.

CIO career development

IT leaders at larger organisations are on the move. Nearly three in ten (28 per cent) are planning a career move in the next 12 months. While many would expect to see more movement in smaller organisations, only 20 per cent of IT leaders in small and 21 per cent of leaders in mid-sized organisations are planning a move.

There are sectoral differences when considering when to move role. For example, more than a third of IT leaders (34 per cent) in the Non-Profit sector are looking to move role this year, up an astonishing 36 per cent compared with last year. One in four Construction/Engineering IT leaders are also looking to move job in 2017, up by 44 per cent compared with last year. However, the most significant fall-off in job seeking is found in the Pharmaceuticals sector, where only 11 per cent of IT leaders are looking for a new role this year, down a massive 50 per cent. Clearly, something very interesting is going on in this sector.

IT leaders at larger firms are more likely to move job this year compared with peers at smaller organisations



Chart 57: How long do you expect to stay with your current employer? Less than one year – by IT budget.

Non-Profit IT leaders rocket to the top of the queue when it comes to looking for a new role in 2017

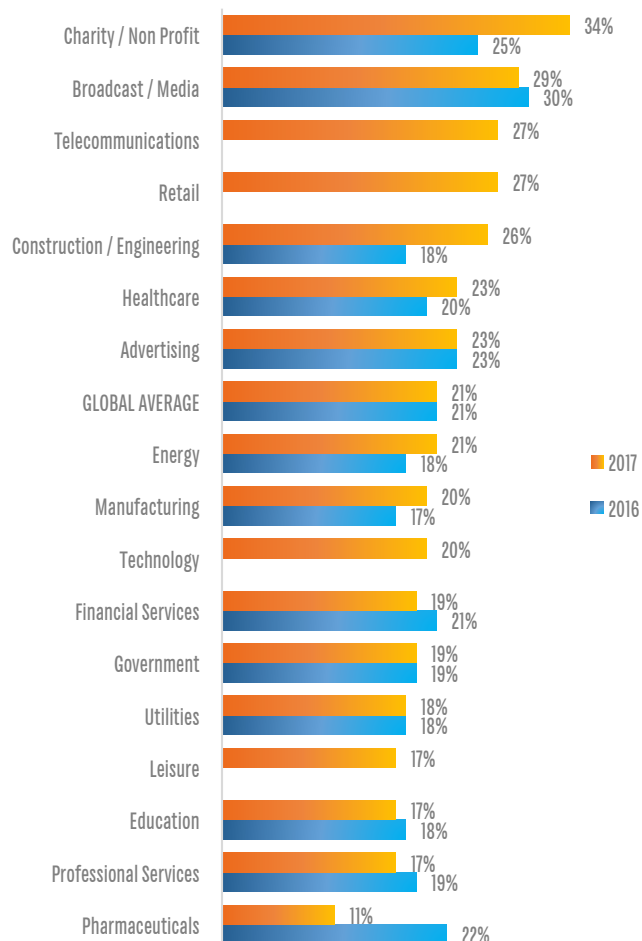


Chart 58: How long do you expect to stay with your current employer? 2016–2017. Less than one year – by sector.

This year we changed some of the sector categorisations. Year-on-year comparisons are not always possible.

CIO job satisfaction

IT leaders, it seems, love their jobs. The proportion of IT leaders who report that they are 'very fulfilled' in their role is at a three-year high and has risen by 18 per cent since 2015. During this time, we have seen a steady increase in respondents who have changed their preference from 'quite fulfilling' to 'very fulfilling'. Clearly, despite all the trials and tribulations of IT leadership, the CIO career landscape is improving!

Unsurprisingly, IT leaders who sit on their executive committee (ExCo) record the highest levels of job satisfaction: 44 per cent have rated themselves 'very fulfilled' for the past two years. IT leaders who report to the CEO also report high levels of fulfilment, but IT leaders who report to the CFO have shown faster increases in happiness in the past three years, up 12 per cent. IT leaders at smaller firms are more fulfilled in their role than IT leaders at larger firms.

An overwhelming majority of IT leaders continue to report being fulfilled in their role

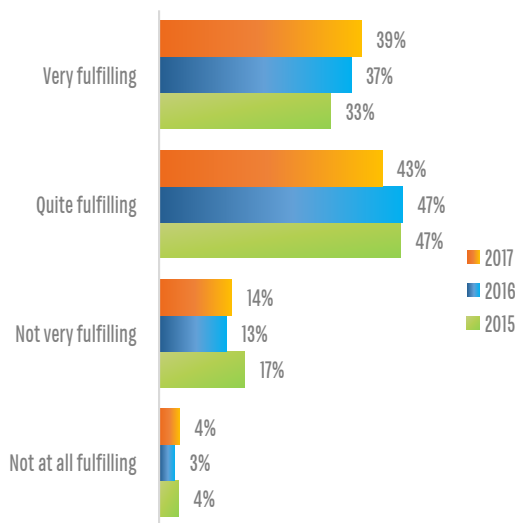


Chart 59: How fulfilling do you find your current role? 2015–2017.

