Government Business Council

Mastering The Migration

A Candid Survey of Federal Leaders on the State of Cloud Computing

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Overview

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Purpose

In February 2011, White House Chief Information Officer Vivek Kundra authored an ambitious federal policy aimed at elevating cloud computing investments to critical urgency across the federal government. Central to its message was the establishment of a "Cloud First" policy, mandating that agencies "modify their IT portfolios to fully take advantage of the benefits of cloud computing in order to maximize capacity utilization, improve IT flexibility and responsiveness, and minimize cost."[1] In the six years since the policy was released, have agencies responded appropriately? To investigate this and other factors contributing to the current state of cloud technology in the federal government, Government Business Council (GBC) and Deloitte undertook an in-depth research study.

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Methodology

To assess the perceptions, attitudes, and experiences federal leaders have regarding cloud computing capabilities and migration efforts in government, GBC deployed a survey to a random sample of *Government Executive, Nextgov,* and *Defense One* online and print subscribers in November 2016. The pool of 328 respondents includes senior employees from more than 30 departments and agencies, with 56 percent holding positions at the GS/GM-13 level or above. Respondents hail from a range of mission areas, the most represented being either technical/scientific or IT, program/project management, and administrative/office services. 87 percent identify as non-DoD federal civilians and 14 percent identify as DoD or active duty military.

1. Federal Cloud Computing Strategy. February 2011.

Executive Summary

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"Cloud First" increased support for cloud, but its impact isn't universally felt

1 in 3 respondents indicate that support for cloud technology at their agency has increased since Cloud First came on the scene. At the same time, 26 percent say the level of support has seen no change in the wake of the policy. Interestingly, another 31 percent report that cloud technology has had no noticeable impact on their agency's mission. Again, while more respondents cite cloud as having a positive impact (24%) than a negative impact (6%), a plurality either remain unconvinced of the efficiencies cloud can deliver or unaware of the potential benefits it offers.

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Many cite challenges in migrating applications to the cloud

With 41 percent of respondents describing their migration efforts as mixed, problematic, or non-existent, the effort to transfer existing applications to the cloud has not been an easy journey for most. In fact, just 1 in 10 describe the transition as having been successful. The most common pain points cited for these difficulties are security concerns, lack of skills and IT expertise, and budget constraints. The difficulty of integrating or rewriting existing applications to fit cloud environments is another common hurdle, as those in charge of such efforts struggle to incorporate applications not originally developed with cloud in mind.

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Ease of operation, stability, and performance are most valued features, but current applications largely under-deliver in the cloud

When asked to identify development features that would provide applications maximum effectiveness in the cloud, respondents most often cite ease of operation, stability, and performance as top priorities. However, 35 percent agree that their current applications were "not at all" developed to take advantage of cloud's unique capabilities. Consequently, those with opinions on the matter grade their applications more negatively when it comes to ease of operation, scalability, and agility. Yet in spite of these deficiencies, 14 percent say their organization will continue the lift-and-shift policy of rewriting applications to match cloud environments, with minimal or no attention paid to pursuing cloud-native architectures designed to enhance such desirable metrics.

Research Findings

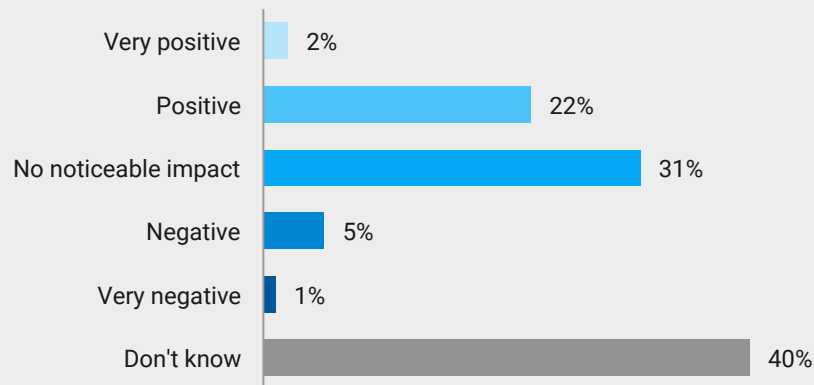**Support for cloud computing has risen, but perceptions of its impact vary**

While a third of respondents indicate that support for cloud technology at their organization has increased in the wake of federal policy, 26 percent say there has been no change in their agency's prioritization of resources for this endeavor since 2011. At the same time, while more respondents describe cloud's impact on their organization as positive than negative, a sizeable number remain unconvinced of its influence.

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Since "Cloud First" was released 6 years ago, has support for cloud computing technologies within your organization increased, decreased, or stayed more or less the same?

Increased	No change	Decreased	Don't know
33%	26%	2%	39%

■ Increased ■ No change ■ Decreased ■ Don't know
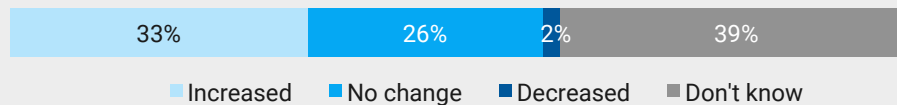
Percentage of respondents, n=326
Note: Percentages may not add up to 100% due to rounding

—

How would you describe the overall impact that cloud computing technologies have had on your organization thus far?

Very positive	2%
Positive	22%
No noticeable impact	31%
Negative	5%
Very negative	1%
Don't know	40%

Percentage of respondents, n=291
Note: Percentages may not add up to 100% due to rounding

1 in 3

respondents say their agency's support for cloud computing technologies has risen since the White House released the Federal Cloud Computing Strategy in 2011.

Also known as the Cloud First policy, its key objectives have been to:

• Articulate the benefits, tradeoffs, and considerations of cloud computing

• Provide a decision framework and case examples to support agencies in migrating towards cloud computing

• Highlight cloud computing implementation resources

• Identify federal government activities and roles and responsibilities for catalyzing cloud adoption

While more respondents say cloud computing has exerted a gross positive impact (24%) on their organization than a negative one (6%), nearly 1 in 3 say no noticeable impact has resulted from cloud implementation.

Security concerns lead the list of challenges facing agency cloud migration efforts / Research Findings

41% of all respondents describe their agency's efforts to transfer applications to the cloud as mixed, problematic, or non-existent. When asked to elaborate the reasons for these difficulties, over half of this group points to security concerns as the major obstacle. A lack of skills/expertise (39%) and budgeting constraints (37%) are also continuing deterrents.

