SIM IT TRENDS STUDY
Taking the Pulse of IT 2020

Issues, Investments, Concerns, & Practices of Organizations and their IT Executives

2020 Comprehensive Report: Results and Observations from the SIM IT Trends Study

IT TRENDS STUDY RESEARCH TEAM

Leon Kappelman, Dallas/Fort Worth Chapter
Eph McLean, Atlanta Chapter
Vess Johnson, Member-At-Large
Russell Torres, Dallas/Fort Worth Chapter
Chris Maurer, Member-At-Large
Mark Snyder, Dallas/Fort Worth Chapter
Kevin Kim, University of North Texas
Katia Guerra, University of North Texas

This research made possible through the generous support of our sponsors:

Platinum Sponsor

PARIVEDA SOLUTIONS
The Business of IT®

Price: $995.00 (Free download for SIM members)

The 2019 SIM IT Trends Study
The 2020 Comprehensive Report:

Issues, Investments, Concerns and Practices of Organizations and their IT Executives

SIM IT TRENDS STUDY RESEARCH TEAM

Leon Kappelman, University of North Texas, Primary Investigator (DFW Chapter)
Eph McLean, Georgia State University (Atlanta Chapter)
Vess Johnson, University of Arkansas Little Rock (Member-At-Large)
Russell Torres, University of North Texas (DFW Chapter)
Chris Maurer, McIntire School of Commerce, University of Virginia (Member-At-Large)
Mark Snyder, SIM Fellow (DFW Chapter)
Kevin Kim, University of North Texas
Katia Guerra, University of North Texas

This research made possible through the generous support of our sponsors:

Platinum Sponsor

PARIVEDA SOLUTIONS
The Business of IT®

Academic Sponsors

Georgia State University J. Mack Robinson College of Business
UALR College of Business
UNT G. Brint Ryan College of Business Department of Information Technology & Decision Sciences
University of Virginia McIntire School of Commerce

Comprehensive Report (Price: $995)
** Free download to SIM Members at http://www.simnet.org/IT-Trends **

This is the complete report of the Society for Information Management's 39th Anniversary IT Trends Study. This report is available to all SIM members at no charge https://trends.simnet.org. A preview of this report will appear in the December 2019 issue of the *MIS Quarterly Executive* and an edited report will appear in the March 2020 issue, both of which are also available free of charge to all SIM members.

November 15, 2019

We have done our very best to make this report error free. But, it is software; and you know how that goes sometimes. So if you find errors or have questions, please let me know via Leon.Kappelman@unt.edu.

Table of Contents

Table of Figures

Table of Tables

Executive Summary

This article presents the findings of the Society for Information Management's 39th Anniversary IT Issues and Trends Study for 2019, with responses from 1033 IT executives, representing 618 organizations and including 376 CIOs. Many trends identified last year continue this year. Internal IT headcount continues to grow and projected growth for next year is also strong, but the number of external consultants and contractors continues the decline, following a pattern of the last three years. IT salaries are up, as is the total spending for IT, although next year's growth is expected to slow somewhat. Not surprisingly, the use of cloud services and solutions is increasing, but there is a shift from internal and hybrid to external cloud services. In terms of IT investments, the top five this year are: Analytics, Cloud Computing, Cybersecurity, Software Development and Maintenance, and CRM. As for what CIOs find as their personally "most worrisome" issues: Cybersecurity, Alignment of IT with the Business, IT Talent Shortage/Retention, Perception of IT Leadership, and Compliance and Regulations. Average CIO job tenure is over six years, about a third of them had non-IT jobs prior to this one, and almost 80% came from other organizations. Undoubtedly important and slowing improving, respondents acknowledge that cybersecurity is not adequate. Over 50% of CIOs report to their CEO, the highest level ever found by this study, and under 25% report to their CFO, the lowest. CIOs are also spending more of their time interacting with other C-suite executives. This year's study confirms that the role and importance of the CIO continues to grow. See Summary and Conclusions for a more complete synopsis of the report.

Introduction

Beginning in 1980, the Society for Information Management (SIM) has conducted a series of surveys of its members to determine the issues of most concern to them and their organizations and to document the evolving usage patterns of the information technologies entrusted to their care. In addition, year-to-year comparisons are made to identify trends and track changes over time. This year's SIM IT Trends Study marks the 39th anniversary of this effort. Over the years, the surveys have expanded to become one of the most comprehensive investigations of IT executives and the management and use of technology.

The Society for Information Management was founded in 1968 and is now the oldest and largest not-for-profit professional organization in the U.S. for CIOs, senior IT executives, prominent academicians, advisors, and other IT leaders. SIM is both a national organization and a network of local chapters whose members meet regularly to share, learn, network, and provide value to their members, their organizations, and to their communities. SIM also co-founded both the *MIS Quarterly* and the *MIS Quarterly Executive*.[1]

The SIM IT Trends Study's survey questionnaire is updated each year to improve its quality and to reflect the changes occurring in the IT field. However, questionnaire changes are kept to a minimum wherever possible so that year-to-year comparisons can be made and trends tracked. In April 2019, this year's questionnaire was e-mailed to each of SIM's 4196 members, who comprise a broad cross section of IT leaders in the U.S. Nine weeks later, after weekly reminders, bi-weekly e-newsletter articles, and a special SIM chapter competition (to encourage survey participation), 1033 completed questionnaires were received, for a response rate of 24.6% (compared to 32.6% in 2018).

1. Top IT Management Issues and Concerns

1.1. The Top IT Management Issues of Organizations.

IT leaders identified their most important IT management issues or concerns by choosing up to five items from a list of 41. The top 10 issues selected by the most senior IT leader in the 618 unique organizations are presented in Table 1, along with the previous 10 years' results.

[1] For more information about SIM and its chapters and programs, the benefits of SIM membership, and how to become a SIM member, visit http://www.simnet.org/.

Table 1: Organizations' Top Ten Most Important IT Management Issues, 2009-19

IT Management Concerns/Issues [a]	2019 (% Selecting)	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
n (unique organizations)	618	793	769	801	785	717	484	195	275	172	243
Security/Cybersecurity/Privacy [b]	1 (35.9%)	1	1	2	2	2	7	9	8	9	9
Alignment of IT with the Business	2 (33.2%)	2	2	1	1	1	1	2	1	3	2
Data Analytics/Data Management	3 (25.7%)	3	3								
Digital Transformation	4 (22.2%)	7	8								
Compliance and Regulations	5 (20.6%)	6	4	12							
Cloud/Cloud Computing	6 (19.7%)	13	14								
Agility/Flexibility (Business) [c]	7 (19.1%)	8	9	5	9	3	2	3	2	2	3
Cost Reduction/Controls (IT) [d]	8 (18.6%)	9	5	6	10	9	4				
Innovation	9 (18.3%)	4	7	3	4	8					
Cost Reduction/Controls (Business) [d]	10 (16.7%)	10	6	7	8	17	5	5	10	8	5

[a] Blank cells, unless otherwise noted, indicate that the issue was not included that year.

[b] In previous years, "Security/Cybersecurity/Privacy" was "Security/Privacy."

[c] "Business Agility/Flexibility" and "IT Agility" were merged into an "Agility/Flexibility" category with Business and IT selections in 2015. "Agility/Flexibility (IT)" was "Architecture Agility" in 2008.

[d] "Business Cost Reduction/Controls" and "IT Cost Reduction/Controls" were merged into a "Cost Reduction/Controls" category with Business and IT selections. "Business Cost Controls" was combined with "Business Productivity" in previous years.

The composition of the top IT management issues and concerns of organizations has remained relatively stable over the past several years. Cybersecurity and alignment remain the top two. However, there are several interesting shifts in the items IT leaders consider management priorities in 2019. Two items moved significantly within the list. Digital transformation rose in importance from 7th to 4th, while innovation fell from the 4th to the 9th position. Cloud computing moved into the top ten this year, rising from 13th to 6th, displacing IT Agility, which dropped to 11th.

1.2. IT Leadership's Top IT Management Issues and Concerns.

IT leaders were next asked to identify up to five IT management issues they find most personally important or worrisome. Their top 10 personal concerns are presented in Table 2, along with the six previous years' results. Seven of last year's personally worrisome remained in this year's top ten and three new entrants appeared. Improving IT Communications and Relationships with the Business occupies the 6th position, the CIO Leadership Role moved up eight positions from 17th to 9th, and Innovation moved into 10th.

Table 2: IT Leaders' Personally Most Important/Worrisome IT Management Issues, 2013-19

IT Leaders' Most Important/Worrisome Concerns [a]	2019 (% Selecting)	2018	2017	2016	2015	2014	2013
n (unique organizations)	618	793	769	801	785	717	484
Security/Cybersecurity/Privacy [b]	1 (46.3%)	1	1	1	1	1	2
Alignment of IT and/with the Business	2 (25.1%)	4	4	3	2	3	1
IT Talent/Skill Shortage/Retention	3 (21.5%)	2	3	2	3	2	3
Credibility of IT/Perception of IT Leadership [c]	4 (20.4%)	3	2	4	6	18	
Compliance and Regulations (e.g., HIPAA, SarBox, SAS70, PCI, etc.) [d]	5 (15.7%)	6	5	11	13	14	16
Improving IT Communications and Relationships with the Business	6 (15.2%)	11	9	10			
Data Analytics/Data Management	7 (14.2%)	8	7				
Business Continuity	8 (14.1%)	5	8	5	7	13	4 [e]
CIO Leadership Role	9 (12.5%)	17	15	14	9	14	10
Innovation	10 (12.1%)	12	10	7	11	12	

[a] Blank cells, unless otherwise noted, indicate that the issue was not included that year.
[b] In previous years, "Security/Cybersecurity/Privacy" was "Security/Privacy."
[c] "Credibility of IT/Perception of IT Leadership" was "Credibility (IT)" in 2015.
[d] "Compliance and Regulations (e.g., HIPAA, SarBox, SAS70, PCI, etc.)" was "Legal Compliance - HIPPA, SarBox, SAS70, PCI, etc." in 2013.
[e] "Business Continuity" and "Disaster Recovery" were combined in the 2013 study.

Agility/Flexibility (IT) was among the three items displaced from the top ten, falling from 7th to 12th. Interestingly, Disaster Recovery, which appeared in the top ten most personally worrisome IT issues in five of the last six years, dropped to 13th this year. The largest shift is Velocity of Change (Technology) which fell from 10th in 2018 to 17th in 2019. In aggregate, the new entrants to the top ten and those they displace suggest a deep recognition of the service-oriented nature of IT and a continued desire to focus on the priorities of the business.

Table 3 contrasts the top 10 lists of IT management issues identified as most important to organizations against those selected as most important personally. As has been observed in prior years, there is only partial correspondence between the two lists. High profile issues such as Security, Alignment, Analytics, and Compliance feature in both and highlight the important role played by the IT organization in the realization of goals related to these. Innovation, while arguably less concrete than these other issues, is often both critical to organizational success and enabled by means of technical advances. The failure of the IT organization to deliver on these items represents a significant risk to both the health of the organization and to the career of the IT leader. Organizational concerns not appearing in the top ten list of personal concerns for IT leaders tend to be either broad in nature (e.g., digital transformation) and potentially less salient at the individual level, or well-established functions of IT (e.g., cost reduction) and thus less likely to be perceived as problematic to IT leadership. Those items of greatest personal concern but not identified as a top ten organizational concern emphasize the service-oriented role of IT departments and consist largely of needs which, if unmet, might prevent the IT leader from delivering promised value to the broader organization.

Table 3: Top Ten Personal and Organizational IT Management Issues, 2019

IT Management Issues	Most Important to their Organizations *(2018 Rank)*	Most Important or Worrisome to IT Leaders *(2018 Rank)*
Security/Cybersecurity/Privacy	1 *(1)*	1 *(1)*
Alignment of IT with the Business	2 *(2)*	2 *(4)*
Data Analytics/Data Management	3 *(3)*	7 *(8)*
Digital Transformation	4 *(7)*	11 *(17)*
Compliance and Regulations	5 *(6)*	5 *(6)*
Cloud/Cloud Computing	6 *(13)*	17 *(21)*
Agility/Flexibility (Business)	7 *(8)*	15 *(27)*
Cost Reduction/Controls (IT)	8 *(9)*	17 *(15)*
Innovation	9 *(4)*	10 *(12)*
Cost Reduction/Controls (Business)	10 *(10)*	39 *(40)*
IT Talent/Skill Shortage/Retention	17 *(17)*	3 *(2)*
Credibility of IT/Perception of IT Leadership	20 *(22)*	4 *(3)*
Improving IT Communications and Relationships with the Business	22 *(29)*	6 *(11)*
Business Continuity	16 *(12)*	8 *(5)*
CIO Leadership Role	32 *(35)*	9 *(17)*
n = most senior IT leader in 618 unique organizations		

2. Technology Investments and Worrisome Technologies

IT leaders were also asked to identify, in three categories, the technologies that comprise their organization's largest current or near-term IT investments, the technologies that should get more investment, and those of greatest personal concern ("i.e., they keep you up at night"). Participants selected up to five in each category from a list of 37 options.

2.1. Organizations' Largest IT Investments.

A total of 618 IT leaders identified their organization's largest current or near term IT investments. The results, in Table 4, show that nine appeared in 2018's top ten. Integration, returns to the top ten list in 10th position, Network/Telecommunications fell from 8th, selected by 17.9% of respondents, to 11th with 11.2%. As we have seen in the past, the composition of the top ten investment list suggests that IT organizations commonly focus on three types of technologies: (1) Emerging technologies which may enable organizational efficiency and effectiveness, potentially resulting in competitive advantages (e.g., Analytics, Cloud Computing, etc.); (2) Technologies intended to mitigate organizational threats (e.g., Cybersecurity); and (3) Established technologies necessary for the basics of providing day-to-day IT services.

Table 4: Top Ten Largest IT Investments of Organizations, 2009-2019

Information Technologies [a]	2019 *(% Selecting)*	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
n (unique organizations)	618	793	769	801	785	717	484	195	275	172	243
Analytics/Business Intelligence/Forecasting/Big Data [b]	1 *(37.9%)*	1	1	1	1	1	1	1	1	1	1
Cloud Computing (e.g., SaaS, PaaS, IaaS) [d]	2 *(36.1%)*	3	3	4	7	5	3	2	2	5	17
Security/Cybersecurity [c]	3 *(33.3%)*	2	2	3	3	7	14		11	8	
App/Software Development/Maintenance [e]	4 *(28.3%)*	4	4	2	4	4	6	11			
CRM (Customer Relationship Management)	5 *(24.1%)*	6	6	5	5	6	2	5	5	9	13
ERP (Enterprise Resource Planning)	6 *(22.5%)*	5	5	6	2	3	4	3	3	3	3
Legacy Apps: Replacing/Re-platforming [f]	7 *(18.8%)*	9	9	11	9	15	16				
Data Center/Infrastructure	8 *(15.4%)*	7	7	7	6	2					
Legacy Apps: (Maintain/Update/Consolidate) [f]	9 *(12.8%)*	10	10	10	9	15	16				
Integration/Application Integration/Data Integration	10 *(11.5%)*	11	12	9	11	18					

[a] Blank cells, unless otherwise noted, indicate that this item was not included that year.

[b] In 2015, "Analytics/Business Intelligence" was combined with "Data Mining" (17th in 2013, 32nd in 2014) and "Forecasting" (25th in 2013, 23rd in 2014). "Big Data" was incorporated in 2016 (10th in 2012, 5th in 2013, 9th in 2014 and 16th in 2015).

[c] In 2006 and 2008, this was "Security Technologies" and simply "Security" in 2010, 2011 and 2013.

[d] In 2009, 2010 and 2011, "SaaS" separately ranked 15th, 9th and 6th respectively.

[e] In 2013, this was "Apps" and in 2012 "Application Development."

[f] Before 2016, these items were combined as "Legacy Applications."

2.2. Most Worrisome Technologies and Those that Should Get More Investment.

Using the same list of technologies, IT leaders also selected up to five items they perceived as currently being underfunded and an additional five most personally worrisome. The top ten items in all three categories are contrasted in Table 5. Only three items, Analytics, Cloud Computing, and Cybersecurity appear in all three lists. This suggests that IT leadership lacks the organizational power and/or financial resources to invest sufficiently in technologies that they believe are needed.

Table 5: Organizations' Largest IT Investments, Those that Should Get More and the Personally Most Worrisome, 2019

Information Technologies	Largest IT Investments *(% Selecting) 2018 Rank*	Those that Should Get More Investment *(% Selecting) 2018 Rank*	Those Most Personally Worrisome *(% Selecting) 2018 Rank*
Analytics/Business Intelligence/Data Mining/Forecasting/Big Data	1 *(37.9%) 1*	1 *(35.8%) 1*	4 *(16.3%) 3*
Cloud Computing (e.g., SaaS, PaaS, IaaS)	2 *(36.1%) 3*	4 *(21.2%) 3*	7 *(13.9%) 7*
Security/Cybersecurity	3 *(33.3%) 2*	2 *(31.6%) 2*	1 *(46.9%) 1*
App/Software Development/Maintenance	4 *(28.3%) 4*	14 *(11.0%) 13*	9 *(11.5%) 8*
CRM (Customer Relationship Management)	5 *(24.1%) 6*	8 *(14.6%) 7*	15 *(8.4%) 17*
ERP (Enterprise Resource Planning)	6 *(22.5%) 5*	18 *(8.6%) 18*	16 *(8.1%) 12*
Legacy Apps: Replacing/Re-platforming	7 *(18.8%) 9*	11 *(13.4%) 9*	6 *(14.4%) 5*
Data Center/Infrastructure	8 *(15.4%) 7*	28 *(5.0%) 22*	18 *(7.3%) 14*
Legacy Apps: (Maintain/Update/Consolidate)	9 *(12.8%) 10*	32 *(4.5%) 34*	10 *(11.3%) 9*
Integration/Application Integration/Data Integration	10 *(11.5%) 11*	16 *(9.9%) 15*	14 *(8.7%) 10*
AI/Machine Learning/Expert Systems	12 *(10.8%)*[a]	3 *(26.1%)*	11 *(10.2%)*[a]
Innovation/Disruptive Technologies	15 *(8.3%) 15*	5 *(19.4%) 4*	5 *(14.6%) 4*
Disaster Recovery/IT Continuity Planning	14 *(9.1%) 12*	6 *(14.9%) 5*	2 *(24.3%) 2*
Staff Development/Training/Retention/H1B [b]	24 *(5.7%) 30*	6 *(14.9%) 6*	3 *(18.1%) 6*
Data Integration/Data Quality	17 *(7.0%) 20*	9 *(13.8%) 14*	8 *(12.3%) 11*
Master Data Management/Data Quality	17 *(7.0%) 16*	10 *(13.6%) 11*	12 *(9.4%) 12*

[a] AI/Machine Learning/Expert Systems was introduced in 2019
[b] H1B is a visa that allows U.S. employers to employ foreign workers in specialty occupations
n = most senior IT leader in 618 unique organizations

As evidenced by ranking 24th as a largest IT investment, sixth as should receive more investment, and third most worrisome, IT Staff Development and Retention remains the most significant misalignment (2018 rankings were 30th, sixth, and sixth). IT leadership's growing concern with talent is likely the result of a strong economy and the short supply of highly technical personnel (Table 6). Staff Development and Retention falls into a group of IT issues/technologies which IT Leaders find particularly worrisome and currently underfunded along with AI, Innovation, Disaster Recovery, and Data Integration and Management.

