Chapter 1

Executive Summary
Computer Economics provides research and advisory services on the strategic and financial management of information technology. Our clients include large IT organizations and major IT consulting firms. Our IT Spending and Staffing Benchmarks study, published annually since 1990, is the definitive source of IT benchmarking data.

Other annual studies include Technology Trends, an assessment of technology adoption, spending, and economic experience; IT Outsourcing Statistics, which provides data on the use of and experience with IT outsourcing; IT Management Best Practices, which measures adoption trends of strategic IT practices; and IT Staffing Ratios, a series of benchmarking studies with metrics for 16 IT job functions.

In addition to these major studies, we publish IT management advisories on various issues of concern to IT managers. These reports are made available through our website. For further information on our custom benchmarking services, website subscriptions, advisory reports, and other services, please contact our office or visit our website at www.computereconomics.com.

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ISDN: 1-56909-021-1

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CHAPTER 1: Executive Summary

Introduction

The Computer Economics IT Spending and Staffing Benchmarks study, now in its 30th year of publication, provides key metrics to assist organizations in the financial and strategic management of information technology. The information presented in this 31-chapter study also helps consulting firms as well as IT product and service providers better understand current trends in end-user organization IT spending and staffing.

Each year, we conduct an in-depth survey of IT organizations in the U.S. and Canada to gather detailed data concerning their IT spending and staffing. The respondents include executives in both public and private sectors. By repeating this survey each year, Computer Economics is in a unique position to identify long-term trends and produce reliable and consistent benchmarks.

The study is based on a survey of 232 IT organizations conducted in the first half of 2019. It provides composite statistics of IT spending and staffing data, a segmentation of the same statistics by organization size, and benchmarks for organizations in 28 sectors and subsectors. A description of the study’s content, design, and methodology is included in this chapter.

Major Findings

Our top-line 13 findings show that, for the most part, IT organizations are accelerating their rush to the cloud and are increasing spending in an effort to reap the benefits. Our composite sample shows the highest (albeit by a tenth of one percent) IT operational budget growth in a decade while IT capital budgets and hiring remain flat. In last year’s study, we saw similar trends, and we took it as tangible evidence of the effects of cloud computing on corporate IT budgets. We take that growth to mean IT organizations are encouraged by their experience with cloud computing thus far and are willing to supplement those efficiency gains with additional spending, especially for business transformation and the continued move to the cloud.

However, company size is a still a determining factor on exactly how IT organizations are navigating the cloud journey. While budget increases are similar across all company sizes, large companies still lag behind their small cousins in adoption of cloud apps and infrastructure. So much so, that large companies have actually increased capital spending at the median slightly the last two years, while
their smaller cousins continue to keep capital budgets flat.

This is not a surprise. Smaller organizations tend to have fewer legacy systems, which makes it easier for them to adopt cloud systems at the core of their applications portfolio. Our survey shows that small and midsize organizations are leading the way in terms of both software-as-a-service (SaaS) adoption as well as use of public cloud infrastructure. Smaller organizations are shedding their IT infrastructure and support needs faster than their bigger cousins.

We have been saying in recent years that, for companies of all sizes, the cloud might hold back major IT budget increases, because efficiencies would allow for productivity gains with only modest IT budget growth. But it appears companies are not willing to fund new initiatives only through savings in ongoing support. Increased budgets seem to be aimed more toward business transformation, replacing legacy systems, and implementing new technologies. In other words, companies are looking to increase IT spending in the short term in an effort to get the long-term efficiency.

One only needs to look at the growth of cloud-based subscription software to see just how interested organizations are in turning toward the cloud. Two years ago, we began asking companies what percentage of their business applications was subscription-based. In 2017, only 9% of companies answered that half or more of their applications were cloud-based. In 2018, 20% of companies report that at least half of their applications are in the cloud. In 2019, 30% of companies report meeting that threshold. We have also seen increased use of cloud infrastructure and decreased spending in the data center.

We have also reported that the cloud was making it easier for IT executives to work within their budget constraints. It appears that this continues to be true. The number of respondents reporting that their budgets are inadequate dropped from 60% in 2016 to only 48% this year. While still about half of respondents wish for larger budgets, the fact remains that CIOs are getting used to the budgets under which they are asked to work. Of course, the relatively strong economy plays a role. But it is most likely also due to the fact that new technologies, including cloud applications and cloud infrastructure, are allowing CIOs to more quickly and cheaply roll out new IT capabilities.

Still, it is surprising how we really have not gone that far into the cloud transition. As mentioned above, only 30% of companies have more than half of their applications in the cloud. And data center workloads in the public cloud are even smaller than that. For several years, we have talked in this space about the impact of cloud, and yet there is so much more left to do. And the real impact of automation and AI has scarcely begun for the majority of organizations. Imagine how much greater the impact will be when these technologies become the norm among organizations.

Although, there are some differences based on company size, all companies are going headlong down the same path toward the cloud. They are simply at different points in the journey. The strong economy is giving companies the confidence to accelerate their efforts toward business
transformation. This should not only lead to cost savings in the near term but truly transform IT organizations. Truthfully, we’ve still just scratched the surface.

In the rest of this section, we outline our key findings in more detail.
Finding 1: IT Operational Spending Growth Is Steady

IT operational spending growth is increasing at a modest rate this year. The 3.1% growth at the median, as shown in Figure 1-1, continues the trend of most of the past five years of increasing spending in operational budgets at a slightly higher rate than inflation. The potential need for stronger growth because of the strong economy is being held in check by efficiencies gained through the cloud. However, it is noteworthy that this is the largest increase in more than 10 years, even if by only a fraction of a percent.

![IT Operational Budget Change from Prior Year: All Sectors](image)

*Source: Computer Economics, 2019*  
*Figure 1-1*
Finding 2: IT Operational Spending Growth Is Broad
The net percentage of companies increasing their IT operational spending has remained strong but has only ticked up slightly. Sixty-eight percent of organizations are increasing IT spending, but that is offset by budget cutting at 20% of organizations, which results in a net increase of 48%, as shown in Figure 1-2. Growth is widespread across all company sizes. Perhaps a small word of warning is in order, however: The 20% of companies cutting operational budgets this year represent an increase from 17% last year. Though, by itself, this is unlikely to indicate any major change in the growth trend.

![Net Percent Increasing IT Operational Spending: All Sectors](image)
**Finding 3: Small Organizations Leading the Pack**

While small companies lead the way with budget increases this year, growth is broad across all company sizes, Figure 1-3 shows. At the median, midsize organizations, those with IT operational budgets between $5 million and $20 million a year, are increasing IT operational budgets by the smallest amount at 3.0%, followed by large organizations at 3.2%. Small IT organizations lead the way at 3.5%.
Finding 4: More CIOs Making Due with What They Have  
Another indicator of outlook is the degree to which IT executives find that their IT budgets are adequate to support the business. As shown in Figure 1-4, 48% of IT executives feel that their IT budgets are either somewhat or very inadequate to meet the needs of the business. While this is just about half of respondents, it is relatively low historically, and the number of CIOs who find their budgets adequate continues to rise.

Although most CIOs would like to have larger budgets, CIOs seem to be finding a way to live within their means and meet the needs of the business. Typically, we view a large number of respondents who report their budgets as inadequate as a sign of pressure for more IT spending. However, in recent years, these feelings that budgets were tight have not led to large IT operational budget increases, despite the strong economy. For now, refreshing technology, lessening dependence on legacy systems, strategic outsourcing, and the use of cloud infrastructure and applications are an easier way to make room in the budget, rather than going to the CFO and asking for a large increase.
Finding 5: IT Spending as Percentage of Revenue Falls Slightly

Total IT spending includes both operational and capital spending, as well as IT spending outside the IT budget. It is the broadest measure of IT spending on a cash basis. As a percentage of revenue, we are seeing a small decrease this year for the composite sample. As shown in Figure 1-5, the percentage decreased from 2.7% last year to 2.5% this year despite the growth in budgets. This would indicate that while IT budgets are increasing at a healthy pace, corporate revenues are increasing at an even stronger pace.

![Total IT Spending as Percentage of Revenue: All Sectors](image)

Source: Computer Economics, 2019

Please note that IT spending as a percentage of revenue varies significantly by industry sector. Therefore, the statistics presented here should only be used as an indication of overall trends, not for benchmarking specific organizations. To provide a fair comparison for your organization, please refer to the industry sector chapter of this study that best corresponds to your organization. Chapters 3A-C, which show these metrics by organization size, are also useful in benchmarking specific IT organization performance.
Finding 6: Per-User Spending Decreases
Consistent with the increased efficiency that we have reported, IT spending per user has declined despite the increase in IT budgets. Figure 1-6 shows that IT spending per user is down from $8,183 in 2018 to $7,569. Cloud efficiencies, increased use of virtualization, and automation of IT processes allow for this number to trend downward, while user counts are rising at many companies due to relatively strong trends in overall employment. In the long run, we expect this metric to continue its downward trend.
Finding 7: Manufacturing Leads in IT Spending Growth

IT operational budgets are rising across nearly all sectors this year, but some sectors are faring better than others. In IT operational budgets, the manufacturing, professional/technical services, and financial services sectors are enjoying growth of 5.0%, 4.0%, and 3.3% respectively, Figure 1-7 shows. The weakest growth is in the government/nonprofit and utilities sectors, at 2.0% and 1.5%, respectively. The construction/trade services sector is this only one to report flat IT budgets this year. All others show at least a moderate increase.