However, half of all respondents are unable to gauge their agency's migration process, underscoring that transition efforts have received low visibility across the federal workforce.

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To the best of your knowledge, how would you characterize recent efforts to transfer your organization's existing applications to the cloud?

Successful 9%
Mixed 17%
Problematic 12%
Non-existent 12%
Don't know 50%

Percentage of all respondents, n=304
Note: Percentages may not add up to 100% due to rounding

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If Mixed, Problematic, or Non-existent:

Which of the following factors do you consider most responsible for your organization's migration difficulties?

Security concerns	53%
Skills/expertise	39%
Budget	37%
Problems integrating/ rewriting legacy applications	35%
Organizational change	27%
Application architecture	23%
Methodologies/tools	16%
Other	8%
Don't know	13%

Percentage of respondents, n=124
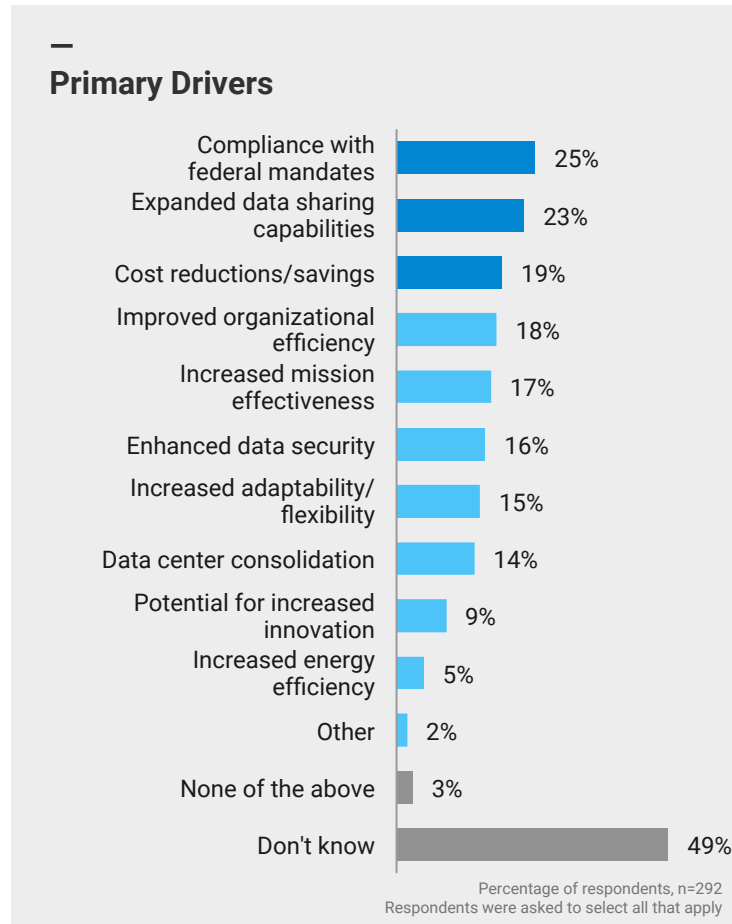Respondents were asked to select all that apply

1 in 4

respondents describe their agency's efforts to transfer applications to the cloud as either problematic or non-existent.

"Other" includes responses such as antiquated equipment, lack of user training about how to use new technology, firewall restrictions, lack of contractor oversight, and an older management not interested in implementing such changes.

Compliance, data sharing drive cloud adoption, but data security challenges such efforts /
Research Findings

Respondents were asked to identify both the main factors driving cloud adoption at their agencies as well as the major obstacles facing these adoption efforts. Among potential drivers, compliance with federal mandates (25%) — such as FISMA and FedRAMP — and greater access to expanded data sharing capabilities (23%) receive the most attention. Among impediments, data security concerns is a major challenge according to 1 in 3 respondents.

Primary Drivers

Driver	Percentage
Compliance with federal mandates	25%
Expanded data sharing capabilities	23%
Cost reductions/savings	19%
Improved organizational efficiency	18%
Increased mission effectiveness	17%
Enhanced data security	16%
Increased adaptability/flexibility	15%
Data center consolidation	14%
Potential for increased innovation	9%
Increased energy efficiency	5%
Other	2%
None of the above	3%
Don't know	49%

Percentage of respondents, n=292
Respondents were asked to select all that apply

Primary Challenges

Challenge	Percentage
Data security concerns	33%
Limited funding	24%
Lack of in-house technical expertise	23%
Cultural resistance	21%
Meeting federal security requirements (e.g., FedRAMP)	21%
Immobility of legacy systems	18%
Inefficient procurement process	16%
Poorly defined budget/allocation structures	14%
Lack of cloud adoption strategy	14%
Other	4%
None of the above	0%
Don't know	38%

Percentage of respondents, n=291
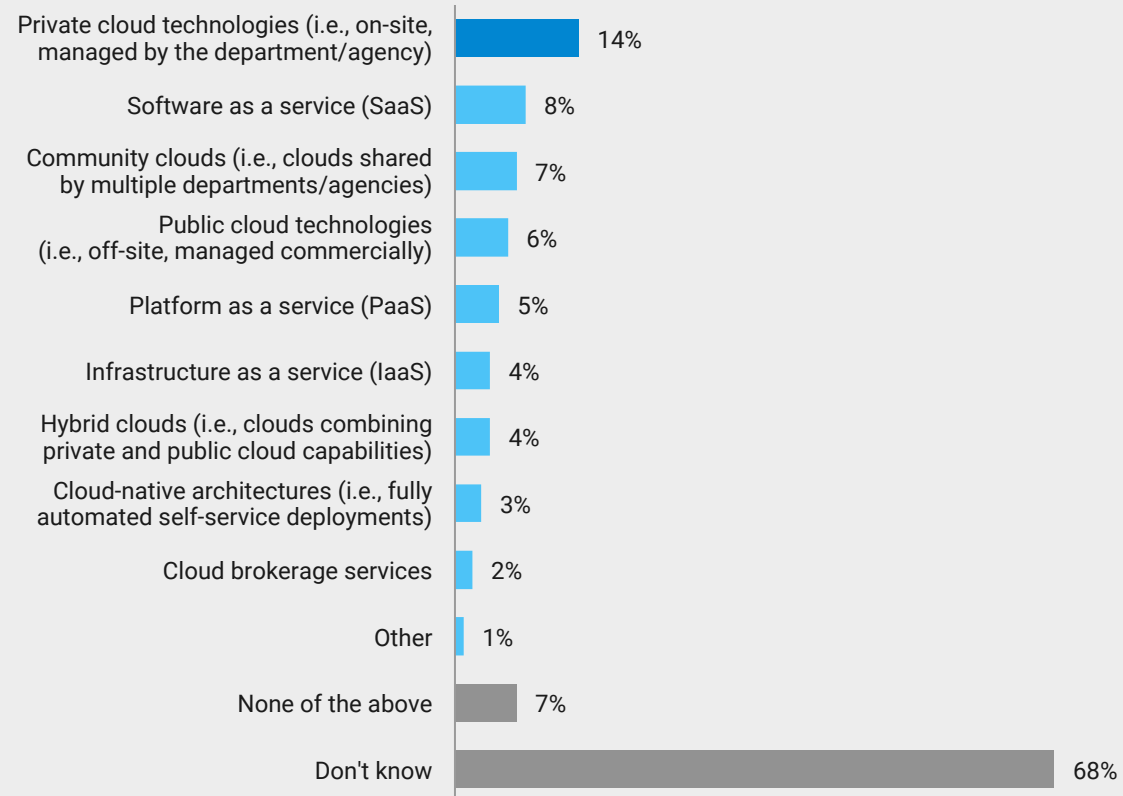Respondents were asked to select all that apply