IT leaders with strategic influence remain happiest

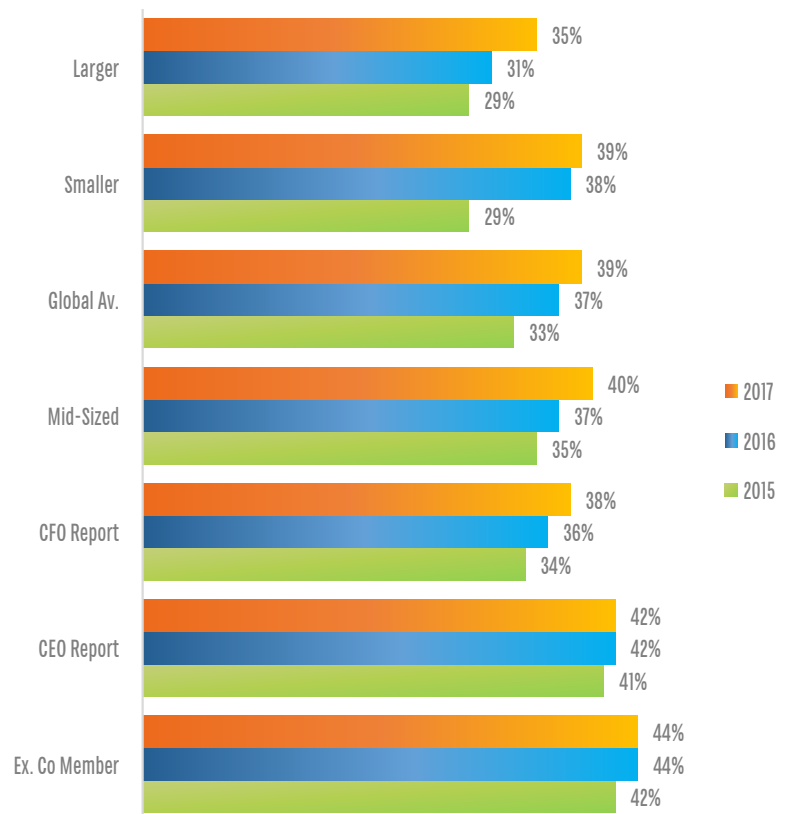


Chart 60: How fulfilling do you find your current role? Very. 2015–2017.

The increasing proportion of IT leaders 'very fulfilled' in their jobs reported this year came as something of a surprise to us, because combining the results of 'very' and 'quite' fulfilled IT leaders together (Chart 61) shows there has actually been a minor dip in satisfaction across IT leaders in most sectors. The relatively short life expectancy of the role, together with demands for highly complex, game-changing digital projects – not to mention the need to keep an increasingly IT-savvy digital workforce happy – means that succeeding in a CIO role is probably harder than it has ever been. However, the top IT leaders appear to be up for the job, perhaps even relishing their increasing ability to exert their influence across the enterprise as their departments become a force for strategic change.

IT leaders have become marginally less active in their approach to finding their next role. The proportion who are actively seeking and applying for roles has fallen by 10 per cent compared with last year, although those who would take a call from a headhunter is up 6 per cent.

Energy sector IT leaders become happiest; Non-Profit CIOs lose their zeal, dropping 12 per cent

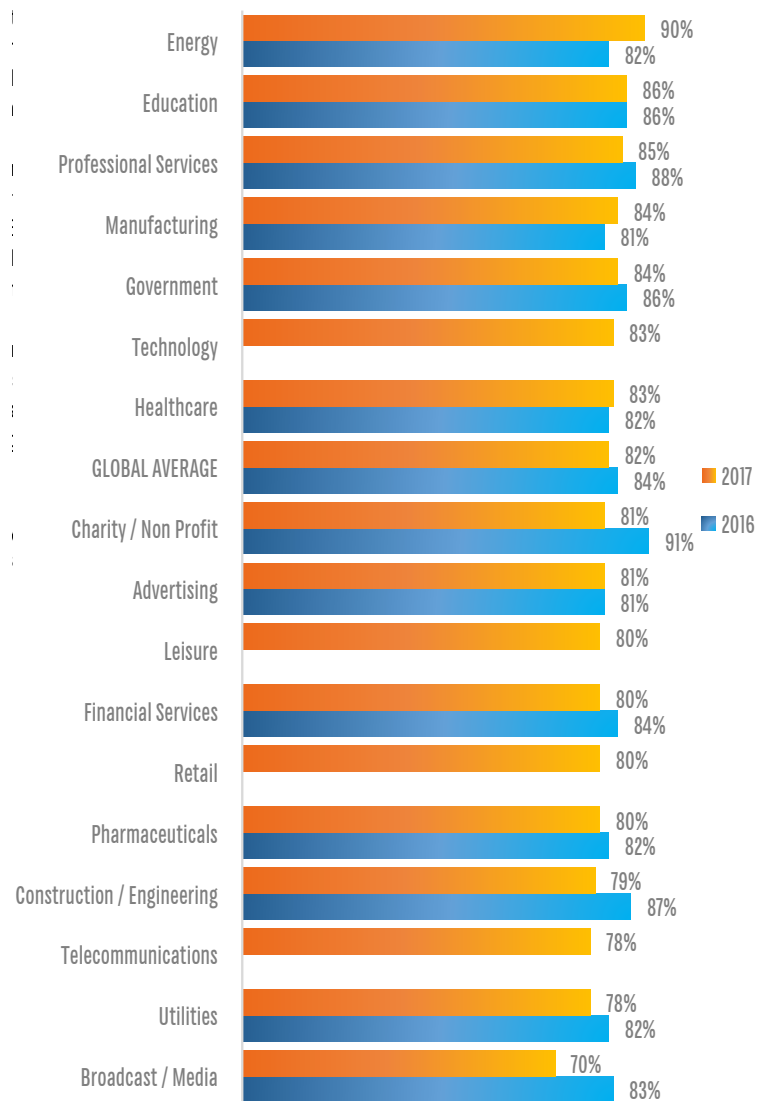


Chart 61: How fulfilling do you find your current role? Very and Quite. By sector
This year we changed some of the sector categorisations. Year-on-year comparisons are not always possible.

Over half of IT leaders would consider a new role or are actively looking

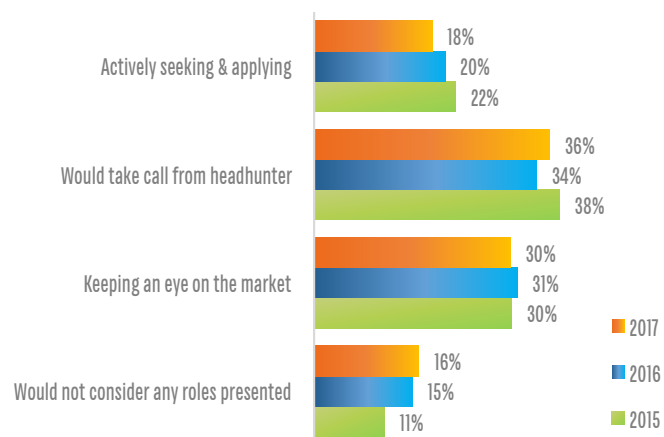


Chart 62: 2015–2017: How active are you in looking for a new role at present?

Salaries

In line with previous years, a third of respondents (33 per cent) enjoyed an increase in base salary last year. For the majority of IT leaders (62 per cent), their salary stayed the same, while there is a (very minor) rise in respondents reporting a decrease in salary.