These results indicate that economic conditions, which strongly influence IT spending and staffing levels, vary by industry sector. Benchmarking of IT metrics, therefore, should include sector-specific metrics as provided in later chapters of this study.
Finding 8: IT Capital Spending Growth Continues to Decline

In addition to IT operational budgets, most organizations maintain IT capital budgets to fund long-term investments in IT infrastructure, equipment, or major system development and implementation. As previously discussed, despite the strong economy, companies at the median are simply not increasing their IT capital spending levels: While 49% of IT organizations are increasing IT capital budgets, 29% are reducing capital spending, Figure 1-8 shows. For the most part, organizations appear to be spending just enough to maintain normal equipment-refresh cycles, not growing their on-premises infrastructure.

Source: Computer Economics, 2019

Figure 1-8
Finding 9: Capital Budgets Increase Slightly as a Percentage of IT Spending

In contrast to the modest but relatively broad-based rise in IT operational spending, IT capital spending as percentage of total IT spending has been trending down. Figure 1-9 shows that capital spending as percentage of IT spending did tick up slightly this year from 18% to 19%. However, we do not believe that this is a sign of any change in the way companies look at capital spending. The traditional cycle of capital spending going up in a strong economy and down in a poor economy is likely no longer true. Virtualization, the cloud, and other technologies are lessening the need for capital expenditure growth even when times are good. While existing equipment must still be refreshed, the years of large capital expenditures in order to handle growth are likely gone, due to the elasticity and efficiencies of newer technologies.

![Capital Budget as a Percentage of IT Spending: All Sectors](image)
Finding 10: Cloud Tops Spending Priorities

Continuing the trend from recent years, the cloud is the top spending priority. Both cloud applications and cloud infrastructure lead the way. A net 80% of respondents are increasing their spending in cloud applications, as shown in Figure 1-10.

Cloud infrastructure, at 61%, continues to be a major priority as well. We expect this trend to continue as the economic and strategic advantages of an elastic and scalable approach become more and more evident.

Data analytics/business intelligence follows in third place, at 56%. Two new additions to our survey, digital transformation and systems/data integration, are next at 51% and 45%, respectively. Two other additions to our survey, legacy systems modernization and data center automation, are the lowest priorities with 24% and 1%, respectively.

![Spending Priorities by IT Initiative: All Sectors](Figure 1-10)
Finding 11: Companies Getting Serious About Cloud Systems

Only 1% of companies in our survey are resisting cloud-based software of any kind. Most companies at least pilot some cloud applications. Overall, the transition to cloud apps has been slow considering the hype surrounding them. However, the transition appears to be picking up steam.

As Figure 1-11 shows, in 2017, only 9% of respondents reported that at least half of their business applications software spending was for cloud subscriptions, with 5% reporting 50-74% cloud and 4% reporting 75-100% cloud. In 2018, the number of companies that hit the half-cloud threshold rose to 20%, with 10% reporting in each category. In 2019, 29% of companies report at least half of their apps spending is cloud-based, with 17% reporting between 50-74% and 12% reporting 75-100% of their apps spending in the cloud. We expect this trend to continue as there are few remaining arguments against cloud applications. Security and compliance concerns have been addressed for the most part.

![Historical Cloud Subscription Rates: All Sectors](source: Computer Economics, 2019)
Finding 12: Data Centers Lowest Priority for New Spending By Far

Information security/privacy has been the top area for increased spending for some time. A net 78% of all IT organizations plan to increase spending in this area, Figure 1-12 shows. We also see improved spending on business applications, with 68% planning increases in this area. But it is clear that data center infrastructure is simply not a priority. As cloud infrastructure, cloud storage, and SaaS take over for on-premises software and storage, data centers are no longer a priority for new spending. Only a net of 1% plan to increase spending in this area. As a sign of the data center’s demise as a priority, end-user technology, including PCs and printers, has passed the data center. And for the second year, data center is the lowest-priority spending category.

![Net Percentage of Organizations Increasing Spending: All Sectors](image-url)

*Source: Computer Economics, 2019*
Finding 13: Improved Productivity Depresses Growth in IT Staffing Levels

While IT spending is generally increasing and the economy is strong, it does not necessarily translate into good news for IT job seekers. Less than half of IT organizations (46%) plan to increase IT staff head counts this year, as shown in Figure 1-13.

Still, with only 19% of IT organizations planning to reduce head counts, we do not see widespread layoffs of IT personnel on the horizon. For the composite sample, IT organizations at the median are holding IT head count at last year’s level.

Although IT staffing levels are flat at the median, it does not mean that IT organizations are not adding staff for some positions. While hiring is slowing for lower-level skills such as computer operations, scheduling, and lower-level tech support positions, higher-level skills show increasing demand. Examples include project managers, data analysts, and IT security professionals. As cloud applications and cloud infrastructure take up a larger percentage of IT spending, there is also a need for IT staff with skills in procurement and vendor management.
Additional Findings
The Computer Economics *IT Spending and Staffing Benchmarks* study provides a comprehensive statistical view of the state of IT budgets in U.S. and Canadian organizations. These results are described in full in subsequent chapters.

In addition, throughout the next 12 months, we will conduct further analysis of the data provided in this study and publish the findings on our website. Computer Economics research is available to clients at no charge. Our research reports also may be purchased on an individual basis by non-clients. For information on becoming a client of Computer Economics, please visit our website at www.computereconomics.com.
Chapter and Sample Descriptions

This study is organized into 31 chapters. Each chapter includes a similar set of benchmarks for a different sample. The chapters are as follows:

**Chapter 2: Composite Benchmarks**

This chapter provides composite metrics for all survey respondents across all sectors and organization sizes. The sample includes 232 organizations and is stratified by size and sector as described in the section on survey methodology. Respondents must have at least $50 million in annual revenue or IT spending in excess of $1 million and maintain at least some operations in the U.S. or Canada. There is no upper limit on the size of survey respondents.

For a list of benchmarks for this sample, consult the section on “Metrics in the Composite and Organization Size Chapters.”

**Chapters 3A, 3B, and 3C: Benchmarks by Organization Size**

In these chapters, we provide a complete set of benchmarks for organizations within the specified size classification. Benchmarks for small organizations are in Chapter 3A, for midsize organizations in Chapter 3B, and for large organizations in Chapter 3C. There are 74 respondents in the small-organization sample, 79 in the midsize sample, and 79 in the large sample. We define the size categories as follows:

- Small organizations have IT operational budgets of less than $5 million.
- Midsize organizations have IT operational budgets of $5 million to less than $20 million.
- Large organizations have IT operational budgets of $20 million or greater.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

**Chapter 4: Process Manufacturing Sector Benchmarks**

Chapter 4 provides benchmarks for process manufacturers. Process manufacturers are defined as those where the production process adds value by mixing, separating, forming, or chemical reaction. The sector includes manufacturers of chemicals, petrochemicals, semiconductors, pharmaceuticals, dietary supplements, food and beverage products, building materials, packaging materials, steel, glass, paper products, and other process-manufactured goods. The 47 respondents in the sample range in size from a minimum of about $50 million to a maximum $32.7 billion in annual revenue.

Process manufacturers are characterized by a comparatively low level of IT spending, focused primarily on back-office, manufacturing, plant and equipment asset management, and supply chain
functions. These firms lead in adoption of enterprise business applications such as ERP, but they have lagged somewhat in adoption of customer-facing systems when compared with other sectors. These firms tend to be conservative in their use of new technologies, although they tend to be ahead of the pack in use of the Internet of Things (IoT). They tend to spend comparatively less on IT as a percentage of revenue than most other sectors.

In addition to appearing in this chapter, some process manufacturers also appear in the samples for the high-tech subsector in Chapter 20 and the food and beverage subsector in Chapter 21 if they meet the definitions for those subsectors.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

**Chapter 5: Discrete Manufacturing Sector Benchmarks**

Chapter 5 provides benchmarks for discrete manufacturing organizations. Discrete manufacturers are defined as those where the production process adds value by fabricating or assembling individual (discrete) unit production. The category includes manufacturers of consumer products, industrial equipment, telecommunications equipment, aerospace products, furniture, auto parts, electrical parts, medical devices, and electronic devices, among other products. The 43 respondents in this sample range in size from a minimum of about $62 million to $80 billion in annual revenue.

