



# A sharper focus on internal controls

**A benchmark study of  
technology companies**

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# Introduction

**Heightened regulatory attention and significant changes in accounting standards are increasing the importance—and challenge—of creating and maintaining effective internal controls over financial reporting.**

**As the internal controls landscape evolves, KPMG LLP (KPMG) is pleased to present the findings from our latest internal controls study of technology companies. Our study provides a process-level look at the Sarbanes-Oxley 404 (SOX 404) internal controls programs implemented by technology companies of all sizes.**

**Our report presents summary findings and key measures from the survey data and is designed to help benchmark a company's SOX 404 program against industry peers and to help companies maximize value from their internal controls investment.**

## Growing scrutiny

Broader shifts in the regulatory landscape, growing scrutiny from regulators, including the Securities and Exchange Commission (SEC) and the Public Company Accounting Oversight Board (PCAOB), and revisions to key accounting standards—particularly those dealing with revenue recognition and lease accounting—provide an opportunity to update and enhance SOX 404 internal controls.

One of the key factors increasing attention on SOX 404 internal controls is the growing public discussion around internal control over financial reporting (ICFR) by officials from the SEC and PCAOB in public speeches and inspection findings. As recent as an April 2016 inspection brief previewing observations from 2015 Inspections of Auditors of Issuers, the PCAOB said, although its findings improved from the previous year, the most common audit deficiencies continue to fall in key areas related to auditing ICFR, along with assessing and responding to risks of material misstatement, and auditing accounting estimates, including fair value.<sup>1</sup>

Another effort driving organizations to examine their SOX 404 internal controls environment is the 2013 revision to the Internal Control—Integrated Framework released by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). The COSO 2013 framework was designed to help organizations enhance their controls environment, broaden the application of internal controls to support operational and reporting objectives, and clarify the ability of organizations to determine whether an internal control is effective.

ICFR was also cited as a leading challenge by respondents to a survey at KPMG's 25th Annual Accounting and Financial Reporting Symposium in late 2015. According to respondents, ICFR was cited by nearly a third (31 percent) as their leading challenge, followed by data infiltration and information technology (IT) security (26 percent), tax compliance (20 percent), and the potential for additional regulation (17 percent).<sup>2</sup>

## Management review controls

As part of a sharper focus on SOX 404 internal controls, organizations are interested in optimizing specific areas such as management review controls (MRCs). MRCs are the reviews conducted by management of estimates and other kinds of financial information for reasonableness. They require significant judgment, knowledge, and experience. Designing and maintaining effective MRCs depend, to a large degree, on evaluating the accuracy of the controls' design and operation. Organizations want assurance that their controls are operating at a sufficient level of precision to support the organization's risk management objectives.

In response to this challenge, many organizations are increasing their control-related documentation and testing efforts. This is to determine whether controls are operating as designed and that they can document the design and implementation decisions to internal and external stakeholders.

<sup>1</sup>PCAOB Staff Inspection Brief, Vol. 2016/1: Preview of Observations from 2015 Inspections of Auditors of Issuers (April 2016)

<sup>2</sup>Attendee survey, KPMG 25th Annual Accounting and Financial Reporting Symposium, December 2015

# Introduction (continued)

## Emerging issues

Major revisions to accounting standards, including revenue recognition<sup>3</sup> and lease accounting,<sup>4</sup> are adding to the challenge of maintaining effective SOX 404 internal controls. Both updates represent significant changes to the standards they are replacing and will require corresponding efforts to implement new controls—or at least to redesign existing controls to meet the new standards' requirements.

As companies prepare to become compliant with these standards, most are currently in an assessment stage, evaluating the requirements and financial reporting implications. Identifying potential effects on the number or types of required changes to their controls environment remains, largely, preliminary.

Growing cyber security risks are also prompting an examination of organizational internal controls. Organizations are reviewing their controls to determine whether:

- They have a thorough understanding of their cyber exposures.
- A cyber breach could have implications for their ICFR.
- Cyber security challenges could indicate a potential deficiency in their ICFR.

The increasing use of data analytics offers considerable promise for organizations and their ability to apply data-driven insights to improve their financial and operational results. In connection with this expanding adoption, reliance on system-generated data requires strong controls around the accuracy and completeness of the information feeding key reports used in the execution of key SOX controls.

<sup>3</sup>SOX 404 Accounting Standards Update 2014-09, Revenue from Contracts with Customers, issued in 2014 by the Financial Accounting Standards Board (FASB), and IFRS 15 Revenue from Contracts with Customers, issued by the International Accounting Standards Board (IASB)

<sup>4</sup>Accounting Standards Update 2016-02, Leases, issued in February 2016 by the FASB, and IFRS 16, Leases, issued by IASB in January 2016

## Ongoing communication

An effective SOX 404 internal controls environment requires an ongoing, collaborative effort among control owners, company management, internal audit, and other stakeholders.

It is important for all participants to understand and optimize the organization's business processes to develop an effective plan to design, implement, and monitor the organization's SOX 404 internal controls.

As market conditions, regulatory changes, and technology developments prompt operational changes, it is critical for the organization's SOX 404 internal controls environment to adapt to help it meet its requirements and address risk as effectively as possible.



## Key findings

The following are some key findings from the survey:

- The average number of key controls was 238.
- The average number of key controls in the software and services industry was 253.
- The average number of key controls in the electronics industry was 275.
- The average number of key controls for internet/online businesses was 161.
- Among companies that have completed an IPO in the last 36 months, the average number of key controls was 202.

Average number of key controls by company size:

- Less than \$1 billion: 166
- \$1 billion–\$5 billion: 244
- More than \$5 billion: 417

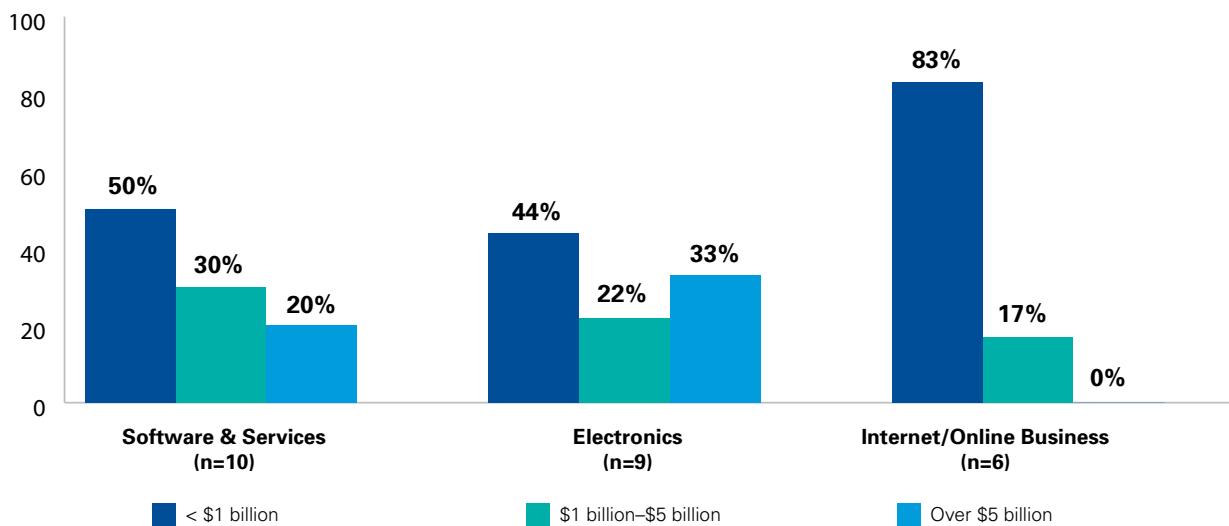
## Objectives and methodology

The results were derived from a Web-based survey that was conducted in late 2015 and early 2016, and the data has been broken out by industry and company size. The survey included companies from the electronics (e.g., hardware, semiconductors, etc.), software and services, and internet/online business industries.

Surveys were completed by a combination of company controllers, compliance managers, and chief audit executives. A total of 25 companies (10 in the software and services industry, 9 in the electronics industry, and 6 internet/online businesses) participated in the survey. The findings offer useful direction and provide a basis for comparison and further analysis.

Readers should consider multiple benchmarks (e.g., mean, median, etc.) for comparison and should draw their own conclusions regarding their individual company's SOX 404 program relative to their appropriate peer group to realize additional value from their respective compliance programs.

### Respondent industry by company size (defined by annual revenue)



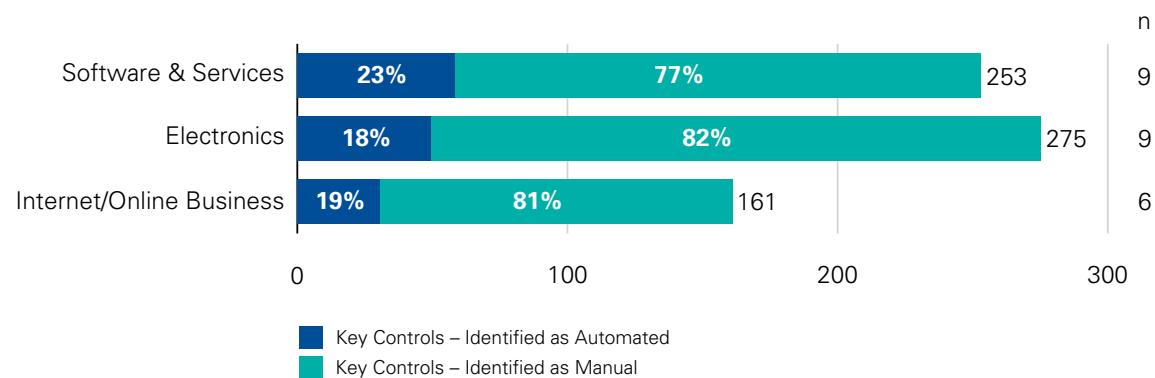
May not equal 100% due to rounding

# Detailed findings

## Key controls

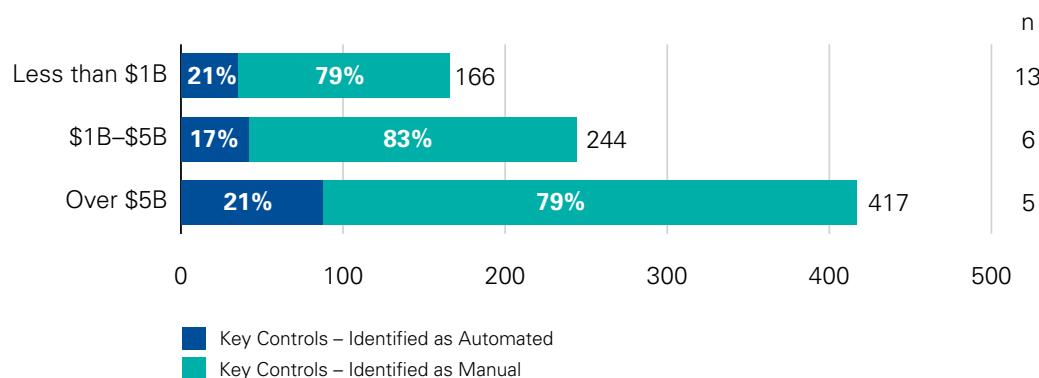
### Average number of key controls by industry