49%
of all respondents are unable to identify the main drivers motivating their organization's adoption of cloud technologies.
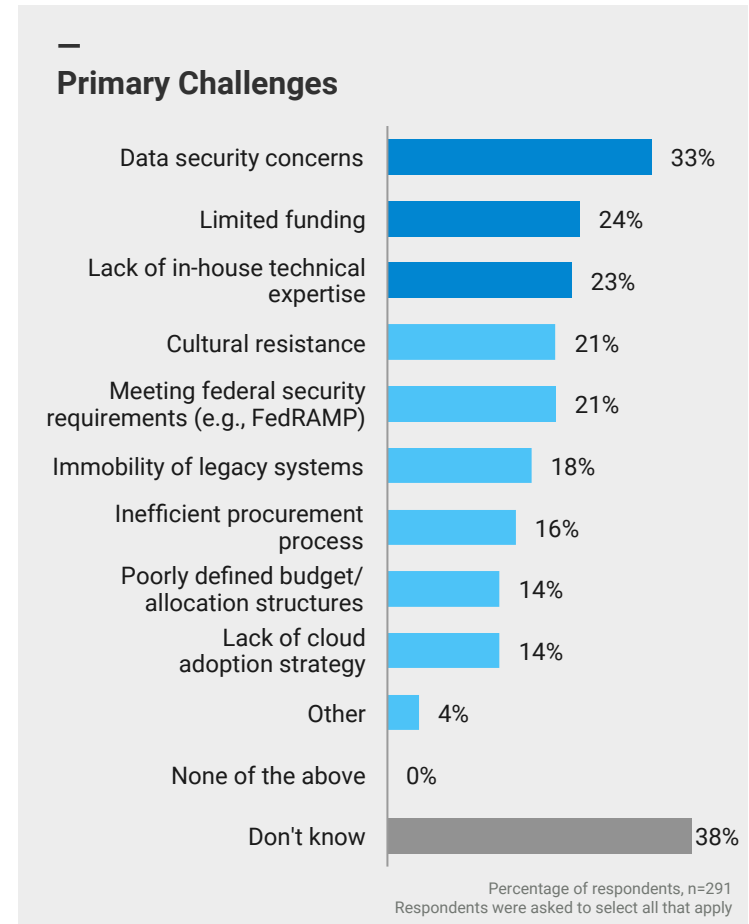
"Other" includes responses such as inconsistent leadership, lack of training, and staffing shortages.

Among those who know, private cloud takes precedence as most common cloud technology in use /
Research Findings

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To the best of your knowledge, which of the following cloud computing technologies does your department/agency currently deploy?

Technology	Percentage
Private cloud technologies (i.e., on-site, managed by the department/agency)	14%
Software as a service (SaaS)	8%
Community clouds (i.e., clouds shared by multiple departments/agencies)	7%
Public cloud technologies (i.e., off-site, managed commercially)	6%
Platform as a service (PaaS)	5%
Infrastructure as a service (IaaS)	4%
Hybrid clouds (i.e., clouds combining private and public cloud capabilities)	4%
Cloud-native architectures (i.e., fully automated self-service deployments)	3%
Cloud brokerage services	2%
Other	1%
None of the above	7%
Don't know	68%

Percentage of respondents, n-310
Respondents were asked to select all that apply

Perhaps owing to the technical nature of the subject, nearly 7 in 10 respondents are unable to identify the specific cloud computing technologies their agency uses. Among those who do know, however, 14 percent say their organization depends on private cloud technologies, which are on-site and internally managed. Likewise, more respondents say their agency employs a software as a service (8%) than those who cite platform as a service (5%) or infrastructure as a service (4%).

Just 3%

of respondents cite the use of cloud-native architectures in their agency.

Respondents are divided as to whether data consolidation has accelerated cloud migration /
Research Findings

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In your opinion, to what extent has data consolidation accelerated your agency's cloud migration efforts?

- Sharply accelerated
- Moderately accelerated
- Barely accelerated
- Has had no influence
- Don't know

3%
9%
11%
13%
64%
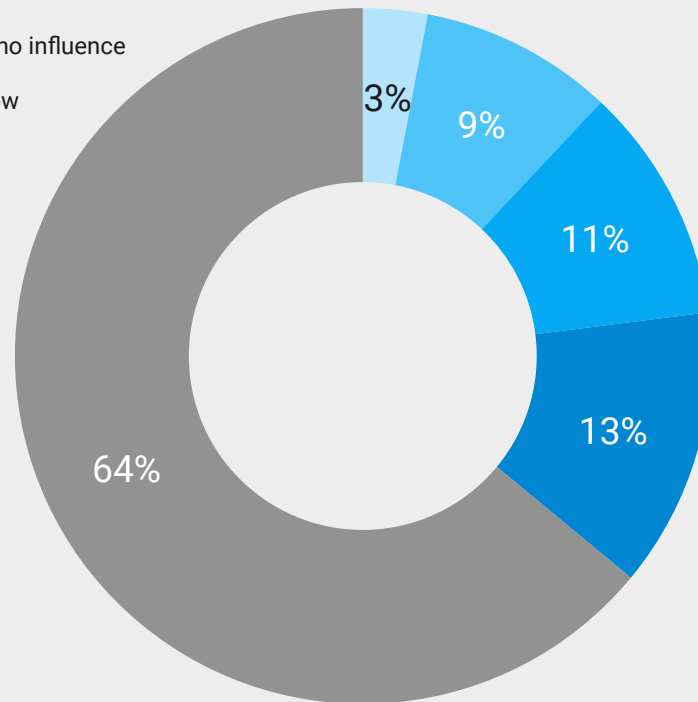
Percentage of all respondents, n=260
Note: Percentages may not add up to 100% due to rounding

12%
of respondents say data consolidation has moderately or sharply accelerated their agency's cloud migration efforts.