Discrete manufacturers are characterized by a comparatively low level of IT spending, focused primarily on back-office, manufacturing, and supply chain functions. Many of these firms tend to be conservative in their use of emerging technologies, preferring practical solutions that are well supported and have clear productivity or cost-reduction benefits.

In addition to appearing in this chapter, some discrete manufacturers also appear in the samples for high-tech organizations in Chapter 20 and industrial and automotive manufacturers in Chapter 22 if they meet the definitions for those subsectors.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-
Chapter 6: Banking and Financial Services Sector Benchmarks

Chapter 6 provides benchmarks for banking and financial services companies. The firms in this sector include commercial banks, investment banks, credit unions, mortgage lenders, consumer finance lenders, and other types of lenders and financial services providers. The 22 respondents in this sector range in size from a minimum of about $50 million to a maximum of $90 billion in annual sales.

Banking and finance companies are information-intensive organizations with a high percentage of knowledge workers. They are leading adopters of business and data analytics. Many of them also have major investments in consumer-facing websites and mobile apps. These businesses are highly regulated, and they have significant requirements for information security, privacy, and disaster recovery. They are among the highest in IT intensity of any sector in our study.

In addition to appearing in this chapter, some banking and finance respondents also appear in the sample for the commercial banking subsector in Chapter 23 if they meet the definition for that subsector.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

Chapter 7: Insurance Sector Benchmarks

Chapter 7 provides benchmarks for insurance companies. The firms in this sector include companies that sell medical and dental insurance, life insurance, property and casualty insurance, auto insurance, disability insurance, and other types of insurance. The 19 respondents in this sector range in size from a minimum of about $50 million to $35 billion in annual revenue.

Insurance organizations are information-intensive businesses, and they rely upon information technology for nearly every aspect of their business, from actuarial calculations to claims processing. Many of them have major investments in consumer-facing websites. Most, if not all, employees of
these organizations use computers in their daily work, and insurance companies often have high rates of computers per employee. Insurance companies also tend to spend more per user on IT than any other sector.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

**Chapter 8: Retail Sector Benchmarks**

Chapter 8 provides benchmarks for retailers. This sector includes retailers of clothing, jewelry, hardware, furniture, sports equipment, groceries, pharmaceuticals, and general merchandise. They include department stores, furniture stores, pharmacies, convenience stores, sporting goods stores, and specialty retailers. We also include hospitality and consumer services in this sector. The 30 respondents in the sample range in size from $80 million to $63 billion in annual revenue.

The retail sector is characterized by moderate levels of IT spending. Most retailers have data networks that support multiple selling locations for point-of-sale and inventory management. Application portfolios range from high-volume transaction-processing systems to sophisticated systems for business and data analytics. Many retailers have major investments in business-to-consumer web commerce systems, and most do at least some selling online. Retailers have a mix of full-time and temporary employees, not all of whom use computers. The automation of credit transactions and storing of customer information make information security and privacy an important requirement in retail.

In addition to appearing in this chapter, our retail respondents also appear in the sample for the brick-and-mortar retail subsector in Chapter 24 and the online retail subsector in Chapter 25, if they meet the definition of those subsectors.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.
For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

**Chapter 9: Wholesale Distribution Sector Benchmarks**

Chapter 9 provides benchmarks for wholesale distributors. The category includes wholesale distributors of building products, home furnishings, home improvement products, auto parts, industrial components, electronics, food and beverage, and other products. The 21 respondents in the sample range in size from a minimum of about $50 million to $4 billion in revenue.

Wholesale distributors serve as middlemen between manufacturers and other businesses, often providing value-added services such as testing, packaging, bundling, warehousing, shipping, marketing, master data management, and inventory management. They serve a vital function in the supply chain of many industries, aggregating the demand of small-order customers and stocking products from a variety of suppliers to provide one-stop shopping. Information concerning supply and demand is essential for wholesale distributors. Transportation management and warehouse management systems are also central to the application portfolios of these organizations. Despite their reliance on information technology, wholesale distributors tend to spend less on IT as a percentage of revenue than most other sectors do, mostly as a result of their high levels of revenue per employee.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

**Chapter 10: Energy and Utilities Sector Benchmarks**

Chapter 10 provides benchmarks for public utilities, oil and gas producers, service companies, and midstream distributors across all organization sizes. The 23 respondents in this sector include public utilities; water, gas, and electric utilities; integrated energy companies; upstream exploration and production companies; natural gas companies; pipeline operators; and other energy and utilities companies. The companies in our sample range in size from a minimum of about $50 million to more than $26.8 billion in annual revenue.

These companies generate high levels of revenue per employee and support extensive field operations, and as such are characterized by high spending on IT on a per-user basis and low to moderate levels of IT spending as a percentage of revenue. They invest in mobile communications
and technology to a higher degree than most organizations. Utilities are capital- and IT-intensive concerns and have a high level of IT spending on a per-user basis and especially high spending on applications for physical plant and customer relationship functions. They are also leaders in the Internet of Things adoption, powered by sensor data and geographical information systems (GIS). Energy utilities are undergoing a significant amount of modernization, much of it driven by state and federal mandates for smart meters, smart networks, smart grids, and other efficiencies geared toward significantly reducing energy use, especially during times of peak demand. As such, utility companies are increasingly supporting new technology initiatives that enable them to improve service delivery, increase efficiency, and reduce overall power demand.

In addition to appearing in this chapter, many energy and utilities respondents also appear in the sample for the utilities subsector in Chapter 26 if they meet the definition for that subsector.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

**Chapter 11: Healthcare Services Sector Benchmarks**

Chapter 11 provides benchmarks for healthcare services companies. The 42 respondents in this sector include community hospital groups, multiregional hospital systems, healthcare systems, dental service organizations, university hospitals, long-term care facilities, and other healthcare organizations. These organizations range in size from a minimum of about $50 million to $16 billion in annual revenue.

These organizations share complex payment and reimbursement arrangements and strict IT security and privacy requirements. The sector requires IT staff with sector-specific skills in dealing with patient medical records systems, mobile platforms, and imaging and other clinical systems with large data storage and networking requirements. Hospitals also support many users who are not employees, and they have relatively high levels of spending on IT.

In addition to appearing in this chapter, many healthcare services providers also appear in the sample for the hospitals subsector in Chapter 27 if they meet the definition for that subsector.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and
large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

**Chapter 12: Professional and Technical Services Sector Benchmarks**

Chapter 12 provides benchmarks for professional and technical services organizations. The 40 respondents in the sample range in size from a minimum of about $50 million to about $10 billion in annual revenue. The sector includes firms that provide professional and technical services, including engineering, legal, accounting, financial advice, consulting, marketing, research, and other services.

These organizations are characterized by a high percentage of knowledge workers who make extensive use of technology. CRM, professional services automation, project management, and knowledge management are important applications in this sector. These organizations are often leaders in the adoption of software as a service and mobile applications. They tend to spend moderate amounts on IT, relative to other sectors.

Please note that IT services providers, software companies, and value-added resellers are not included in the sample for this sector, even though they often have professional services groups. Rather, we include such organizations in the IT services and solutions sector in Chapter 15.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

**Chapter 13: Transportation and Logistics Sector Benchmarks**

Chapter 13 provides benchmarks for the transportation and logistics sector. The 24 respondents in this sample range in size from a minimum of $52 million to about $41 billion. The category includes organizations that operate buses, trucks, railways, airlines, barges, and ships. The sector also includes logistics companies that transport goods and transportation companies as well as regional transportation authorities that move people.

These organizations require systems to track moving stock, manage inventory, and maintain flexible communications systems. Some of them are leaders in collection of sensor-based data for tracking
fleet assets and have extensive networks to support these requirements. In some cases, only a portion of the employees in this sector use IT systems, and these capital-intensive organizations spend only a moderate amount on IT as a percentage of revenue.

In addition to appearing in this chapter, some transportation and logistics companies also appear in the sample for the logistics subsector in Chapter 30 if they meet the definition for that subsector.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

**Chapter 14: Construction and Trade Services Sector Benchmarks**

Chapter 14 provides benchmarks for construction and trade services companies. The 28 respondents in the sample range in size from about $52 million to $9.9 billion in annual revenue. The category includes engineering and construction companies; commercial, residential, and industrial construction contractors; oil field services firms; firms that provide mining services; environmental services firms; and other construction and trade services firms.

For companies in this sector, only a portion of employees use corporate IT systems. They require systems to support engineering, back-office, and project management activities. Some of them are heavy users of geographic information systems. These organizations support a high number of smartphone users, but they tend to have small IT budgets in proportion to revenue and employee headcount.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”
Chapter 15: IT Services and Solutions Sector Benchmarks

Chapter 15 provides IT spending and staffing statistics for the IT services and solutions sector. The category includes software companies, software-as-a-service providers, systems integrators, IT solution providers, business process outsourcing firms, and other providers of technology services and solutions. There are 27 organizations in the sample, ranging in size from around $50 million to $126 billion in annual revenue.