Investments related to Legacy platforms also provide interesting insight into the perspectives of IT leaders on older applications. Many organizations are investing heavily in both the Replacement (7th) and Maintenance (9th) of legacy systems. While neither of these appears in the top ten list of technologies that should receive more investment, IT leaders are still highly concerned about both of them.

AI/Machine Learning/Expert Systems was added as an option this year and the third most often as a technology that should receive additional investment. IT leaders apparently see the promise of AI and would like to see funding allocated to develop the skills and tools necessary to capture its value. Interestingly, despite some overlap between AI and other Analytics technologies, its introduction did not materially alter where Analytics falls on any of these lists. This suggests that IT leaders perceive AI as distinct from Analytics and

recognize the potential of both to make contributions to improved organizational performance.

2.3. The Most Difficult to Find and Most Important IT Workforce Skills

This year's study revisited the most difficult to find and most organizationally important IT skills, last examined in 2017's study. Participants selected up to five items they deem most-difficult-to-find and most-important to the organization from each of two separate lists: "technical skills or capabilities" and "soft skills or personal attributes."

The technical skills viewed by IT leaders as most-difficult-to-find and most-important to the organization have remained fairly stable since 2017. Software Packages/COTS moved down from 10th and 11th on the most-difficult-to-find and most-important lists, to 11th and 14th respectively this year. As in 2017, there is significant overlap between those viewed as most-difficult-to-find and those most-important to the organization. Only four items presented in Table 6 are not in the top ten lists for both categories. Even among these items, rankings between the two lists are reasonably similar, corroborating the view that organizationally important IT skills are generally a scarce resource. Taken as a whole, these findings point to a highly competitive environment for technically skilled IT employees and confirm that IT leaders are justified in their concerns about talent retention (Table 2).

Table 6: Top Ten Most-Difficult-to-Find and Most-Important Technical Skills, 2019

Technical Skill or Capability	Percentage Selecting	
	Most Difficult to Find *(% Selecting) 2018 Rank*	Most Important to Organization *(% Selecting) 2018 Rank*
Security / Cybersecurity	**1** ***(46.6%) 1***	**1** ***(45.8%) 1***
Analytics / Business Intelligence / Big Data / Data Scientist	**2** ***(41.4%) 2***	**2** ***(37.4%) 2***
Architecture / Architect --- Application / Solution	**3** ***(22.8%) 5***	**4** ***(23.8%) 5***
Analyst --- Business	**4** ***(21.5%) 3***	**3** ***(34.8%) 3***
Functional Area Knowledge	**5** ***(20.6%) 4***	**9** ***(16.7%) 4***
Cloud	**6** ***(19.4%) 6***	**6** ***(18.8%) 8***
Architecture / Architect --- Data / Information	**7** ***(18.9%) 8***	**7** ***(18.1%) 10***
Software Development / Programming Languages [a]	**8** ***(17.3%)*** a	**5** ***(20.7%) a***
Analyst --- Technical	**9** ***(17.2%) 13***	**11** ***(16.2%) 12***
Architecture / Architect --- Enterprise	**10** ***(16.7%) 9***	**12** ***(13.4%) 13***
IT Project Manager	**12** ***(12.1%) 12***	**8** ***(17.3%) 5***
ERP (Enterprise resource planning)	**13** ***(11.7%) 7***	**10** ***(16.3%) 5***

[a] New item consolidating Programmer / Development – Mobile, Programmer / Development – Web, and Programmer / Development – Other

n = most senior IT leader in 618 unique organizations

The top ten soft skills selected by IT leaders as most-difficult-to-find or most-important to the organization are presented in Table 7. There is significant agreement between both lists as well as between this year's findings and 2017's results. Only Collaboration with Others/Teamwork and Relationship Management are not both lists, with the most

significant difference belonging to the latter. Relationship Management shift up may reflect the growing reliance on external partners like cloud providers. The importance of Collaboration/Teamwork skills reminds us that delivering IT services is largely a "team sport." Two items were displaced from the top ten soft skills lists. In 2017, Business Analysis was viewed as the ninth most-important soft skill, but fell to 11th this year. Similarly, Communication – Written, 10th 2017 tied for 11th this year.

Table 7: Top Ten Most-Difficult-to-Find and Most-Important Soft Skills, 2019

Soft Skill or Personal Attribute	Percentage Selecting	
	Most Difficult to Find *(% Selecting) 2018 Rank*	Most Important to Organization *(% Selecting) 2018 Rank*
Critical Thinking	1 *(46.8%) 1*	1 *(42.3%) 1*
Strategic Thinking / Planning	2 *(41.1%) 2*	2 *(33.9%) 2*
Leadership / Providing Leadership	3 *(33.5%) 3*	3 *(32.3%) 4*
Systems / Holistic Thinking	4 *(29.3%) 5*	6 *(18.3%) 10*
Emotional Intelligence / Empathy	5 *(27.8%) 7*	6 *(16.4%) 12*
Business Knowledge --- Industry Specific	6 *(25.9%) 4*	5 *(27.3%) 5*
Innovation / Innovative	7 *(23.1%) 6*	8 *(21.6%) 8*
Change Management (Organizational)	8 *(20.9%) 7*	8 *(22.0%) 7*
Problem Solving	9 *(18.1%) 9*	10 *(23.5%) 6*
Relationship Management	10 *(16.5%) 14*	15 *(13.4%) 14*
Collaboration with Others / Teamwork	11 *(15.9%) 13*	4 *(32.4%) 3*
	n = most senior IT leader in 618 unique organizations	

3. Participating Organizations and their IT Practices

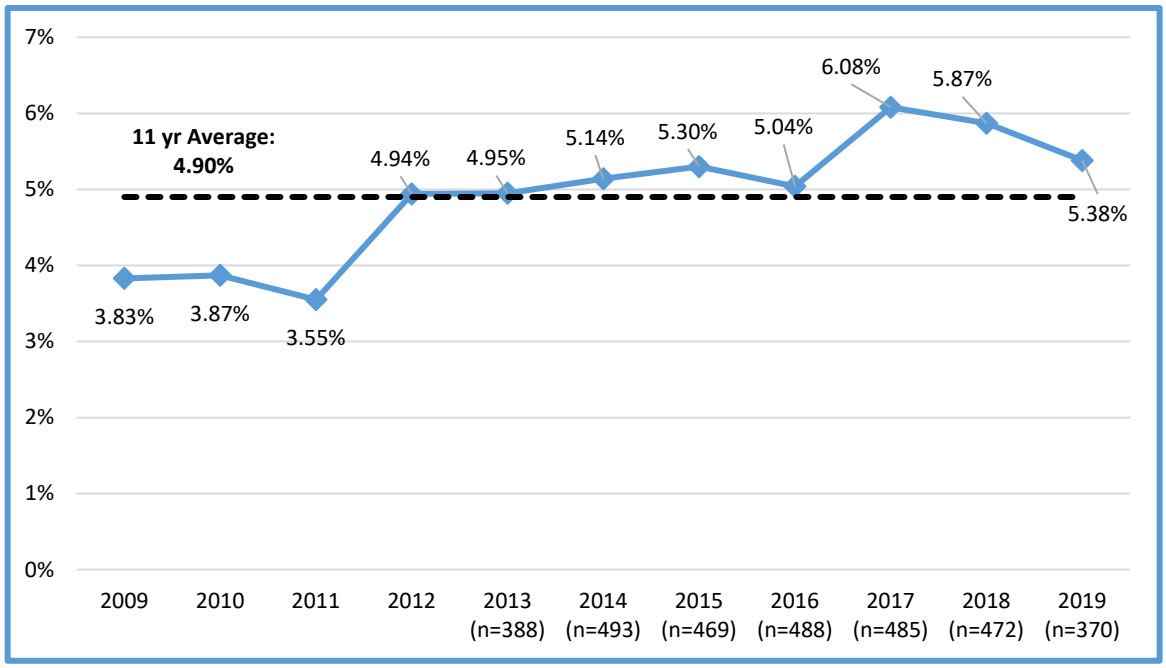
3.1. Location, Industry, Revenue, and IT Spending of Participating Organizations.

As in previous years, the majority (96.3%) of 618 unique organizations are headquartered in the U.S. Average revenue of these organizations (n=436) is $4.0 billion (down from $5.7 billion in 2018) and the median revenue is $400 million (up from $350 the previous year). While 30 different economic sectors are represented, 53% of the 618 come from six sectors: Healthcare/Medical (13.5%), Financial/Insurance (13.2%), Manufacturing (8.5%), Professional Services/Consulting (6.5%), Education (6.5%), and IT Services/Consulting (5.0%).

Reported IT budgets averaged $153 million (n=410), up 29.7% from 2018 ($118 million). The median, however, decreased from $9 million in 2018 to $8 million in 2019 suggesting that IT budgets have not increased sharply and 2019's sample likely includes more organizations with very large IT budgets. Standardizing these figures to account for organization size, the average IT budget as a percentage of revenue (n=370) was 5.38%, down from 5.87% in 2018. Given that not every organization reports both revenue and IT budget, we calculated an average IT budget of $215.2 million and total IT spending across

the sample of $133 billion[2]. Figure 1 shows that IT spending as a percentage of revenue decreased for the second year in a row but remains above the 11 year average of 4.9%.

Figure 1: Average IT Spending as a Percentage of Revenue, 2009-2019



IT spending is not consistent across industries, with some spending well above the sample average and others well below (Table 8).

[2] These calculated figures are presumably more representative than the reported sample means. By multiplying the average IT budget as a percentage of revenue (5.38%) by the average annual revenue ($4 billion), we estimate the average IT budget at $215.2 million. Total IT spend of the 618 responding organizations was calculated by multiplying this average IT budget by 618.

Table 8: IT Spending as Percentage of Revenue, by Business Sector, 2019 (sectors with at least 10 organizations)

Sector	Number of Organizations	Average % of Revenue Spent on IT
Education	21	22.8%
IT Hardware / Software	11	17.7%
Business or Professional Services / Consulting	22	14.8%
Consumer Goods / Services	13	14.7%
Financial Services / Insurance / Banking	44	10.5%
IT Services / Consulting	17	8.7%
Healthcare / Medical / Medical Technology / BioMedical	48	8.3%
Not-for-Profit	20	4.2%
Government	15	4.0%
Other for profit	11	3.7%
Retail / Wholesale	13	2.7%
Transportation / Distribution / Logistics	12	2.2%
Energy	11	1.8%
Food Services / Hospitality / Leisure / Tourism	12	1.6%
Manufacturing	35	1.6%

3.2. IT Organization Structure and Governance.

Respondents were asked to specify the degree of centralization of their overall IT organizational structure, ranging from (1) "Completely Decentralized" to (5) "Completely Centralized." A slight downward trend in centralization was observed in 2019 (Figure 2), showing some signs of cyclicality over the past ten years (Figure 3).

Figure 2: IT Organization Structure, 2019 vs. 2018

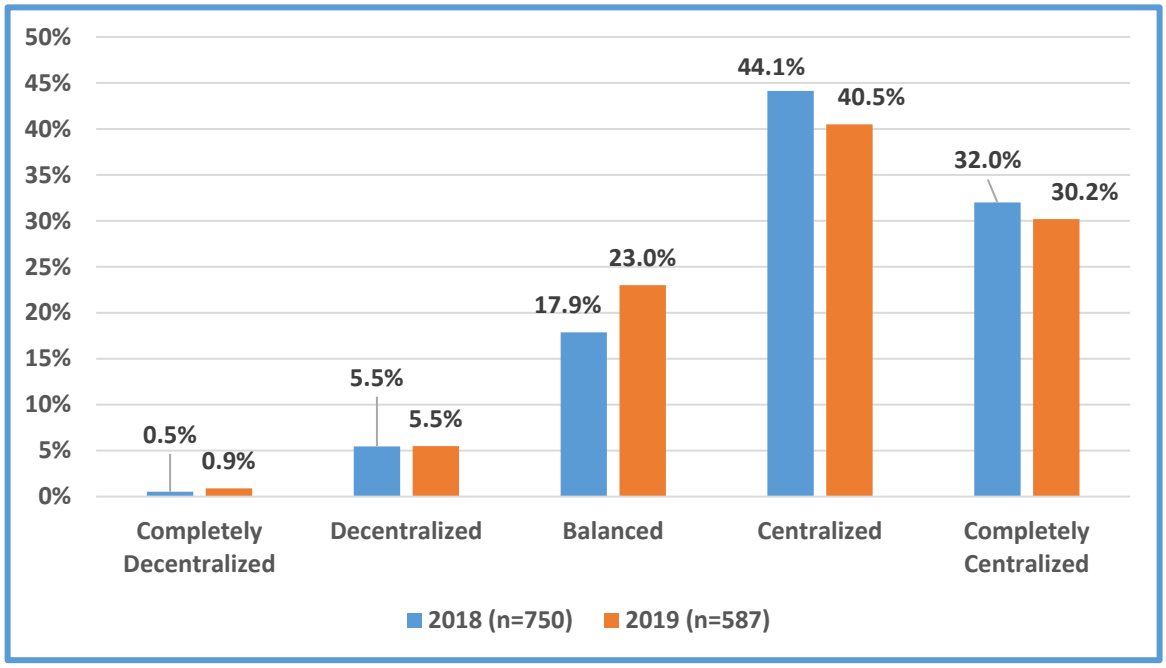
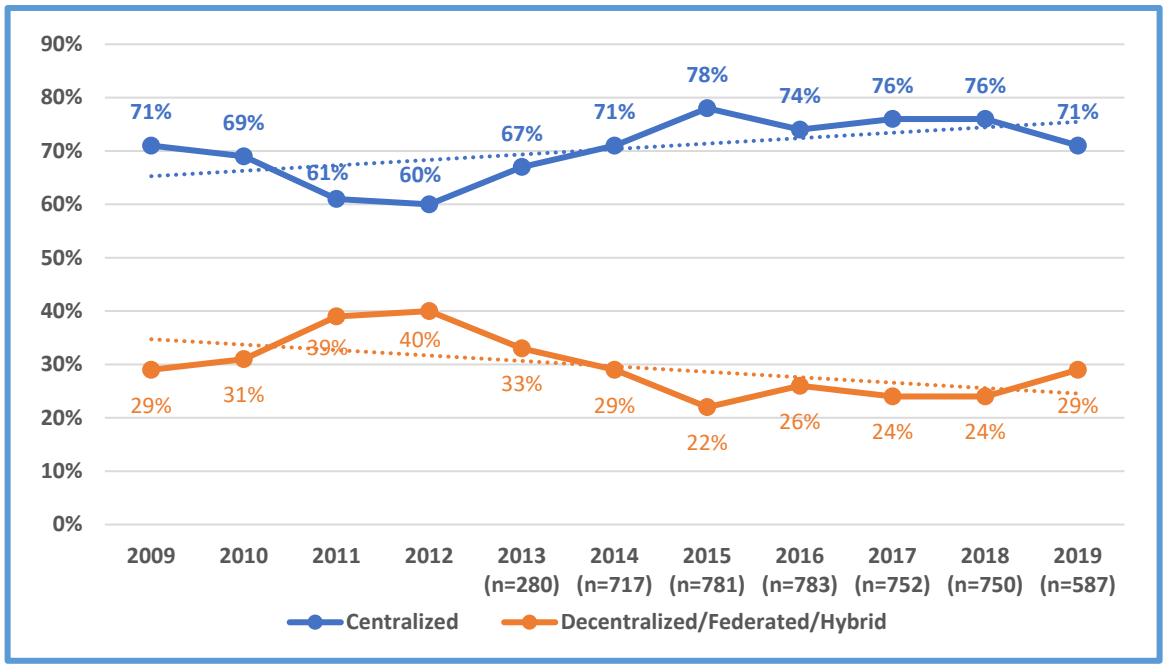


Figure 3: IT Organization Structure Trends, 2009-2019



IT organizational structure is quite broad, so Table 9 displays the extent to which specific IT governance activities were centralized/decentralized in 2018 and 2019. There were no significant changes in 2019.

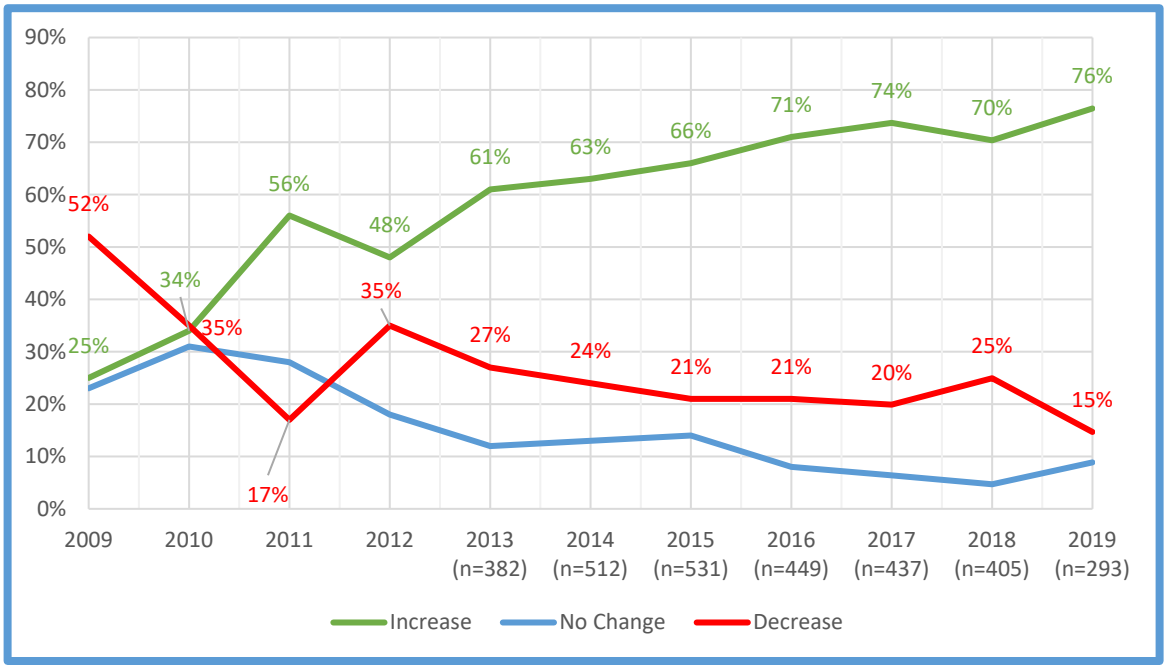
Table 9: Degree of Centralization/Decentralization of IT Governance Activities, 2019 vs. 2018

IT Organizational Activities	2018 Weighted Average	2018 n	2019 Weighted Average	2019 n	Completely Decentralized 2019				Completely Centralized
					1	2	3	4	5
IT Infrastructure/Support/ Operations/Services	4.3	753	4.2	592	1.0%	4.6%	13.0%	37.5%	43.9%
Enterprise-wide Business Applications	4.1	746	4.0	586	1.4%	7.5%	16.9%	37.9%	36.3%
IT Purchasing, Procurement, Investments	4.1	750	4.0	583	0.9%	8.2%	17.7%	36.4%	36.9%
Overall IT Governance	4.1	742	4.1	742	1.5%	6.3%	14.8%	36.5%	40.8%
Line-of-Business/Business Unit Applications	3.6	728	3.6	562	3.2%	16.9%	26.5%	27.6%	25.8%
IT Architecture/Standards	4.2	737	4.1	576	1.9%	6.4%	12.0%	37.7%	42.0%

3.3. IT Budget and Spending Trends.

From 2018 to 2019, the average reported increase in IT budget was 6.6% (n=293), which is up considerably over the past two years (4.9% in 2018 and 5.3% in 2017). After a slight decline in 2018, the percentage of organizations increasing their IT budgets (76%) reached an all-time high in 2019 (Figure 4).