11% believe it has barely accelerated such efforts, while…

13% are of the opinion that data consolidation has had no influence on the migration process.

"
Cloud environments are scalable and allow agencies to provision resources as required, on-demand. Consistent with the Cloud First policy, agencies shall use cloud infrastructure where possible when planning new mission or support applications or consolidating existing applications. Agencies should take into consideration cost, security requirements, and application needs when evaluating cloud environments.

Data Center Optimization Initiative (DCOI)
White House Memorandum, signed August 1, 2016. Link

The Case For Cloud-Native

Harnessing the full advantages of the cloud demands agencies rethink core development principles

Scalability. Rapid deployment. Navigational ease.

These are some of the core principles driving the push toward cloud-native architectures (CNAs) and applications in the federal government. While still in alpha stage, 18F's cloud.gov portal encourages agencies to take advantage of the benefits that CNAs can offer, including:
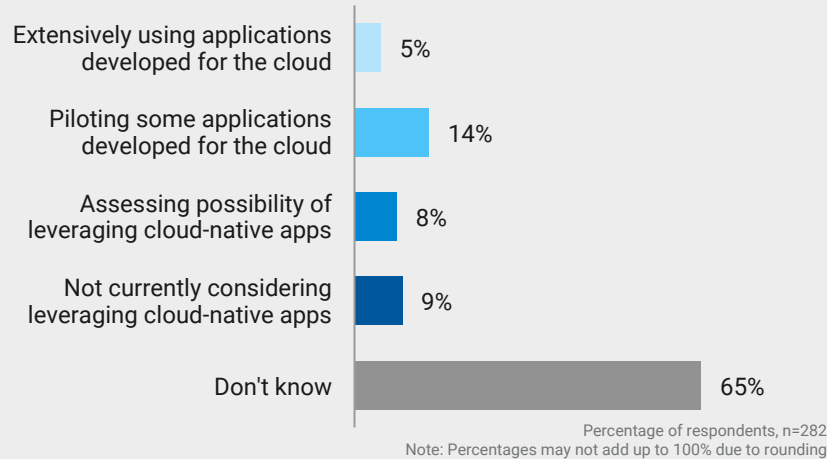
- The ability to quickly deploy applications that comply with federal policies — without needing to manage infrastructure

- The ability to scale applications on top of existing cloud services

- The freedom to experiment, build, and test prototypes without adding extra expense

- Shortening the path to ATO (Authority to Operate) for each new or updated application, because after your agency gives cloud.gov ATO, only your application needs to be evaluated for security and compliance

Going cloud-native involves a combination of **microservices, platform-as-a-service (PaaS) strategy,** and **devops** techniques to speed up deployment and cut the costs associated with conventional application maintenance.
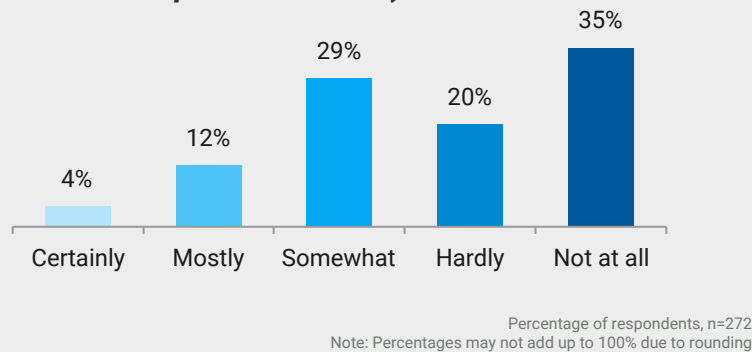
Source: https://cloud.gov/

35 percent of respondents feel their current applications were never developed for the cloud /
The Case For Cloud-Native

What best describes your organization's current progress in leveraging cloud-native applications?

Category	Percentage
Extensively using applications developed for the cloud	5%
Piloting some applications developed for the cloud	14%
Assessing possibility of leveraging cloud-native apps	8%
Not currently considering leveraging cloud-native apps	9%
Don't know	65%

Percentage of respondents, n=282
Note: Percentages may not add up to 100% due to rounding

1 in 5

respondents say their organization is either extensively leveraging cloud-native applications or at least piloting early applications developed for the cloud.