Companies in this sector leverage IT as part of their core competency and tend to invest in emerging technologies. They often have a large customer service component in their businesses and make use of sophisticated CRM systems. Their finance and accounting systems can have complex needs around subscription or usage-based billing and revenue recognition. They usually have the need for professional services automation and project management systems. One important note: Our metrics for this sector are for internal IT support only and not for development or delivery of IT products or services to customers.

In addition to appearing in this chapter, some of the respondents in this chapter also appear in the sample for the high-tech subsector in Chapter 20 if they meet the definition for that subsector.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

Chapter 16: Government Sector Benchmarks

Chapter 16 provides benchmarks for government organizations. The 41 respondents in the sample range in size from $52.6 million to $68 billion in annual revenue. The category includes city and county governments, federal and state agencies, law enforcement agencies, organizations that provide IT services to government agencies, and other government organizations.

Government organizations can have major investments in citizen-facing systems and websites, and they often are heavy users of geographic information systems. In many cases, there is a historical reliance on custom software and legacy systems.

In addition to appearing in this chapter, our government respondents also appear in the samples for city and county governments in Chapter 28 and government agencies in Chapter 29, depending on how they meet the definitions for those subsectors.
Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

**Chapter 17: Nonprofits and Charitable Organizations Sector Benchmarks**

Chapter 17 provides benchmarks for nonprofits and charitable organizations. The sector includes local and national charity organizations, conservation groups, organizing bodies, and other nonprofit organizations. We do not include organizations where the nonprofit status only reflects the entity type, such as nonprofit hospitals, where for all intents and purposes they operate from an IT perspective in a way that is not significantly different from for-profit hospitals. The 19 respondents in the sample range in size from a minimum of about $50 million to $430 million in annual revenue.

Nonprofits and charitable organizations tend to lag for-profit organizations in adopting new technologies, and spending on new initiatives is constrained. Their unique requirements for information systems tend to be in financial applications, which often need to support grant management, contributions accounting, and fund accounting. They frequently need specialized CRM systems to support fundraising campaigns and donor relationship management. Contrary to common belief, nonprofit organizations do not always spend less on IT as a percentage of revenue or per-user than commercial organizations do.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

**Chapter 18: Education Sector Benchmarks**

Chapter 18 provides benchmarks for the education sector. The sector includes public and private colleges and universities, business and medical schools, for-profit educational institutions, and school districts. The 20 respondents in the sample have annual revenues ranging in size from a minimum of about $50 million to $1.9 billion.
CHAPTER 1: EXECUTIVE SUMMARY

Many educational institutions have multi-building campuses or multiple campuses, which leads to significant investment in network infrastructure. They also tend to have high desktop support requirements for student labs and classrooms. Back-office systems for accounting, human resources, billing, and other administrative functions are typical, but they often have specialized applications to handle enrollment and student records.

In addition to appearing in this chapter, some of the respondents in this chapter also appear in the sample for the higher education subsector in Chapter 31 if they meet the definition for that subsector.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

Chapter 19: Commercial Real Estate Subsector Benchmarks

Chapter 19 provides benchmarks for commercial real estate organizations. The 38 respondents in the sample range in size from $100 million to over $3.2 billion in annual revenue. The sector includes retail, office, industrial, multi-family, and other property management companies; commercial real estate developers; real estate investment firms; and real estate brokers, consultants, and advisors.

Most commercial real estate firms are asset-intensive with high levels of revenue per employee. As a result, they tend to have a comparatively low level of IT spending as a percent of revenue but moderate to high levels of IT spending on a per-user basis. Their specialized needs for IT systems include asset management, property management, lease management, and other commercial real estate applications. They are heavy investors in the Internet of Things with initiatives such as smart buildings and energy management systems. They tend to be more advanced than many other industries in their adoption of cloud applications and mobile devices.

In addition to appearing in this chapter, a few of the respondents in this chapter also appear in the sample for banking and financial services organizations in Chapter 6 if they meet the definition for that sector.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.
CHAPTER 1: EXECUTIVE SUMMARY

over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

Chapter 20: High-Tech Subsector Benchmarks

Chapter 20 provides benchmarks for high-tech companies. The category includes computer products manufacturers, telecommunications equipment manufacturers, semiconductor manufacturers, aerospace and defense manufacturers, pharmaceutical makers, biotechnology product makers, software developers, software-as-a-service providers, and other high-tech companies. The 34 respondents in this sample range in size from a minimum of about $50 million to $80 billion in revenue.

Organizations in the high-tech subsector are characterized by having complex team-based sales processes, large customer service and support needs, and significant investment in research and development. They tend to spend a moderately higher amount on IT than other sectors.

In addition to appearing in this chapter, the high-tech subsector respondents often appear in the samples for other sectors, specifically process manufacturing (Chapter 4), discrete manufacturing (Chapter 5), and IT services and solutions (Chapter 15), if they meet the definitions for those sectors.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

Chapter 21: Food and Beverage Subsector Benchmarks

Chapter 21 provides benchmarks for food and beverage manufacturers. The 16 respondents in the sample range in size from $65 million to $2.2 billion in annual revenue. Food and beverage companies produce beverages, snack foods, meat products, seafood products, dairy products, dietary supplements, and other consumable food products. Some are suppliers to other food manufacturers or to the food service industry, while many also distribute consumer products to retailers or direct to consumers.

Food and beverage companies have moderately low levels of IT spending, focused primarily on back-office, manufacturing, and supply chain functions. These firms invest in ERP, product life-cycle
management, and supply chain applications, but usually have lower investment in customer-facing systems than other subsectors. Like most process manufacturers, they often have sophisticated systems for factory plant and equipment maintenance, including real-time monitoring. Food safety regulations have forced food manufacturers to increase their investment in supply chain management to allow tracking and tracing products from source to final distribution.

In addition to appearing in this chapter, food and beverage respondents also appear in the sample for process manufacturers (Chapter 4), since all food and beverage companies are, by definition, process manufacturers.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

**Chapter 22: Industrial and Automotive Subsector Benchmarks**

Chapter 22 provides benchmarks for industrial and automotive manufacturers. The 18 respondents in this subsector make auto parts, aviation products, material handling equipment, engines, machinery, and similar capital goods. The manufacturers in the sample range in size from $86 million to $7.3 billion in annual revenue.

Industrial and automotive companies have moderate levels of IT spending, focused primarily on back-office, manufacturing, and supply chain functions. These firms invest in ERP and supply chain applications, but have lower investment in customer-facing systems than other subsectors. On the other hand, they are increasingly making investments in manufacturing execution systems, including capabilities for factory data collection, real-time machine network connectivity, and sensor data from smart manufacturing processes. Many of them also have requirements for field service and the ability to connect to installed products at customer locations.

In addition to appearing in this chapter, most of the industrial and automotive respondents also appear in the sample for discrete manufacturers in Chapter 5 if they meet the definition for that sector.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-
over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

**Chapter 23: Commercial Banking Subsector Benchmarks**

Chapter 23 provides benchmarks for commercial banks. This subsector includes credit unions and community, regional, and national banks. The 16 respondents in this sample have annual revenue ranging from a minimum of about $50 million to $90 billion.

As with other types of financial services firms, commercial banks are information-intensive businesses with a high percentage of knowledge workers. These businesses are highly regulated, and they have significant requirements for information security, disaster recovery, and real-time transaction processing. Many of them also have major investments in consumer-facing website applications. Banking organizations are IT-intensive and spend a higher percentage of revenue on IT than companies in most other sectors.

In addition to appearing in this chapter, all of the respondents for the commercial banking subsector appear in the sample for the banking and finance sector in Chapter 6.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

**Chapter 24: Brick-and-Mortar Retail Subsector Benchmarks**

Chapter 24 provides benchmarks for brick-and-mortar retailers. This subsector includes department stores, clothing stores, convenience stores, pharmacies, hardware stores, nonprofit retailers, furniture retailers, agricultural retailers, and other retailers. The 18 respondents in this sample have annual revenue ranging from $80 million to $63 billion.

Most brick-and-mortar retailers have data networks that support multiple selling locations for point-of-sale and inventory management. Application portfolios range from high-volume transaction-processing systems to sophisticated systems for business intelligence and data analytics. Most brick-and-mortar retailers have at least some capabilities for business-to-consumer web commerce. Brick-and-mortar retailers have a mix of full-time and temporary employees, not all of whom use
computers. The automation of credit transactions and storing of customer information make information security and privacy an important requirement in this subsector.

In addition to appearing in this chapter, all of the brick-and-mortar retailers also appear in the sample for the retail sector in Chapter 8. However, in this chapter we exclude hospitality organizations, consumer services providers, and other organizations selling to consumers that do not have retail storefront operations. Some of the retailers in this chapter also appear in the sample for online retailers in Chapter 25, if they have e-commerce capabilities.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

**Chapter 25: Online Retail Subsector Benchmarks**

Chapter 25 provides benchmarks for online retailers. This subsector includes clothing retailers, home furnishing retailers, dietary supplements and health products retailers, sports equipment retailers, and other online retailers. The 15 respondents in this sample have annual revenue ranging from $80 million to $63 billion.

