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Kyndryl´s 2023 State of Mainframe Modernization Survey Report

with a focus on government organizations

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Executive summary

In recent years, fluctuating global economies have challenged many organizations as leaders reconsidered spending choices. While some pilot programs and consumer/citizen-facing technology investments have been put on pause, we've seen a continued commitment to enterprise IT spending within organizations as they modernize and digitally transform their mission-critical environments. In fact, enterprise technology spending is considered recession-proof because economic turbulence has not impacted organizations' greater needs of driving efficiencies, ensuring agility, and elevating overall resilience.

Private and public sector CIOs share many commonalities related to aging infrastructure—especially mainframe systems. While reliable, mainframes struggle to keep pace with modern demands for agility, flexibility, and data-driven insights for citizens, customers, and employees alike. Modernization becomes crucial, but the path forward presents similar challenges for both sectors. The question is how to protect current investments in mainframe security, reliability, and high-performance computing capabilities while also exploring new ways to use technologies like cloud computing.

The goal for both private and public sector IT leaders is a more cost-effective, energy-efficient infrastructure that can increase organizational flexibility and innovation, without sacrificing the advantages of the mainframe. Despite commonalities, each organization's modernization roadmap looks different: the benefits they prioritize, the challenges they expect to face, and the future of the mainframe they envision.

Kyndryl commissioned Coleman Parkes Research to survey 500 enterprises, including 71 government organizations, that rely on mainframes across North America, Latin America, the Asia-Pacific region, Europe, the Middle East, and Africa to understand how leaders are approaching mainframe transformation and application modernization.

For mainframe decision-makers, Kyndryl's survey provides a bird's-eye view of the efforts underway to transform mission-critical operations within state, local, and federal government organizations. It also offers an opportunity to compare with the approach other industries are taking.

After an overview of several different mainframe modernization approaches, this report drills down into the "modernize on the mainframe" approach that some technology leaders are choosing as best suited to their digital transformation needs.

Five major takeaways from the survey

1. The majority of government organizations undertaking mainframe modernization (62% - 73%) report that they are experiencing increases in revenue—and 100% say they are achieving cost savings—regardless of the modernization approach – modernize on, integrate with, or move off. This clearly shows the value of modernizing in general.

2. Most organizations surveyed (90%) indicate that mainframes remain essential to their business operations. While security, reliability, and performance were cited as the top three key feature of mainframe by all respondents, the government respondents emphasized security far more than reliability and performance.

3. Almost all respondents noted that they were moving at least some of their workloads to the cloud or distributed platforms. However, government is leading all other industries, with 100% stating that the move to cloud is underway or completed. While all industry respondents stated that they plan to move a third of their applications off-mainframe, government organizations are leading the way with a target of moving 40% of their applications off the mainframe. Notably, no government organization cites plans to move all of their workloads entirely off the mainframe.

4. Across all industries, government organizations were the most concerned (52%) about staff retiring and taking mainframe skills with them. Perhaps this is one reason the majority (69%) of government respondents plan to use external firms to help them on their modernization journey and fill existing skills and knowledge gaps. The skills gap represents a major opportunity for rising technical talent to jump in and fill these gaps as there is a high job placement rate for those who obtain these skills.

5. While security is a major consideration in the strategic decision for respondents across all industries, for government it came at number three. Cloud-native platforms and enterprise software (e.g., finance, supply chain, CRM, HR, ERP, etc.) were cited as the primary driver for government decision makers.

The survey results show that mainframes remain and will continue to remain one of the technological backbones of the world's economy. They enable businesses and governments across the globe to run mission-critical applications while processing massive amounts of data.

However, the survey also shows that organization leaders do not want to maintain the status quo: the greatest risk is inaction. Most IT leaders are strategically transforming their organizations every day to meet user expectations, drive revenue, and make the most of their chosen route to transform. The respondents were almost evenly split, one third each, on the modernization approach – modernize on, integrate with, and move off.

The journey: Three paths to modernization

Organizations looking to update their mission-critical operations are approaching mainframe modernization in three ways: by modernizing on, integrating with, or moving off the mainframe. Our survey found that most government organizations use a combination of these approaches in their transformation journeys, but may prioritize one of the approaches.

How and why technology leaders are modernizing

No organization can afford a stagnant mainframe strategy. Nearly all respondents recognize this truth as they combine approaches to realize significant—and surprisingly similar—financial benefits.

Today, updating core systems often means tailoring projects to meet business and technical needs. Most organizations take a hybrid approach: they consider the capabilities of each platform and make selections for their applications and data accordingly.