At the same time, 8 percent of respondents indicate their agency is still only considering cloud-native possibilities and 9 percent have yet to explore cloud-native development altogether. Most respondents, however, are uncertain where their agency stands in terms of pursuing cloud-native designs. Together, these findings indicate that cloud-native has yet to receive widespread recognition as a major development goal, its impact only observed by a small group of early adopters and preliminary testers.
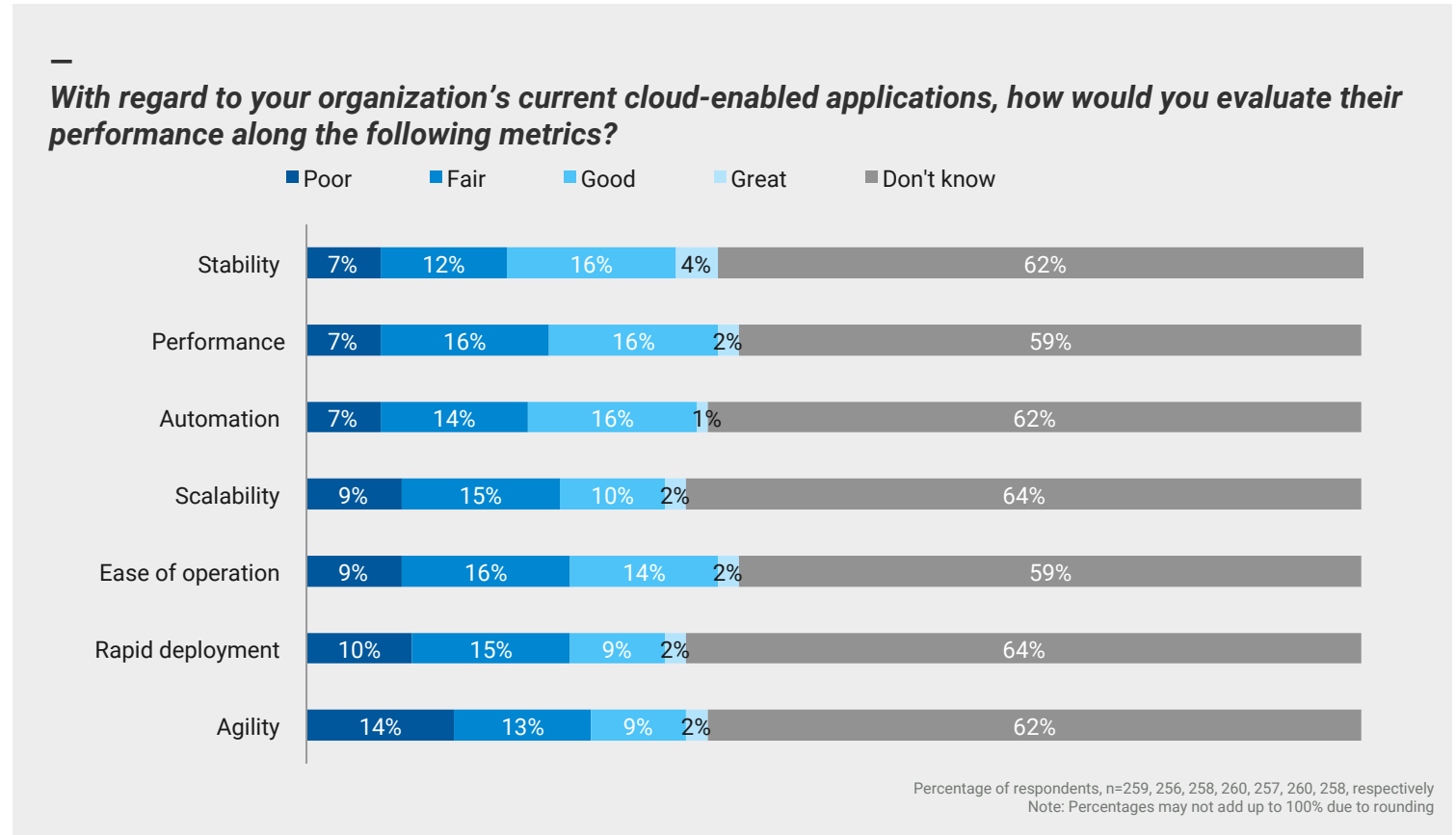
Do you feel the applications you currently use on a day-to-day basis were originally developed to operate on a cloud environment (i.e., to take maximum advantage of capabilities unique to the cloud)?

Certainly	Mostly	Somewhat	Hardly	Not at all
4%	12%	29%	20%	35%

Percentage of respondents, n=272
Note: Percentages may not add up to 100% due to rounding

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We need applications designed to meet the needs of employees rather than just to match the existing system. Applications should increase our functionality, not lose it.

Survey Respondent

Regarding current cloud app performance, respondents give low marks to agility and rapid deployment /
The Case For Cloud-Native

When asked to grade their current cloud-enabled applications on a set of metrics, the majority of respondents are either unable to say or express lukewarm ratings across the board. Among all metrics listed, only *stability* — defined for respondents as 'sound privacy controls, security integrity, and disaster recovery' — receives a higher combined rating of 'good/great' (20%) versus 'fair/poor' (19%). All other application qualities fare more negatively, with particularly low scores given to *rapid deployment* (i.e., ease of implementing mission-specific functionality) and *agility* (e.g., ease of making modifications, creating new features).

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With regard to your organization's current cloud-enabled applications, how would you evaluate their performance along the following metrics?

■ Poor   ■ Fair   ■ Good   ■ Great   ■ Don't know

Metric	Poor	Fair	Good	Great	Don't know
Stability	7%	12%	16%	4%	62%
Performance	7%	16%	16%	2%	59%
Automation	7%	14%	16%	1%	62%
Scalability	9%	15%	10%	2%	64%
Ease of operation	9%	16%	14%	2%	59%
Rapid deployment	10%	15%	9%	2%	64%
Agility	14%	13%	9%	2%	62%