All processes – Includes IT general controls (ITGCs) and entity-level controls



### Average number of key controls by company size

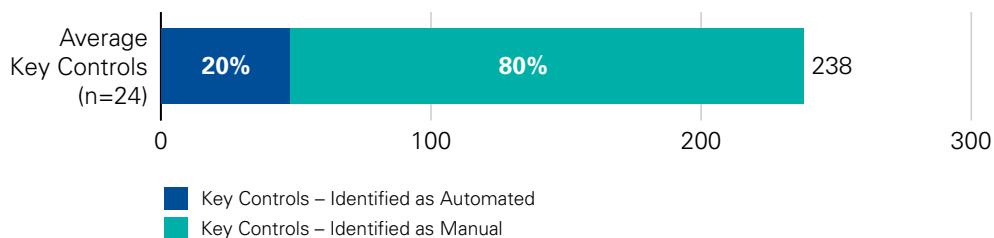
All processes – Includes ITGCs and entity-level controls



# Key controls

## Average number of key controls

All processes – Includes ITGCs and entity-level controls

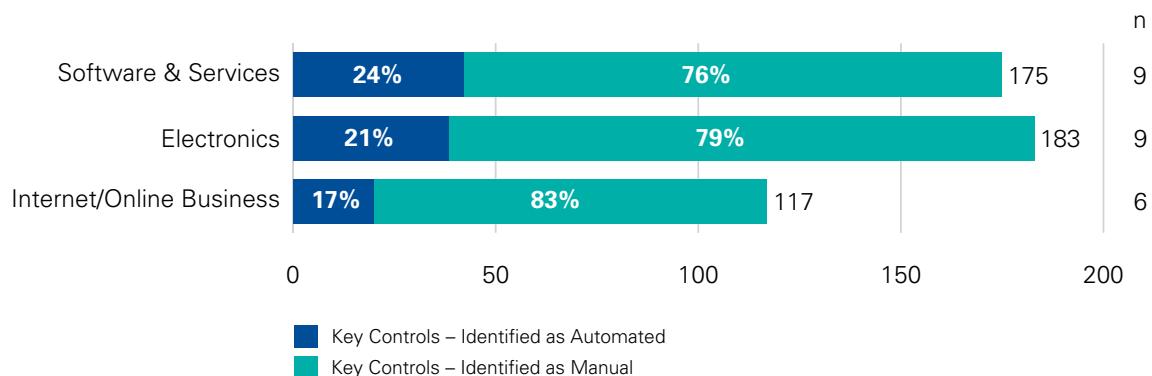


# Detailed findings (continued)

## Financial controls

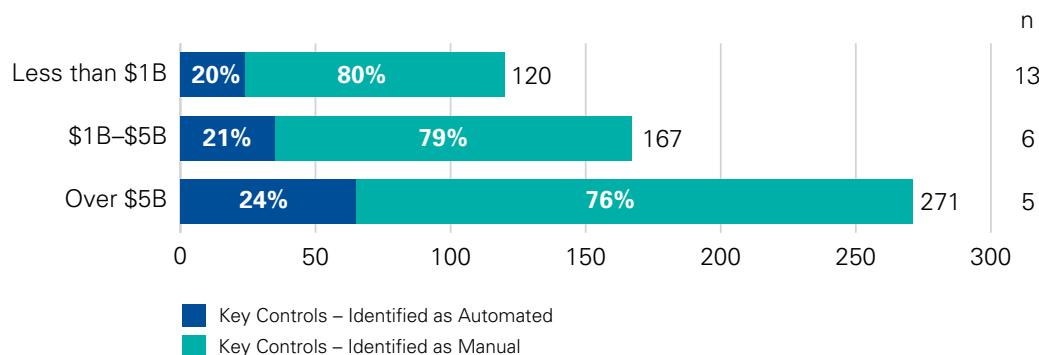
### Average number of financial process key controls by industry

All financial processes – Excludes ITGCs and entity-level controls



### Average number of financial process key controls by company size

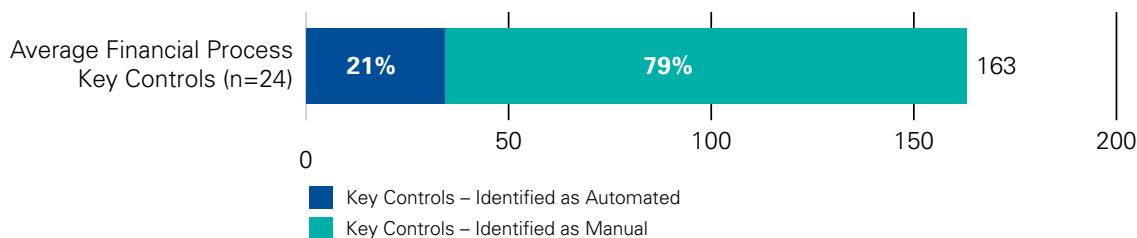
All financial processes – Excludes ITGCs and entity-level controls



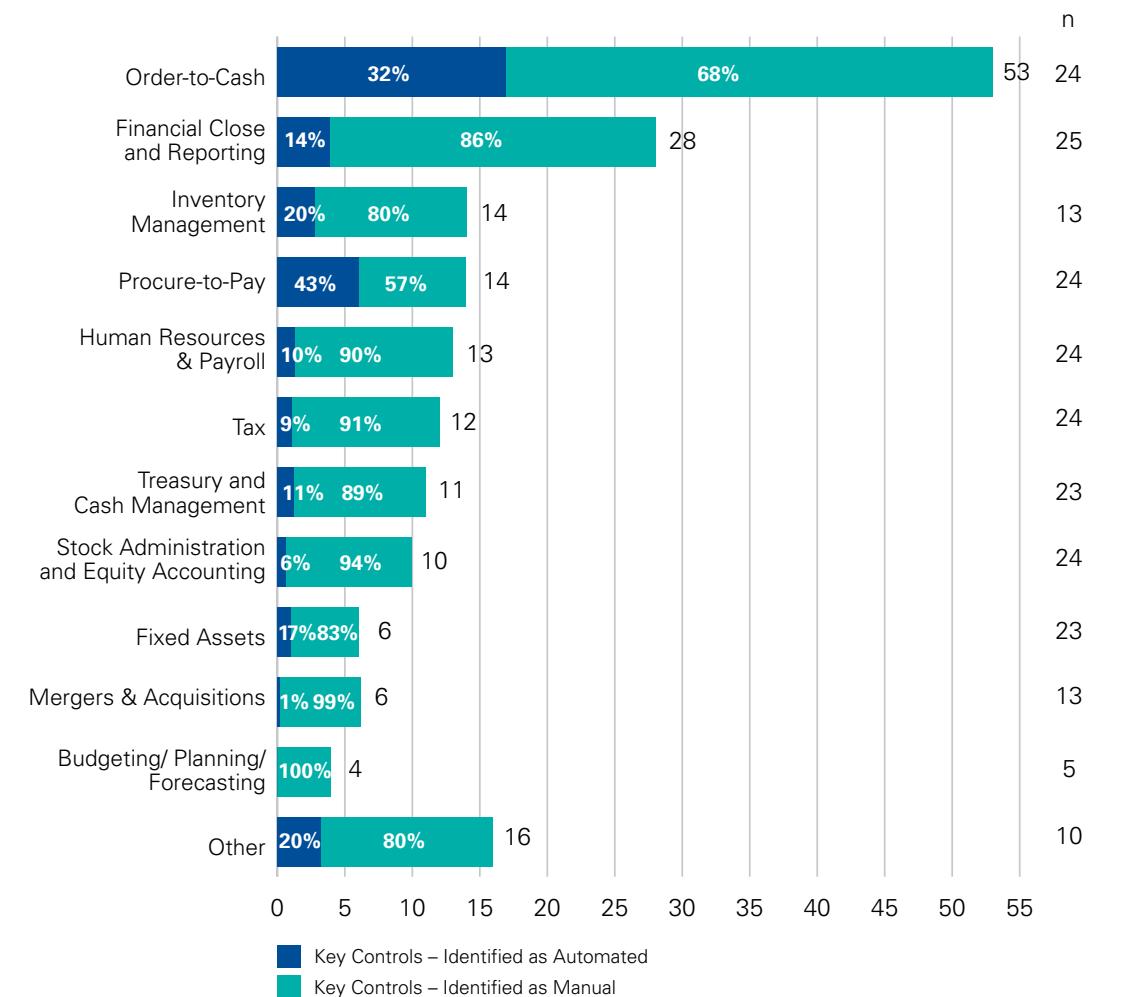
# Financial controls

## Average number of financial process key controls

All financial processes – Excludes ITGCs and entity-level controls



## Average number of key controls among financial processes

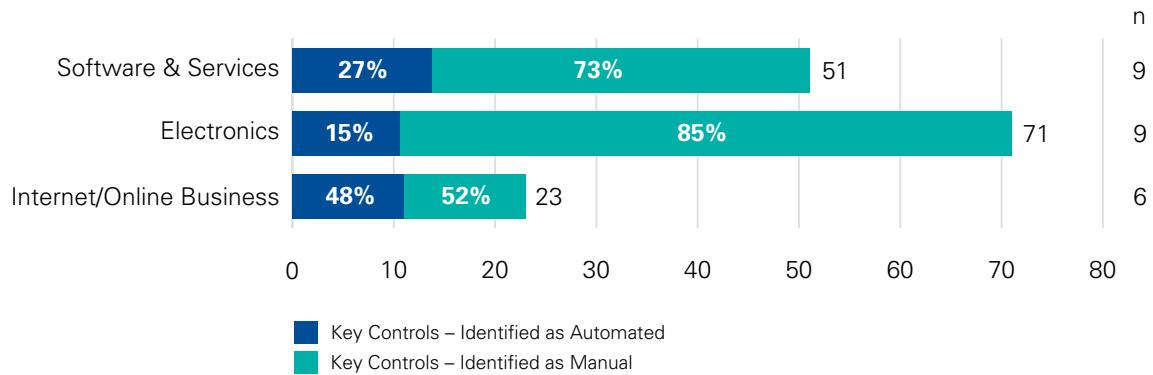


## Detailed findings (continued)

### IT general controls

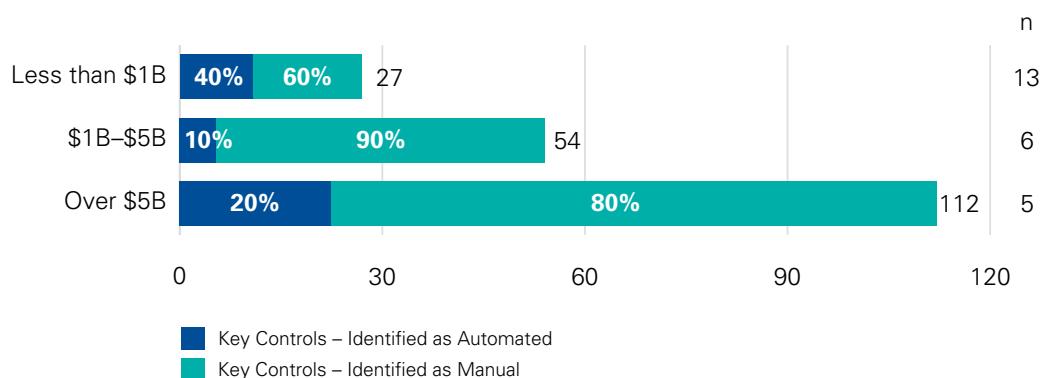
#### Average number of ITGCs by industry