To maximize value, the majority of organizations generally use one of the following three approaches – modernize on their mainframes, integrate with other platforms, or move certain workloads off the mainframe.

Modernize on: 37% of government respondents are taking the modernize on route. Their primary drivers for taking this route are improved security, lower risk, and deploying as quickly as possible. Second and third drivers are about optimizing operational cost and increasing agility.

Integrate with: 31% of the government respondents are taking the integrate with route. Their primary drivers for taking this route are improved security, data accessibility, and improved innovation. Second and third drivers are about unlocking the data to gain better insights and boosting innovation.

Move off: 32% of the government respondents are taking the move-off approach. Their primary drivers for taking this route are improved security, faster time to market, and improved performance. Second and third drivers are about quickly enabling new capabilities and delivering better performance.

It is surprising that improved security was the top driver across all three modernization routes, given that 76% of government respondents voted security as the top characteristic valued for mainframes, and 65% also cited security as the biggest concern stopping them from moving off mainframes. This clearly illustrates that security needs are workload-specific and are not a barrier to the integrate with or move off approaches.

Are we there yet?

Digital transformation doesn't happen overnight—it's an ongoing effort. 55% of government organizations report that their mainframe modernization efforts are "in progress"; but nearly a third (30%) are just starting. Only 14% state that they have fully transformed their mainframe environments.

The approach to mainframe modernization does not seem to be a major determining factor in how long a modernization project takes. On average, organizations choosing to modernize on, integrate with, and move off reported that modernization projects took about five months (5.13 months, 5.01 months, and 4.86 months, respectively).

Modernizing on the mainframe

Organizations that intend to continue running workloads on the mainframe know they must continually modernize to yield benefits in a fast-moving business world. These respondents see three key advantages of modernizing on the mainframe: improved security (55%), improved performance (51%), and reliability (48%).

The majority of the organizations surveyed (62%) say their approach to mainframe modernization is to optimize performance and capacity and rationalize software—choosing which applications to keep, replace, retire, or consolidate. Another popular approach is DevSecOps integration with the mainframe environment (61%), which brings together development, IT operations, and security for streamlined processes. Nearly half of respondents (48%) are recompiling mainframe programs to the newest version to upgrade performance.

When optimizing applications to remain on the mainframe, many organizations are using containers and microservices—which offer greater flexibility—to enhance the application development process. The adoption of this approach **is highest amongst government organizations** at 52% compared to an overall average of 46%. Containers are designed to make applications more portable and scalable, while microservices can deliver more agility to support innovation.

For respondents considering modernizing on the mainframe, key considerations include the age of the system, security, and the availability of internal knowledge of the system. These were the top three ranked considerations across every industry, including government respondents.

> "[W]e use mainframes to manage the railway's critical systems… These systems require high availability, reliability, and security. Mainframes help us in processing large volumes of data in real-time, enabling quick decision-making and responsiveness to any changes in our operations."