Many more respondents in the Leisure and Retail sectors are enjoying a salary increase. Another sector performing well in terms of salary growth is the Energy sector. Three in ten received an increase, up by 38 per cent on last year, the most progress of any sector. This perhaps explains the increasing levels of fulfilment seen in the Energy sector in the previous section. Maybe money does buy some happiness?! By contrast, considerably fewer IT leaders in Advertising are experiencing salary growth, although this is down from a historical high last year. Despite this, more than three in ten IT leaders will still see salary inflation in 2017.

A third of IT leaders enjoy pay increase while six in ten are unchanged

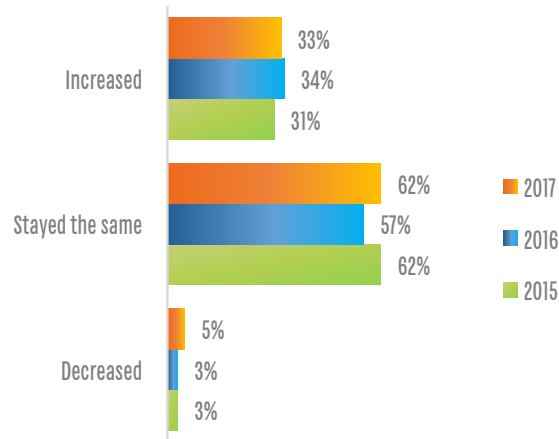


Chart 63: How has your base salary changed compared with last year? 2015–2017.

Government respondents are least likely to experience salary increase; Retail and Leisure are doing best

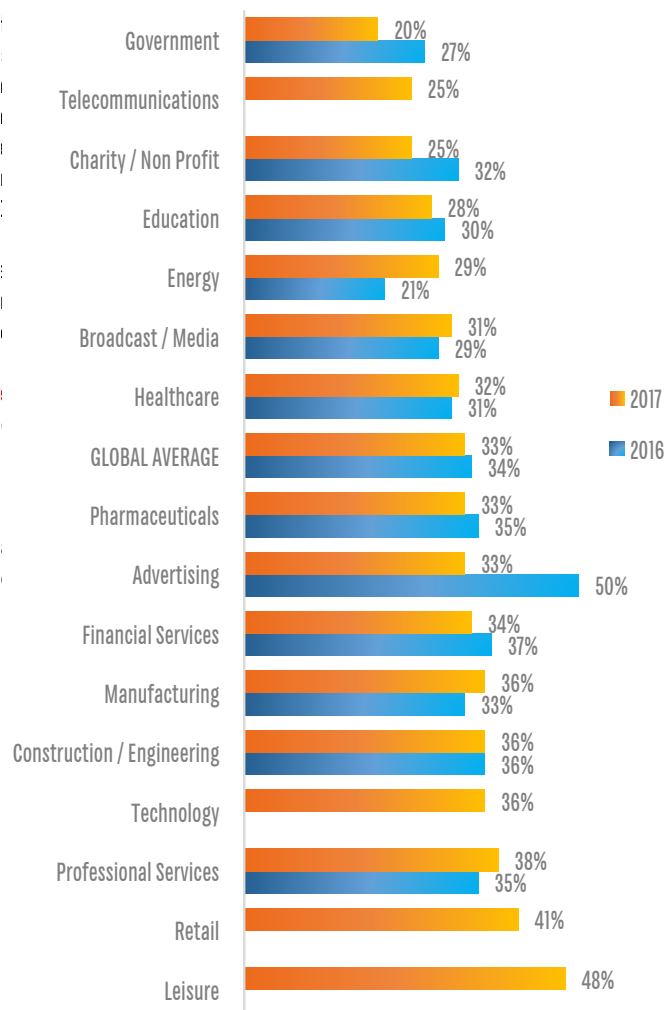


Chart 64: How has your base salary changed compared with last year? Increased 2016–2017, by sector.

This year we changed some of the sector categorisations. Year-on-year comparisons are not always possible

Being large does not necessarily lead to large salary increases. This year, IT leaders at larger organisations are the least likely to receive a salary increase, compared with their peers in small and mid-sized organisations. However, fewer respondents at small organisations saw a salary increase last year compared with the previous year. Respondents at mid-sized organisations were marginally more likely to experience salary rises. The news is not good in the large corporate world, with 12 per cent fewer IT leaders of large companies recording a salary increase last year.

Possibly unsurprisingly, IT leaders who report to the CEO are more likely to have received a salary increase in the past 24 months compared with IT leaders who report to the CFO. IT leaders who sit on the executive management board remain more likely than average to receive a pay rise, with 35 per cent reporting an increase. IT leaders who have been in their role for less than five years are more likely to receive a salary increase than long-term occupants of their job. And in a striking development, female respondents are far more likely to have received a salary increase compared with their male peers: clear evidence perhaps that traditional gender salary inequalities may be starting to be addressed? We will explore this more at our report launch events.

IT leaders at smaller organisations continue to be more likely to receive a salary increase

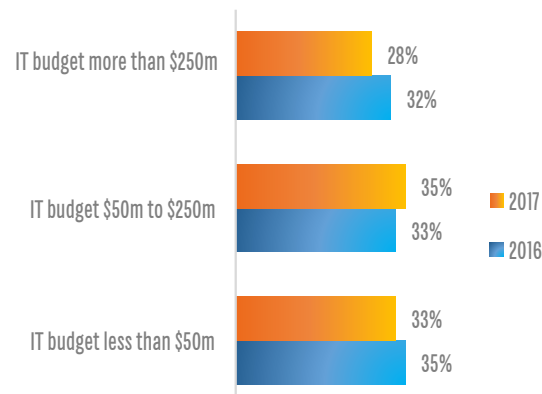


Chart 65: How has your base salary changed compared with last year? Increased 2016–2017, by IT budget.