All ITGCs



#### Average number of ITGCs by company size

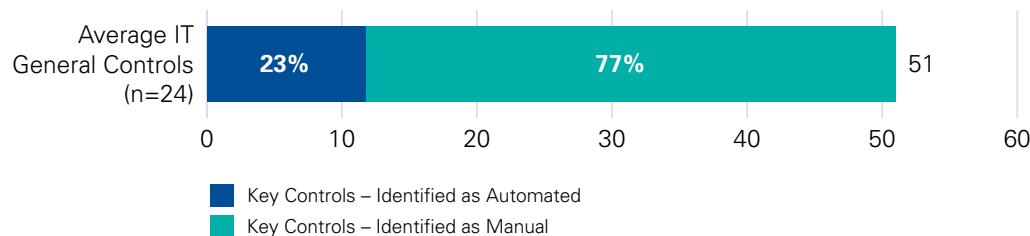
All ITGCs



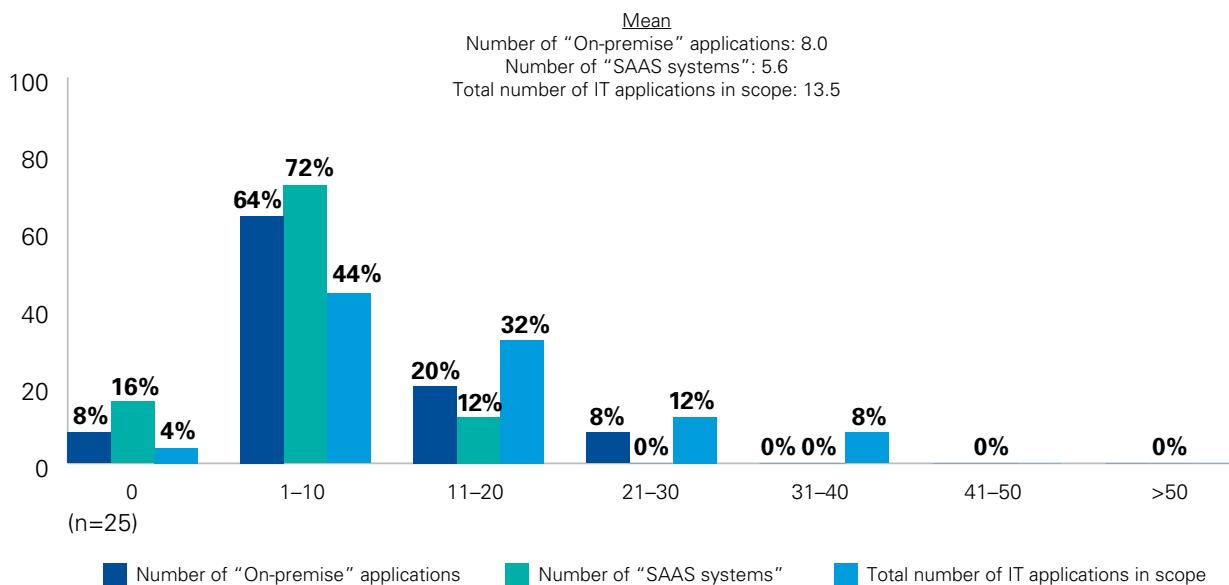
# IT general controls

## Average number of ITGCs

All ITGCs



## Number of IT applications in scope for SOX 404 compliance

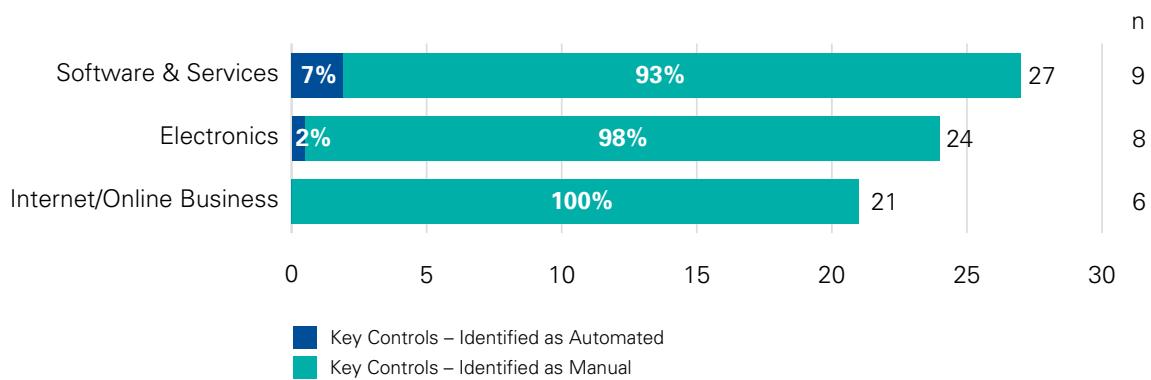


## Detailed findings (continued)

### Entity-level controls

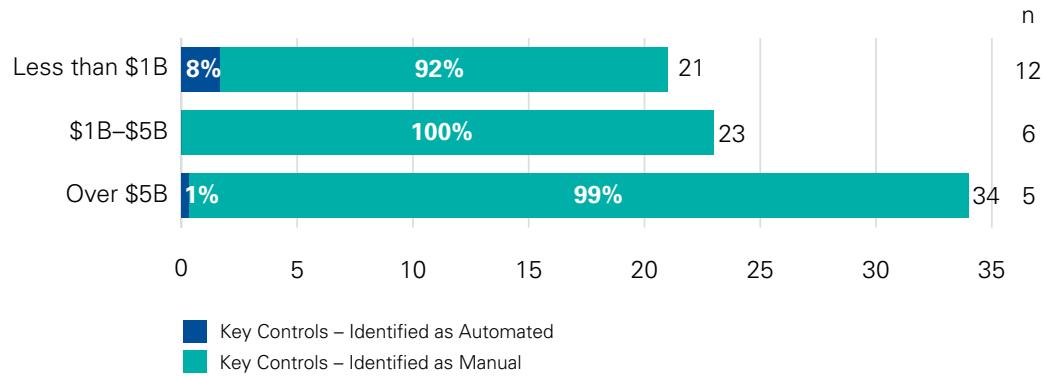
#### Average number of entity-level controls by industry

All entity-level controls



#### Average number of entity-level controls by company size

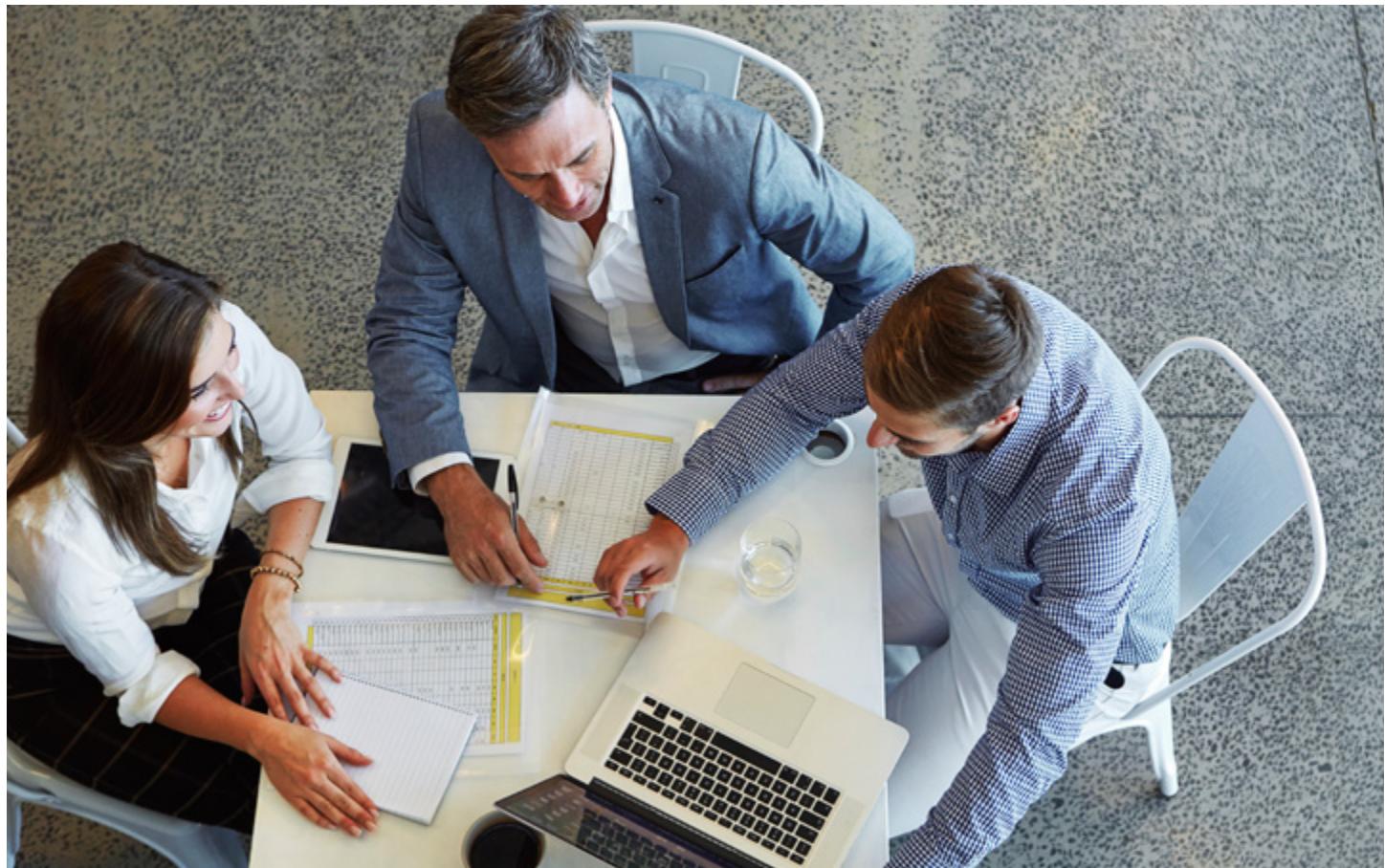
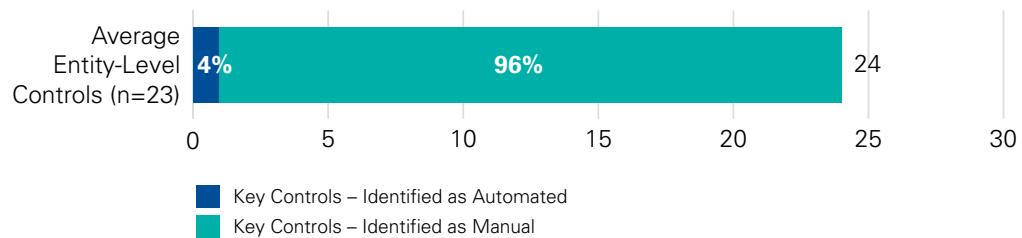
All entity-level controls