Percentage of respondents, n=259, 256, 258, 260, 257, 260, 258, respectively
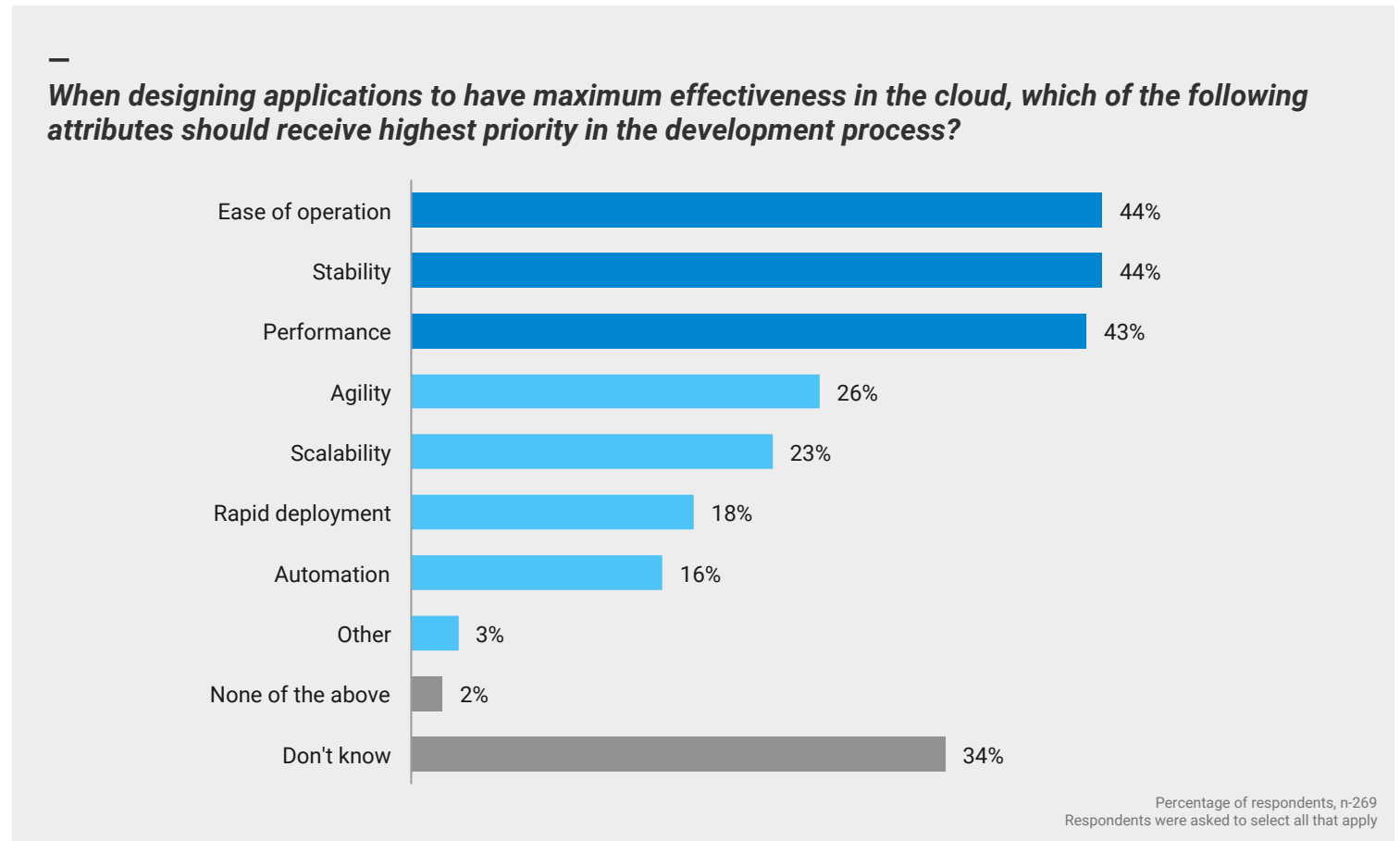Note: Percentages may not add up to 100% due to rounding

In addition to stability, respondents are slightly more favorable of applications when it comes to *performance* (e.g., page load times, uploading/downloading efficiencies) and *automation* (e.g., of application management, workflow). The fact that other features like *scalability* (e.g., ability to accommodate tasks of increasing complexity), *rapid deployment*, and *agility* are viewed less favorably could indicate that existing applications lack the very cloud-native properties which are critical to maximizing deployment speed, scalable solutions, and the addition of new functionalities when needed.

27%
of respondents grade their applications on agility as 'fair' or 'poor,' versus just 11% who consider it 'great' or 'good.'

Respondents say ease of operation, stability, and performance should receive greatest design priority /
The Case For Cloud-Native

When asked how applications can be developed to have maximum effectiveness in the cloud, respondents place a high premium on having ease of operation, stability, and performance in the applications they use. The combination of these factors, and the 17-18 pt. favorability gap they hold over the next listed attribute, suggest that security, speed, and sensible, user-friendly navigation are at the top of respondents' wish lists when it comes to operating cloud-enabled applications.

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When designing applications to have maximum effectiveness in the cloud, which of the following attributes should receive highest priority in the development process?

Attribute	Percentage
Ease of operation	44%
Stability	44%
Performance	43%
Agility	26%
Scalability	23%
Rapid deployment	18%
Automation	16%
Other	3%
None of the above	2%
Don't know	34%

Percentage of respondents, n-269
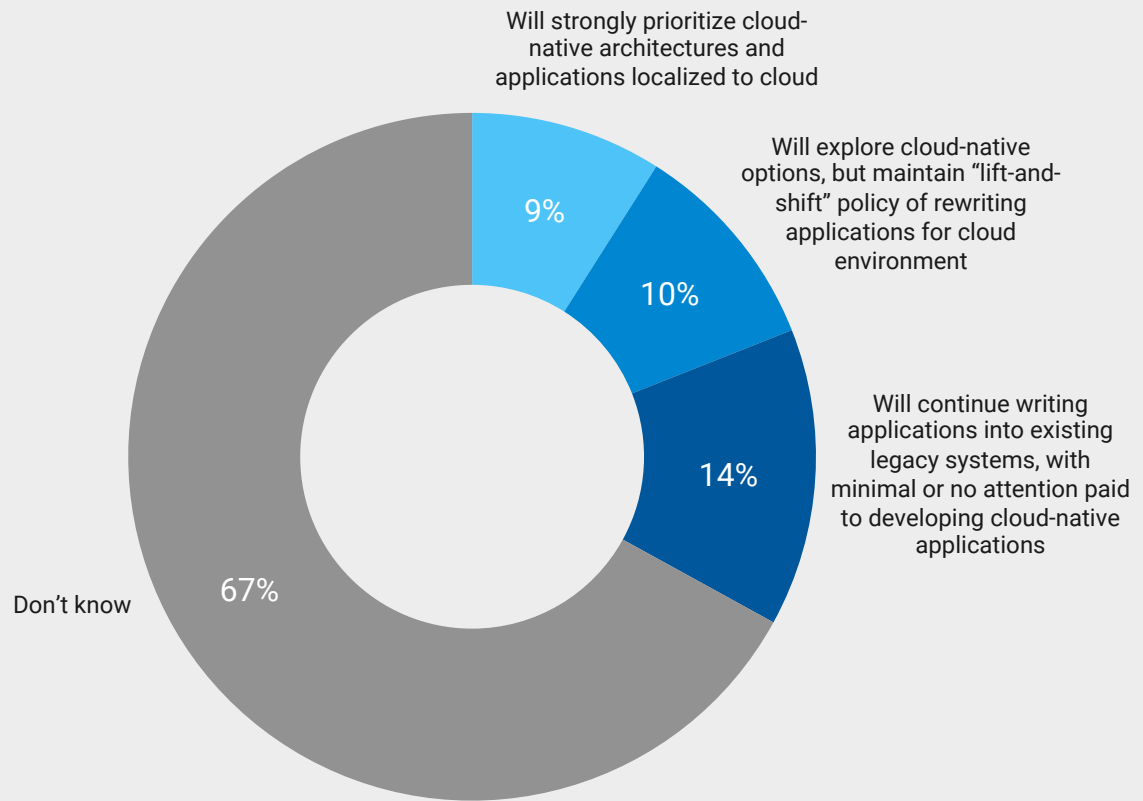Respondents were asked to select all that apply

However, even while ease of operation, stability, and performance receive the majority of attention, at least 1 in 5 also favor applications with greater agility to modify existing features as well as the flexibility necessary to scale applications for solving tasks of increasing complexity.