As with other types of retailers, online retailers have portfolios that range from high-volume transaction-processing systems to sophisticated systems for business intelligence and data analytics. Online retailers, obviously, have major investments in e-commerce systems, which drives much higher levels of IT spending compared to retailers in general. The automation of credit transactions and storing of customer information make information security and privacy an important requirement in this subsector.

In addition to appearing in this chapter, all of the respondents for this subsector appear in the sample for the retail sector in Chapter 8. Many, though not all, online retailers have a brick-and-mortar presence as well. If so, they would also be found in the sample for brick-and-mortar retail in Chapter 24.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-
over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

**Chapter 26: Utilities Subsector Benchmarks**

Chapter 26 provides benchmarks for utilities. The 15 respondents in this subsector range in size from about $87.9 million to $126 billion in annual revenue. This category includes gas and electric utilities, power transmission distributors, water and power utilities, and telecommunications service providers.

Utilities are capital- and IT-intensive concerns and have a high level of IT spending on a per-user basis and especially high spending on applications for physical plant and customer relationship functions. Energy utilities are undergoing a significant amount of modernization, much of it driven by state and federal mandates for smart meters, smart networks, smart grids, and other efficiencies geared toward significantly reducing energy use, especially during times of peak demand. As such, utility companies are increasingly supporting new technology initiatives that enable them to improve service delivery, increase efficiency, and reduce overall power demand.

In addition to appearing in this chapter, all of the utilities respondents in this chapter also appear in the sample for the energy and utilities sector in Chapter 10.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

**Chapter 27: Hospital Subsector Benchmarks**

Chapter 27 provides benchmarks for hospitals. The 30 respondents in this subsector range in size from $60 million to $16 billion in annual revenue. This category includes community hospitals, university hospitals, nonprofit hospitals, health clinics, healthcare systems, and regional healthcare providers.

Hospitals share complex payment and reimbursement arrangements and strict IT security and privacy requirements. The sector requires IT staff with sector-specific skills in dealing with patient medical records systems, mobile platforms, and imaging and other clinical systems with large data
storage requirements. Hospitals also support many users who are not employees and have relatively high levels of spending on IT.

In addition to appearing in this chapter, all of the hospital respondents in this chapter also appear in the sample for the healthcare services sector in Chapter 11.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

**Chapter 28: City and County Government Subsector Benchmarks**

Chapter 28 provides benchmarks for city and county governments. This chapter is concerned with the IT workings of city or county governments and not individual agencies within larger governments (which can be found in Chapter 29). The 23 respondents in this subsector have annual operating budgets ranging from $60 million to $68 billion.

City and county governments require information systems for nearly every aspect of their day-to-day operations and services. Yet they often lag other sectors in adopting new systems and technologies and upgrading existing systems. Asset management, geographic information systems, e-government applications, and specialized accounting systems can be important applications in this sector. Information security, privacy, and disaster recovery also are important concerns. Their IT spending tends to be moderate in comparison to other sectors.

In addition to appearing in this chapter, all of the city and county government respondents in this chapter also appear in the sample for government organizations in Chapter 16.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”
Chapter 29: Government Agency Subsector Benchmarks

Chapter 29 provides benchmarks for federal, state, and regional government agencies. The category includes public health agencies, courts and law enforcement agencies, organizations that provide IT services to government agencies, social service agencies, state parks, lotteries, and other federal, state, and regional government units. The 18 respondents in the sample have operating budgets that range in size from $52.6 million to about $40 billion.

Most government agencies rely heavily on IT to maintain information and deliver services. Nearly all employees use IT, and spending on IT can be considerably higher than spending by local government. Asset management, geographic information systems, e-government applications, and specialized accounting systems can be important applications in this subsector. Information security, privacy, and disaster recovery also are important concerns.

In addition to appearing in this chapter, the respondents in this subsector also appear in the sample for government organizations in Chapter 16.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

Chapter 30: Logistics Subsector Benchmarks

Chapter 30 provides benchmarks for logistics providers. The 18 respondents in this sample range in size from $52 million to about $40.7 billion. The sector is comprised of logistics companies that transport goods, including refined petroleum distributors, national moving or courier companies, freight transportation companies, supply chain logistics providers, and other logistics companies.

These organizations require systems to track moving stock, manage inventory, and maintain flexible communications systems. Only a portion of the employees in this sector use IT systems, and these capital-intensive organizations spend only a low-to-moderate amount on IT as a percentage of revenue.

In addition to appearing in this chapter, all of the logistics providers in this chapter also appear in the sample for transportation and logistics organizations in Chapter 13.
Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”

**Chapter 31: Higher Education Subsector Benchmarks**

Chapter 31 provides benchmarks for higher-education institutions. The sector includes public and private colleges and universities, business and medical schools, and for-profit institutions. The 16 respondents in the sample have annual revenues ranging in size from about $50 million to $1.6 billion.

Most educational institutions have large campuses and need to network multiple sites, resulting in extensive investment in network infrastructure. They also have high desktop support requirements due to the presence of classroom and student lab systems. Back-office systems for accounting, human resources, billing, and other administrative functions are typical, but they may have specialized applications to handle enrollment and student records. Their IT spending tends to be moderate to high as a percentage of revenue but relatively low on a per-user basis.

In addition to appearing in this chapter, all of the respondents in this chapter also appear in the sample for the education sector in Chapter 18.

Our sector and subsector benchmarks are based on three years of survey data. For benchmarking purposes, these statistics should be used in conjunction with our benchmarks by organization size in Chapters 3A, 3B, and 3C. These chapters provide a broader set of metrics for small, midsize, and large organizations based on data from the current-year survey. We also provide an analysis of year-over-year trend data by sector in the Executive Summary in Chapter 1 and for the composite sample in Chapter 2.

For a list of benchmarks in this chapter, consult the section on “Metrics in Sector and Subsector Chapters.”
Metrics in Composite and Organization Size Chapters

This section lists the metrics provided in Chapter 2 for the composite sample and in Chapters 3A, 3B, and 3C for small, midsize, and large organizations. These chapters include 50 figures or tables, presented in 13 sections.

In Section 1, we describe the key characteristics of the sample to establish a basis for comparison with other IT operations. These metrics are as follows:

- Organization size demographics, including revenue, employees, and revenue per employee
- IT spending demographics, including total IT spending, IT capital spending, and IT outsourcing budget
- IT infrastructure demographics, including number of data centers, network sites, and business applications
- Key metrics of IT intensity, including users per employee, PCs per user, percentage of users with tablets, percentage of users with smartphones, users per network site, and percentage of application functionality from custom systems

In Section 2, we describe IT spending by type of spending. These metrics not only provide additional demographic information, but also identify IT trends. They include:

- Percentage of IT spending devoted to ongoing support
- Percentage of IT spending devoted to new initiatives
- Outsourcing as percentage of IT budget
- Percentage of IT spending outside IT budget
- Cloud software subscriptions as percentage of application spending

In Section 3, we examine key budget priorities for IT organizations. These metrics include:

- Spending priorities by budget area, showing the net percentage of organizations planning to increase spending on IT personnel, business applications, data center, networking, and end-user technology
Plans for IT outsourcing, showing the percentage of companies planning to increase, decrease, and maintain spending at about the same level

Spending priorities by IT initiative, showing the net percentage of organizations planning to increase spending on security/privacy, cloud applications, business intelligence and data warehousing solutions, cloud infrastructure, mobile devices, and disaster recovery/business continuity

The importance of lower costs vs. improving service levels in the coming year

Section 4 presents metrics on total IT spending, which includes current-year IT capital and operational spending, but excludes depreciation. These metrics include:

- Total IT spending as percentage of revenue
- Total IT spending per user
- Total IT spending per PC
- Budget categories as average percentage of total IT spending, including spending on personnel, business applications, data center hardware/software, energy/utilities, IT facilities/floor space, network infrastructure, security, voice/data carrier expenses, PCs/end-user devices, printers/printing, and other expenses

![Budget Categories as Average Percentage of IT Operational Spending (Example Only)](image)
Section 5 presents metrics for IT operational spending. These metrics are as follows:

- Percentage of organizations decreasing, maintaining, or increasing IT operational spending year over year
- IT operational budget percentage change from prior year
- Adequacy of current IT operational budget to support the business
- IT operational spending as percentage of revenue
- IT operational spending per user
- IT operational spending per PC
- Percentage of IT operational budget charged back to business units
- Budget categories as average percentage of IT operational spending, including spending on personnel, business applications, data center hardware/software, energy/utilities, IT facilities/floor space, network infrastructure, IT security, voice/data carrier fees, PCs/end-user devices, printers/printing, and other expenses
- Personnel as percentage of IT operational spending at the 25th percentile, median, and 75th percentile
- Depreciation as percentage of IT operational budget