# Entity-level controls

## Average number of entity-level controls

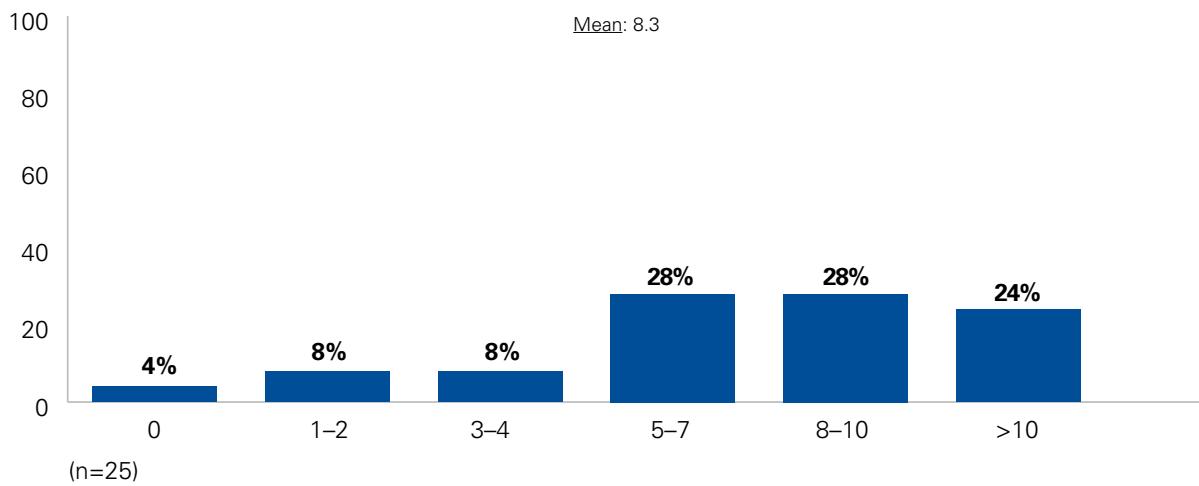
All entity-level controls



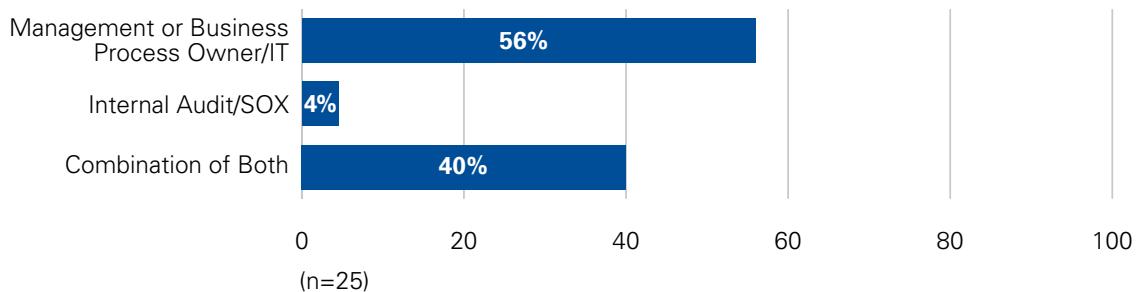
## Detailed findings (continued)

### SOC 1<sup>5</sup>

#### Total number of SSAE<sup>6</sup> 16 SOC 1 reports that are in scope



#### Party responsible for reviewing SOC 1 reports

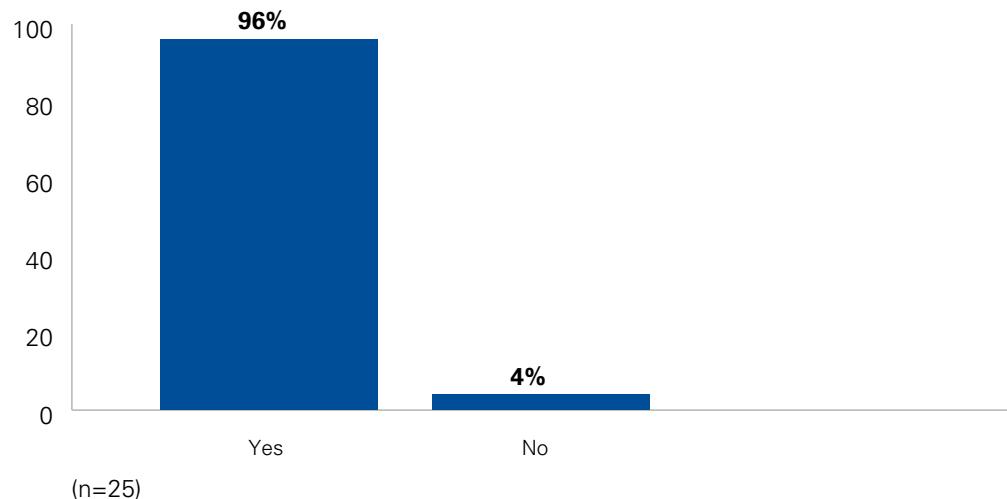


<sup>5</sup>Service Organization Controls Report

<sup>6</sup>Statement on Standards for Attestation Engagements

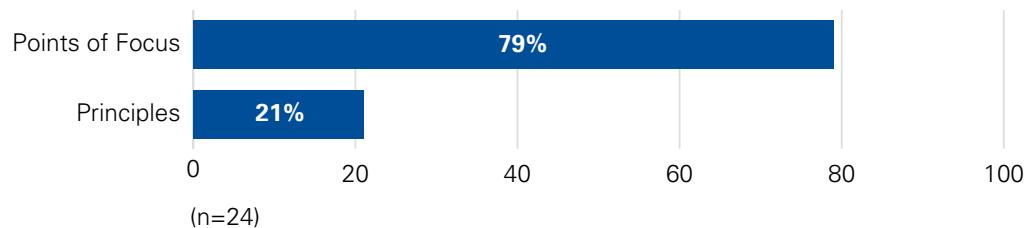
# COSO 2013

## Adoption of COSO 2013



## Level of COSO 2013 mapping

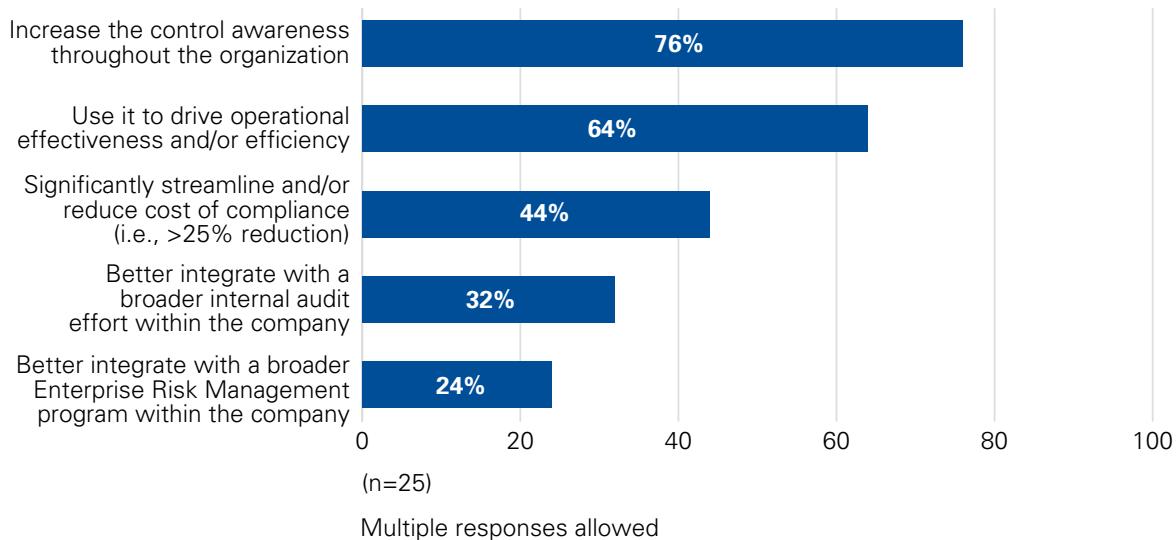
Among those who have adopted COSO 2013



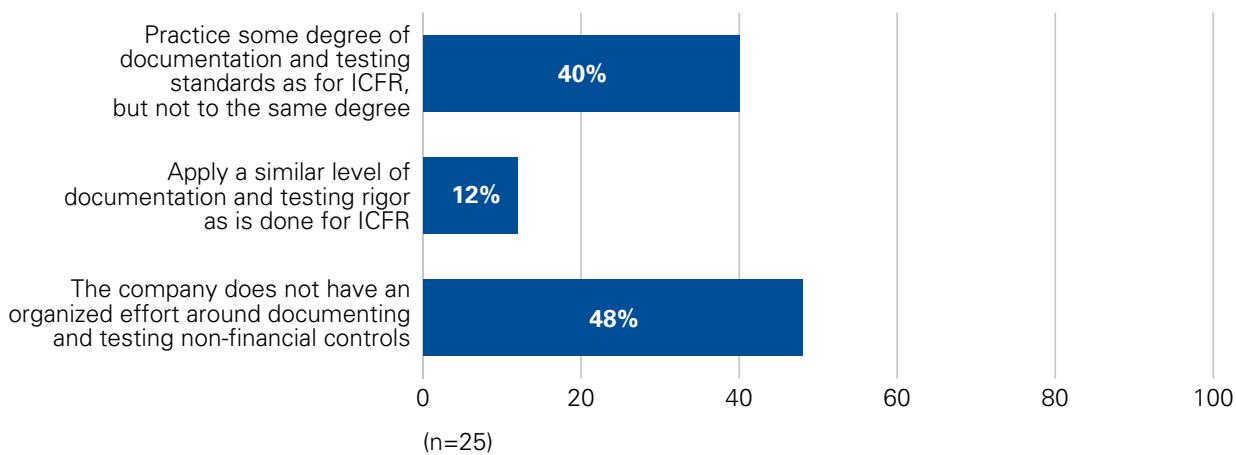
# Detailed findings (continued)

## Program information

### Incremental goals for internal controls program in the next year



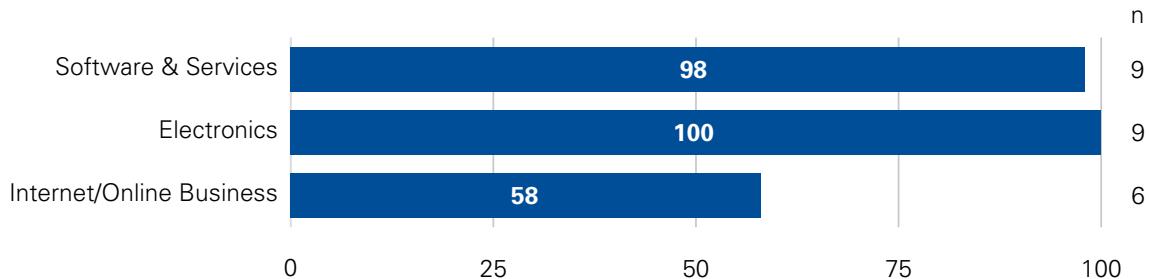
### What does your company do with respect to non-financial controls (i.e., operational, etc.) within the company?