Figure 4: Percentage of Organizations Increasing, Not Changing, and Decreasing IT Budgets from Prior Year, 2009-2019



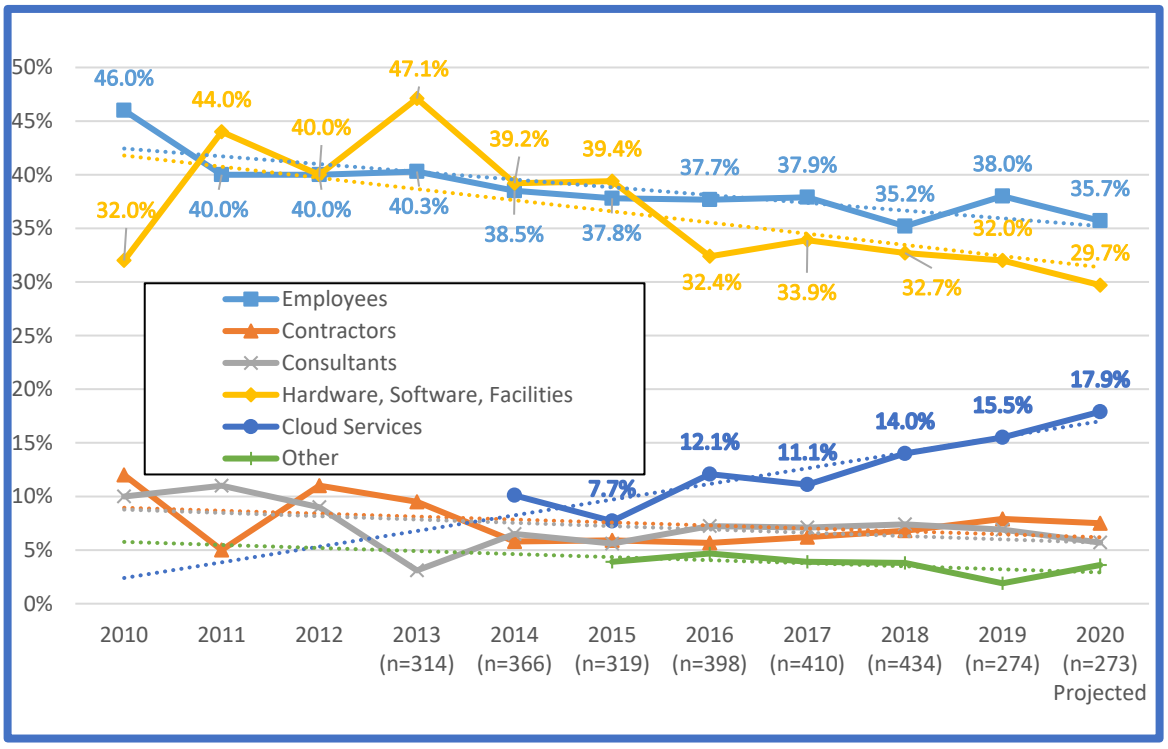
IT budget allocation across eight mutually exclusive budget categories is detailed in Table 10. Notably, the percentage of total IT budget allocated to Employees rose to an all-time high in 2019 after a slight decline in 2018. Cloud spending continues to rise while software spending decreased slightly. Looking to 2020, organizations expect Employee spending to return to 2018 levels, Hardware allocations to drop, and Cloud spending to continue to increase. Figure 5 depicts the continual shift away from Hardware, Software, and Facilities to Cloud Computing while most other categories remain relatively flat.

Table 10: IT Budget Allocations, 2016-2019 (Actual) and 2020 (Projected)

Budget Categories	% Allocated					Projected % Change 2019-20
	2016 Actual	2017 Actual	2018 Actual	2019 Actual	2020 Projected	
Hardware	12.0%	12.6%	11.9%	11.9%	10.4%	-12.6%
Software	15.4%	16.6%	16.0%	15.1%	14.5%	-4.0%
Facilities (including supplies & consumables)	5.0%	4.7%	4.8%	5.0%	4.8%	-4.0%
Employees	37.7%	37.9%	35.2%	38.0%	35.7%	-6.1%
Consultants	7.2%	7.1%	7.4%	7.9%	7.5%	-5.1%
Contractors	5.7%	6.2%	6.8%	6.9%	5.7%	-17.4%
Cloud Services (SaaS, PaaS, IaaS, process, +)	12.1%	11.1%	14.0%	15.5%	17.9%	15.5%
Other	4.7%	3.9%	3.8%	1.9%	3.6%	89.5%
n = most senior IT leader in n unique organizations	398	410	434	274	273	273

Annual totals may not equal 100% due to rounding

Figure 5: IT Budget Allocations, 2010-2019, 2020 (Projected), with Trendlines



Respondents were asked to provide the percent of their IT budget assigned to each of 10 overlapping budget categories (Table 11). After increases from 2017 to 2018, nearly every category saw a decrease in 2019 with the largest reductions in Software Development, Offshore IT, and Outsourcing. Although, a smaller percentage of a larger total IT budget may not indicate a decrease in dollars spent. For 2020, respondents are optimistic that nearly every category will increase with the exception of Keeping the Lights On and Offshore IT.

Table 11: IT Budget Allocations to Non-Mutually Exclusive Categories, 2017-2019 actual, 2020 projected

Non-Mutually Exclusive IT Budget Categories	% Allocated				Actual % Change 2018 to 2019	Projected % Change 2019 to 2020
	2017 Actual	2018 Actual	2019 Actual	2020 Projected		
Keeping the IT Lights On (KTLO)	40.5%	48.9%	39.6%	37.7%	-19.0%	-4.9%
Software Development & Maintenance	20.1%	27.1%	18.6%	18.9%	-31.3%	1.6%
IT Capital Investment	14.6%	18.4%	14.7%	15.1%	-20.1%	2.7%
Outsourcing	9.1%	10.7%	8.2%	8.6%	-23.0%	4.0%
Cybersecurity	5.3%	7.7%	6.9%	8.1%	-10.4%	17.8%
BI/Analytics	5.3%	6.0%	6.1%	6.8%	1.3%	11.3%
IT-Related R&D	3.9%	5.3%	4.8%	5.2%	-9.6%	7.9%
Offshore IT	4.5%	5.8%	4.4%	4.3%	-23.8%	-3.2%
Management/Leadership Training	1.7%	2.4%	2.0%	2.2%	-16.3%	8.5%
Technical Training	2.1%	2.7%	2.2%	2.4%	-18.9%	7.8%

Average annual totals do not equal 100% because these categories are overlapping and not mutually exclusive.
n = most senior IT leader in 356 (2020 projected), 369 (2019 actual), 548 organizations (2018 actual), 530 (2017 actual)

Respondents reporting Analytics spending in Table 11 (n=264), were asked to report the percentage of their Analytics spending allocated to eight mutually exclusive budget categories shown in Table 10. The largest expense category was Employees (30.2%) followed by Software (17.2%), Cloud (11.9%), Consultants (11.2%), Contractors (6%), Hardware (3.6%), and Training (3%).

Similarly, the 431 (69.9%) organizations indicating at least some IT outsourcing, reported that 60.2% of outsourcing budgets are spent domestically (n=185), and projections for 2020 are lower at 56.0%. These respondents were also asked to select up to three IT services that represent their largest outsourcing expenses (Table 12). Testing/Quality Assurance and Cybersecurity both increased notably in 2019 while Help Desk and Network Administration dropped.

Table 12: Top IT Outsourcing Services, 2018-2019[a]

Outsourcing Category	2018 (n=298)	2019 (n=182)
Software & Application Development, Maintenance, Support, & Programming	76.8%	74.7%
Data Center, Infrastructure, IT Operations	50.3%	54.4%
Network Administration & Management	29.9%	25.3%
Software/System Testing & Quality Assurance	17.4%	23.1%
Help Desk/Service Desk	31.2%	23.6%
Cyber Security/IT Security	31.2%	37.4%

[a] Percentage of organizations that selected category as one of the top three outsourcing services

Since Software Development is a major, multi-faceted expense (Table 11), respondents were asked to select up to three of their largest development expenses from a list of 10 (See Table 13). The largest expense continues to be Integration, but New Custom/Bespoke Development increased sharply from 2018 to 2019.

Table 13: Top Software Development Spending Categories, 2017-2019[a]

Software Development Categories	2017	2018	2019	% change 2018-19
n (unique organizations)	337	326	223	
Integration	65.3%	67.8%	62.3%	-8.1%
Maintenance/Enhancement of legacy	49.3%	48.2%	47.5%	-1.4%
Customization	38.0%	38.0%	31.8%[b]	-33.9%
Modification of COTS	14.2%	10.1%		
Web	33.8%	31.0%	27.4%	-11.6%
New Custom/Bespoke development	18.1%	22.4%	32.7%	46.0%
Maintenance/Enhancement (other than legacy)	23.4%	19.9%	24.7%	23.9%
Migration	14.5%	14.7%	14.8%	0.5%
Mobile		13.5%	13.0%	-3.7%
Internet of Things (IoT)		6.4%	3.6%	-44.1%

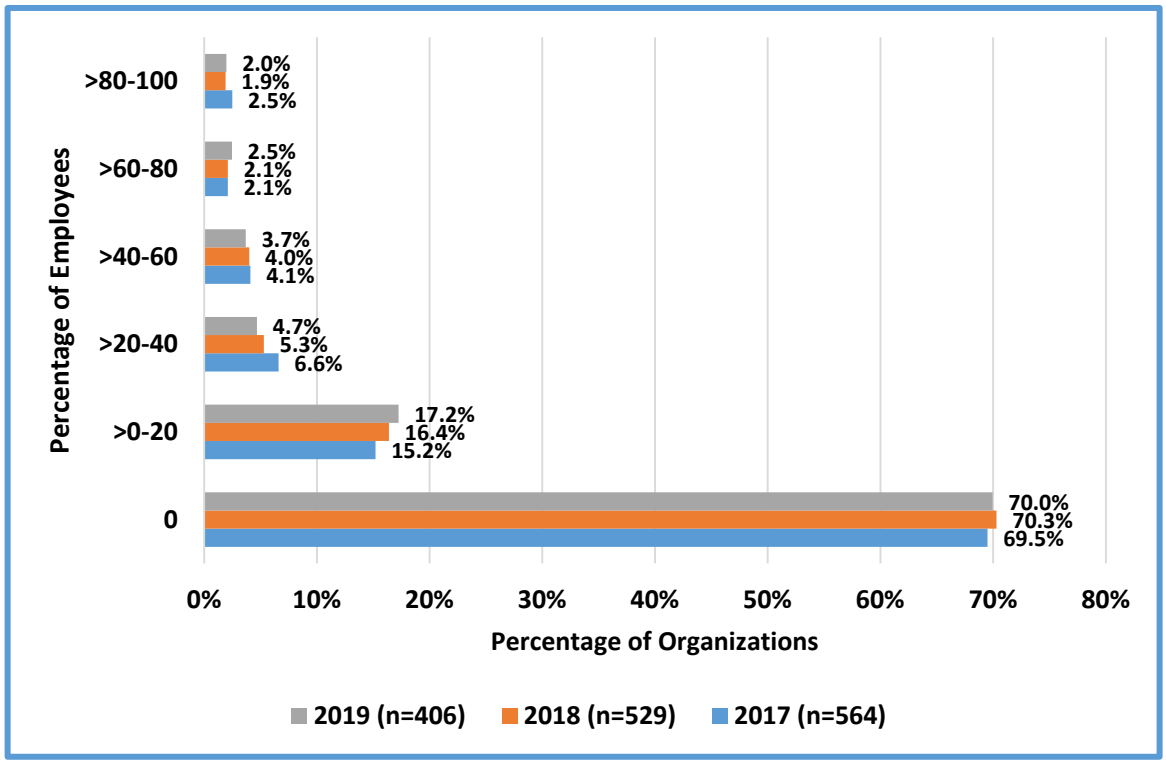
[a] Percentage of respondents who ranked this category as one of their top-three largest categories. Blanks represent a category not present in the survey that year.
[b] Customization and Modification of COTS were combined into one category for 2019

3.4. IT Workforce and Salary Trends.

3.4.1. IT Employees and their Salaries. In 2019, the average number of "full-time IT employees (IT FTEs, not including contractors or consultants)" who "report to or under the top IT person" was 229 (n = 463). This is considerably lower than the numbers reported in prior years (2018, 374; 2017, 397; 2016, 692). However, the median number of IT FTEs in 2019 was 30, which is more consistent with prior years (2018, 26; 2017, 30; 2016, 28). 76%

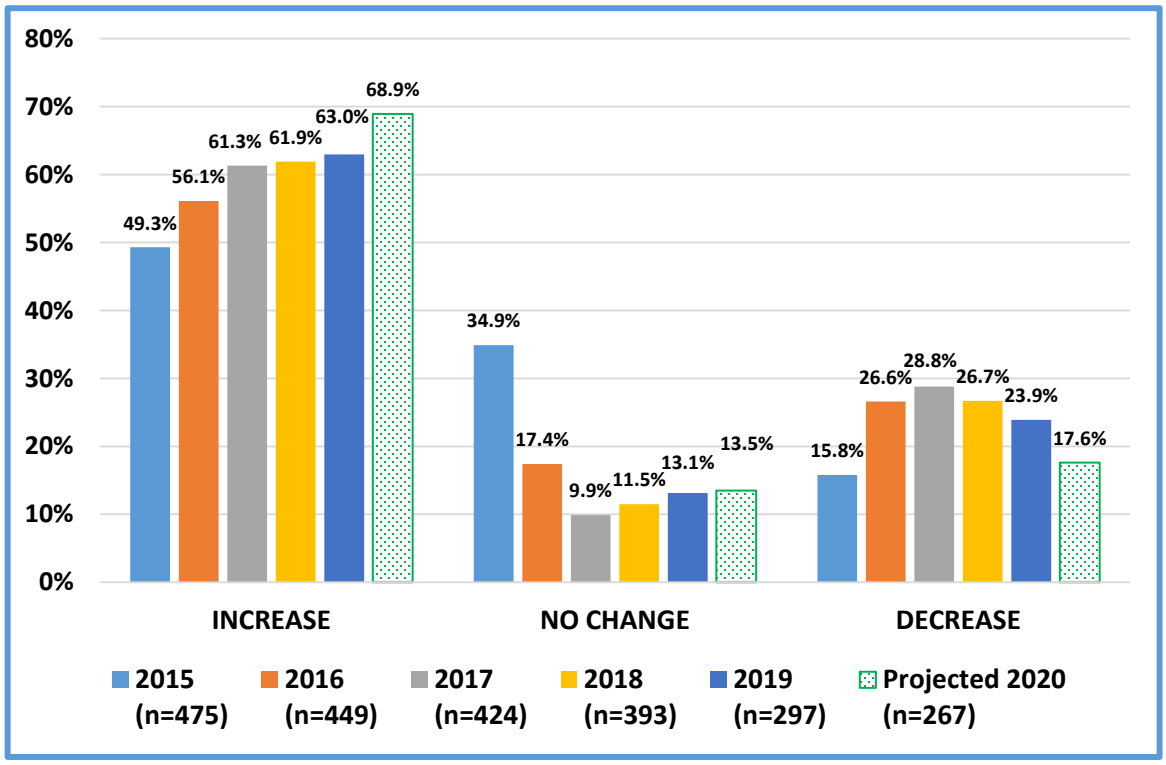
of responding organization reported having 100 or fewer IT employees, which similar to the 76.5% reported in 2018. Nine organizations (1.9%) reported having no IT FTEs at all, presumably because they outsource all of their IT. On average 8.6% of IT FTEs in 2019 were "located outside their home country (i.e., offshore)" (n=406), down slightly from 8.8% in 2018. 70% of organizations reported having no IT employees outside of their home country (Figure 6).

Figure 6: Percentage of IT FTEs Located outside Employer's Home Country, 2017-2019



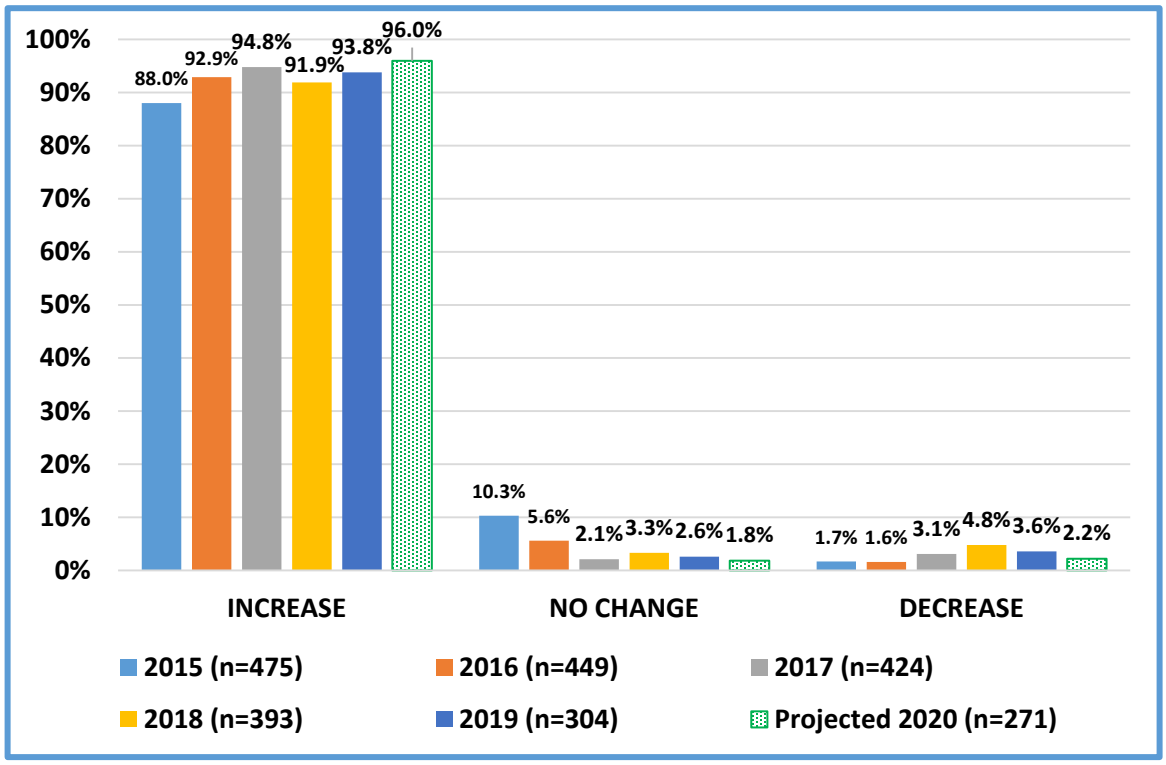
In 2019, 63% of 297 responding organizations reported an increase in the number of internal IT employees (Figure 7), up slightly from 61.9% in 2018, and 68.9% projected increases in 2020. The percentage of organizations reporting no change was 13.1% compared to 11.5% in 2018, an increase of 13.9%, while organizations reporting decreasing headcounts was 23.9%, down from 26.7% in 2018 (a decrease of 10.5%). Overall, in 2019 there was an average increase of 4.1% in IT FTEs, up from 3.9% in 2018.