Section 6 provides an analysis of IT capital budgets, including:

- Percentage of organizations decreasing, maintaining, and increasing IT capital spending
- IT capital budget change from prior year
- IT capital budget as percentage of total IT budget
- Budget categories as average percentage of IT capital spending, including spending on personnel, business applications, data center hardware/software, energy/utilities, IT facilities/floor space, network infrastructure, security, voice/data carrier fees, PCs/end-user devices, printers/printing, and other expenses

In Section 7, we provide key metrics and trend data on IT staffing, including:
■ Users per IT staff member

■ Percentage of organizations increasing, maintaining, and decreasing IT staff levels from previous year

■ IT staff headcount change from previous year

■ IT staff turnover

■ Annual training allocation per IT employee

■ Contingency workers as percentage of IT staff

■ IT staff functions as average percentage of IT staff, including IT managers, IT finance/vendor management/procurement, project management, clerical support, application developers, application maintenance/support, data management, quality assurance/testing, database administration, server support, network support, communications support, web/e-commerce, IT security, help desk, desktop support, documentation/training/process and standards, and other functions
In Section 8, we provide key benchmarks for nine job functions:

- IT managers as percentage of IT staff
- OS instances per server support staff member
- Network devices per network support staff member
- Applications per application developer
- Applications per application maintenance and support staff member
- PCs per desktop support staff member
CHAPTER 1: EXECUTIVE SUMMARY

- Users per help desk staff member
- Help desk first-call resolution rate
- Help desk tickets per end-user support staff member

Section 9 shows IT spending by service area as a percentage of total IT spending. The service areas are IT management, business applications, data center, network, and end-user computing.

Section 10 provides business application metrics, including:

- Business application spending as percentage of IT spending
- Business application spending per user

Section 11 covers these data center metrics:

- Processing workload by operating system, including IBM mainframe, Unix, Linux, IBM i (formerly AS/400), Windows Server, and other
- Consolidated data center spending per user
- Consolidated data center spending per server
- Data center hardware/software spending as percentage of IT spending
- Data center hardware/software spending per user
- Energy/utilities as percentage of IT spending
- Energy/utilities spending per user
- Facilities/floor space spending per user
- OS instances per physical server
- Users per physical server

Section 12 covers the following networking metrics:

- Consolidated network spending per user
Network infrastructure as percentage of IT spending

Network infrastructure spending per user

Network spending per network site

IT security as percentage of IT spending

IT security spending per user

Data/voice carrier spending as percentage of IT spending

Data/voice carrier spending per user

Section 13 covers the following end-user computing metrics:

Consolidated end-user technology spending per user

PCs/end-user device spending per user

PCs/end-user devices as percentage of IT spending

PC refresh rate in years

Printer/printing as percentage of IT spending

Printer/printing spending per user

Users per printer

The study reports the benchmarks in this chapter by organization size in Chapters 3A, 3B, and 3C.

A discussion of the methods used in this study is at the end of this chapter.
**Metrics in Sector and Subsector Chapters**

The sector chapters, Chapters 4-19, and the subsector chapters, Chapters 20-31, have 30 figures and tables.

In Section 1, we describe the key characteristics of the respondents in this sector to establish a basis for comparison with other IT operations. These metrics are as follows:

- Organization-size demographics, including revenue, employees, and revenue per employee
- IT spending demographics, including total IT spending, IT capital budget, and IT outsourcing spending
- IT infrastructure demographics, including number of data centers, network sites, and business applications
- Key metrics of IT intensity, including users per employee, PCs per user, percentage of users with tablets, percentage of users with smartphones, users per network site, and percentage of application functionality from custom systems
- Helpdesk first call resolution rate

In Section 2, we describe IT spending by type of spending. These metrics not only provide additional demographic information, but also identify IT trends. They include:

- Percentage of IT spending devoted to ongoing support
- Percentage of IT spending devoted to new initiatives
- Outsourcing as percentage of IT budget
- Percentage of IT spending outside IT budget

Section 3 presents metrics on IT spending, which includes current-year IT operational and capital spending but excludes depreciation. These metrics include:

- Total IT spending as percentage of revenue
- Total IT spending per user
- Total IT spending per PC
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- Budget categories as average percentage of total IT spending, including spending on personnel, business applications, data center hardware/software, energy/utilities, IT facilities/floor space, network infrastructure, security, voice/data carrier expenses, PCs/end-user devices, printers/printing, and other expenses

Section 4 presents metrics for IT operational spending, which includes depreciation. These metrics are as follows:

- IT operational spending as percentage of revenue
- IT operational spending per user
- IT operational spending per PC
- Percentage of IT operational budget charged back to business units
- Budget categories as average percentage of IT operational spending, including spending on personnel, business applications, data center hardware/software, energy/utilities, IT facilities/floor space, network infrastructure, security, voice/data carrier fees, PCs/end-user devices, printers/printing, and other expenses
- Personnel as percentage of IT operational spending at the 25th percentile, median, and 75th percentile
- Depreciation as percentage of IT operational budget

Section 5 provides an analysis of IT capital budgets, including:

- IT capital budget as percentage of total IT budget
- Budget categories as average percentage of IT capital spending, including spending on personnel, business applications, data center hardware/software, energy/utilities, IT facilities/floor space, network infrastructure, security, voice/data carrier fees, PCs/end-user devices, printers/printing, and other expenses

In Section 6, we provide key metrics and trend data on IT staffing, including:

- Users per IT staff member
- IT staff turnover
- Annual training allocation per IT employee
Contingency workers as percentage of IT staff

IT staff functions as average percentage of IT staff, including IT managers, IT finance/vendor management/procurement, project management, clerical support, application developers, application maintenance/support, data management, quality assurance/testing, database administration, server support, network support, communications support, web/e-commerce, IT security, help desk, desktop support, documentation/training/process and standards, and other functions

Section 7 shows IT spending by service area as percentage of total IT spending. The service areas are IT management, business applications, data center, network, and end-user computing.

Section 8 provides business application metrics, including:

- Business application spending as percentage of IT spending
- Business application spending per user

Section 9 covers these data center metrics:

- Processing workload by operating system, including IBM mainframe, Unix, Linux, IBM i (formerly AS/400), Windows Server, and other
- Consolidated data center spending per user
- Data center hardware/software spending as percentage of IT spending
- Data center hardware/software spending per user

Section 10 covers the following networking metrics:

- Consolidated network spending per user
- Network infrastructure as percentage of IT spending
- Network infrastructure spending per user

Section 11 covers the following end-user computing metrics:

- Consolidated end-user technology spending per user
- PCs/end-user devices as percentage of IT spending
Appendix

This appendix includes common terms and definitions used in our annual survey and in this study. It also includes a detailed definition for all IT spending categories and staffing categories. The appendix concludes with a brief discussion on the statistics used in this study.

Common Terms and Definitions

This section provides definitions for some important terms used in our annual survey.

Business Applications: In counting business applications, we count systems, not individual programs. For ERP, we count each major subsystem, such as finance or HR, as a separate system. Business applications do not include database management systems, applications for managing infrastructure, or application development tools. Moreover, we do not count personal productivity applications or utilities, such as Microsoft Office, Adobe Acrobat, anti-virus, or web browsers.

Custom-Developed Systems: This includes all custom-written or in-house developed systems, plus any modifications or enhancements to commercial software packages.

Data Center: A data center is a physical location where computer servers are maintained/operated by full-time operations staff, including co-location facilities. We do not count locations that only have file, print, or email servers. We do not include disaster recovery facilities, unless they also operate as data centers during routine business.

Employees: Our definition includes full-time employees, part-time employees, temporary employees, and seasonal workers, whether paid as employees or as contractors. Employees are counted as full-time equivalents.

IT Spending: IT spending in our study refers to all IT expenditures incurred for the internal support of the business. It includes the following major types of IT spending.

- **IT Operational Spending** includes all IT expenses for the current fiscal year, plus depreciation. IT operational spending includes IT spending within the IT budget plus any IT spending within user department budgets.

- **IT Capital Spending** includes all IT spending that is treated as capital expenditures in the current fiscal year. IT capital expenditures typically flow through to the IT operational budget as depreciation over several years.
Depreciation includes the depreciation expense for IT investments, whether or not the depreciation is charged to the IT department. For organizations that record IT investment depreciation somewhere apart from the IT operational budget, we ask our survey respondents to put such amounts back into the IT operational budget.

Total IT Spending is the sum of IT operational spending and IT capital spending on a cash basis. It does not include depreciation. It also includes any IT spending that is within user department budgets.

Network Site: A network site is a physical location such as an office building, warehouse, or campus that is connected to the organization’s network and supported by its IT organization. An organization housed in a single campus has one network site. We do not count individual users connecting through the Internet or virtual private network (VPN) as network sites.