Salary increases favour female IT leaders, in the role less than five years, who report to the CEO

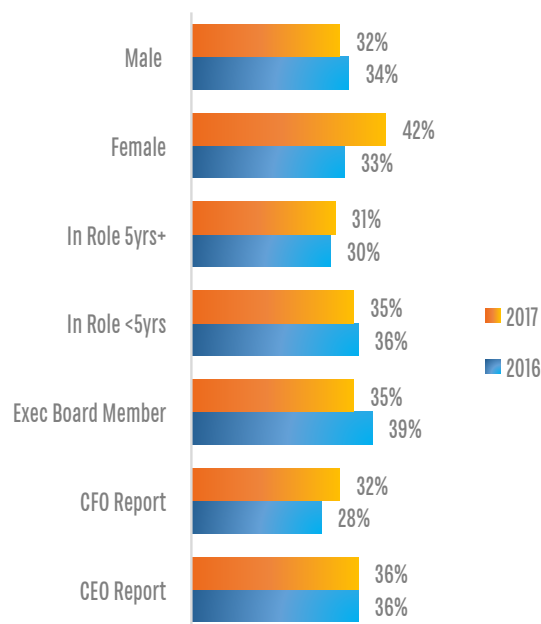


Chart 66: How has your base salary changed compared with last year? Increased 2016–2017 – by reporting, time in role, gender.

Bonuses and benefits

Bonus rates for IT leaders remain broadly in line with previous years. Slightly more respondents are going without a bonus, but this remains approximately three in ten IT leaders on average. The most significant change in bonus rates affects respondents who traditionally generate a bonus worth 20 per cent of their annual salary. This group declined by 20 per cent compared with last year, and most of these IT leaders seem to reappear in the lower or zero bonus categories, rather than in the higher bonus levels.

With the notable exceptions of the Government, Non-Profit and Education sectors, the large majority of IT leaders receive a bonus as part of their annual remuneration. However, in a number of sectors, the proportion of respondents to receive a bonus is dropping compared with last year: Pharmaceuticals (17 per cent decline) and Financial Services (7 per cent decline) are examples of this trend.

Seven per cent increase in the number of IT leaders who did not receive a bonus last year

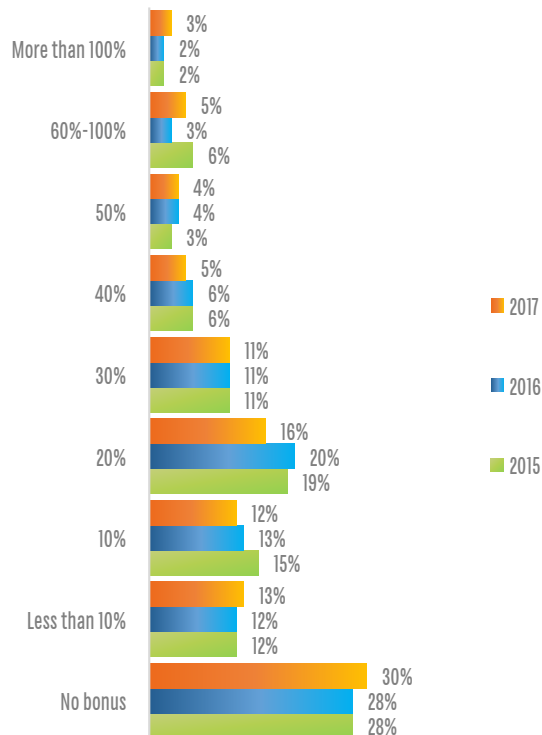


Chart 67: What bonus have you received in the last 12 months? 2015–2017.

Decline in number of IT leaders receiving bonuses in Pharmaceuticals and Financial Services

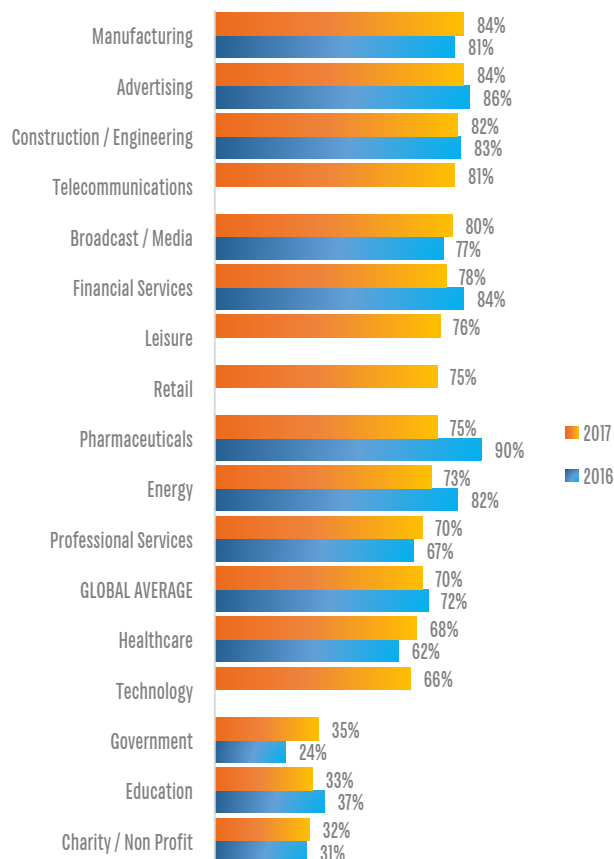


Chart 68: What bonus have you received in the last 12 months? By sector.

This year we changed some of the sector categorisations. Year-on-year comparisons are not always possible.

The value of other benefits – including car, short-term and long-term incentive plans (LTIPs), shares or equity – continue to add significant value to IT leaders' remuneration. The proportion of respondents who receive no additional benefits is static at just under three in ten (28 per cent). A majority continue to receive benefits valued between 10 per cent and 30 per cent of their annual base salary. The proportion receiving mega-benefits (valued at more than 100 per cent of annual base salary) also remains stable (6 per cent of all IT leaders this year).