Figure 7: Percentage of Organizations Reporting Increases, No Change and Decreases in Internal IT FTEs, 2015-2019, 2020 projected



In 2019, 96.4% of organizations reported that average IT salaries increased or remained flat (Figure 8). This is up slightly from 95.2% in 2018. The average increase in IT salaries was also up from 4.4% in 2018 to 4.9% in 2019. Given the increases in IT workforce size and average IT salaries, it is not surprising that total spending on IT salaries increased by an average of 5.4% (n=318) in 2019, which is 8% more than 2018's 5% increase. However, organizations appear less optimistic looking to 2020, with only 78.6% of organizations projecting increases in average IT salaries (down from 93.8% this year), 6.3% projecting no change (verses 2.6% this year), and 15.1% projecting a decline (verses 3.6% this year).

Figure 8: Percentage of Organizations Reporting Increases, No Change and Decreases in Average IT Salary, 2015-2019, 2020 projected

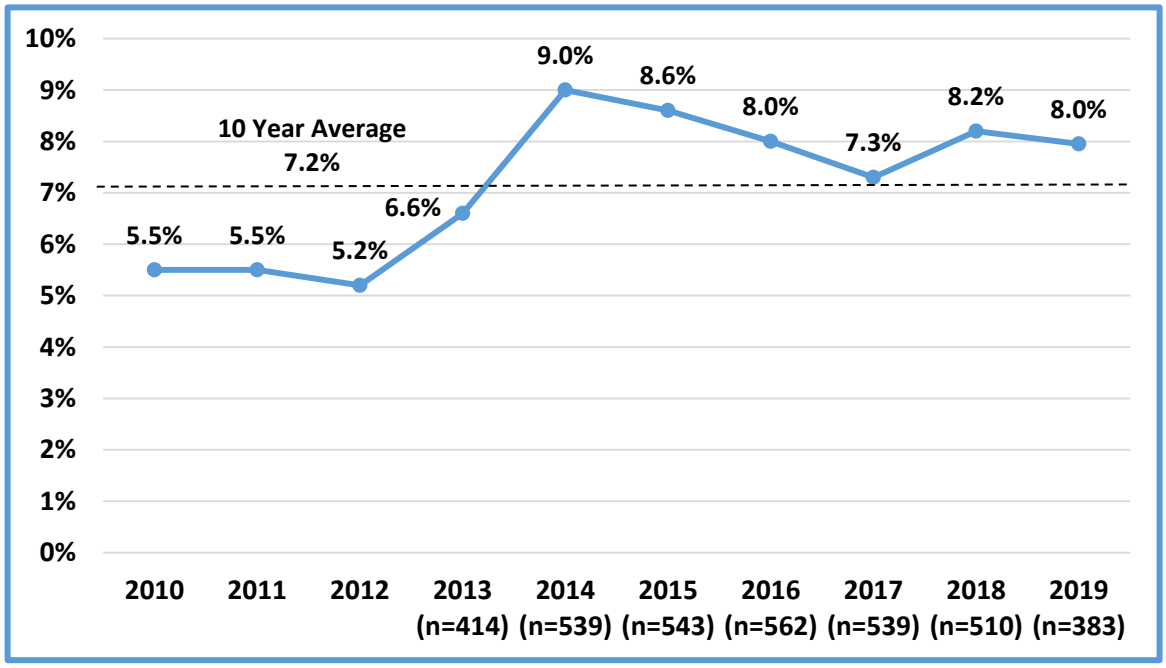


3.4.2. IT Contractors and Consultants. The average number of IT contractors and consultants used by responding organizations in 2019 fell to 65.5 (n=369), down from 72.6 in 2018 and 83.3 in 2017. However, the median remained steady at 3.0 and the standard deviation was 400.9 indicating substantial variability in the use of contractors and consultants. 89.2% reported using less than 50, which is down slightly from 90.1% in 2018, and 23.3% reported no use of contractors or consultants, down by 11.4% from 26.3% in 2018.

Of the 193 organizations that reported using IT contractors and consultants, 54.4% increased their numbers (4.4% higher than 2018's 52.1%), 20.2% reported no change, and 25.4% a decrease, which is 25.7% lower than the 34.2% in 2018. For 2020, 55.7% anticipate an increase in the use of IT contractors and consultants, 18.8% no change, and 25.6% a decrease.

3.4.3. IT Workforce Turnover and Retirements. Figure 9 shows the IT employee turnover rate. Turnover rate for 2019 remained relatively stable at 8.0% down slightly from 8.2% in 2018. Trending above the 10 year average may indicate a tight IT labor market and increased job opportunities for IT professionals. Attracting and retaining high-performing IT personnel, continues to be an issue of critical concern for leaders (Table 2, Table 5).

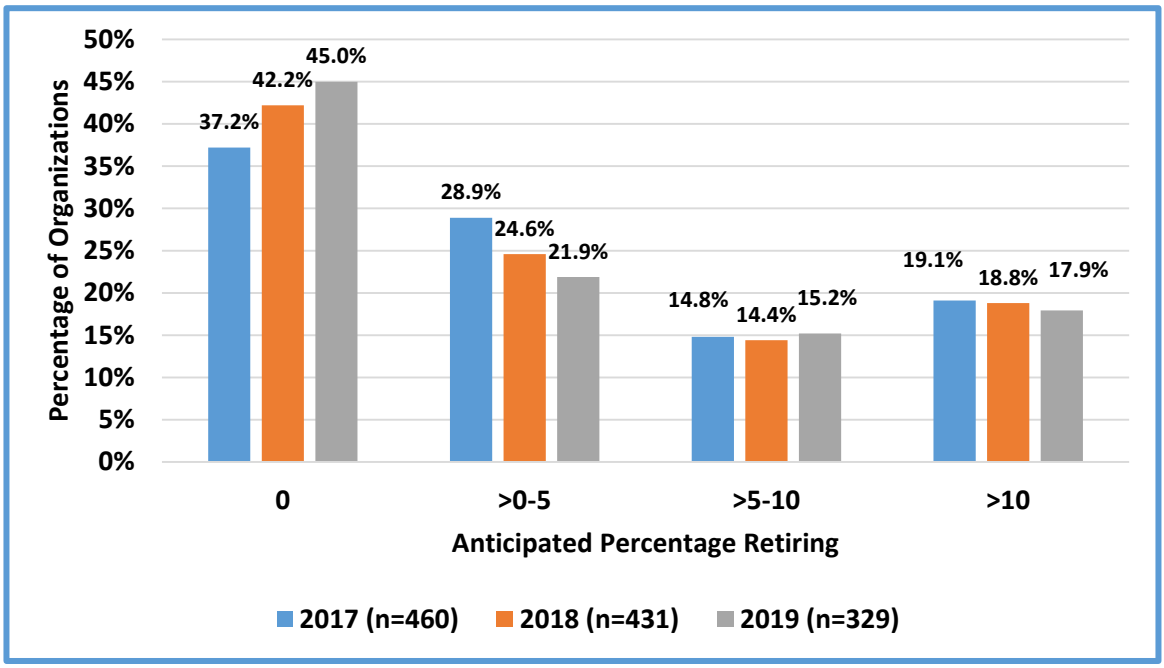
Figure 9: Turnover Rate for Full-Time IT Employees, 2010-2019



Respondents also provided estimates of what portion of their IT staff turnover was "involuntary (i.e., the result of downsizing, layoffs, terminations, etc.)" rather than "voluntary (i.e., quitting, retirements, etc.)." Voluntary departures accounted for 67.7%, a small decrease from 69.6% reported in 2018. At 32.9%, involuntary departures accounted for approximately 2.6% of the 8% total turnover rate.

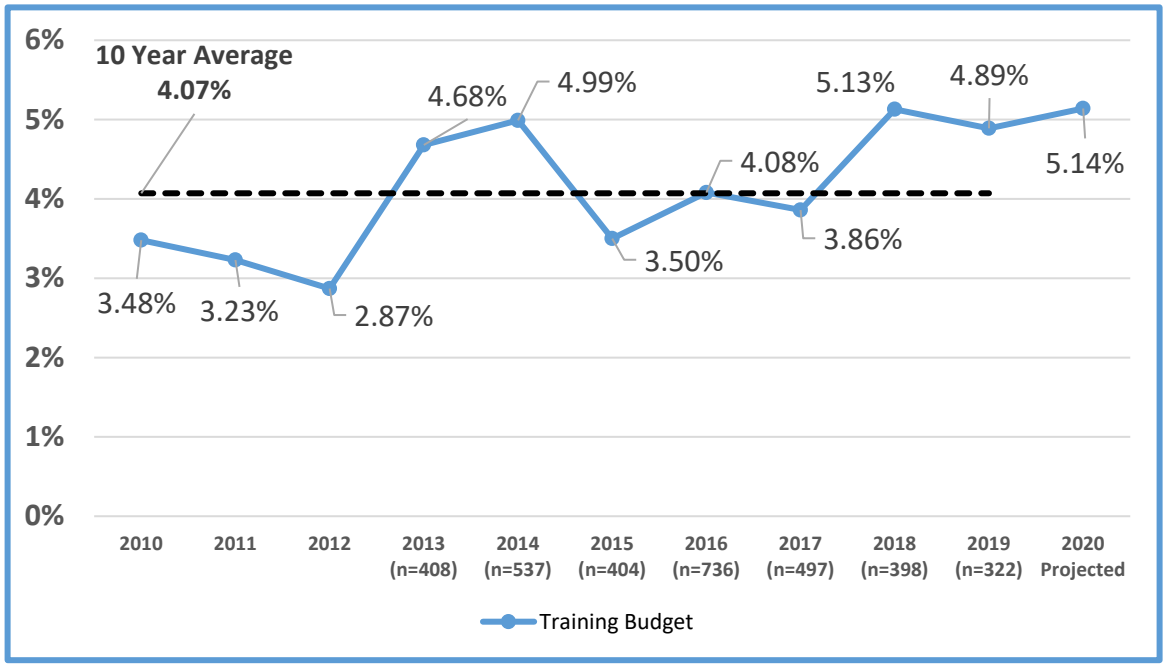
Respondents (n=329) expect 7.1% of their IT employees to retire in the next five years, an increase from 6.9% in 2018. While this has remained relatively flat over recent years, it is not known to what extent specific skills may be more adversely affected by retirements (e.g., mainframe, COBOL). Figure 10 shows the distribution of organizations expecting various percentages of IT employees to retire in the next five years.

Figure 10: Percentage of IT Employees Expected to Retire in the Next Five Years, 2018 vs. 2017



3.4.4. IT Workforce Training Expenditures. Overall investment in training remains high in 2019. IT leaders reported that IT expenditures on managerial/leadership and technical training were 2.34% and 2.55% of the IT budget respectively. Within the 10 year period reported in Figure 11, 2019 ranks third in terms of overall percentage of IT budget spent on training at 4.89%. Though down from a historic high of 5.13% observed in 2018, the percentage of IT budget allocated to training allocation remains well above the 10 year average of 4.07%, consistent with efforts to attract, develop, and retain talent. IT leaders forecast continued investment in training, estimating for 2020 an allocation of 5.14% of the IT budget for training.

Figure 11: Percentage of IT Budget Spent on Training 2010-2019, 2020 (Projected)

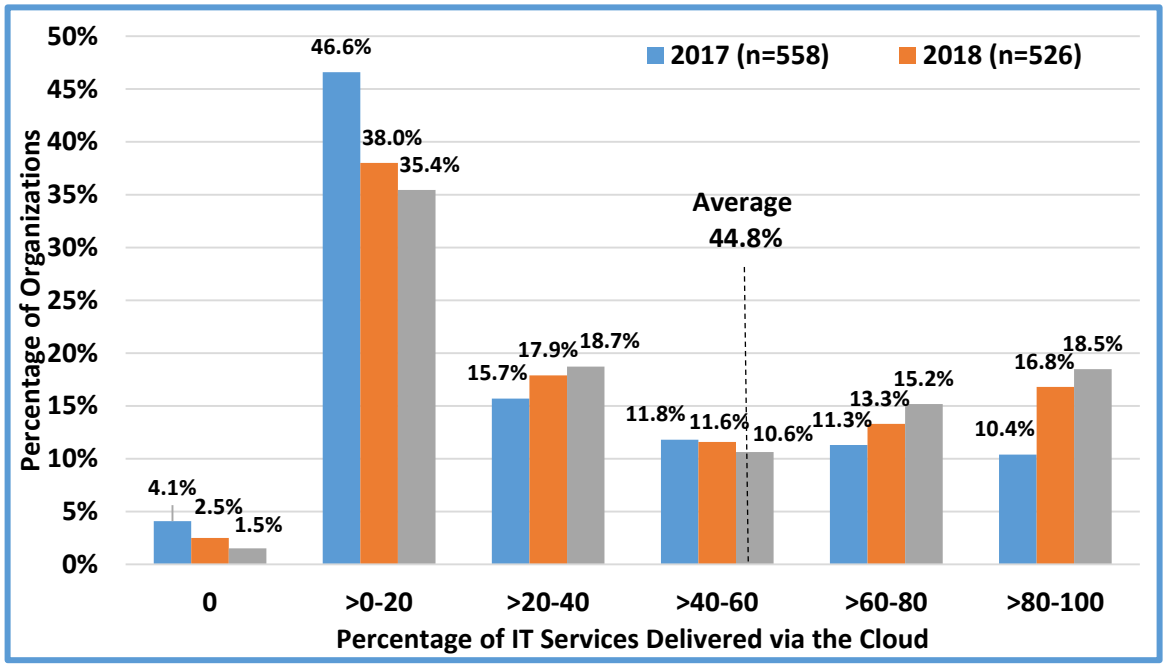


3.5. Use of Cloud and Shared Services.

Of 395 reporting organizations, 98.5% indicated they used Cloud Services and Solutions, up from 97.5% in 2018. These organizations, on average, delivered 44.8% "of all IT services" via the Cloud, up from 41.7% in 2018, 34.6% in 2017, and 31.9% in 2016.

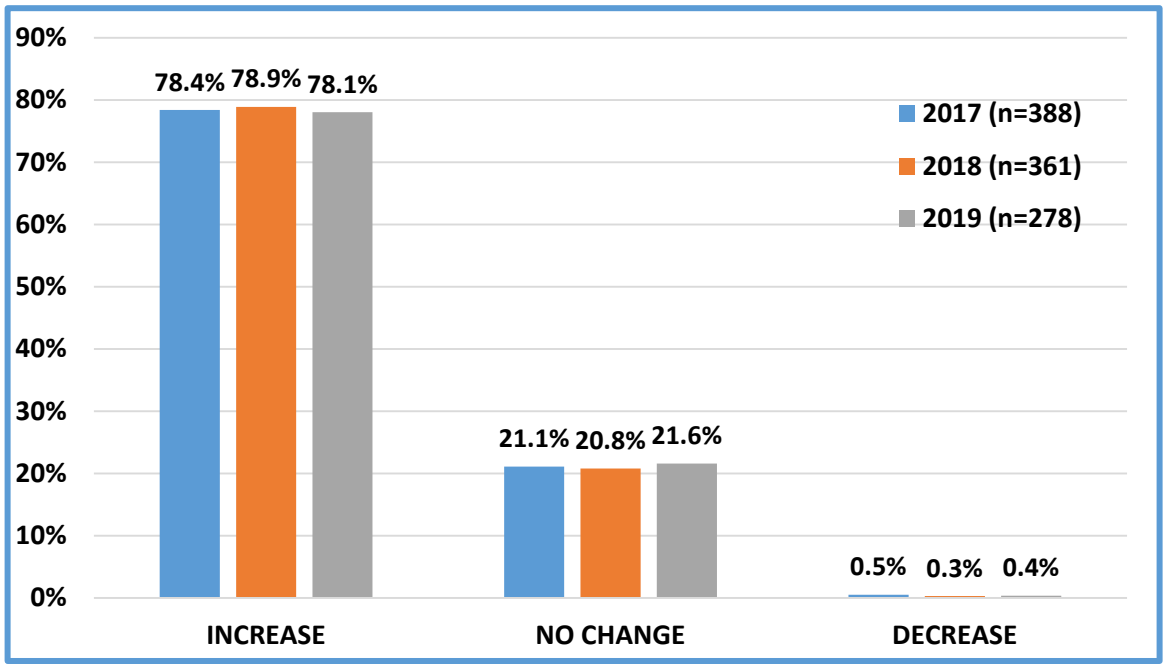
3.5.1. Cloud-Based IT Services and Solutions. As shown in Figure 12, the distribution continues to shift to the right as more organizations deliver more IT services via the cloud. Only 1.5% reported no cloud-based IT services compared to 2.5% in 2018, a decrease of 40%. 44.1% reported less than 30% of services were cloud-based, down from 52.3% in 2018 and 60.8% in 2017. The median percentage of cloud-based delivery in 2019 remained steady at 30%.