44%
of respondents prioritize applications with simple navigation, intuitive controls, and a short learning curve.

1 in 5 respondents say their agency will prioritize or explore cloud-native development going forward /
The Case For Cloud-Native

19 percent of respondents indicate their agency will either strongly prioritize cloud-native architectures and applications or, at the very least, explore cloud-native options in the near future. Meanwhile, 14 percent are confident their agency will continue current trends of "lift-and-shift," the practice of writing applications to fit existing legacy system requirements in cloud environments. However, another 67 percent are unsure what direction their agency will pursue, perhaps indicative of the technical nature of the subject and the niche audience involved in such decision-making.

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To the best of your knowledge, which best describes your own organization's current commitment toward future development of cloud-native applications?

Will strongly prioritize cloud-native architectures and applications localized to cloud

Will explore cloud-native options, but maintain "lift-and-shift" policy of rewriting applications for cloud environment

Will continue writing applications into existing legacy systems, with minimal or no attention paid to developing cloud-native applications

9%

10%

14%

67%

Don't know

Percentage of respondents, n=262
Note: Percentages may not add up to 100% due to rounding

Final Considerations

When considering how to take full advantage of the cloud:

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Avoid cloud sprawl, resist lift-and-shift, and take stock

Even as federal mandates like Cloud First and the potential for expanded data sharing continue to drive agencies to adopt new cloud technology, a number of major obstacles stand in the way. With 1 in 4 respondents describing their efforts transferring applications to the cloud as problematic or non-existent, and over half attributing these difficulties to security concerns, agencies must find cloud solutions that safeguard information without sacrificing mobility. At the same time, IT leaders should avoid "cloud sprawl," the result of going all-in on cloud without first having a clear strategy in mind for how to manage multiple cloud environments and the organizational changes demanded by this transition. The current "lift-and-shift" of applications into the cloud may be expedient, but is unsustainable in the long term as cracks in the veneer begin to show: periodic slowdowns, performance disruptions, and buggy navigation — common results of a development process that never originally had the cloud in mind.

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The secure path forward is "cloud-native"

Instead, agencies should think seriously about organizing their cloud in a way that hosts applications most effectively. One way agencies can move in this direction is by pursuing a "cloud-native" approach. Rather than devoting an already constrained IT budget to maintaining legacy hardware and infrastructures, organizations can seek expert guidance and tools from industry leaders in the cloud-native space, allowing for more automated maintenance, secure iterations, and development of applications that truly realize the full capabilities of the cloud. Such applications will not only be more secure, but agile, scalable, and navigationally intuitive for the end users who need them most.
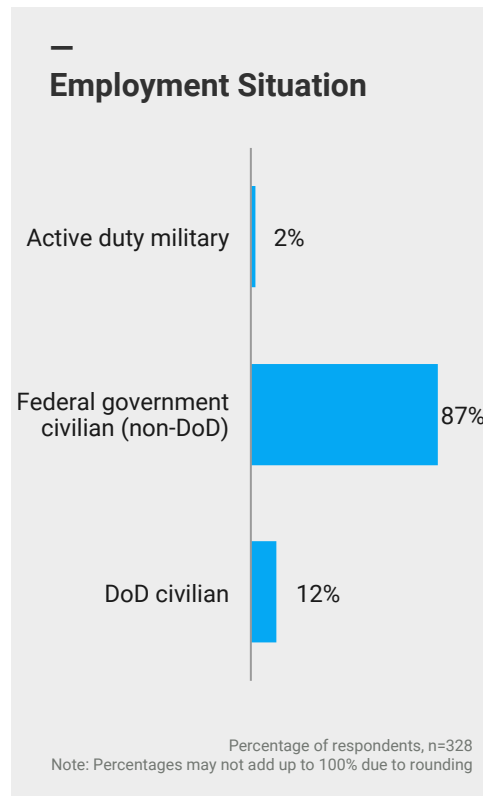
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Leverage the trailblazers

The good news? The brilliant folks at 18F and GSA are already leading the way. Through cloud-native workshops like Cloud.gov, agencies can begin investing in smarter cloud management and application design immediately. The platform has already implemented more than 300 applications in partnership with several agencies, and that number will rise as more realize the benefits of cloud-native architectures. The Department of Education's College Scorecard and 18F's Federalist project are only the beginning. By leveraging these trailblazers and the expertise of cloud-native industry leaders, agencies can avoid the sprawl once and for all. Innovation is here, and its vehicle is cloud-native.
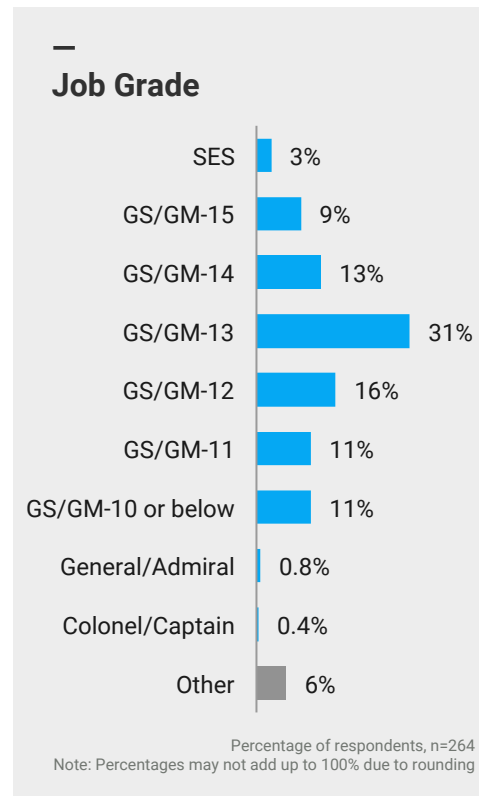
Respondent Profile

**A majority of respondents hold senior positions within the federal government**

Employment Situation

- Active duty military — 2%
- Federal government civilian (non-DoD) — 87%
- DoD civilian — 12%