Majority of respondents value their benefits package at 10 per cent to 30 per cent of their annual base salary

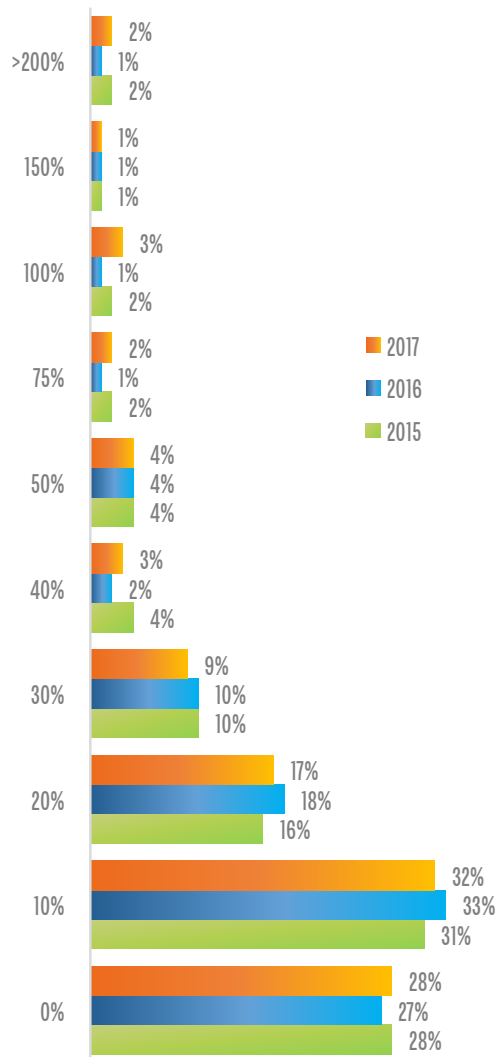


Chart 69: What is the value of the benefits you receive, including car, LTIPs, shares or equity (as a percentage of your base salary)? 2015–2017.

Digital ecosystem business models are consolidating – move quickly!

Over 600 respondents to the Harvey Nash / KPMG CIO Survey provided additional information, including company name, to take part in further analysis by Massachusetts Institute of Technology Center for Information Systems Research. MIT CISR is one of the world's leading IT research organisations.



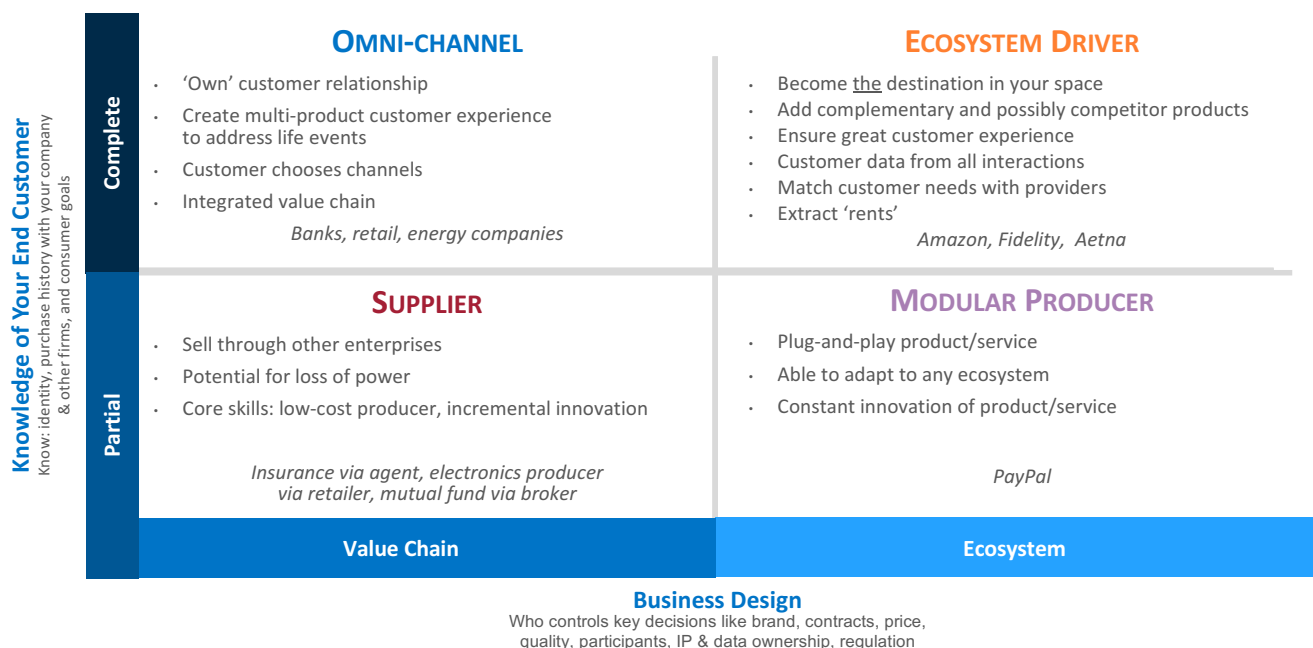
At MIT CISR, as we study how enterprises are transforming themselves with digital technologies, we are beginning to see industry consolidation. There is an emerging consensus among economists that two likely key causes of consolidation – mergers and technology – are significantly weakening competition in two-thirds of industries. As your enterprise reinvents itself in the digital era, often by pursuing a different business model, we think you need to make investments in your business that quickly create opportunities, because it seems there is a significant first mover advantage for enterprises that are transforming. In this piece, we will describe four business models for the digital economy. Using the 2017 Harvey Nash / KPMG CIO Survey data, we show the current distribution of business models (and compare it with the distribution in 2013) and glean insights about the capabilities that each business model needs to be successful.

Options for the next-generation enterprise

To understand the impact of digitisation on the next-generation enterprise, we talked to 144 senior executives and asked them to describe their most important digitally enabled breakthrough projects. We found that leaders had to make two choices as they design the next-generation enterprise – the business design and their relationship with the end customer (see Figure 1).