Figure 12: Percentage of IT Services Delivered via the Cloud, 2017-2019



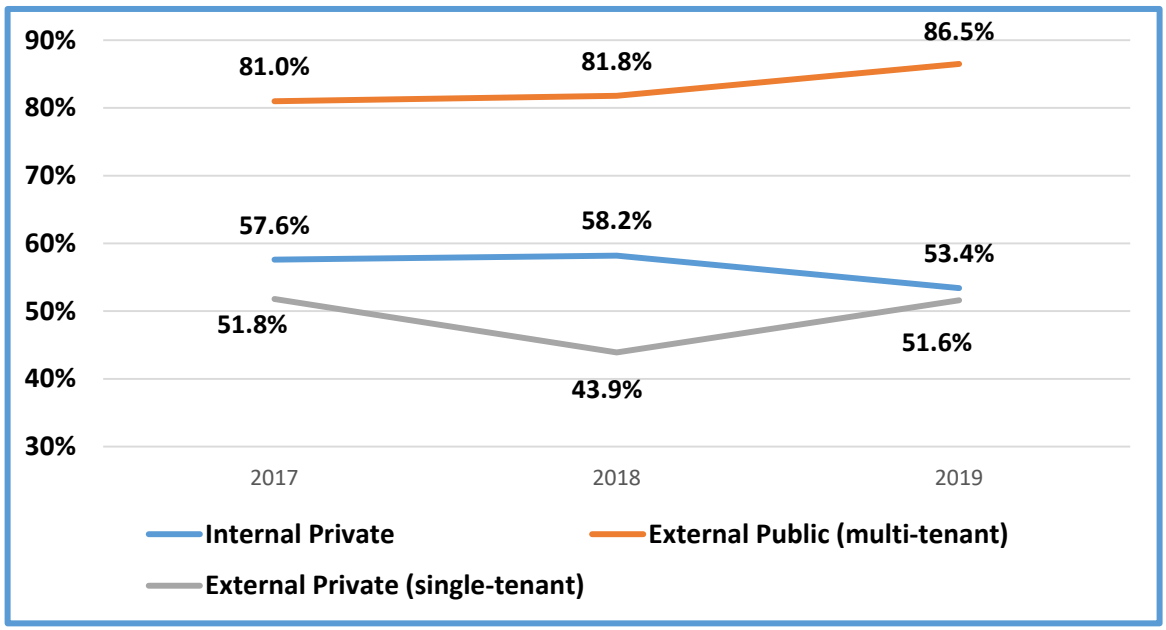
An increase in external cloud usage was reported by 78.1% of respondents, with 21.6% reporting no change and 0.4% a decrease (Figure 13). 74.5% reported increases in the number of cloud features purchased, while 25.2% reported no change and 0.4% reported a decrease. Respondents reported that the average cost per seat for External Cloud Services increased by 9.6%, the unit cost of processing power increased by 1.8%, and storage unit costs increased by 1.5%.

Figure 13: Percentage of Organizations Reporting Increases, No Change and Decreases in External Cloud Usage, 2017-19



In Figure 14, the three-year trend appears to show a transition from internal private cloud to external public cloud. Since 2017, usage of external public cloud has increased 6.8% up from 81% in 2017 to 86.5% in 2019. During the same time frame internal private cloud usage has decreased by 7.3% from 57.6% in 2017 to 53.4% in 2019.

Figure 14: Percentage of Organizations Using Each Category



In Figure 15, this shift is reinforced by the percentage of all cloud-based IT provided by category, and the percentage of companies using these categories for over 50% of their cloud-based IT is seen in Figure 16.

Figure 15: Average Percentage of All Cloud-Based IT Provided by Category

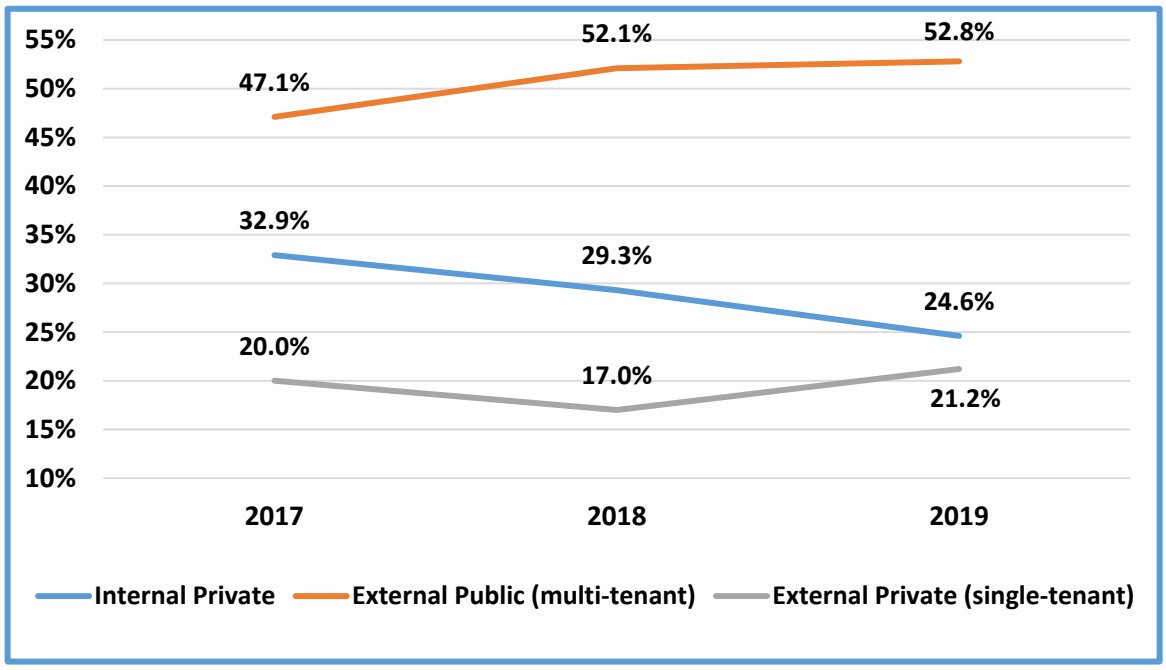
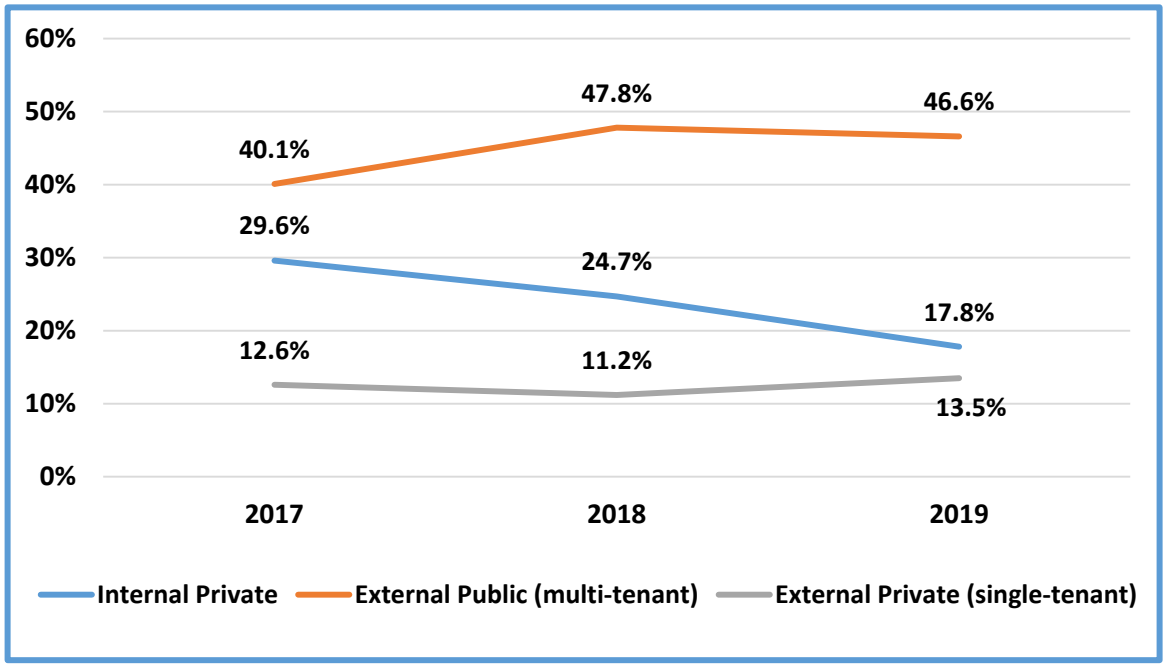


Figure 16: Organizations Using Each Category for Over 50% of Cloud-Based IT



Examining the cloud platform mix in Figure 17, interestingly results indicate a shift away from exclusively utilizing internal private cloud to exclusively external public.

Figure 17: Corporate Cloud Platform Mix

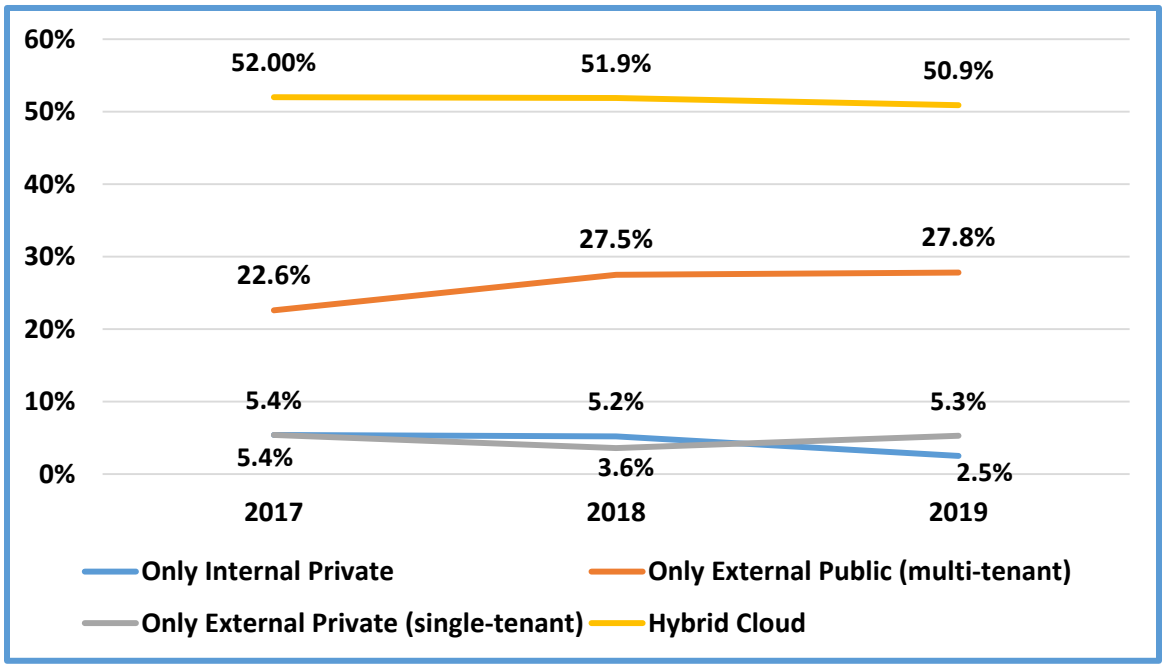
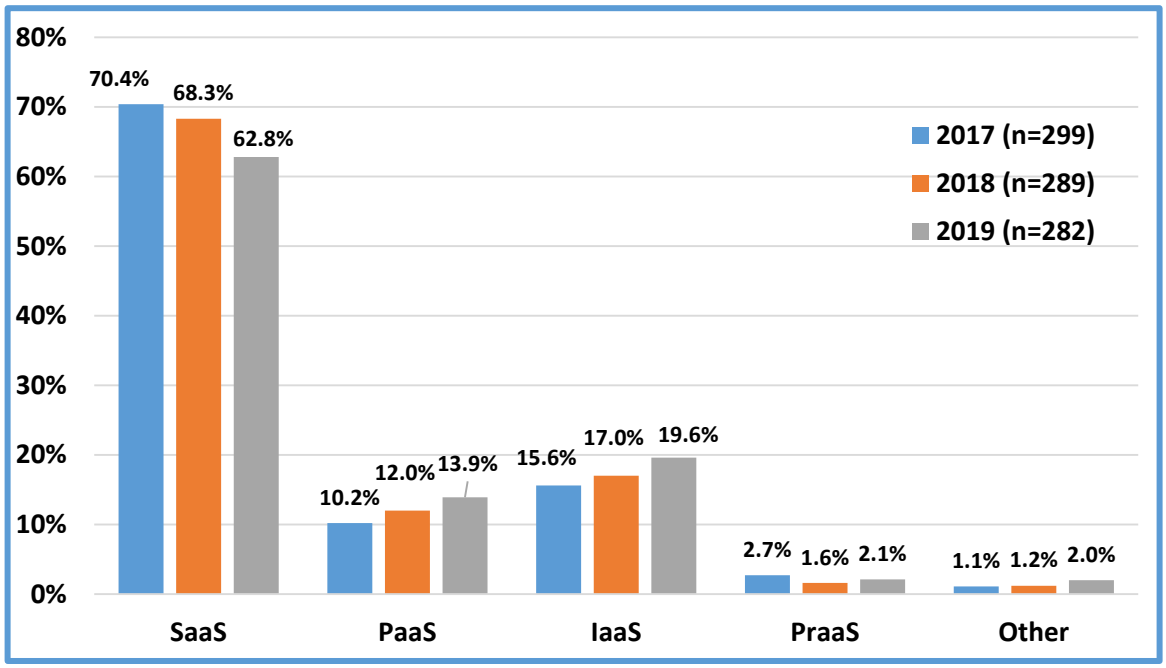


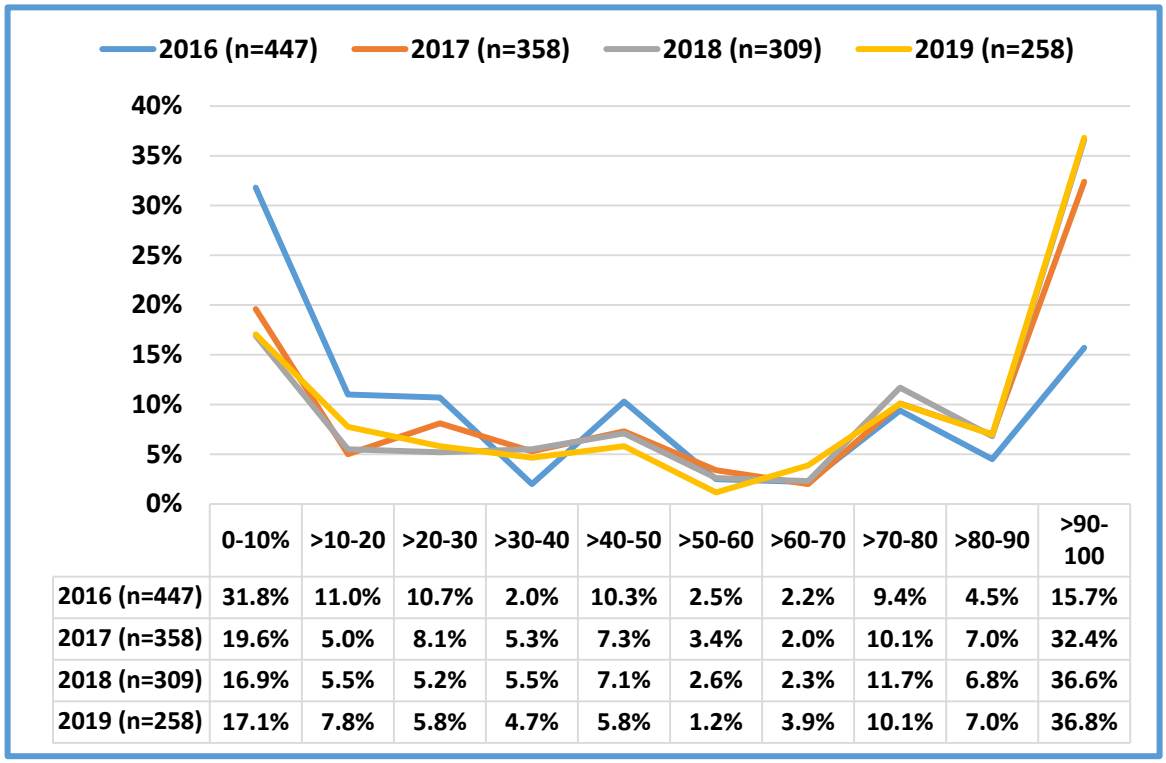
Figure 18 shows the responses to the question: "What percentage of the external cloud-based IT services are provided in each of the following categories: Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS), and Process as a Service (PraaS)?" In 2019, there is a continued decline in SaaS usage and an increases in both PaaS and IaaS.

Figure 18: Percentage of External Cloud Services Delivered by Service Category, 2018 vs. 2017



3.5.2. Shared Services for IT Delivery. Similar to 2017 and 2018, 89.1% of organizations indicated that they used at least some shared IT services in 2019. At 62.3%, the average amount of all IT services delivered as a shared service in 2019 is similar to that reported in 2018 (63.3%), was up from 59.2% in 2017. Figure 19 shows the increasing use of IT shared services over the past four years.

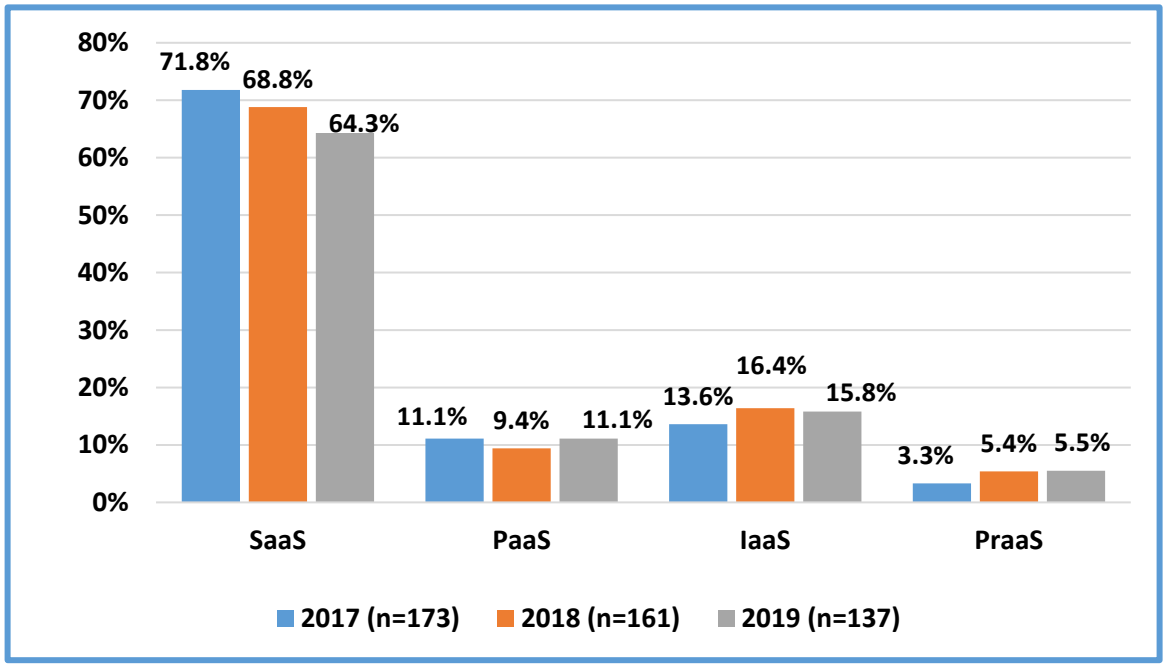
Figure 19: Percentage of All IT Services Delivered as Shared Services, 2016-2019



	0-10%	>10-20	>20-30	>30-40	>40-50	>50-60	>60-70	>70-80	>80-90	>90-100
2016 (n=447)	31.8%	11.0%	10.7%	2.0%	10.3%	2.5%	2.2%	9.4%	4.5%	15.7%
2017 (n=358)	19.6%	5.0%	8.1%	5.3%	7.3%	3.4%	2.0%	10.1%	7.0%	32.4%
2018 (n=309)	16.9%	5.5%	5.2%	5.5%	7.1%	2.6%	2.3%	11.7%	6.8%	36.6%
2019 (n=258)	17.1%	7.8%	5.8%	4.7%	5.8%	1.2%	3.9%	10.1%	7.0%	36.8%

Organizations where IT is delivered as a shared service through the cloud were asked "What percentage of IT shared services are provided in each of the following categories?" Continuing a downward trend begun in 2017, SaaS dropped an additional 6.5% from 2018. Other areas such as PaaS remained somewhat flat while IaaS and PraaS are trending upward. This could be linked to the transition from internal to external cloud-based IT (Figure 17).