## Key reports

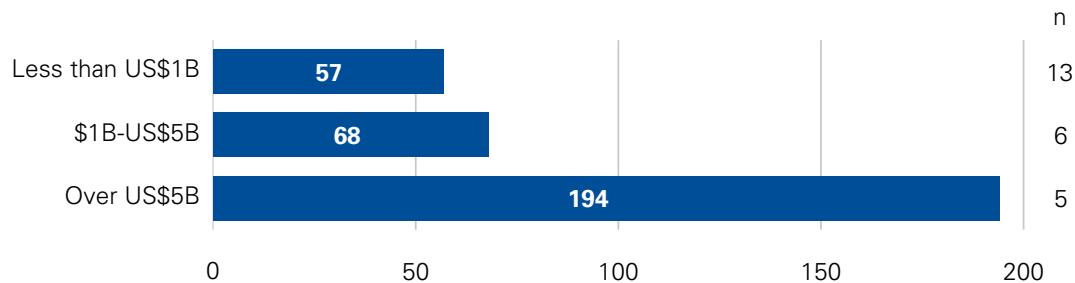
### Average number of key reports used in the direct execution of the control by industry

All processes – Includes ITGCs and entity-level controls



### Average number of key reports used in the direct execution of the control by company size

All processes – Includes ITGCs and entity-level controls



### Average number of key reports used in the direct execution of the control

All processes – Includes ITGCs and entity-level controls

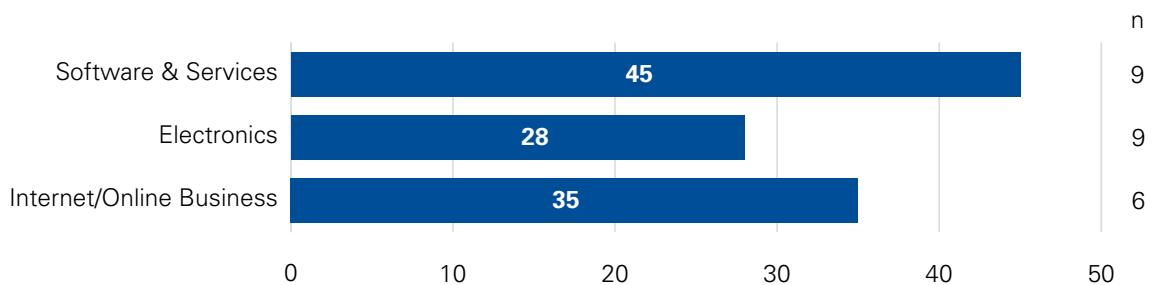


## Detailed findings (continued)

### Key spreadsheets

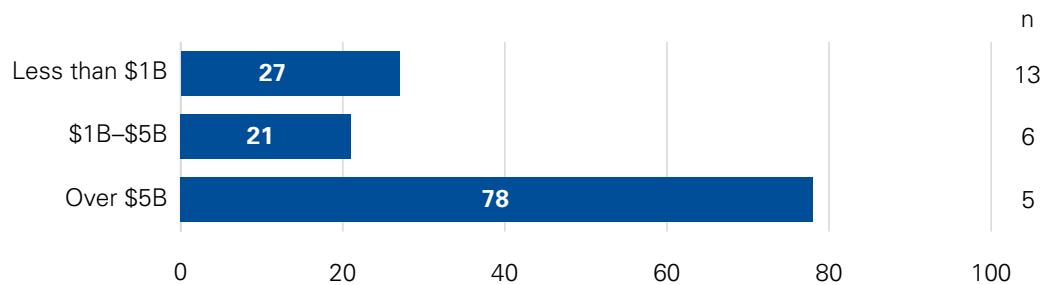
#### Average number of key spreadsheets by industry

All processes – Includes ITGCs and entity-level controls



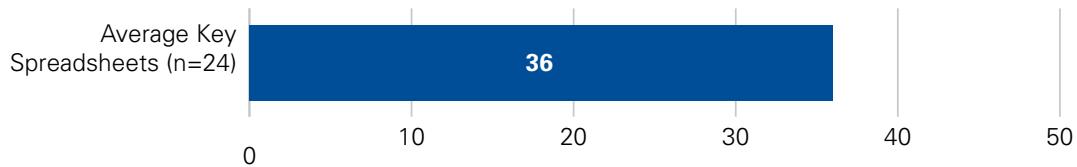
#### Average number of key spreadsheets by company size

All processes – Includes ITGCs and entity-level controls



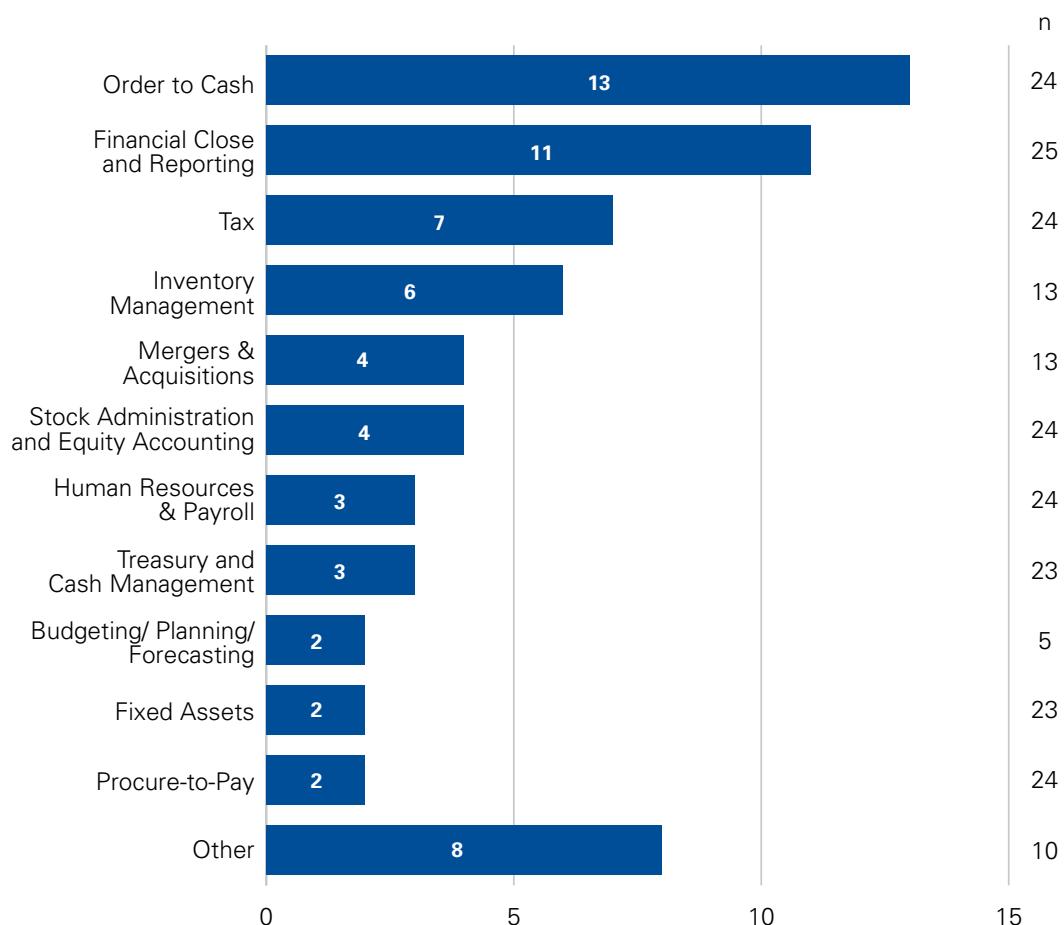
#### Average number of key spreadsheets

All processes – Includes ITGCs and entity-level controls



# Management review controls

## Average number of management review controls among financial processes



## Detailed findings (continued)

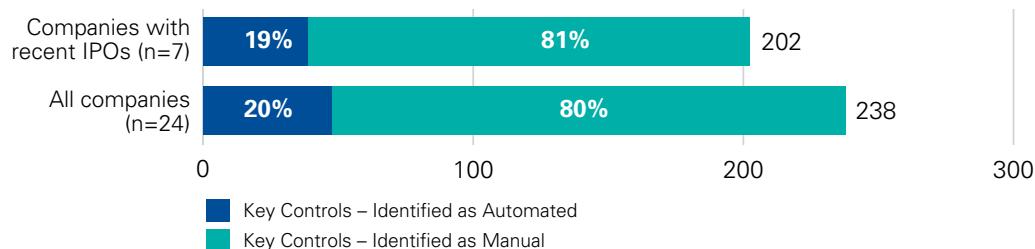
### Recent IPO company findings

KPMG separately broke out ICFR for companies that had undergone an initial public offering (IPO) during the last 36 months ("recent IPOs"). Recent IPO companies are somewhat unique in that they typically have less mature control environments that are still evolving. Like all public companies, however, recent IPOs also deal with emerging issues related to ICFR evaluation, SOX compliance efforts, evolving SEC and PCAOB standards, and external auditor requirements.

In this survey, there are seven recent IPO companies. Six of the seven had annual revenues of less than \$1 Billion and one between \$1 Billion and \$5 Billion. For the industry breakdown, there was one recent IPO company in software and services, two in electronics, and four in the internet/online business. In all cases (except for key spreadsheets), recent IPOs have either the same or fewer controls.

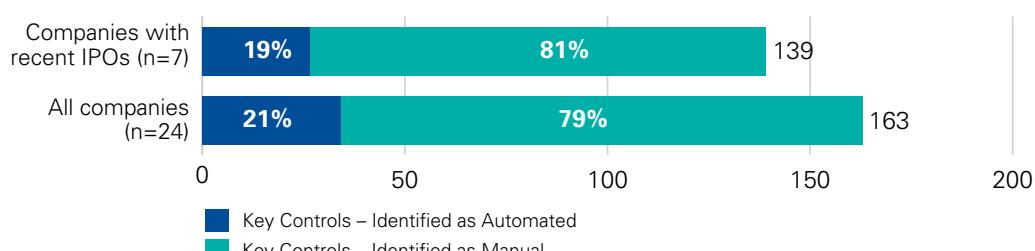
#### Average number of key controls for companies with recent IPOs

All processes – Includes ITGCs and entity-level controls



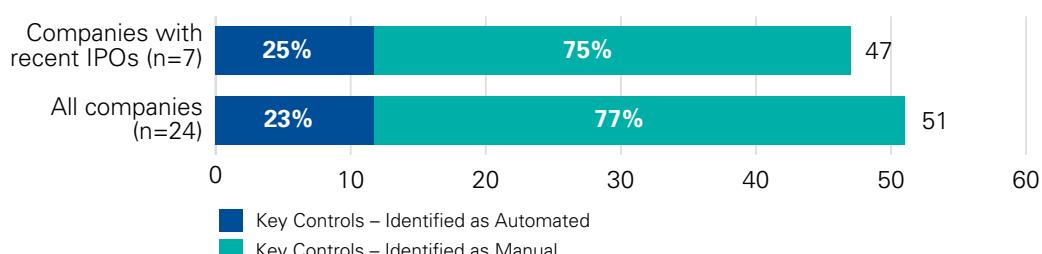
#### Average number of financial process key controls for companies with recent IPOs