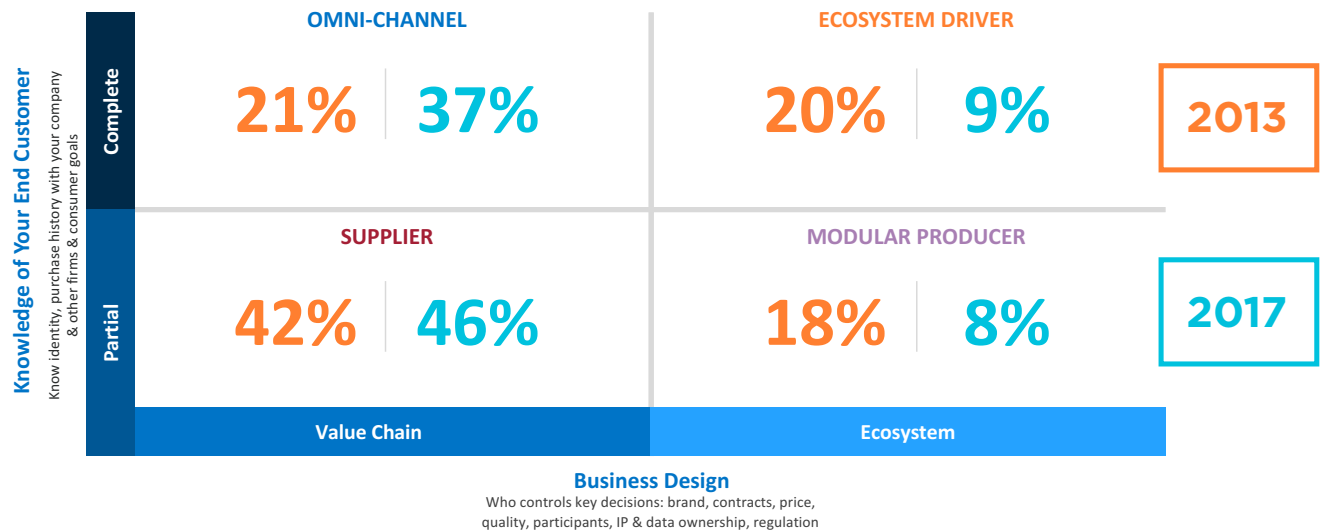
The horizontal axis of the 2x2 is the business design, with value chain and ecosystem as the options. Value chain models, popularised by Michael Porter in the 1980s, were implemented successfully by many enterprises, including Walmart, Procter & Gamble, ExxonMobil and most banks and retailers. Digitisation is enabling a different kind of model that we call a digital business ecosystem. We think of a digital

Figure 1. Options for the next-generation enterprise



P. Weill & S. L. Woerner, "Thriving in an Increasingly Digital Ecosystem", MIT Sloan Management Review, Summer 2015, Vol. 56, No. 4, pp. 27-34, 16 June 2015.
P. Weill & S. L. Woerner, *The Next Generation Enterprise: Transforming for a Digital Economy*, Harvard Business School Press, forthcoming 2017.

Figure 2. Percentage of companies by dominant model



P. Weill & S. Woerner, "Thriving in an Increasingly Digital Ecosystem," *MIT Sloan Management Review*, Summer 2015, Vol. 56, No. 4, pp. 27-34, 16 June 2015.
P. Weill & S. Woerner, *The Next Generation Enterprise: Transforming for a Digital Economy*. Harvard Business School Press, forthcoming 2017.

business ecosystem as a co-ordinated network of enterprises, devices and customers that creates value for all participants. There is typically a single enterprise in a particular space – such as shopping (Amazon), healthcare (Aetna), technology (Microsoft), industrial internet (GE) and wealth management (Fidelity) – driving the ecosystem and attracting customers.

The vertical axis is the depth of knowledge of your end customer. Deep knowledge of the end customer enables your enterprise to make more attractive offers and increase customer engagement. For example, how well do you know your end customer and their key life events? Can you make offers to help customers negotiate those life events? For B2C customers, life events include moving house, buying a car, getting married, having a child and saving for retirement. For B2B customers, life events include opening a new store, launching a new product and conducting a major advertising campaign.

The combination of the two dimensions leads to four possible business models. We observe all four as viable business models today, each with distinct opportunities and challenges. Many firms have revenues from several of the models.

- Suppliers have at best a partial knowledge of their end customer, and typically operate in the value chain of another, more powerful, enterprise. A company like Procter & Gamble is an example of a supplier (selling through retailers rather than direct to the customer, thus not collecting end customer data), though P&G is taking steps – through B2C websites like pampers.com, sentiment analysis and

test-and-learn initiatives – to learn more about, and increase engagement with, its end customers.

- Omni-channel businesses provide customers access to their products across multiple channels, including physical and digital channels, allowing the customer to move seamlessly across channels while providing a superior customer experience. We see many banks, telecommunications companies and retail enterprises working hard towards this model.
- Modular producers provide plug-and-play products or services that can adapt to any number of ecosystems. To survive, they have to be one of the best service providers of their core activity (like payments). To thrive, they must constantly innovate their products and services, ensuring they're among the best options available and at the right price. PayPal is an example of a modular producer – its payment system can be used by almost any enterprise and individual, globally.
- Ecosystem drivers want to become the destination for a subset of their customers in their space. They provide a platform for the participants to do business that can be more (e.g. Google) or less (e.g. Apple) open. They leverage their brand to attract participants, ensure a great customer experience and offer one-stop shopping providing their own products, complementary products and sometimes competitor products. An ecosystem driver is typically the only enterprise in the ecosystem that sees all the data and uses the insights to make the destination increasingly attractive.

How the competitive landscaped has evolved

In 2013, we measured the distribution of firms' dominant models (calculated by source of revenue and depth of customer knowledge) across the four business models. We found suppliers were 42 per cent, omni-channel 21 per cent, modular producers 18 per cent and ecosystem drivers 20 per cent of enterprises (see Figure 2). Customers had many choices as to which enterprise was their go-to company for banking, travel, shopping, entertainment, etc. And over half of these ecosystem drivers were small enterprises, often start-ups, trying to create a blockbuster business.

In the intervening five years, we have seen a consolidation (i.e. a Darwinian shaking out) of ecosystem drivers and modular producers, the successful ones growing rapidly and the others failing and often disappearing (or being acquired). These two ecosystem business models – which rely on having great platforms – have decreased to 9 per cent (ecosystem drivers) and 8 per cent (modular producers). The other enterprises are focusing on learning about their end customers as the number of omni-channel businesses has increased to 37 per cent (from 21 per cent). The percentage of suppliers is up a little to 46 per cent.

Customers are voting with their mobile devices and are choosing from a handful of dominant ecosystem drivers for each domain in their lives – which, in turn, increases those ecosystem driver enterprises' power in the marketplace. An example of this consolidation is the continuing rise of Amazon. Amazon accounted

for 43 per cent of all online retail revenue last year and 20 per cent of all US consumers are Prime members.¹ Even more telling, 55 per cent of US consumers begin their product searches at Amazon.² Amazon has supplied Dash buttons that can be put anywhere in the house so customers can make one-click purchases of products they are running out of without going online. Alexa, the Amazon voice-activated assistant, can tell you the weather, stream music and take orders for products, and that's just a start. And Amazon is even experimenting with physical stores and perfecting the technology. Its Amazon Go store allows customers with the app to go in, pick up food and leave, paying electronically and never having to queue for the cashier.