Network Device: These include routers, firewalls, network appliances, and other devices that make up the network infrastructure. We do not count “edge devices” such as PCs, printers, servers, storage devices, data collection devices, ATMs, or sensors.

New Initiatives: Refers to the implementation of new systems or IT capabilities.

Physical Servers: These include all types of physical servers, from mainframes to low-end servers.

Ongoing Support: Refers to activities needed to operate existing systems, including routine maintenance and support for normal growth in the business.

Operating System Instances: These are running instances of operating systems, including OS instances running natively on servers or virtual machines. Where server virtualization is practiced, the number of OS instances should be greater than the number of physical servers. We do not count the virtualization software itself (e.g. VMware) as an OS instance.

Outsourcing: We define IT outsourcing as contracting with a service provider to perform a function that would otherwise be performed in-house. An IT function can be fully outsourced or partially outsourced. Outsourcing includes any work managed by the service provider under an outsourcing contract. It does not include the use of contract workers under the day-to-day supervision of the IT organization for purposes of staff augmentation.

Personal Computer (PC): The term “PC” in our survey includes all physical desktops, laptops, workstations, thin clients, kiosks, handheld data-collection devices, ATMs, and POS systems. The count includes employee-owned desktops/laptops if they are supported by the IT organization. We do not include dumb terminals, tablets, or smartphones in our definition, however.
Revenue: Revenue in our survey corresponds to the revenue for the business that is being supported by the IT organization responding to our survey. If the IT organization supports only certain business units, respondents are instructed to report the revenue for those business units. Healthcare providers report operating revenue (not gross patient revenue). Governmental and nonprofit organizations report their organization’s total operating budget.

Smartphones: Smartphones include devices that potentially give employees access to mobile applications in addition to email, voice, and text communications. Our survey counts both company-owned and employee-owned smartphones, as long as they receive support from the IT organization.

Tablet Computers: These include all tablet computers, whether employee-owned or company-owned, as long as they receive support from the IT organization.

Users: Our definition of users includes individuals who are users of the organization’s IT systems. Users can be employee users, plus contractors, temporary employees, agents, partners, and other non-employee users that the IT organization supports. Our definition, however, specifically excludes website users. Not all employees need to be users, and not all users need to be employees. Therefore, the number of users may be greater than or less than the number of employees.
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IT Spending Category Definitions
The definitions in this section apply to operational, capital, and total IT spending categories. Please note the following special considerations in how we assign IT spending to categories:

- In the IT operational budget, all personnel costs go into the personnel line item.

- In the IT capital budget, capitalized labor is charged to the most appropriate category. For example, capitalized labor for application development is in application software.

- Most outsourcing costs are allocated to the IT budget as if the function were being performed in-house. Fees for services that primarily replace personnel are primarily personnel expenses.

- Fees for software as a service are in the application software category.

- Fees for public cloud infrastructure services are in the data center infrastructure category.

We make certain adjustments to the IT budget so that our study can account for all IT spending. Business units sometimes pay for engineering systems, PCs, voice/data service, software-as-a-service applications, or specialized business systems directly out of their budgets. We include these expenses within our definition of IT spending. We also include clinical systems for hospitals, point-of-sale systems for retailers, and ATM systems for banks in IT spending.

On the other hand, sometimes expenses show up in IT budgets that we do not include within our definition of IT spending. These items include spending on industrial control systems, robotics, or material handling systems. When using our metrics for benchmarking purposes, organizations should not include these expenses in their IT spending. We also exclude IT product or service costs for external customers of the business. (In other words, for IT product, services, and consulting firms, our benchmarks should be used for internal IT support only.)

The remainder of this section describes the budget categories in detail, with categories organized by group. In some cases, the category and group are one and the same, such as for the IT Personnel Expenses Group. In other cases, the group contains several categories, such as the Data Center Expenses Group.

**IT Personnel Expenses**
The IT personnel category includes all personnel costs, including compensation, taxes, benefits, and recruiting and training fees. The cost of contingency IT workers is charged to this category. Also, most outsourcing expenses for services that replace the need for IT staff belong here.
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Application Software Expenses
The application software category includes software license and maintenance fees, acquisition costs, and development costs for business applications and associated databases and middleware. It also includes subscription costs for software-as-a-service or hosted applications.

Data Center Expenses
These categories include all expenses for data center systems, software, services, and facilities.

- **Data Center Hardware/Software:** This category includes servers, storage, mainframes, and associated operating system software. It also includes data center utilities, automation systems, storage management applications, and systems management applications. Disaster recovery, public cloud infrastructure as a service, and data center outsourcing services also belong in this category.

- **Energy/Utilities:** This category includes all data center utility costs for power and cooling.

- **IT Facilities/Floor Space:** This category includes the cost of buildings, rent, property taxes and insurance, and corporate facilities charges.

Network Expenses
These categories include all expenses for network and communications services, software, and hardware, as well as expenses related to securing IT networks.

- **Network Infrastructure:** This category includes all network and communications systems hardware and software. Communications systems include telephone, email, messaging, unified communications, videoconferencing, mobile device management systems, and related hardware and software.

- **IT Security:** This category includes acquisition and maintenance costs for security hardware, software, and services such as security audits, assessments, testing, and managed security services.

- **Voice/Data Carrier Expenses:** This category includes telecom and data communications carrier service fees for all types of service, including long-distance and wireless service for all business units. It also includes charges for managed and cloud telecom and data communications services.

End-User Technology Expenses
These categories include expenses for hardware, software, and systems assigned to employees or workgroups.
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- **PCs/End-User Devices**: This category includes expenses for PCs and other end-user computing devices, including laptops, tablets, thin clients, smartphones, and terminals. It also includes desktop operating systems, desktop applications, and maintenance contracts or warranties. Fees for desktops as a service also go here.

- **Printers/Printing**: This category includes acquisition, leasing, and maintenance costs for all printers, copiers, scanners, plotters, and related consumables. This category also includes managed print services.

**Other Miscellaneous Expenses**
This category includes miscellaneous expenses, travel and entertainment expenses, data services, and expenses unique to specific organizations.
IT Staffing Category Definitions

Our staffing ratio reports provide multiple metrics designed to assess staffing requirements for specific IT functions. In our annual survey, we divide IT staff into 19 categories. Organizations should refer to these category definitions to better understand how to categorize IT staff members for the purpose of benchmarking. These categories are designed to cover every IT function at a broad level. The categories also are organized by group, which can be useful in determining how to categorize IT staff members.

IT staff members include employees as well as contractors and temporary employees who work under the supervision of the IT organization. In our IT staffing metrics, we adjust the IT staff member headcount to account for outsourcing.

IT job functions are defined as follows:

**IT Management Group**

The IT Management Group includes IT executives and managers, IT finance and vendor management personnel, project managers, and administrative support personnel.

- **IT Managers and Executives:** IT managers are individuals whose primary job function is to manage people. We group all IT management levels into a single job function, including IT executives. First-level managers who are primarily “doers” (i.e., managers in name only) are not counted as managers, but rather fall under the function that they supervise.

- **IT Finance, Vendor Management, Procurement:** Individuals whose primary job function within the IT organization is related to finance, accounting, budgeting, procurement, vendor contracts, or vendor management.

- **Project Managers:** Individuals who are part of a formal project management office or whose primary job function is project management. It does not include individuals who manage projects in addition to their primary job responsibilities.

- **Administrative Support:** Clerical/administrative personnel are individuals who support IT managers and other IT staff functions.

**Application Group**

The Application Group includes application programmers as well as other IT staff that support the development, maintenance, and use of enterprise business applications and web systems.

- **Application Developers, System Analysts, Architects:** These job functions include personnel involved with the development of business applications. They include application programmers, systems analysts, solutions architects. This category also includes enterprise
architects. It does not include business analysts, database administrators, or application maintenance and support personnel, who belong in their respective categories.

- **Application Maintenance and Support**: These job functions include personnel involved with the maintenance and support of business applications. They include application programmers who troubleshoot, debug, and make routine changes to applications. This category also includes application-specific support specialists. It does not include business analysts, database administrators, or application developers, who belong in their respective categories.

- **Business Analysts**: Individuals whose primary job function brings them directly into user business functions to gather user requirements, define or design business processes using information systems, and serve as liaisons between users and IT. This category also includes customer relationship personnel who represent the user community to the IT group and ensure IT systems are effectively used by the organization.

- **Data Management, Data Warehouse, Business Intelligence**: These individuals design, develop, architect, and model data schemes and databases for the organization. They may also design the organization’s data warehouse and business intelligence systems and analyze information maintained by such systems. This category does not include database administrators, who go in the database administration category.

- **Quality Assurance and Testing**: Individuals who are part of a dedicated quality assurance or testing function. It does not include individuals who perform testing as part of their other job responsibilities, such as application programmers who also perform their own unit testing.