Figure 20: Percentage of IT Shared Services by Category, 2017-2019



3.6. Cybersecurity Practices.

Only 48.85% of organizations (n=537) reported having a Chief Information Security Officer (CISO) or equivalent position in 2019, up 7.3% from 2018 (Table 14). However, as was true last year, organizations *without* a CISO have higher IT budgets as a percentage of revenue (5.9% vs. 5.3%) than organizations *with* a CISO). Moreover, cybersecurity budgets are higher for organizations with a CISO (8.6% of the overall IT budget) compared to those without (5.6%).

Table 14: Cybersecurity Leadership, 2017-2019

Does your organization have a CISO or equivalent position?	2017	2018	2019
n (unique organizations)	695	670	537
Yes	46.2%	45.5%	48.8%
No	52.8%	53.1%	49.7%
I Don't Know [a]	1.0%	1.3%	1.5%

[a] Option not provided to respondents in 2016

The existence of a CISO position is expectedly correlated with organizational size. (Figure 21). Nevertheless, the percent of organizations with over $500 million in revenue, and especially those over $1 billion, without someone in charge of cybersecurity is concerning. It may also in part explain the persistent onslaught of reported breaches. Also

keeping with previous trends, the majority of CISOs report to the CIO (Table 15). While only 3.5% of CISOs report to the Board, this is a considerable improvement from 2018's mere 0.3%.

Figure 21: Percentage of Organizations by Total Revenue with a CISO, 2019 (n=371)

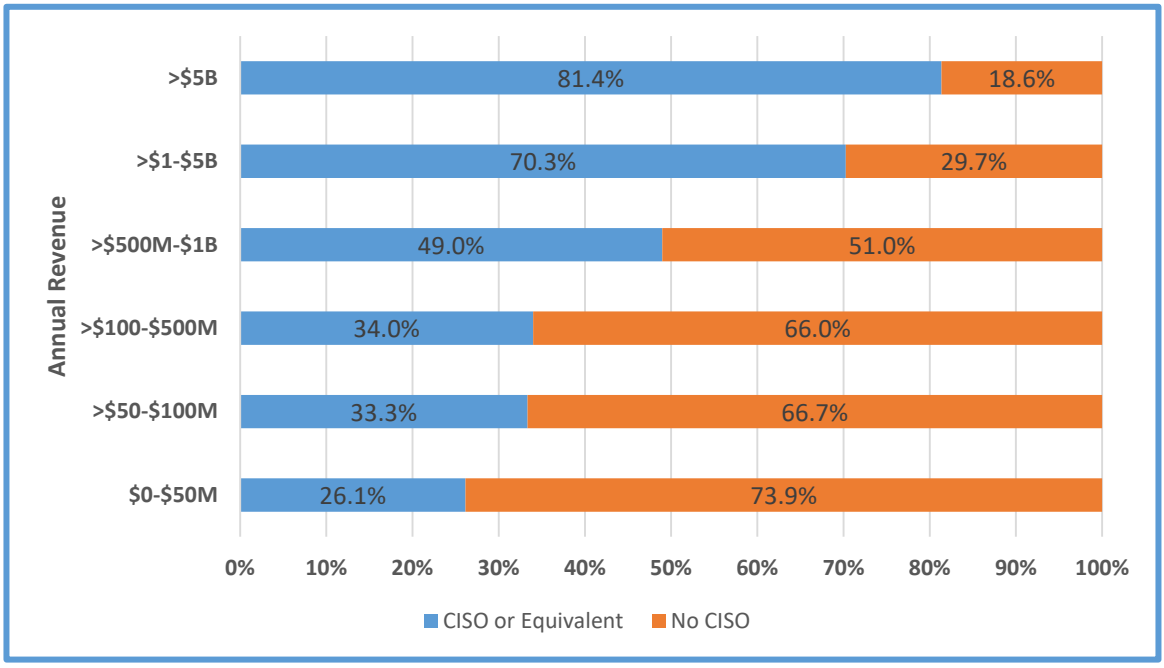
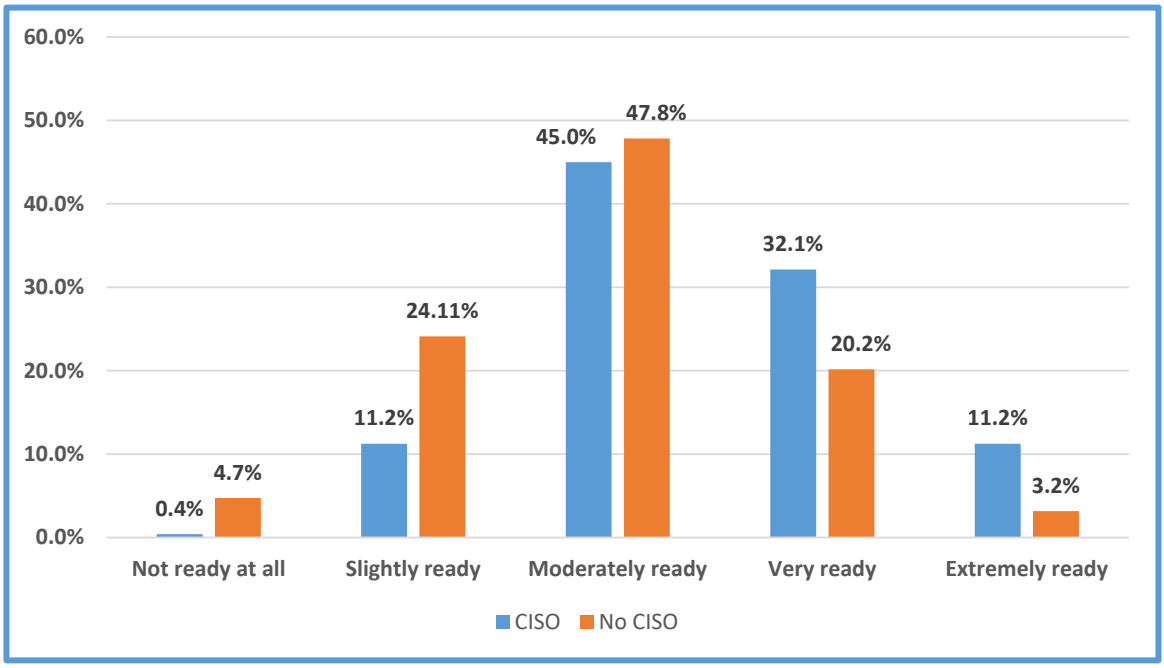


Table 15: To Whom Does the CISO (or Equivalent) Report? (2018-2019)

Position	% of Organizations	
	2018 (n=302)	2019 (n=256)
CIO (Information)	62.3%	62.9%
CEO/President	10.9%	12.1%
CTO (Technology)	7.3%	9.0%
COO (Operating)	5.6%	4.7%
Other	5.6%	4.3%
CFO/Treasurer/Finance	4.0%	2.0%
CLO (Legal)	2.3%	0.8%
Internal Audit	1.0%	0.4%
Board/Board Member	0.3%	3.5%
CCO (Compliance)	0.3%	0.0%
CAO (Administrative)	0.3%	0.4%

Respondents were asked to evaluate their overall cybersecurity readiness on a five-point scale, from "Not Ready at All" (1) to "Extremely Ready" (5). The average score in 2019 (n=508) was 3.17, similar to the 2018 value of 3.19. For organizations with a CISO, this score is higher (3.43) than for those without CISOs (2.93).

Figure 22: Cybersecurity Readiness, 2019 (n=508)



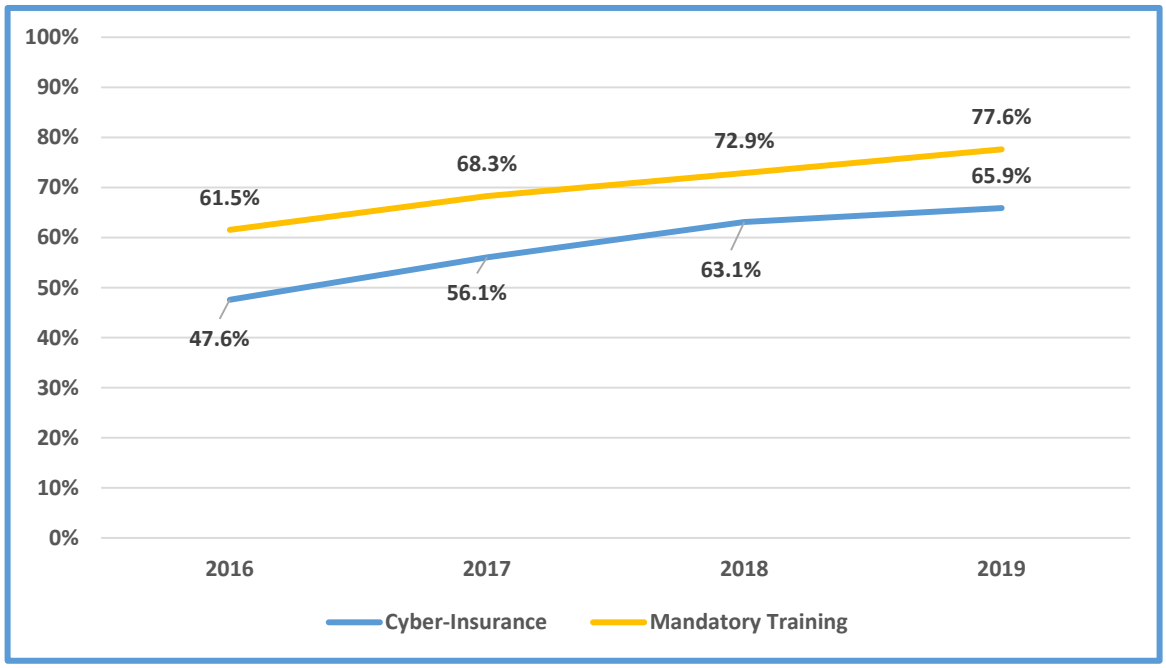
To assess the extent to which cybersecurity is embedded within the organizational culture, respondents were asked whether cybersecurity was considered explicitly as part of five common decision-making activities. Although improvement was observed from 2017 to 2018, 2019 saw decreases (Table 16).

Table 16: Percentage of Organizations Considering Cybersecurity When Doing _____, 2017-2019

Business Process	2017	2018	2019	% Change 2018-19
N (unique organizations)	668	627	501	
IT Procurement/Purchasing	71.9%	75.3%	68.1%	-9.6%
Software/Systems Development	81.9%	82.0%	78.2%	-4.6%
IT Change Management (Hardware & Software)	78.3%	79.4%	73.9%	-6.9%
Developing Business Strategy	54.6%	51.8%	52.3%	1.0%
Other	3.4%	4.0%	6.2%	55.0%

Figure 23 shows trends associated with cyber-insurance coverage and mandatory cybersecurity training in organizations. The percentage of organizations with cyber-insurance coverage increased again in 2019, but the rate appears to be tapering off, signaling that most organizations seeing this as a worthwhile form of protection may already have insurance policies in place. It is encouraging to see a steady increase in the percentage of organizations requiring security training of all employees.

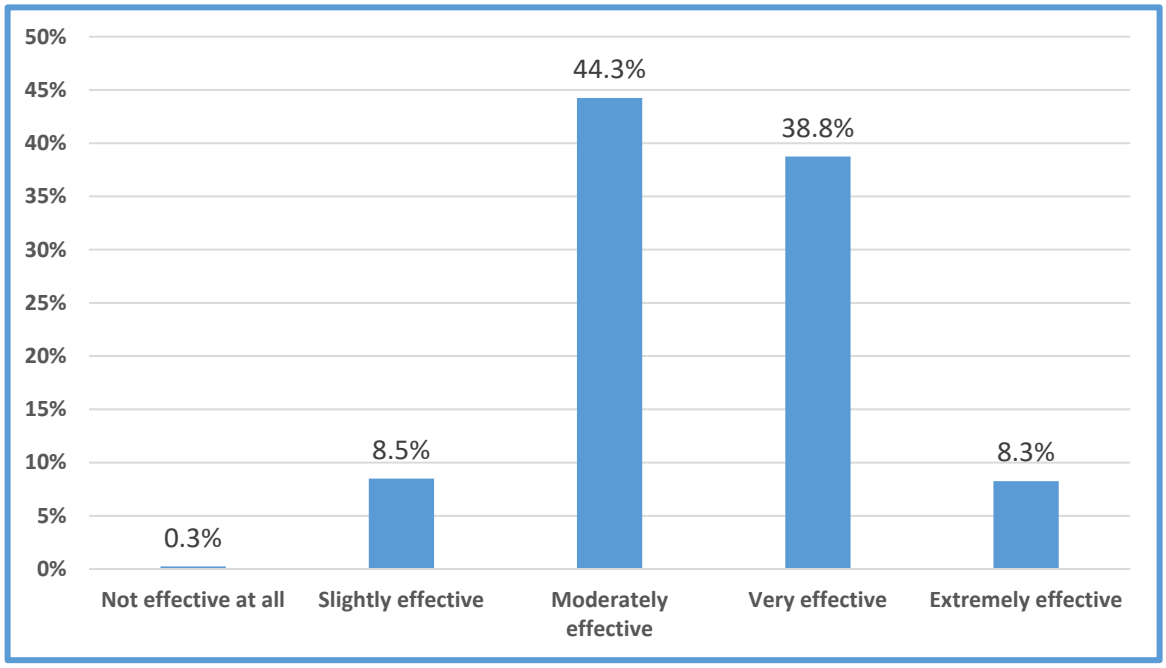
Figure 23: Cyber Insurance and Cybersecurity Training in Organizations, 2016-2019



Insurance question: 2016 n=662, 2017 n=628, 2018 n=591, 2019 n=472
Training question: 2016 n=697, 2017 n=681, 2018 n=634, 2019 n=513

Requiring employees to complete security training is a good step in promoting safe and secure computing practices, but the quality of this training can vary considerably. Figure 24 reports the effectiveness of cybersecurity training programs on a scale of 1 to 5. The average effectiveness score for 2019 was 3.46, up slightly from 3.32 the previous year. These responses do, however, suggest that there is still significant room for improvement in the quality of cybersecurity training within organizations.

Figure 24: Effectiveness of Cybersecurity Training, 2019 (n=400)



4. IT Performance Measurement

To track how organizations monitor their IT operations, respondents were asked to "Select up to five (5) of your organization's most important performance measures" from a list of 34 for three separate categories: "internal IT," "outsourced IT" [if applicable] and "your personal performance."

4.1. Performance Measures for Internal and Outsourced IT.

618 responses were collected for internal IT operations and 431 organizations specified that they outsource at least some of their IT operations and therefore provided performance measures for outsourced operations. Table 17 summarizes these responses and also categorizes each performance measure by their primary focus: IT (I), Business Operations (B) or Strategic (S).

Table 17: Performance Measures for Internal and Outsourced IT, 2019

Focus	Performance Measure	Percentage Selecting [a]	
		Internal IT (n=618 organizations)	Outsourced IT (n=431 organizations)
I	Availability / Up Time	1 (48.2%)	1 (43.2%)
I/B	Customer/User Satisfaction --- Internal Users	2 (38.7%)	2 (28.3%)
I/B	Cyber-security Related	3 (28.0%)	9 (14.8%)
I/B	Cost Control / Reduction --- IT	4 (24.3%)	3 (28.1%)
I	Help Desk Performance	5 (22.3%)	8 (16.5%)
S	Value of IT to the Business	6 (21.4%)	10 (11.6%)
I	Products Delivered --- on Time	7 (20.6%)	4 (25.3%)
B	Customer/User Satisfaction --- External Users	8 (18.8%)	16 (7.9%)
I/B	IT Service Quality	9 (16.7%)	5 (21.1%)
S	IT's Contribution to Strategy	10 (14.9%)	23 (4.4%)
I	Products Delivered --- on Budget	11 (14.2%)	6 (20.0%)
I/B	IT Budget Compliance	12 (13.6%)	15 (8.6%)
B/S	Innovative New Ideas	12 (13.6%)	18 (7%)
B	Productivity Improvement --- Business	14 (11.5%)	12 (9.7%)
B	Improved Decision Making	15 (9.9%)	25 (4.2%)
I/B	IT Spending --- as % of Revenue	15 (9.9%)	28 (2.3%)
B	Cost Control / Reduction --- Business	17 (9.5%)	17 (7.7%)
B	Total Cost of Ownership	18 (9.1%)	13 (9.5%)
I	Time to Market --- IT	19 (7.1%)	18 (7.0%)
I	SLA Target Compliance	20 (6.6%)	7 (18.1%)
S	Increases in New Products or Services	20 (6.6%)	20 (5.8%)
I/B	Productivity Improvement --- IT	22 (6.5%)	13 (9.5%)
I	Software Quality / Defect Rates in Software	23 (6.0%)	11 (11.1%)
I	IT Employee Retention	24 (5.7%)	32 (1.4%)
S	Profit Growth	25 (5.3%)	27 (2.6%)
S	Revenue Growth	26 (5.2%)	29 (2.1%)
B	Time to Market --- Business	27 (4.7%)	23 (4.4%)
I	Headcount Reduction --- IT	28 (4.5%)	21 (5.3%)
B	Project Return on Investment	28 (4.5%)	21 (5.3%)
B	Headcount Reduction --- Business	30 (2.4%)	30 (1.9%)
-	NONE / No Measures are Used	31 (2.1%)	26 (3.2%)
S	Return on Equity	32 (1.6%)	32 (1.4%)
I	IT Spending --- per Employee	33 (1.5%)	30 (1.9%)
B	Customer/User Satisfaction--- External Suppliers	34 (0%)	34 (0%)

[a] Duplicate rank numbers indicate a tie.
Focus: I=IT, B=Business Operations, S=Strategic

There is considerable overlap between performance measures used to evaluate internal IT operations and outsourced IT with eight metrics appearing in the top ten of each. Not surprisingly, SLA compliance is ranked quite high for outsourced IT, but is not as high for evaluating internal IT operations, whereas IT's contribution to strategy is important for internal IT but not for outsourced IT. As a whole, there is a good balance between IT, business, and strategic-focused performance measures in the top ten of both lists; however, strategic measures are ranked generally lower for outsourced operations.