Capabilities to develop

In addition to customers frequenting a smaller number of dominant players, there's another factor at work. Becoming a successful ecosystem driver isn't easy and requires a long list of world-class capabilities. We analysed the survey data to understand which capabilities were needed for each business model (see Figure 3). Suppliers, because they sell through other enterprises, must be skilled at managing costs as price is a key factor for success in a world where search is easy. Robotics and automation are a key capability for keeping costs down.

Omni-channel businesses must continue to learn about their customers, create a seamless customer experience and maintain a stream of new products and

Figure 3. Which capabilities are key for the models?

	Supplier	Omni-channel	Modular producer	Ecosystem driver
Fostering innovation				✓
Aligning governance				✓
Selecting appropriate architecture*		✓		✓
Managing risk and security				✓
Using data and analytics effectively				✓
Using partnerships*		✓	✓	✓
Integrating new digital solutions with core business		✓		✓
Using digital to advance business strategy				✓
Leveraging test-and-learn (quick about shutting down projects)*		✓	✓	
Investing in Platform as a Service				✓
Investing in robotic automation	✓			

* Analysis is significant at the p<0.1 level, all other analyses are significant at the p<0.05 level.

1. www.businessinsider.com/amazon-accounts-for-43-of-us-online-retail-sales-2017-2

2. <https://www.bloomberg.com/news/articles/2016-09-27/more-than-50-of-shoppers-turn-first-to-amazon-in-product-search>

services to keep customers engaged. In an increasingly digital economy, test-and-learn capabilities like A/B testing, figuring out which offers will work best, are key to learning about customers. Architecture matters when customers expect to use one channel just as easily as another or even move between channels during a single transaction. Easily integrating new digital solutions is key to maintaining customer engagement and buzz.

A modular producer needs to be able to plug into any enterprise's platform to succeed and investing in partnerships, often consummated digitally, is the primary way to access new opportunities. For example, having an easy-to-use, easily accessible API set is an important component to building a successful partnership. Modular producers also have to constantly innovate to add capabilities in order to stay ahead of what often becomes a commodity business. Test-and-learn capabilities become critical to deciding which new offers are worthwhile and will extend reach.

Becoming an ecosystem driver requires being good at a wide variety of capabilities, almost everything that modular producers and omni-channel businesses have to do and more. Perhaps this is why consolidation has occurred so quickly. Building a platform that customers want to interact with, and partners and suppliers want to do business on, is the most important capability. Platform as a Service is one way for an enterprise to get up and running as an ecosystem driver. But it's not enough. An ecosystem driver has to have great customer data and the ability to protect that data. Digital capabilities are key to its strategy and success, and there is a need for constant innovation to engage

customers and partners. An ecosystem driver model has a lot of moving parts so a robust digital governance model that continually enhances, rather than fragments, the platform is key.

The CIO plays a key role in creating and reusing all these key capabilities. The survey results show that the CIO is becoming more strategic, no matter which model(s) the enterprise uses. Effective CIOs are increasingly partnering with other executives and influencing the executive committee, often helping choose which model(s) are best for the enterprise, particularly around the decision of what is realistic. CIOs in all of the models are meeting regularly with their boards – somewhere between every three and six months – with discussions focused in areas such as strategy (i.e. which model), reporting (i.e. progress being made) and defensive (i.e. cyber, privacy and compliance).

If the trend we have identified here continues, we will see customers identifying the go-to enterprise in each of their life spaces (like healthcare, education, entertainment, etc.). This will lead to further technology-enabled consolidations as a few firms will become very powerful ecosystem drivers – effectively intermediating between the end customer and the service provider. We think this consolidation has so far largely been a consequence of first mover advantage. How will you compete in this environment? Which model(s) are you today? And how do you start building capabilities now to move to another model? This is a fundamental conversation for the CIO to lead among his or her enterprise's management team. And the sooner the better.



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Peter Weill

Chairman and Senior Research Scientist, MIT Sloan School of Management's Center for Information Systems Research.

Regional League Tables

GROWTH ORIENTATED

% CIOs operating with IT budget increase

1	France	72%
2	Colombia	68%
3	Austria	62%
4	Venezuela	59%
5	Denmark	54%
6	Vietnam	51%
7	Ireland	51%
8	Canada	51%
9	Mexico	48%
10	United Kingdom	48%
11	Germany	48%
12	United States	47%
13	Panama	47%
14	GLOBAL AVERAGE	46%
15	Hong Kong	42%
16	China	39%
17	Portugal	39%
18	The Netherlands	39%
19	Belgium	38%
20	Australia	38%
21	Italy	37%
22	Poland	37%
23	India	36%
24	Sweden	35%
25	Switzerland	32%
26	Barbados	32%
27	Brazil	28%
28	Japan	27%

EXPERIENCING UNPREDICTABILITY

% CIOs agree political, business and economic environment has become more unpredictable

1	Venezuela	97%
2	Panama	95%
3	Mexico	94%
4	Portugal	93%
5	India	93%
6	Brazil	87%
7	Italy	80%
8	China	78%
9	Vietnam	76%
10	Colombia	75%
11	Barbados	73%
12	France	72%
13	Hong Kong	69%
14	Canada	66%
15	Switzerland	66%
16	Germany	63%
17	Japan	63%
18	Belgium	63%
19	GLOBAL AVERAGE	63%
20	The Netherlands	63%
21	Australia	62%
22	Sweden	62%
23	Poland	61%
24	United States	59%
25	United Kingdom	58%
26	Ireland	57%
27	Denmark	52%
28	Austria	48%