All financial processes – Excludes ITGCs and entity-level controls



#### Average number of ITGCs for companies with recent IPOs

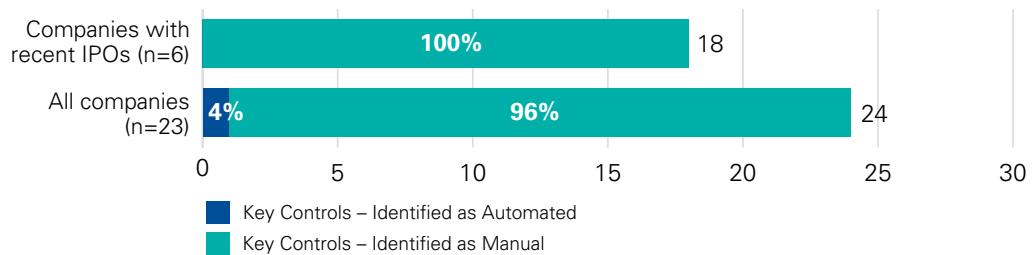
All ITGCs



# Recent IPO company findings

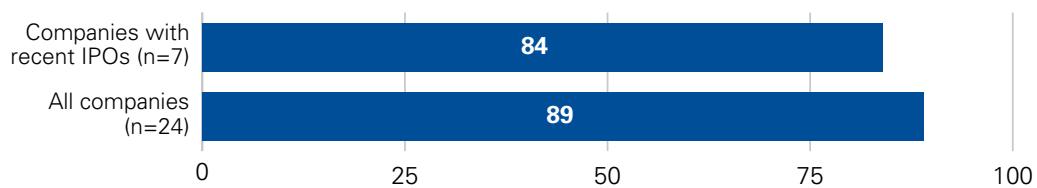
## Average number of entity-level controls for companies with recent IPOs

All entity-level controls



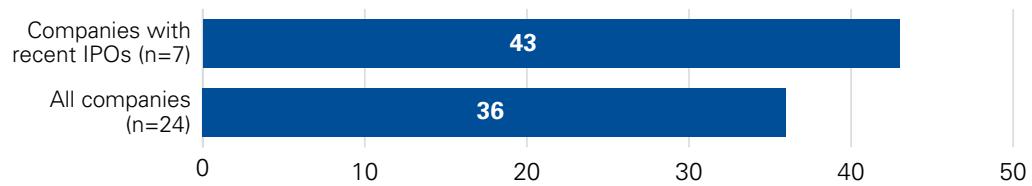
## Average number of key reports used in the direct execution of the control for companies with recent IPOs

All processes – Includes ITGCs and entity-level controls



## Average number of key spreadsheets for companies with recent IPOs

All processes – Includes ITGCs and entity-level controls



# Controls by business processes

## Financial processes

### Total key controls per process – All Companies

	Order-to-Cash	Procure-to-Pay	Human Resources & Payroll	Fixed Assets	Financial Close and Reporting	Inventory Management	Treasury and Cash Management	Stock Administration and Equity Accounting	Tax	Mergers & Acquisitions	Budgeting/Planning/Forecasting	Other
Minimum	14	2	2	1	8	4	1	2	2	1	2	4
Maximum	291	32	31	18	87	35	31	22	37	12	6	46
Mean	53	14	13	6	28	14	11	10	12	6	4	16
Quartile (25)	26	8	8	4	18	9	6	7	6	3	2	9
Quartile (50)/Median	37	13	11	5	21	12	9	9	9	6	4	10
Quartile (75)	58	19	18	9	27	19	15	11	17	8	4	19

### Total key controls per process – Software & Services

	Order-to-Cash	Procure-to-Pay	Human Resources & Payroll	Fixed Assets	Financial Close and Reporting	Inventory Management	Treasury and Cash Management	Stock Administration and Equity Accounting	Tax	Mergers & Acquisitions	Budgeting/Planning/Forecasting	Other
Minimum	21	6	3	3	12	4	1	4	3	1	2	4
Maximum	90	32	24	18	87	20	19	14	37	12	4	46
Mean	54	15	12	7	35	10	11	9	13	6	3	17
Quartile (25)	31	9	8	4	20	5	8	6	5	3	3	7
Quartile (50)/Median	55	12	10	6	24	5	10	8	9	7	3	9
Quartile (75)	78	20	17	7	43	13	17	11	16	8	4	21

### Total key controls per process – Electronics

	Order-to-Cash	Procure-to-Pay	Human Resources & Payroll	Fixed Assets	Financial Close and Reporting	Inventory Management	Treasury and Cash Management	Stock Administration and Equity Accounting	Tax	Mergers & Acquisitions	Budgeting/Planning/Forecasting	Other
Minimum	15	7	2	2	17	9	3	2	4	3	2	9
Maximum	291	24	31	11	54	35	31	22	23	10	6	31
Mean	61	14	15	7	26	17	12	11	12	6	4	17
Quartile (25)	27	10	6	5	21	9	7	6	7	5	3	11
Quartile (50)/Median	31	13	8	5	22	16	9	10	9	6	4	12
Quartile (75)	44	15	24	9	27	19	15	12	18	8	5	22

# Financial processes

## Total key controls per process – Internet/Online Business

	Order-to-Cash	Procure-to-Pay	Human Resources & Payroll	Fixed Assets	Financial Close and Reporting	Inventory Management	Treasury and Cash Management	Stock Administration and Equity Accounting	Tax	Mergers & Acquisitions	Budgeting/Planning/Forecasting	Other
Minimum	14	2	7	1	8	8	4	7	2	1	4	9
Maximum	62	26	17	9	30	8	15	12	23	10	4	11
Mean	38	12	12	6	18	8	7	10	10	5	4	10
Quartile (25)	20	3	10	3	15	8	4	9	6	3	4	10
Quartile (50)/Median	42	10	12	6	16	8	4	9	7	4	4	10
Quartile (75)	52	18	14	9	20	8	9	11	12	7	4	11

## Total key controls per process – Companies with recent IPOs

	Order-to-Cash	Procure-to-Pay	Human Resources & Payroll	Fixed Assets	Financial Close and Reporting	Inventory Management	Treasury and Cash Management	Stock Administration and Equity Accounting	Tax	Mergers & Acquisitions	Budgeting/Planning/Forecasting	Other
Minimum	15	2	6	1	15	9	4	7	2	4	–	9
Maximum	74	26	24	18	25	35	17	20	18	8	–	11
Mean	44	16	14	7	19	22	8	11	10	6	–	10
Quartile (25)	33	13	9	4	16	16	4	9	7	5	–	10
Quartile (50)/Median	38	16	12	7	21	22	7	10	7	6	–	10
Quartile (75)	58	22	18	9	22	29	9	11	15	7	–	11

# Controls by business processes (continued)

## Financial processes

### Automated key controls per process – All Companies

	Order-to-Cash	Procure-to-Pay	Human Resources & Payroll	Fixed Assets	Financial Close and Reporting	Inventory Management	Treasury and Cash Management	Stock Administration and Equity Accounting	Tax	Mergers & Acquisitions	Budgeting/Planning/Forecasting	Other
Minimum	3	0	0	0	0	0	0	0	0	0	0	0
Maximum	109	18	9	5	14	8	10	4	9	1	0	14
Mean	17	6	1	1	4	3	1	1	1	0	0	3
Quartile (25)	7	3	0	0	1	2	0	0	0	0	0	0
Quartile (50)/Median	13	5	1	1	3	2	0	0	0	0	0	2
Quartile (75)	20	8	2	1	5	4	1	1	1	0	0	5

### Automated key controls per process – Software & Services

	Order-to-Cash	Procure-to-Pay	Human Resources & Payroll	Fixed Assets	Financial Close and Reporting	Inventory Management	Treasury and Cash Management	Stock Administration and Equity Accounting	Tax	Mergers & Acquisitions	Budgeting/Planning/Forecasting	Other
Minimum	4	2	0	0	0	1	0	0	0	0	0	0
Maximum	25	18	9	5	14	8	10	1	8	0	0	14
Mean	14	9	2	2	6	4	2	0	1	0	0	6
Quartile (25)	10	5	1	1	3	2	0	0	0	0	0	2
Quartile (50)/Median	13	6	2	1	5	2	1	0	0	0	0	5
Quartile (75)	20	12	2	2	9	5	2	1	1	0	0	7

### Automated key controls per process – Electronics

	Order-to-Cash	Procure-to-Pay	Human Resources & Payroll	Fixed Assets	Financial Close and Reporting	Inventory Management	Treasury and Cash Management	Stock Administration and Equity Accounting	Tax	Mergers & Acquisitions	Budgeting/Planning/Forecasting	Other
Minimum	5	2	0	0	0	0	0	0	0	0	0	0
Maximum	109	13	2	2	6	7	5	4	9	1	0	3
Mean	22	5	1	1	3	3	1	1	2	0	0	1
Quartile (25)	5	3	0	0	2	2	0	0	0	0	0	0
Quartile (50)/Median	10	5	0	1	3	2	0	0	0	0	0	0
Quartile (75)	17	7	2	1	5	4	1	1	2	1	0	2

# Financial processes

## Automated key controls per process – Internet/Online Business

	Order-to-Cash	Procure-to-Pay	Human Resources & Payroll	Fixed Assets	Financial Close and Reporting	Inventory Management	Treasury and Cash Management	Stock Administration and Equity Accounting	Tax	Mergers & Acquisitions	Budgeting/Planning/Forecasting	Other
Minimum	3	0	0	0	0	1	0	0	0	0	0	0
Maximum	23	8	2	2	4	1	1	2	1	0	0	1
Mean	13	3	1	1	2	1	0	0	0	0	0	1
Quartile (25)	7	0	0	0	0	1	0	0	0	0	0	0
Quartile (50)/Median	14	1	1	1	2	1	0	0	0	0	0	1
Quartile (75)	20	5	1	1	3	1	1	0	0	0	0	1

## Automated key controls per process – Companies with recent IPOs

	Order-to-Cash	Procure-to-Pay	Human Resources & Payroll	Fixed Assets	Financial Close and Reporting	Inventory Management	Treasury and Cash Management	Stock Administration and Equity Accounting	Tax	Mergers & Acquisitions	Budgeting/Planning/Forecasting	Other
Minimum	5	0	0	0	0	2	0	0	0	0	–	0
Maximum	21	13	2	5	5	2	1	3	1	0	–	1
Mean	14	5	1	1	3	2	0	1	0	0	–	1
Quartile (25)	11	2	0	1	2	2	0	0	0	0	–	0
Quartile (50)/Median	16	5	0	1	3	2	0	0	0	0	–	1
Quartile (75)	19	7	2	2	4	2	1	1	1	0	–	1

# Controls by business processes (continued)

## Financial processes

### Manual key controls per process – All Companies

	Order-to-Cash	Procure-to-Pay	Human Resources & Payroll	Fixed Assets	Financial Close and Reporting	Inventory Management	Treasury and Cash Management	Stock Administration and Equity Accounting	Tax	Mergers & Acquisitions	Budgeting/Planning/Forecasting	Other
Minimum	10	2	2	0	6	3	1	2	0	1	2	2
Maximum	182	18	31	13	73	33	31	21	37	12	6	41
Mean	36	8	12	5	24	12	9	9	11	6	4	13
Quartile (25)	17	4	7	3	16	7	5	6	5	3	2	6
Quartile (50)/Median	25	7	9	4	19	9	8	8	7	6	4	9
Quartile (75)	38	10	15	8	25	14	13	11	16	8	4	12