Percentage of respondents, n=328
Note: Percentages may not add up to 100% due to rounding

Job Grade

- SES — 3%
- GS/GM-15 — 9%
- GS/GM-14 — 13%
- GS/GM-13 — 31%
- GS/GM-12 — 16%
- GS/GM-11 — 11%
- GS/GM-10 or below — 11%
- General/Admiral — 0.8%
- Colonel/Captain — 0.4%
- Other — 6%

Percentage of respondents, n=264
Note: Percentages may not add up to 100% due to rounding

Reports/oversees

- 1 to 5 — 18%
- 6 to 20 — 11%
- 21 to 50 — 5%
- 51 to 200 — 3%
- Over 200 — 3%
- None — 59%

Percentage of respondents, n=263
Note: Percentages may not add up to 100% due to rounding

87%
of respondents identify as federal government civilians working outside DoD.
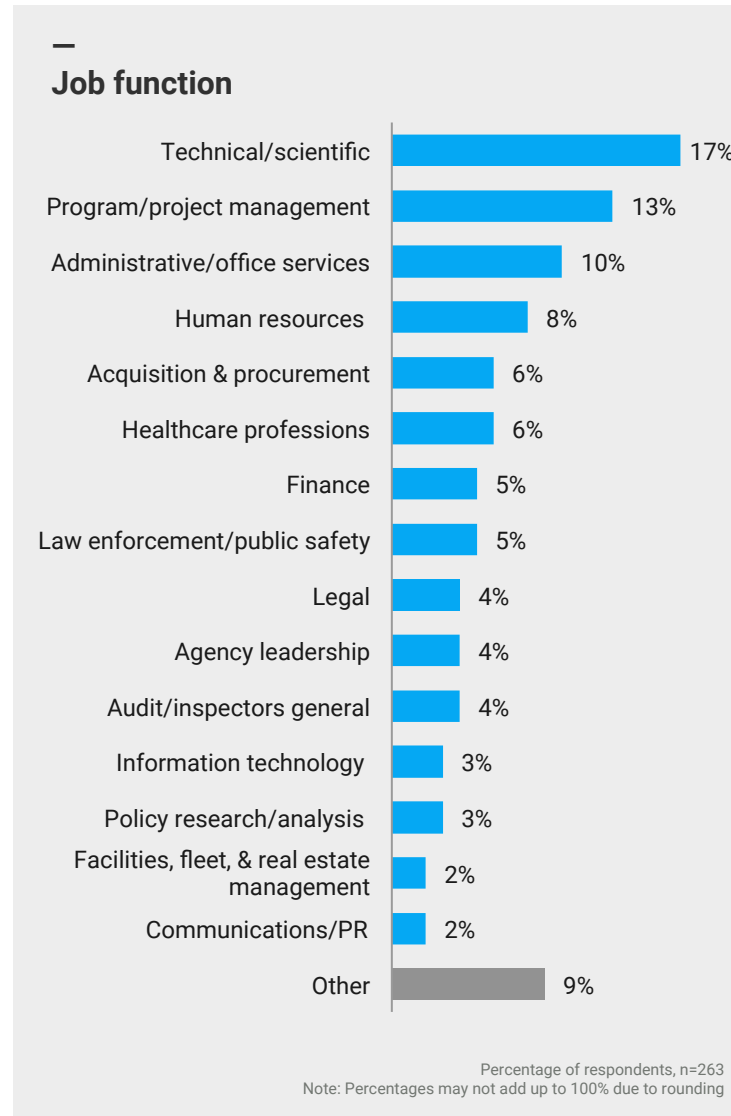
56%
of respondents identify as working at the GS/GM-13 level or above.
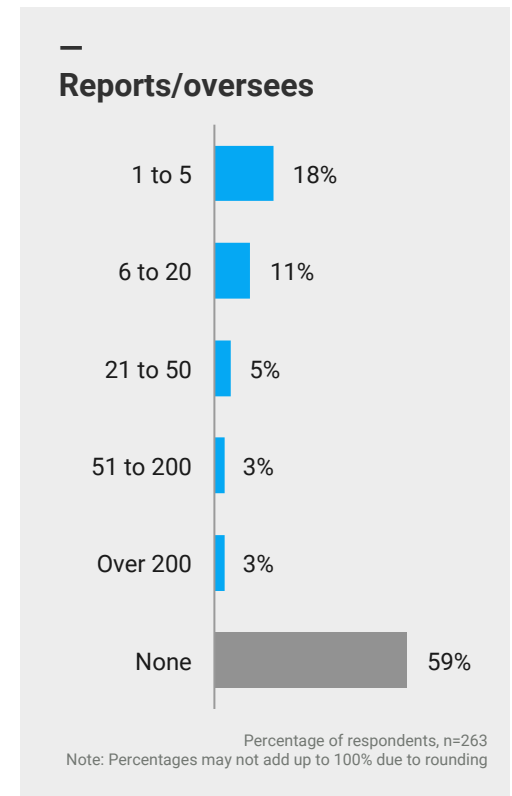
40%
of respondents are supervisors who oversee at least one employee, either directly or through direct reports.

Most widely represented cohorts are respondents with technical or program management background / Respondent Profile

Job function

Job function	Percentage
Technical/scientific	17%
Program/project management	13%
Administrative/office services	10%
Human resources	8%
Acquisition & procurement	6%
Healthcare professions	6%
Finance	5%
Law enforcement/public safety	5%
Legal	4%
Agency leadership	4%
Audit/inspectors general	4%
Information technology	3%
Policy research/analysis	3%
Facilities, fleet, & real estate management	2%
Communications/PR	2%
Other	9%

Percentage of respondents, n=263
Note: Percentages may not add up to 100% due to rounding

Departments and agencies represented

Interior
Agriculture
Veterans Affairs
Treasury
Health & Human Services
Army
Social Security Administration
Office of the Secretary of Defense
Environmental Protection Agency
Homeland Security
General Services Administration
Labor
National Aeronautics & Space Administration
Air Force
Justice

Congress/Legislative Branch
Navy
Energy
Transportation
Commerce
Government Accountability Office
Office of Personnel Management
State
Central Intelligence Agency
Combatant Commands
Marine Corps
Education
National Science Foundation
Small Business Administration
Other independent agency

Respondents, n=328

Respondents were asked to choose which single response best describes their primary job function.

Departments and agencies are listed in order of frequency.

About

Government Business Council

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