4.2. Performance Measures for CIOs

Evaluating the effectiveness of a CIO is difficult; and therefore CIOs were asked to select up to five performance measures (from the same list of 34) that evaluate their "Personal Performance" in addition to "Internal IT" and (if applicable) "Outsourced IT". 376 responses from CIOs were compiled for the first two categories and 252 responses were received for the Outsourced IT performance measures. Table 18 provides the rankings of performance measures over the past three years.

Table 18: Performance Measures for CIOs and Internal and Outsourced IT, 2017-2019

Focus	Performance Measures	Percentage Selecting [a]								
		My Personal Performance			Internal IT			Outsourced IT		
	Year	2017	2018	2019	2017	2018	2019	2017	2018	2019
	n (CIOs)	469	418	376	469	418	376	276	276	252
I/B	Customer/User Satisfaction (Internal Users)	1	1	1	2	2	2	2	2	2
S	Value of IT to the Business	2	2	2	7	6	5	16	19	13
S	IT's Contribution to Strategy	3	3	3	10	10	10	25	30	22
I	Availability/Up Time	3	4	4	1	1	1	1	1	1
B/S	Innovative New Ideas	8	8	5	15	13	12	19	17	18
I/B	Cost Control/Reduction (IT)	7	5	6	6	5	7	3	6	4
I/B	Cybersecurity Related	5	6	7	3	4	3	6	3	7
I/B	IT Budget Compliance	9	7	8	10	11	14	13	11	16
I	Projects Delivered on Time	11	10	9	8	8	6	9	4	3
B	Productivity Improvements (Business)	15	13	10	14	12	11	13	19	10
B	Customer/User Satisfaction (External Users)	6	12	11	5	8	9	10	13	15
I/B	IT Service Quality	10	9	12	9	7	8	3	4	6
B	Improved Decision Making	12	11	13	22	17	16	28	28	25
I	Help Desk Performance	20	15	14	4	3	4	8	6	9
I	Projects Delivered on Budget	13	14	15	12	14	13	6	8	5
B	Cost Control/Reduction (Business)	19	22	16	15	18	15	15	15	16
S	Increases in New Products or Services	23	18	17	22	18	20	17	14	19
I/B	IT Spending as % of Revenue	16	16	18	12	15	18	22	22	30
B	Total Cost of Ownership	20	23	19	21	21	17	12	12	12
S	Profit Growth	14	20	20	18	23	27	26	28	25
S	Revenue Growth	18	18	21	25	16	19	31	26	28
I	IT Employee Retention	17	17	22	17	26	28	33	34	32
I	Time to Market (IT)	24	23	23	26	22	23	22	16	19
I/B	Productivity Improvements (IT)	30	26	23	31	23	22	26	19	14
B	Project Return on Investment	22	21	25	22	23	25	21	18	21
B	Time to Market (Business)	27	25	26	32	28	25	30	24	22
I	SLA Target Compliance	25	29	26	19	26	21	5	9	8
S	Return on Equity	26	30	28	27	31	32	22	33	30
I	Software Quality/Defect Rates	28	26	29	19	20	24	11	10	10
I/B	Headcount Reduction (IT)	30	33	29	30	32	29	17	26	25
-	NONE/No Measures are Used	29	30	31	28	29	30	20	22	24
I/B	IT Spending per Employee	32	28	32	28	30	33	32	30	29
B	Headcount Reduction (Business)	33	34	32	33	33	30	29	32	32
B/S	Customer/User Satisfaction (External Suppliers)		32	34		33	34		25	34

[a] Duplicate rank numbers indicate a tie.
Blank = not collected that year.
Focus: I=IT, B=Business Operations, S=Strategic

There is a great deal of consistency in how CIO performance has been evaluated over the last three years. While there are a number of operational metrics used, CIOs are still commonly evaluated along several strategic measures as well. Strategic measures generally are more indirect (e.g., Contribution to Strategy) than Operational ones (e.g. User Satisfaction, Availability) that can be directly measured. Notably, Productivity Improvements (Business) entered the top ten for CIO personal performance and outsourced IT for the first time suggesting that business leaders are looking to gain tangible productivity gains from IT investments and are starting to hold IT leaders accountable for delivering such gains. Also notable is the drop in cybersecurity-related performance controls for both CIO performance and outsourced IT. Both remain in the top ten, but this drop may indicate that cybersecurity performance is difficult to evaluate and that many incidents are outside the direct control of the CIO.

5. CIO Tenure, Reporting, Background, and Activities

The average age of the 263 CIOs who responded to this question was 51.7 (standard deviation of 8.0 and median of 51), and 84.7% were male, down slightly from 85.7% in 2018. Their average tenure as the top IT person decreased from 6.6 years to 6.3 years (standard deviation of 6.8 years and median of 4 years). While this is still above the ten-year average of 5.7 years (Figure 25), it does represent a drop of 4.5%. Over 32.4% of the responding CIOs have been in their position for seven years or more, while 44.1% have had their position for three years or less.

Figure 25: Average Job Tenure of CIOs, 2010-19

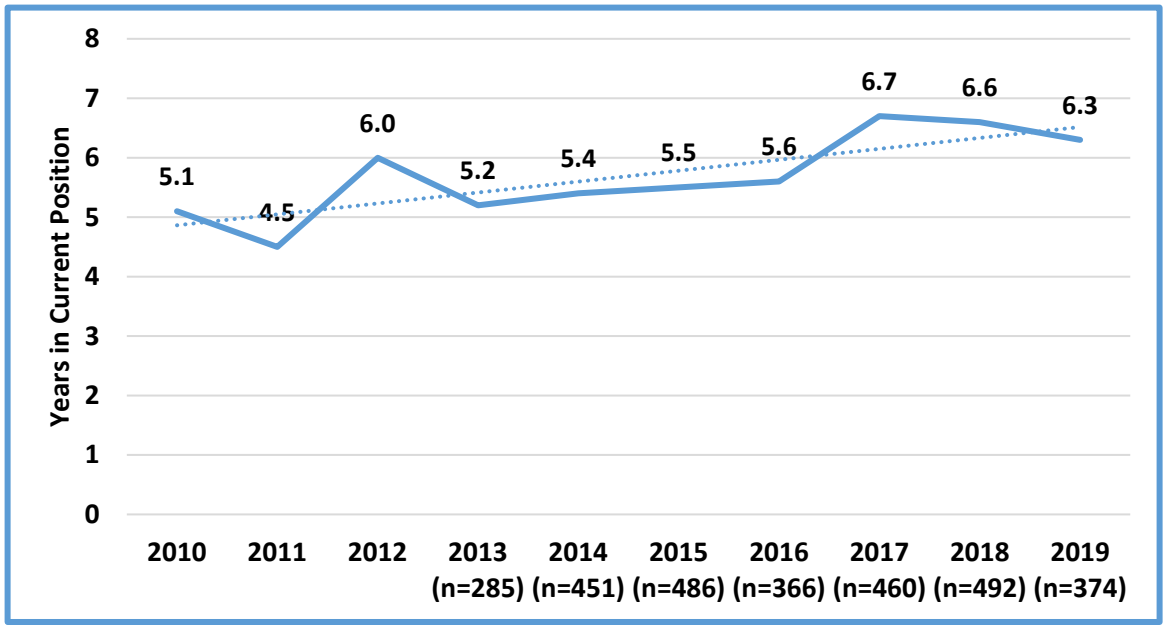


Table 19 shows CIO reporting relationships over the past decade and indicates that in 2019, 89.1% reported to CEOs, CFOs, or COOs. This is up from 88.5% reported in 2018.

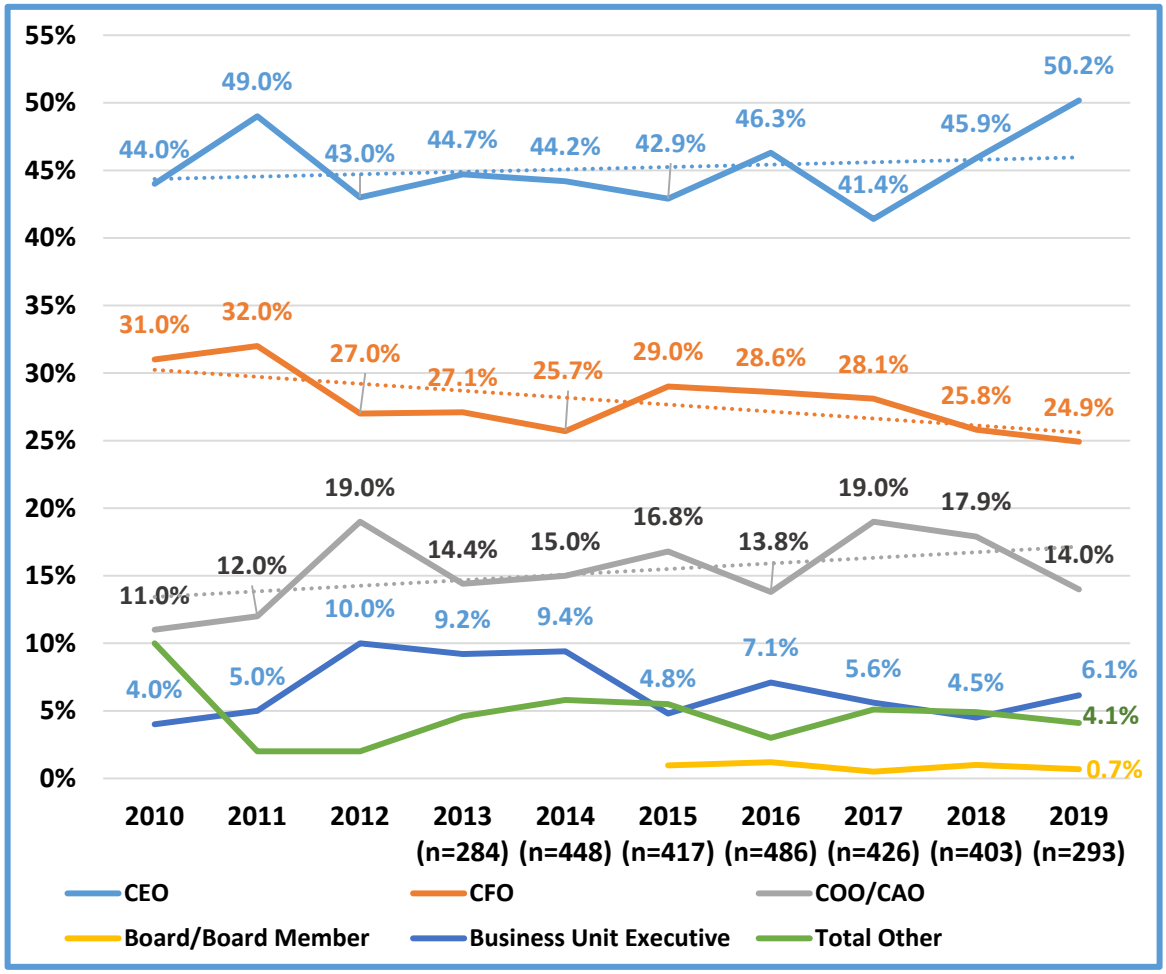
Figure 26 displays the data from Table 18 graphically. The number of CIOs reporting to the CEO is at a 10-year high at 50.2%, while reporting to the CFO is at a 10-year low at 24.9%.

Table 19: To Whom Does the CIO Report, by Percentage of Respondents, 2010-2019

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Avg.
CEO	44.0%	49.0%	43.0%	44.7%	44.2%	42.9%	46.3%	41.4%	45.9%	50.2%	45.2%
CFO	31.0%	32.0%	27.0%	27.1%	25.7%	29.0%	28.6%	28.1%	25.8%	24.9%	27.9%
COO/CAO	11.0%	12.0%	19.0%	14.4%	15.0%	16.8%	13.8%	19.0%	17.9%	14.0%	15.3%
Board/Board Member	*New Question*					0.96%	1.20%	0.50%	1.0%	0.7%	0.9%
Business Unit Executive	4.0%	5.0%	10.0%	9.2%	9.4%	4.8%	7.1%	5.6%	4.5%	6.1%	6.6%
Other (IT) [a]	10.0%	2.0%	2.0%	4.6%	5.8%	5.5%	3.0%	1.3%	0.7%	1.7%	1.2%
Other (non-IT) [a]								3.8%	4.2%	2.4%	3.5%
Total Other	10.0%	2.0%	2.0%	4.6%	5.8%	5.5%	3.0%	5.1%	4.9%	4.1%	4.7%
	n = number of responding CIOs				284	448	417	486	426	403	

[a] In 2017, the "Other" category was split into two new categories: Other (IT) and Other (non-IT).

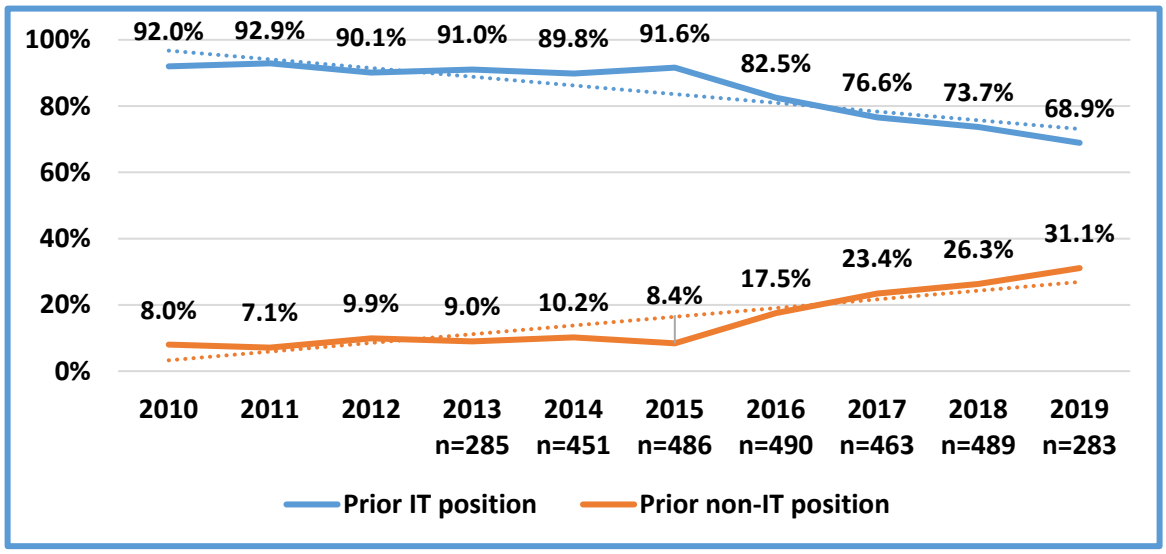
Figure 26: To Whom Does the CIO Report, 2010-2019



5.1. CIO Previous Employment.

As shown in Figure 27, the 5-year decline in the number of CIOs coming from IT positions continues falling from the 73.7% in 2018 to 68.9% in 2019. This represents a 25.8% drop since its high of 92.9% in 2011.

Figure 27: CIOs Prior Position – IT versus Non-IT



As shown in Figure 28, the percentage of CIOs coming from outside organizations decreased from the 10-year high in 2018 of 80.5% to 79.3%. This slightly reduces the 318% gap between CIOs coming from outside their current organization versus those being promoted from within to 283%. This perhaps signals a slowdown or topping in the trend that began in 2012 with a meager 40% gap

Figure 28: CIOs Prior Position – Outside versus Within Current Organization

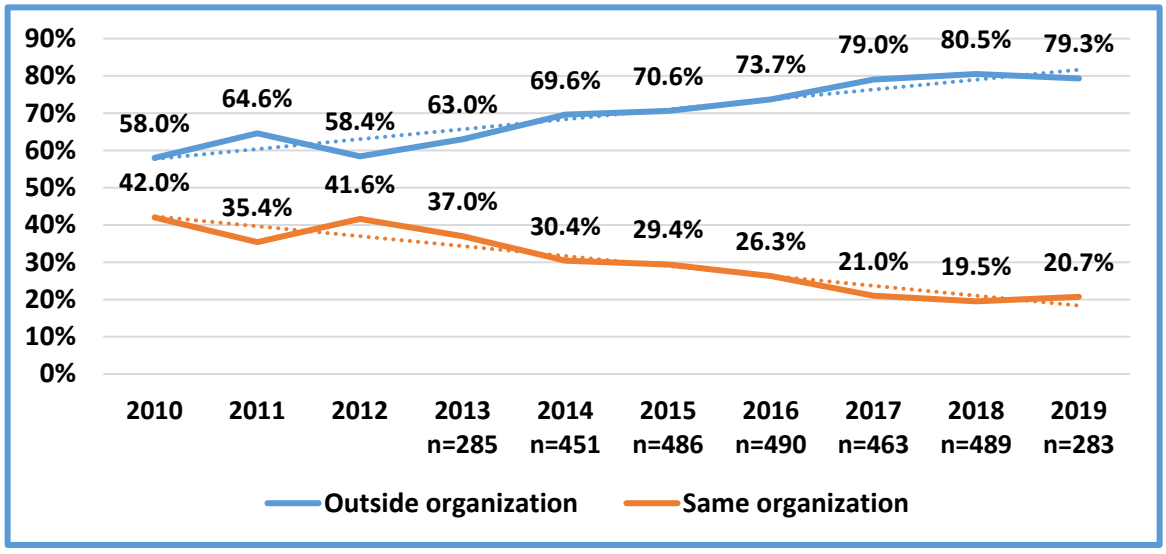
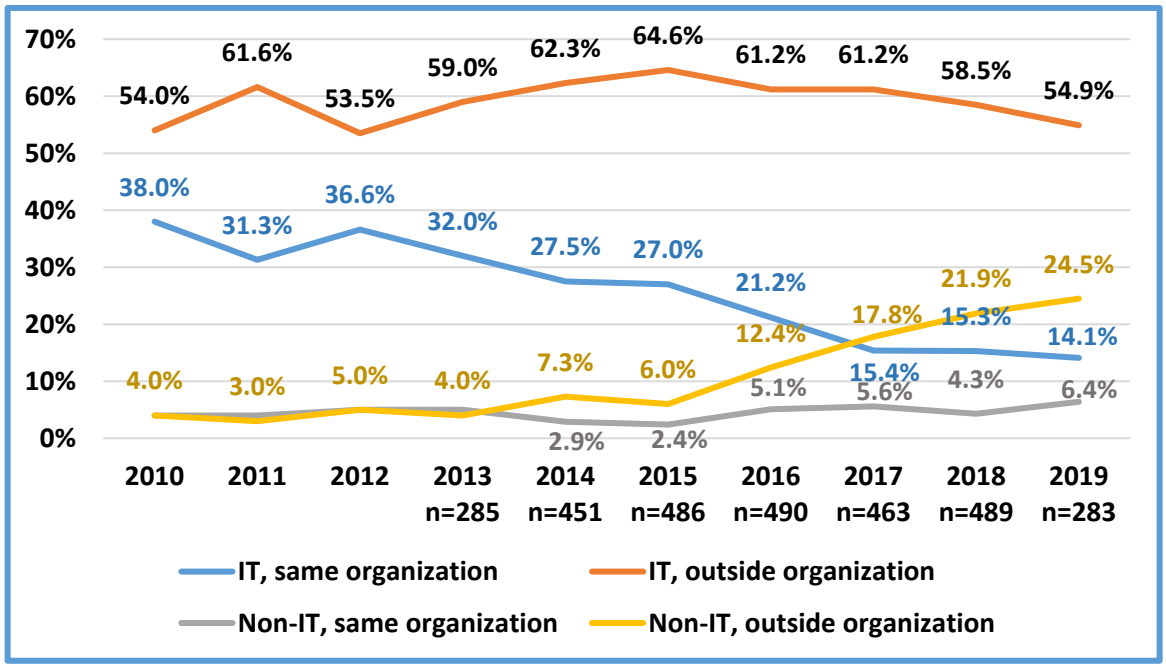


Figure 29 shows a more granular view of these data. Since 2015, CIOs coming from IT roles both inside and outside their current organization has declined, while those coming from non-IT roles in other organizations continues to rise. Furthermore, IT executives moving into the CIO position from within their organization remains on the decline (down 73% from 36.6% in 2012 to 14.1% this year), while the non IT executive moving into the CIO position from within their current organization increased nearly 49% from 4.3% in 2018 to 6.4% (and over 120% since 2014).