IMPORTANCE OF OUTSOURCING

SAFEST FROM CYBER ATTACK

% CIOs planning to increase outsourcing spend			% CIOs faced major security incident in past two years		
1	Austria	80%	1	India	18%
2	France	79%	2	Panama	21%
3	Colombia	71%	3	Venezuela	21%
4	Vietnam	67%	4	Barbados	25%
5	Canada	62%	5	China	25%
6	Portugal	60%	6	Brazil	25%
7	Venezuela	60%	7	United States	27%
8	Switzerland	58%	8	Colombia	27%
9	Ireland	57%	9	Ireland	29%
10	China	56%	10	Hong Kong	30%
11	Japan	55%	11	Australia	31%
12	Belgium	53%	12	GLOBAL AVERAGE	32%
13	Denmark	52%	13	France	32%
14	Panama	52%	14	Portugal	32%
15	GLOBAL AVERAGE	48%	15	Poland	32%
16	The Netherlands	48%	16	Italy	33%
17	Hong Kong	48%	17	United Kingdom	33%
18	Mexico	48%	18	Sweden	34%
19	Sweden	47%	19	Germany	37%
20	Brazil	46%	20	Canada	37%
21	Poland	46%	21	Mexico	40%
22	United States	45%	22	Belgium	42%
23	United Kingdom	44%	23	Denmark	42%
24	Germany	44%	24	Vietnam	45%
25	Australia	43%	25	Austria	45%
26	India	38%	26	The Netherlands	51%
27	Italy	30%	27	Switzerland	54%
28	Barbados	25%	28	Japan	55%

EMBRACING DIGITAL LEADERSHIP

AUTOMATION

% Organisations with Chief Digital Officer

1	Hong Kong	48%
2	Italy	39%
3	France	38%
4	Poland	38%
5	Venezuela	38%
6	Sweden	37%
7	Belgium	36%
8	Mexico	35%
9	India	33%
10	Switzerland	31%
11	Japan	31%
12	Ireland	29%
13	Australia	28%
14	The Netherlands	27%
15	United Kingdom	27%
16	GLOBAL AVERAGE	25%
17	Germany	25%
18	Denmark	23%
19	United States	21%
20	Austria	21%
21	Portugal	20%
22	Barbados	17%
23	Colombia	16%
24	Vietnam	15%
25	China	13%
26	Canada	12%
27	Panama	12%
28	Brazil	7%

% Currently investing in digital labour, cognitive automation or robotic process automation

1	France	61%
2	Austria	59%
3	India	55%
4	Vietnam	51%
5	Denmark	50%
6	Japan	48%
7	Poland	47%
8	Brazil	47%
9	Hong Kong	46%
10	Portugal	46%
11	Switzerland	45%
12	The Netherlands	43%
13	Australia	43%
14	Belgium	42%
15	Sweden	38%
16	Italy	37%
17	Ireland	37%
18	Mexico	35%
19	GLOBAL AVERAGE	34%
20	Germany	33%
21	Colombia	32%
22	United Kingdom	30%
23	China	30%
24	Venezuela	29%
25	United States	29%
26	Canada	28%
27	Panama	14%
28	Barbados	8%

CAREER PLANNING



SALARY INFLATION



% CIOs moved job in past year			% CIOs reporting pay increase in past year		
1	Sweden	23%	1	China	71%
2	Denmark	23%	2	Vietnam	68%
3	United Kingdom	23%	3	Poland	50%
4	Germany	18%	4	Brazil	49%
5	Japan	16%	5	Japan	44%
6	GLOBAL AVERAGE	15%	6	France	36%
7	United States	15%	7	Germany	36%
8	Austria	14%	8	Portugal	36%
9	India	14%	9	Hong Kong	35%
10	Venezuela	14%	10	Ireland	34%
11	Portugal	14%	11	Italy	33%
12	Ireland	13%	12	United States	33%
13	Poland	13%	13	GLOBAL AVERAGE	33%
14	Australia	13%	14	Australia	32%
15	France	12%	15	Barbados	32%
16	Italy	11%	16	Belgium	32%
17	Canada	10%	17	Canada	32%
18	Colombia	10%	18	United Kingdom	30%
19	China	8%	19	Panama	29%
20	Belgium	8%	20	Austria	27%
21	Hong Kong	8%	21	Mexico	27%
22	Switzerland	8%	22	Sweden	24%
23	Barbados	7%	23	The Netherlands	18%
24	Vietnam	7%	24	Switzerland	14%
25	The Netherlands	6%			
26	Brazil	4%			
27	Mexico	3%			

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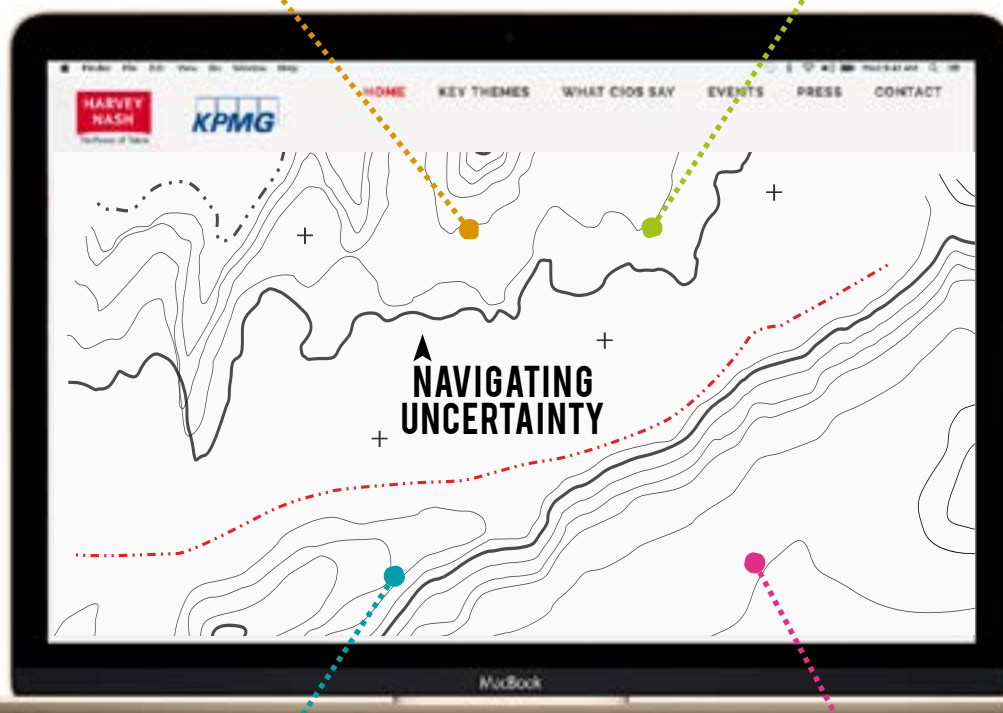
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