- **Web/E-Commerce Staff**: Web developers, designers, administrators, and other individuals who work on the company’s public websites as well as those who maintain intranet sites. They also include personnel who are dedicated to e-commerce activities, such as EDI specialists.

**Data Center Group**

This group includes job functions that are accomplished by infrastructure support personnel responsible for maintaining servers, mainframes, storage, databases, and data center facilities.

- **Database Administrators**: Database administration and support personnel are responsible for maintaining, updating, modifying, and backing up database management systems.

- **Server Support Staff**: All data center staff who support the server and storage infrastructure, including system administrators, system programmers, system engineers,
storage administrators, and facility engineers. It also includes computer operators, job
schedulers, and production control personnel, disaster recovery administrators, and other
ancillary functions in the data center.

Network and Communications Group
This group includes job functions that comprise personnel responsible for maintaining data and
voice networks and email, messaging, videoconferencing, and unified communications systems.

- **Network Support Staff**: All network administration, engineering, architectural, and support
  positions for both data and voice network infrastructure.

- **Email/Messaging/ Communications Support Staff**: Engineers, specialists, and
  administrators who manage email, messaging, videoconferencing, unified communications,
  and other communication systems.

- **Security Professionals**: Individuals whose primary responsibilities include security policy
  and procedures, security compliance, and security audits.

End-User Support Group
This group includes most end-user support functions as well as training and documentation.

- **Help Desk**: Help desk personnel who provide first-contact support to end users, typically
  by phone, email, or other forms of remote communication. It does not include desktop
  support personnel.

- **Desktop Support**: Technical support staff members who install, configure, and maintain
  operating systems and applications on PCs and carry out other PC support functions such as
  troubleshooting and repairing network connectivity issues, migrating user data, installing
  peripherals, and responding to user problems that the help desk is unable to resolve. Desktop
  support may be handled remotely or in the field.

- **Training, Documentation, IT Process and Standards**: Staff members who develop or
  maintain documentation and provide training. This category also includes IT staff members
  whose job function is to establish and improve internal IT processes, methodologies,
  standards, and guidelines, such as those assigned to ITIL, CMMI, Six Sigma, and other IT
  process improvement programs.
Other Positions
We include IT staff in the “other” category if they perform functions not typically found in an IT organization.

Statistical Notes
Statistics are useful for summarizing data and analyzing trends. To evaluate the statistical findings in this study, it is useful to understand a few basic concepts and definitions.

Central Tendencies
One method frequently used to summarize how values are distributed within a sample is to identify where the “center” of all the responses falls. This center can be identified in various ways:

- The **median** is the halfway point: Half of the response values fall below this level and the other half above.
- The **mean** is the sum of all responses divided by the number of responses. The mean is also known as the **average**.
- The **mode** is the value that occurs most frequently in a collection of responses. Our study does not report the mode for any of our statistics.

Percentiles
IT benchmarks are often presented as means, or averages. In the study, most metrics are reported as percentiles. We present values at the 25th percentile, 50th percentile (median), and 75th percentile. A percentile is the value below which a given percentage of cases fall. For instance, if we report that IT staff headcount is increasing 1% at the 25th percentile, this means that lowest one-quarter of respondents are increasing headcount by 1% or less.

We believe percentiles are more useful as benchmarks than the mean average. In most spending and staffing categories, there are organizations that have unusually high spending or staffing. These outliers can pull up the mean average. Another way to view this is that the distribution of values is not normal, and the mean average will be higher, or in some cases lower, than the middle value, or median. The median value is often more representative of the typical organization than the mean.

More importantly, percentiles present a range within which typical spending or staffing falls for the survey population. Half of the organizations fall between the 25th percentile and 75th percentile, and IT organizations that fall within the range can determine that their spending or staffing is similar to other organizations. The difference between the 25th and 75th percentiles also reveals the amount of variation within the population. The narrower the variation, the more useful a benchmark is as a guide.
In some cases, we do present mean averages. We present averages when we want to rank responses or present responses as a portion of the total. For instance, we use averages when we rank top IT priorities or determine the percentage of organizations that are increasing or decreasing spending. We also use averages to assess IT spending mix where each line item is shown a percentage of the total.

**Interpreting the Results**

The data presented in this study must be considered in context. No two organizations are exactly alike, and there is no such thing as an “average company.” The statistics presented in this study must be looked at as a snapshot of a dynamic and complex set of interactions within organizations that use information systems. One must view the data from as many perspectives as possible to develop a valid appreciation of its meaning.

Therefore, we strongly encourage organizations that are using this information not to make conclusions solely on the basis of industry sector statistics, especially since these statistics are based on the smallest sample sizes. It is advisable to review the same statistics for the entire sample (Chapter 2) and by organization size (Chapters 3A-3C). Such an approach will provide additional perspectives on IT spending and staffing.

In addition, common sense should prevail when utilizing the statistics in this study. There are many factors that affect IT spending and staffing within an organization. One organization may conduct business with extensive support from IT, while a similar organization may have little automation. The latter will spend less on IT than the former, but that does not mean the latter is more efficient in its use of technology.

Therefore, the benchmarks presented in this study should not be taken as the final word on the “health” of an organization’s IT spending and staffing. Rather, they should be used as guidelines to understand an organization’s position relative to others and to gain insight into areas where further investigation may be warranted.

**Survey Methodology**

This section describes our overall process for collecting and analyzing the survey data as well as characteristics of the survey participants.

**Sample Selection and Process**

The survey was conducted from January to May 2019. We identified and selected participants by making solicitations to specific organizations in the U.S. and Canada that met our criteria for organization size and industry sector. The job position of each survey respondent was evaluated to ensure that each would be knowledgeable and likely to have access to the organization’s IT spending and staffing metrics. We then reviewed the applicants in terms of their industry sector and organization size to ensure that they were qualified to participate.
Qualified participants were offered two ways to respond to the survey: an online version and a PDF version. As the survey progressed, we monitored response volume by industry and organization size and adjusted our survey solicitation activities accordingly to ensure that the stratification of the survey sample was within acceptable bounds. This is an important step that allows meaningful comparisons to be done with previous years of this study.

At the end of the survey period, we reviewed all survey responses and conducted follow-up interviews with respondents in cases where answers were incomplete, inconsistent, or outside normal ranges, or where responses otherwise failed our validation tests. We corrected survey responses where appropriate. In cases where the respondent would not or could not provide meaningfully consistent information, we dropped the response from our sample to protect the integrity of our survey.

Finally, survey results were loaded into a statistical model to produce the analysis that appears in this study.
Survey Participants
There were 232 IT organizations in the U.S. and Canada who participated in our survey this year. The sample was stratified into three categories of organization size:

- Small organizations (IT operational budgets of less than $5 million)
- Midsize organizations (IT operational budgets of $5 million to less than $20 million)
- Large organizations (IT operational budgets of $20 million or greater)

To maintain the validity of certain spending and staffing ratios, we do not allow organizations to participate unless they have at least $50 million in annual revenue or IT operational budgets of at least $1 million.

In the case of public sector organizations, respondents were instructed to use the total organizational operating budget in place of revenue.

As shown in Figure 1-16, midsize companies comprise 34% of the survey respondents, followed by small organizations at 32%, and large organizations at 34%.

Source: Computer Economics, 2019

Figure 1-16
The percentage of respondents in each industry sector is shown in Figure 1-17.

Please refer to the chapter descriptions earlier in this executive summary for a description of each industry sector and subsector.
Custom Benchmarking Services

Readers are encouraged to analyze the data within this study and use it as a basis for benchmarking their own IT spending, staffing, and technology adoption. For those organizations that would like assistance in this effort, Computer Economics offers a custom benchmarking service in which we gather metrics for the target organization and compare them against the data collected in this study.

The deliverable from a custom benchmarking exercise is a report that triangulates the metrics from the target organization against the benchmark data by industry sector and organization size, as well as against the composite sample. Preliminary observations about potential causes of variation from the benchmark and directions for further inquiry are also provided. Contact us for a sample of the final presentation that is delivered as part of this service.

Organizations request custom benchmarking services from Computer Economics for a variety of reasons:

- To take advantage of the experience and resources of Computer Economics to more quickly and accurately prepare a benchmark evaluation
- To obtain the perspective of Computer Economics as a neutral third party for evaluating the spending, staffing, and technology utilization of an organization
- To evaluate the spending and staffing ratios of a potential corporate acquisition or investment target, as part of a due diligence exercise

Computer Economics can also serve as a trusted third party to prepare a custom benchmarking study for a group of companies in a more narrow sector—even between competitors—to allow participants to benchmark their IT spending, staffing, and technology utilization without revealing the details of their own metrics to the other participants. As with all our surveys, all information gathered by Computer Economics is held in strict confidence and is only revealed in aggregate in the survey results.

For more information about our custom benchmarking services, or to obtain a price quote, please contact us. Contact information may be found on our website at [www.computereconomics.com](http://www.computereconomics.com).