### Manual key controls per process – Software & Services

	Order-to-Cash	Procure-to-Pay	Human Resources & Payroll	Fixed Assets	Financial Close and Reporting	Inventory Management	Treasury and Cash Management	Stock Administration and Equity Accounting	Tax	Mergers & Acquisitions	Budgeting/Planning/Forecasting	Other
Minimum	11	3	2	2	6	3	1	3	3	1	2	2
Maximum	78	14	24	13	73	12	18	14	37	12	4	41
Mean	40	6	10	5	29	6	9	8	12	6	3	12
Quartile (25)	18	4	5	3	18	3	5	5	5	3	3	4
Quartile (50)/Median	35	5	8	4	23	3	8	8	7	7	3	5
Quartile (75)	53	8	15	6	35	8	9	11	15	8	4	7

### Manual key controls per process – Electronics

	Order-to-Cash	Procure-to-Pay	Human Resources & Payroll	Fixed Assets	Financial Close and Reporting	Inventory Management	Treasury and Cash Management	Stock Administration and Equity Accounting	Tax	Mergers & Acquisitions	Budgeting/Planning/Forecasting	Other
Minimum	10	4	2	1	11	7	3	2	0	3	2	9
Maximum	182	16	31	10	51	33	31	21	21	9	6	28
Mean	39	9	14	6	23	14	12	10	10	6	4	16
Quartile (25)	20	6	6	4	17	8	7	6	4	5	3	11
Quartile (50)/Median	22	8	8	4	21	9	9	7	8	6	4	12
Quartile (75)	27	11	22	9	24	16	15	11	17	8	5	20

# Financial processes

## Manual key controls per process – Internet/Online Business

	Order-to-Cash	Procure-to-Pay	Human Resources & Payroll	Fixed Assets	Financial Close and Reporting	Inventory Management	Treasury and Cash Management	Stock Administration and Equity Accounting	Tax	Mergers & Acquisitions	Budgeting/Planning/Forecasting	Other
Minimum	10	2	7	0	8	7	4	7	2	1	4	9
Maximum	45	18	16	9	29	7	14	12	23	10	4	10
Mean	25	9	11	5	16	7	7	9	9	5	4	10
Quartile (25)	14	3	10	2	13	7	4	8	6	3	4	9
Quartile (50)/Median	25	7	11	5	15	7	4	9	7	4	4	10
Quartile (75)	31	16	12	8	17	7	8	11	11	7	4	10

## Manual key controls per process – Companies with recent IPOs

	Order-to-Cash	Procure-to-Pay	Human Resources & Payroll	Fixed Assets	Financial Close and Reporting	Inventory Management	Treasury and Cash Management	Stock Administration and Equity Accounting	Tax	Mergers & Acquisitions	Budgeting/Planning/Forecasting	Other
Minimum	10	2	6	0	13	7	4	7	2	4	–	9
Maximum	53	18	24	13	24	33	17	20	18	8	–	10
Mean	29	11	13	6	17	20	7	10	10	6	–	10
Quartile (25)	22	9	9	3	15	14	4	7	7	5	–	9
Quartile (50)/Median	23	10	11	6	17	20	7	9	7	6	–	10
Quartile (75)	39	15	16	9	17	27	8	11	14	7	–	10

## Management review controls per process – All Companies

	Order-to-Cash	Procure-to-Pay	Human Resources & Payroll	Fixed Assets	Financial Close and Reporting	Inventory Management	Treasury and Cash Management	Stock Administration and Equity Accounting	Tax	Mergers & Acquisitions	Budgeting/Planning/Forecasting	Other
Minimum	0	0	0	0	0	0	0	0	0	0	1	0
Maximum	35	8	13	8	67	29	18	16	26	12	3	41
Mean	13	2	3	2	11	6	3	4	7	4	2	8
Quartile (25)	3	0	0	0	2	1	0	1	2	1	1	1
Quartile (50)/Median	7	0	1	2	8	2	2	3	4	3	2	3
Quartile (75)	23	3	4	3	14	7	4	4	8	5	2	7
n	24	24	24	23	25	13	23	24	24	13	5	10

# Controls by business processes (continued)

## IT general controls

### Total key controls per process – All Companies

	ITGC - Computer Operations	ITGC - Program Development	ITGC - Change Management	ITGC - Systems Security
Minimum	1	1	2	1
Maximum	76	94	70	248
Mean	8	11	11	29
Quartile (25)	3	1	4	8
Quartile (50)/Median	4	4	8	12
Quartile (75)	6	5	11	22

### Total key controls per process – Software & Services

	ITGC - Computer Operations	ITGC - Program Development	ITGC - Change Management	ITGC - Systems Security
Minimum	3	1	2	1
Maximum	9	12	70	134
Mean	5	5	15	29
Quartile (25)	4	3	4	11
Quartile (50)/Median	4	4	10	17
Quartile (75)	6	6	13	26

### Total key controls per process – Electronics

	ITGC - Computer Operations	ITGC - Program Development	ITGC - Change Management	ITGC - Systems Security
Minimum	1	1	3	4
Maximum	76	94	25	248
Mean	13	18	9	37
Quartile (25)	3	1	4	6
Quartile (50)/Median	4	3	8	11
Quartile (75)	11	4	11	18

### Total key controls per process – Internet/Online Business

	ITGC - Computer Operations	ITGC - Program Development	ITGC - Change Management	ITGC - Systems Security
Minimum	2	3	4	6
Maximum	6	6	8	25
Mean	4	5	6	13
Quartile (25)	4	4	5	7
Quartile (50)/Median	4	5	6	9
Quartile (75)	5	5	7	19

### Total key controls per process – Companies with recent IPOs

	ITGC - Computer Operations	ITGC - Program Development	ITGC - Change Management	ITGC - Systems Security
Minimum	2	1	5	4
Maximum	6	6	70	134
Mean	4	3	16	30
Quartile (25)	3	1	6	6
Quartile (50)/Median	4	1	7	7
Quartile (75)	5	4	10	21

# IT general controls

## Automated key controls per process – All Companies

	ITGC - Computer Operations	ITGC - Program Development	ITGC - Change Management	ITGC - Systems Security
Minimum	0	0	0	0
Maximum	32	6	8	37
Mean	3	1	2	6
Quartile (25)	0	0	0	0
Quartile (50)/Median	1	0	1	2
Quartile (75)	4	0	4	9

## Automated key controls per process – Software & Services

	ITGC - Computer Operations	ITGC - Program Development	ITGC - Change Management	ITGC - Systems Security
Minimum	0	0	0	0
Maximum	7	1	8	20
Mean	3	0	3	8
Quartile (25)	1	0	0	4
Quartile (50)/Median	3	0	4	8
Quartile (75)	4	0	6	10

## Automated key controls per process – Electronics

	ITGC - Computer Operations	ITGC - Program Development	ITGC - Change Management	ITGC - Systems Security
Minimum	0	0	0	0
Maximum	32	4	4	37
Mean	4	1	1	5
Quartile (25)	0	0	0	0
Quartile (50)/Median	0	0	0	0
Quartile (75)	1	0	1	1

## Automated key controls per process – Internet/Online Business

	ITGC - Computer Operations	ITGC - Program Development	ITGC - Change Management	ITGC - Systems Security
Minimum	0	0	0	0
Maximum	5	6	7	25
Mean	3	3	3	6
Quartile (25)	1	2	0	0
Quartile (50)/Median	3	3	2	1
Quartile (75)	4	5	5	2

## Automated key controls per process – Companies with recent IPOs

	ITGC - Computer Operations	ITGC - Program Development	ITGC - Change Management	ITGC - Systems Security
Minimum	0	0	0	0
Maximum	4	6	7	25
Mean	1	2	3	8
Quartile (25)	1	0	1	0
Quartile (50)/Median	1	0	1	1
Quartile (75)	2	3	5	15

# Controls by business processes (continued)

## IT general controls

### Manual key controls per process – All Companies

	ITGC - Computer Operations	ITGC - Program Development	ITGC - Change Management	ITGC - Systems Security
Minimum	0	0	0	0
Maximum	44	90	69	211
Mean	5	10	8	23
Quartile (25)	0	1	3	4
Quartile (50)/Median	3	4	5	9
Quartile (75)	4	4	8	17

### Manual key controls per process – Software & Services

	ITGC - Computer Operations	ITGC - Program Development	ITGC - Change Management	ITGC - Systems Security
Minimum	0	0	0	0
Maximum	6	12	69	114
Mean	2	5	12	22
Quartile (25)	0	3	2	1
Quartile (50)/Median	2	4	6	13
Quartile (75)	3	6	9	16

### Manual key controls per process – Electronics

	ITGC - Computer Operations	ITGC - Program Development	ITGC - Change Management	ITGC - Systems Security
Minimum	1	1	2	2
Maximum	44	90	25	211
Mean	9	17	8	32
Quartile (25)	3	1	4	4
Quartile (50)/Median	4	3	6	9
Quartile (75)	10	4	9	18

### Manual key controls per process – Internet/Online Business

	ITGC - Computer Operations	ITGC - Program Development	ITGC - Change Management	ITGC - Systems Security
Minimum	0	0	0	0
Maximum	6	3	8	19
Mean	2	2	3	8
Quartile (25)	0	1	1	6
Quartile (50)/Median	1	2	3	6
Quartile (75)	3	2	5	7

### Manual key controls per process – Companies with recent IPOs

	ITGC - Computer Operations	ITGC - Program Development	ITGC - Change Management	ITGC - Systems Security
Minimum	0	0	0	0
Maximum	6	1	69	114
Mean	3	1	13	23
Quartile (25)	1	1	3	4
Quartile (50)/Median	3	1	5	6
Quartile (75)	4	1	8	6

# Entity-level controls

## Total key controls – All Companies

	All Companies	Software & Services	Electronics	Internet/Online Business	Companies With Recent IPOs
Minimum	10	15	10	14	10
Maximum	62	62	36	27	24
Mean	24	27	24	21	18
Quartile (25)	20	20	22	19	15
Quartile (50)/Median	22	23	24	20	19
Quartile (75)	26	24	26	25	21

## Automated key controls – All Companies

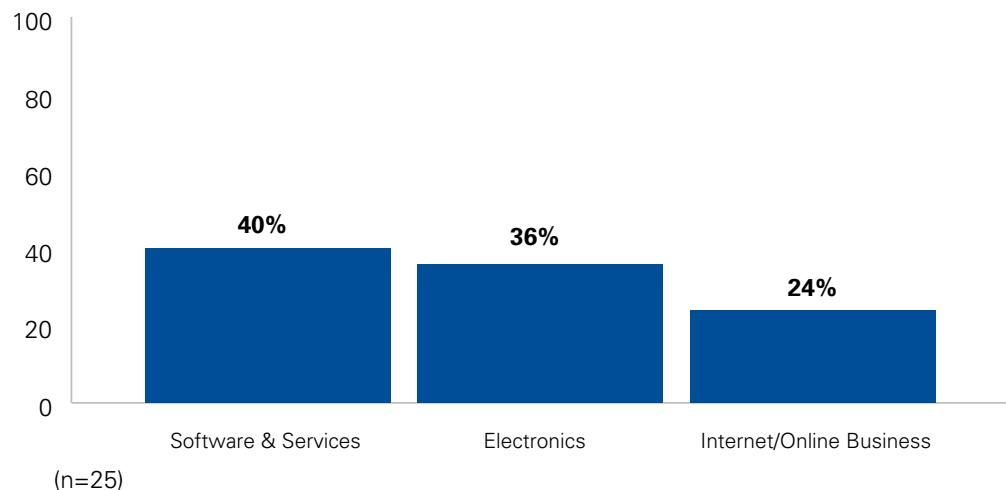
	All Companies	Software & Services	Electronics	Internet/Online Business	Companies With Recent IPOs
Minimum	0	0	0	0	0
Maximum	18	18	2	0	0
Mean	1	2	0	0	0
Quartile (25)	0	0	0	0	0
Quartile (50)/Median	0	0	0	0	0
Quartile (75)	0	0	0	0	0