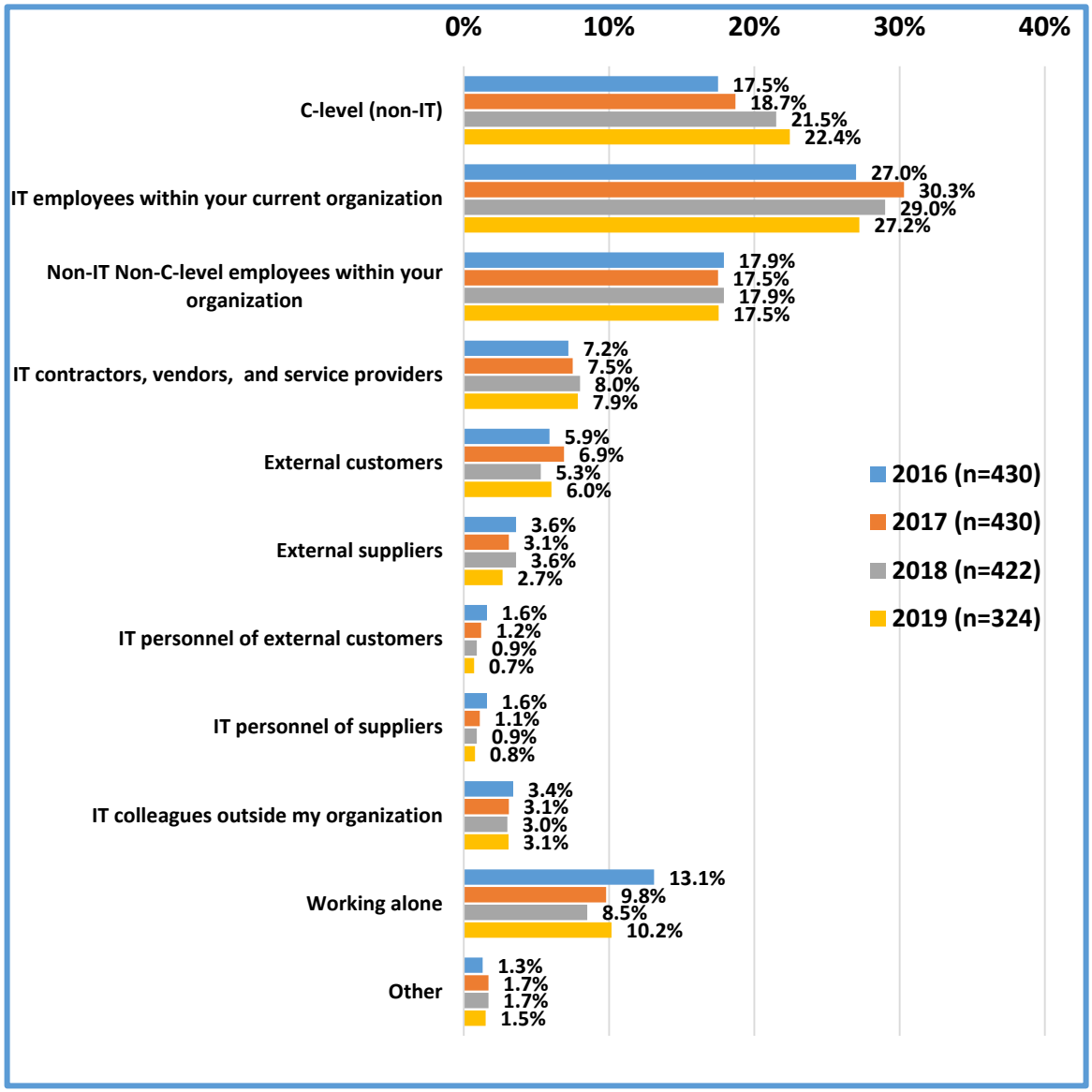
Figure 29: CIO Prior Employment, 2010-2019



5.2. With Whom Do CIOs Spend their Time.

The job of the CIO is complex and involves interaction with people both inside and outside the organization. Figure 30 shows the average percentage of a CIO's time spent with different groups of people.

Figure 30: Average Percentage of CIO Time Spent Interacting with _____, 2016-2019



On average, the 324 responding CIOs spent more than three times more time with people in their own organization than with those from other organizations (67.2% vs. 21.1%). Perhaps the most significant trend is the increase in time spent with C-level executives. From 2016 to 2019, the percentage of time spent with colleagues at the C-level has increased by 28% from 17.5% (2016) to 22.4% (2019). While time interacting with IT Contractors, Vendors, Service Providers, and External Customers and Suppliers was relatively flat while time interacting with IT personnel fell over 10% since 2017.

CIOs spending any time with "C-level (non-IT) personnel" were also asked about the frequency of those interactions – specifically, if they met daily, weekly, monthly, quarterly, or annually with C-level executives and/or board members. Table 20 summarizes their

responses and highlights the percentage of CIOs reporting "at least weekly" interactions (i.e., daily plus weekly), as well as the percentage change between 2018 and 2019 in at-least-weekly interactions. Double-digit increases occurred in "at least weekly" interactions with the CEO, CAO, and Board of Directors. All others also increased with the exception of those at-least-weekly interactions with CFOs, which were down by 4.7% over the last year.

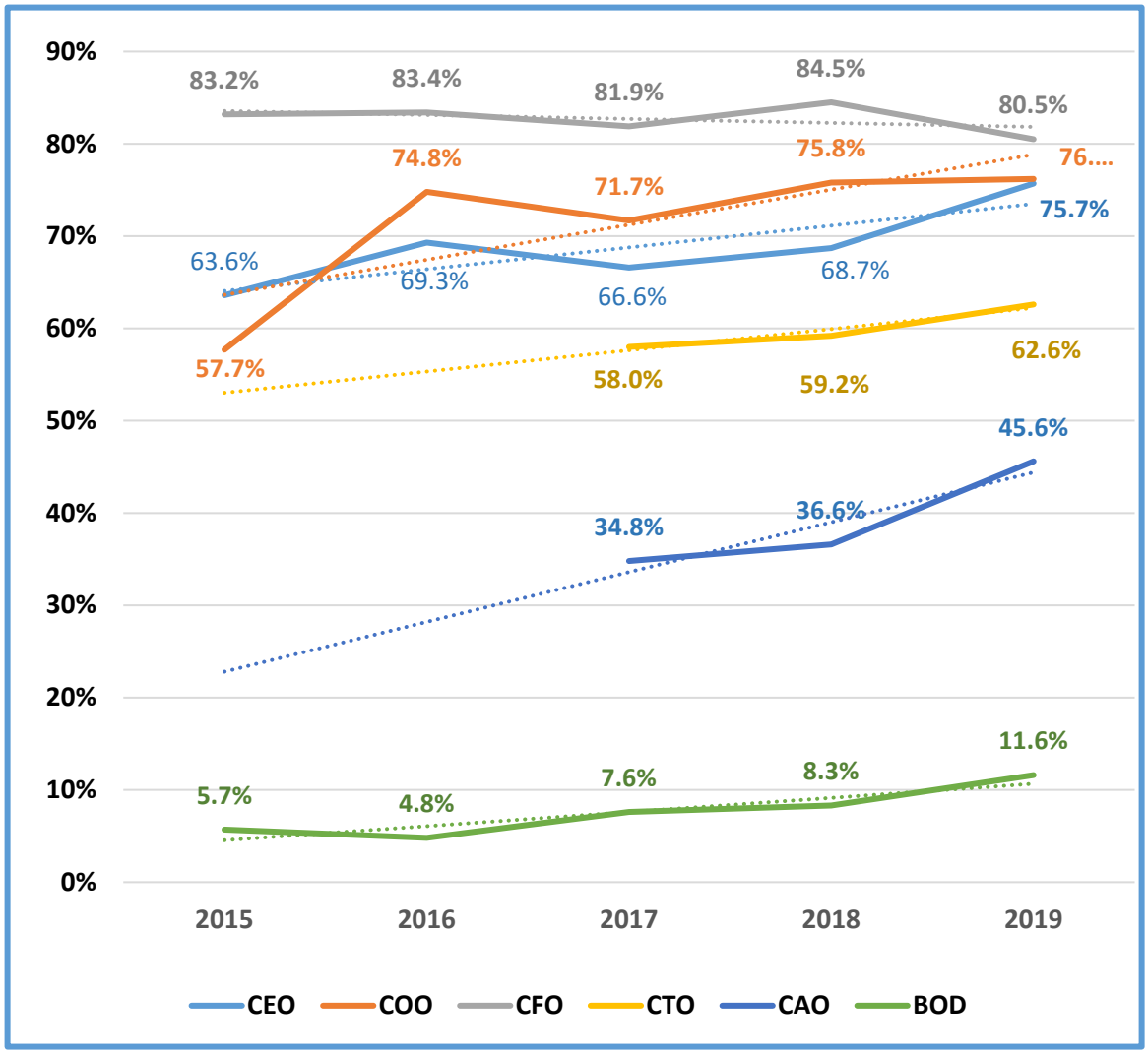
Table 20: Percentage of CIOs Interacting with C-level Peers, by Frequency, 2018-2019

	Year	Daily	Weekly	At least weekly	% Change 2018-19	Monthly	Quarterly	Annually	None	n
CEO	2015	20.1%	43.5%	63.6%	10.2%	24.6%	7.3%	1.2%	3.3%	423
	2016	25.2%	44.1%	69.3%		19.3%	7.9%	2.2%	1.2%	404
	2017	24.4%	42.2%	66.6%		20.9%	8.5%	1.5%	2.5%	398
	2018	25.4%	43.3%	68.7%		21.5%	6.0%	1.8%	2.1%	386
	2019	29.8%	45.9%	75.7%		15.4%	6.2%	0.7%	2.0%	305
COO	2015	22.0%	35.7%	57.7%	1.4%	12.5%	2.4%	0.5%	27.0%	423
	2016	31.1%	43.7%	74.8%		12.3%	2.8%	0.3%	9.7%	318
	2017	31.7%	40.0%	71.7%		12.9%	4.0%	0.3%	11.1%	350
	2018	33.9%	41.8%	75.8%		10.6%	1.5%	0.6%	11.5%	330
	2019	31.4%	44.8%	76.2%		10.7%	2.7%	0.8%	9.6%	261
CFO	2015	31.0%	52.2%	83.2%	-4.7%	9.9%	2.8%	0.2%	3.8%	423
	2016	33.8%	49.6%	83.4%		11.8%	3.1%	0.0%	1.8%	391
	2017	31.0%	50.9%	81.9%		12.9%	3.1%	0.8%	1.3%	387
	2018	34.5%	50.0%	84.5%		9.2%	3.5%	1.1%	1.6%	368
	2019	30.9%	49.7%	80.5%		14.1%	3.0%	0.7%	1.7%	298
CTO	2017	44.7%	13.2%	58.0%	5.7%	4.7%	2.3%	0.4%	34.6%	257
	2018	41.6%	17.6%	59.2%		2.6%	2.1%	1.3%	34.8%	233
	2019	46.0%	16.6%	62.9%		8.5%	0.9%	0.9%	27.0%	211
CAO	2017	16.7%	18.0%	34.8%	24.7%	9.9%	0.9%	0.4%	54.1%	233
	2018	11.5%	25.1%	36.6%		10.6%	2.6%	0.4%	49.8%	227
	2019	19.0%	26.7%	45.6%		6.7%	1.5%	0.0%	46.2%	195
CMO	2015	13.5%	30.0%	43.5%	0.0%	19.4%	6.4%	1.2%	29.6%	423
	2016	14.6%	40.4%	55.0%		24.2%	5.0%	1.9%	14.0%	322
	2017	16.7%	38.4%	55.1%		19.1%	7.9%	0.9%	17.0%	341
	2018	17.3%	39.0%	56.2%		21.7%	6.7%	0.6%	14.7%	313
	2019	20.2%	36.0%	56.2%		22.9%	3.1%	1.6%	16.3%	258
CLO	2015	3.8%	25.5%	29.3%	0.5%	25.5%	9.7%	5.9%	29.6%	423
	2016	7.5%	32.6%	40.1%		26.0%	12.9%	5.1%	15.9%	334
	2017	9.5%	29.2%	38.8%		20.9%	16.9%	5.8%	17.5%	325
	2018	7.2%	32.7%	39.9%		25.2%	10.8%	3.9%	20.3%	306
	2019	9.3%	30.8%	40.1%		23.1%	9.7%	5.3%	21.9%	247
BOD	2015	1.9%	3.8%	5.7%	39.6%	14.7%	31.9%	17.5%	30.3%	423
	2016	1.1%	3.7%	4.8%		17.0%	37.0%	15.4%	25.8%	367
	2017	2.4%	5.1%	7.6%		14.4%	30.9%	20.9%	26.3%	369
	2018	2.9%	5.4%	8.3%		12.6%	32.6%	19.7%	26.9%	350
	2019	6.6%	5.0%	11.6%		16.6%	33.4%	16.2%	22.2%	302
Single board member	2015	3.1%	7.6%	10.7%	5.5%	13.0%	18.2%	13.5%	44.7%	423
	2016	19.7%	29.6%	49.3%		19.7%	8.5%	0.0%	22.5%	71*
	2017	2.3%	8.8%	11.1%		16.7%	19.6%	13.7%	38.9%	306
	2018	4.1%	6.6%	10.7%		15.9%	18.3%	17.6%	37.6%	290
	2019	3.2%	8.1%	11.3%		16.9%	23.0%	15.7%	33.1%	248
HR	2018	16.2%	51.4%	67.6%	-5.6%	24.9%	4.3%	0.5%	2.7%	370
	2019	15.7%	48.1%	63.9%		26.6%	4.4%	0.7%	4.4%	293

* Low response on "individual board member" in 2016 may skew results

Figure 31 illustrates the five-year trends in C-level and board interaction. There appears to be upward trends in frequency with respect to all but CFO interactions. CFO interaction seems to have a slight downward trend; however, is relatively flat save for the 4.7% drop in 2019.

Figure 31: Trends in "at least weekly" C-level Interaction



Summary and Conclusions

In many ways, the finding in this year's SIM IT Issues and Trends Study are similar to the results of the studies for the last two years. In fact, organizations' top three IT management issues this year – Cybersecurity, Alignment of IT with the Business, and Analytics – are the same as they were in 2018 and 2017 (Table 7). Similarly, the top three IT investments – Analytics, the Cloud, and Cybersecurity – are unchanged since 2017 too.

IT *spending*, as a percentage of revenue, is down slightly over the last two years (Figure 1), but still above the ten-year average. However, in absolute dollar terms, IT *budgets* are up 6.6% this year and up almost 18% since 2016. The largest IT budget allocation is for IT Employees, followed by Cloud, Software, Hardware, Consultants, and Contractors (Table 10, Figure 5).

Finding and retaining IT talent continues to be a top concern to IT leaders, after Cybersecurity and Alignment (Table 2). The top four skills "most-difficult-to-find" and "most-important-to-the-organization" are the same, differing only slightly in order. In 2019, the hardest to find technical skills were Cybersecurity, Analytics, Enterprise/Application Architects, and Business Analysts. The increase continued in their internal IT headcounts this year, along with corresponding increases in average IT salaries and in total IT personnel spending (Fiogure7, Figure 8). Training budgets are down slightly this year, but they are still well above their ten-year average and they are projected to increase next year (Figure 11). Year-to-year turnover is relatively stable (Figure 9) and projected retirements are up slightly (Figure 10).

Overall, cloud-based computing usage – and costs – continue to grow (Figure 12); however, the use of external clouds is increasing, while the use of hybrid and internal clouds is decreasing (Figure 14, Figure 15, Figure 16, Figure 17). In terms of Cloud (Figure 18) and IT shared services (Figure 20), Software-as-a-Service (SaaS) is the overwhelming favorite use, but Platform-as-a-Service (PaaS) and Infrastructure-as-a-Service (IaaS) are both growing as a percentage of total usage.

Almost half of the organizations in the study have Chief Information Security Officers (CISO), up slightly over last year (Table 14). The larger the organization, the more likely it is to have a CISO (Figure 21). On the question about Cybersecurity Readiness, most organizations report they are only "moderately ready (Figure 22). Similarly, most report that their Cybersecurity Training is only "moderately effective." Clearly, more work is needed here.

The 376 CIOs who participated in this year's survey were 85% male and have been in their executive position for an average of a little over six-and-one-half years (Figure 25). Almost a third of them had non-IT jobs prior to their current position as CIOs (Figure 27) and almost 80% of them came from outside of their current organization (Figure28). About half of them report directly to their CEO (Table 19) – the highest number ever reported – and about a quarter of them report to their CFO – the lowest ever reported. They are also spending more of their time with members of the C-suite than in previous years (Table 20,

Figure 30, Figure 31). CIO performance continues to be measured by a combination of IT operations, business operations, and strategic metrics (Table 18).

Clearly, the job of the CIO continues to be increasingly complex. CIOs need a wide range of operational, organizational, and strategic management capabilities to fulfill the promise of digital transformation, deliver business analytics and innovation, mitigate cybersecurity threats, and cope with skill shortfalls, new regulations, and cost-cutting pressures. In combination, these requirements make the job of CIO arguably the most challenging in any organization. The facts that CIOs are spending more time with other members of the C-suite, and that more of them report to the CEO than ever before suggests that many CIOs are succeeding and becoming highly valued members of the top management team. This holds out hope for all of us who find being an IT professional both important and rewarding.