## Manual key controls – All Companies

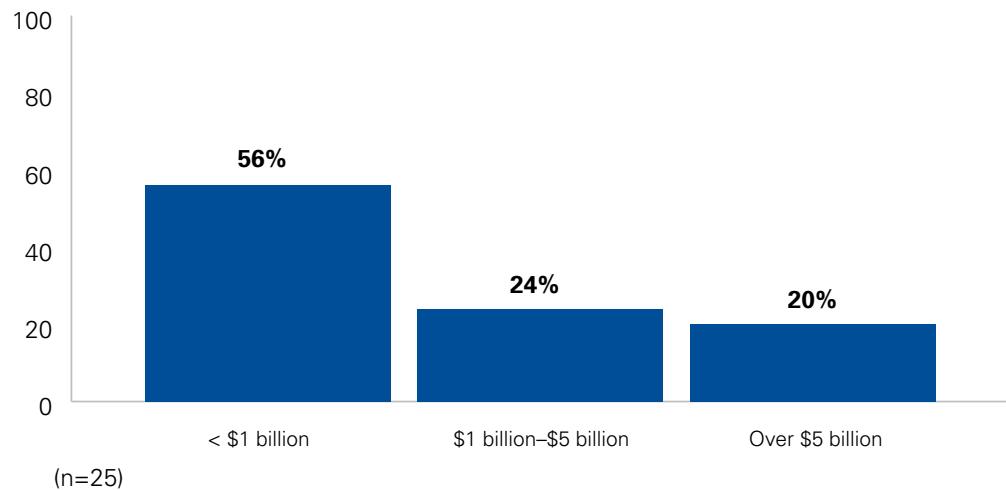
	All Companies	Software & Services	Electronics	Internet/Online Business	Companies With Recent IPOs
Minimum	0	0	10	14	10
Maximum	62	62	35	27	24
Mean	23	25	23	21	18
Quartile (25)	20	20	22	19	15
Quartile (50)/Median	22	23	23	20	19
Quartile (75)	26	24	26	25	21

# Respondent demographics

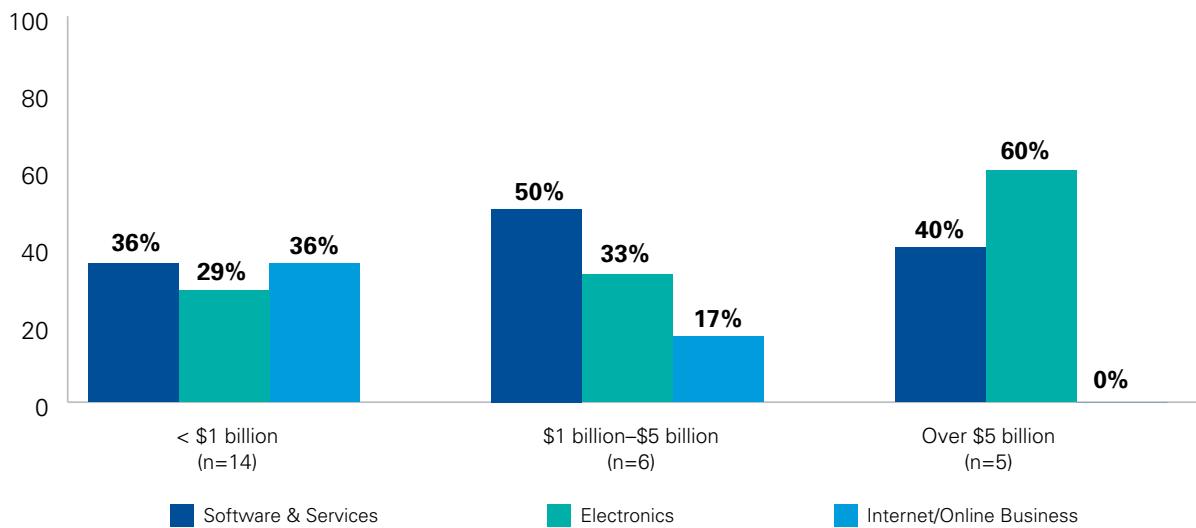
## Respondent industry



## Respondent company size

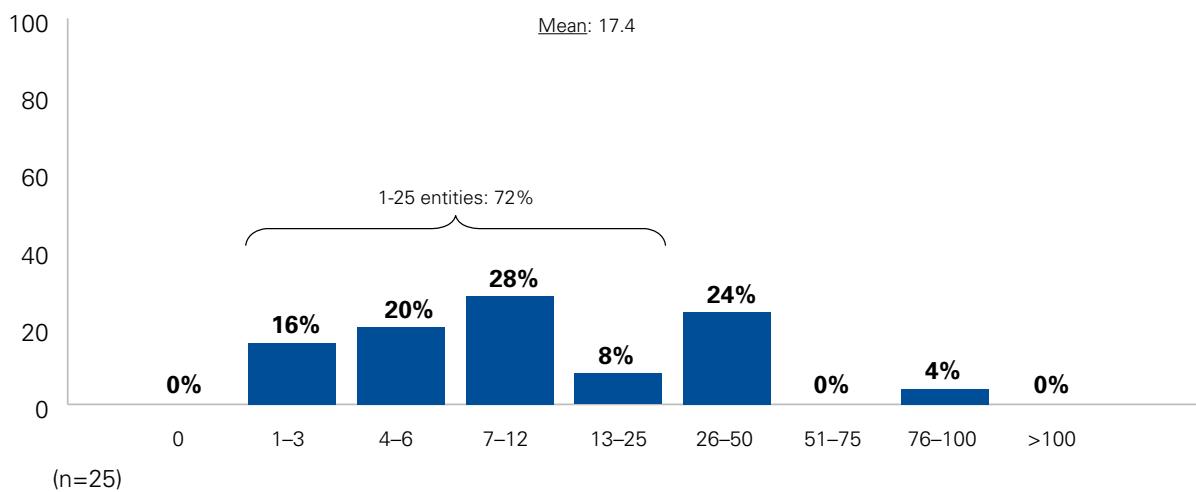


## Respondent company size by industry



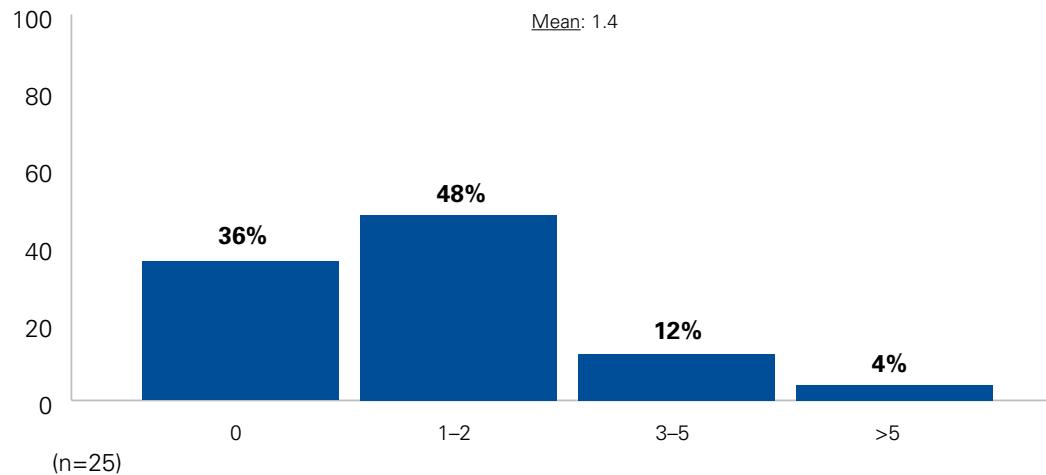
May not equal 100% due to rounding

## Number of operating business entities

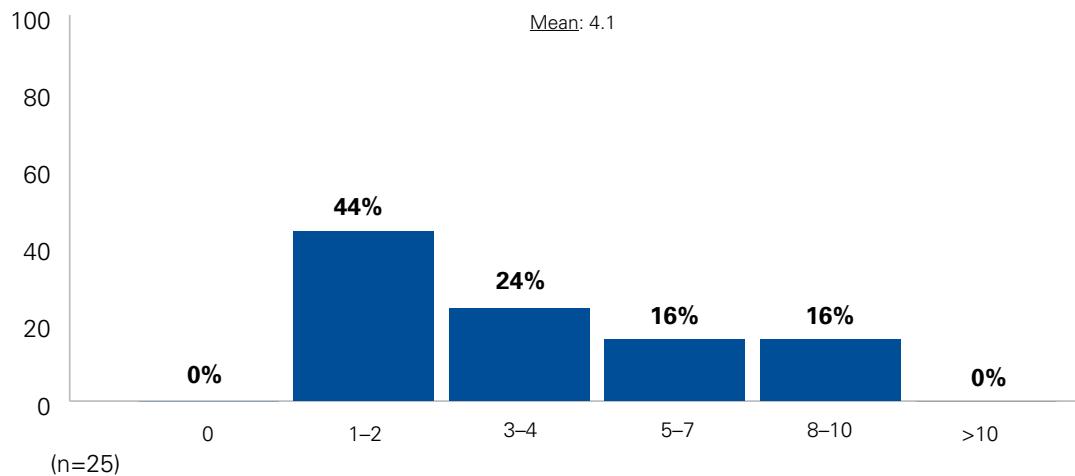


# Respondent demographics (continued)

## Number of shared service centers



## Number of business locations selected to be in scope for SOX 404 compliance



# About the authors

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Tom serves as KPMG's Risk Consulting leader for Technology, Media, and Telecommunications. In this role, he guides the delivery of KPMG Advisory services to some of the world's leading technology companies to help them create world-class risk and business management processes. These services include internal audit, SOX 404 projects, IT, and other risk management services.

Tom has extensive experience delivering strategic IT consulting services and assisting clients in building effective distributed systems management solutions. He has developed and implemented leading risk assessment and audit planning methodologies, high-quality internal auditing services for domestic and international objectives, and self-assessment methodologies for internal audits. In addition, he spearheads the development of new risk management services in response to evolving client needs.

In his industry leadership capacity, Tom has directed original research, white papers, and roundtable forums on emerging topics of vital interest to software and technology firms. Some examples include software license compliance, software asset management, and identity access management.

## Ron Lopes

Ron is a partner in KPMG's Advisory practice and has more than 25 years of experience in the Silicon Valley. He has significant experience guiding the delivery of services to many leading multinational technology companies to help them create high-value-added risk and business management processes.

Ron has worked on a multitude of projects for clients, including internal audits, financial and operational control reviews, risk assessments, third-party compliance audits, process reviews, financial statement audits, process improvement engagements, and SOX 404 compliance efforts. He has developed and implemented high-impact risk assessment and audit planning methodologies, as well as self-assessment methodologies for internal audits.

Ron has significant experience in revenue recognition, financial reporting, and benchmarking/leading practices. A significant portion of his career has involved assisting clients with the coordination and execution of large international projects and objectives.

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# About KPMG

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