– Line of business leader in a government organization

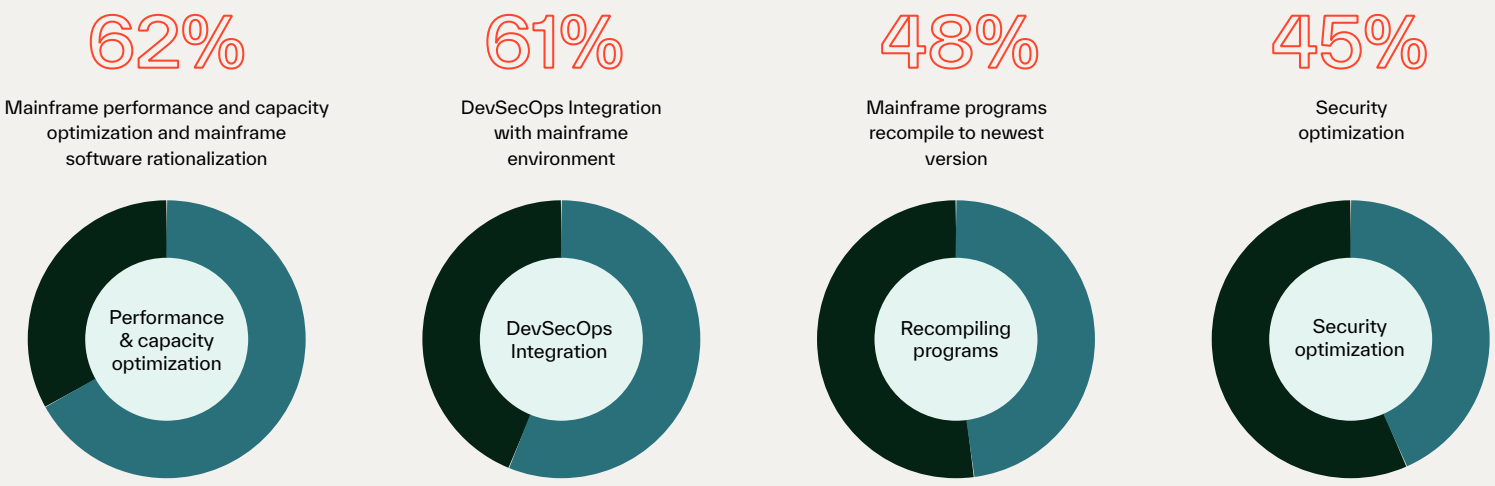

Figure 1: The main approaches to modernizing on the mainframe in the government sector

Organizations can transform their use of the mainframe—and derive new value from their long-term investment—by taking advantage of its modern capabilities. For example, organizations that choose this path are well positioned to:

- Transform mainframe applications using modern programming languages
- Open the mainframe by enabling application programming interfaces (APIs)
- Unlock data
- Adopt DevOps or DevSecOps
- Consolidate Linux® workloads
- Implement containers to make applications more portable and scalable
- Increase automation and introduce artificial intelligence (AI) for IT operations (AIOps)
- Deploy a site reliability engineering (SRE) model and teams
- Rationalize, optimize, and consolidate the software stack
- Optimize performance and reduce the consumption of MIPS (Million Instructions per Second)
- Preserve the mainframe's robust data security capabilities

"Integrating mainframe applications with hyperscalers allows us to leverage advanced security features and best practices…, optimizes costs,… provides flexibility and scalability to handle varying workloads efficiently… [and enables us to] leverage modern technologies to drive innovation and improve operational efficiency."

— Line of business leader in a government organization

In modernizing on the mainframe, organizations transform existing applications by implementing modern features, upgrading and reconfiguring automating as much as possible.

Pursuing benefits and weighing risks: The pull of the cloud

Organizations that choose this path opt to move applications and data from the mainframe environment to the cloud for multiple reasons, including optimizing costs, increasing scalability, exiting the data center business, or making use of benefits offered by other platforms.

Benefits

As more and more organizations in many industries pursue the accessible, flexible, and scalable services of the cloud, our government respondents are following suit. A little over three-quarters (76%) report that their move to the cloud is underway or complete. Almost half (46%) say that the switch resulted in technology consolidation, which tends to make an organization more efficient. 35% are integrating with cloud-native services, which can make applications and data more easily accessible and facilitate more flexible ways of working. Other top-ranked benefits include improved security (52%), faster continuous development (39%), greater agility (41%), improved scalability (42%), and Increased assurance and reliability (41%).

Risks

The wide-ranging benefits of moving some or all workloads to cloud are attractive, but organizations are also on guard against possible risks. More than half of all respondents, including government organizations, have security concerns. Also, nearly half of all respondents (46%) worry that costs might be unpredictable or difficult to manage, and for government respondents, that concern is even higher (62%). This is a surprising source of anxiety as data shows that modernizing the mainframe generally results in cost savings. More than a third of all respondents (38%) fear that moving off mainframe will be complex and time-consuming, a more understandable concern considering the extent and ambition of such projects. On the other hand, government organizations are less concerned with complexity (ranking at only 28%), and more worried about the dependency on connectivity (34%).

Challenges presented by modernization

When modernizing the mainframe, government organizations see challenges slightly differently than the overall cross-sector results. For example, they rank lack of planning slightly higher (24% versus 20%). The same is true for overcoming performance issues (24% versus 18%). And while overall, code quality challenges was the third-ranked challenge, government respondents focused instead on scope creep for budget and timelines (14%). The lowest -ranked concerns for government organizations were code quality challenges and the burden of testing (8% each).

"[M]oving to the cloud is a key part of our business strategy to move off the mainframe… [C]loud computing offers several benefits, including scalability, flexibility, and reduced hardware costs. It can also provide a more modern and agile platform for running applications and services."

— Line of business leader in a government organization

Proven value: Seeking to optimize through modernization

As it is clear from the survey results, organizations are equally split in all three approaches of modernization. The realized benefits tell a similar story. On average, the government organizations in our sample expect to see cost savings each year of USD $21.58 million by modernizing on mainframe, USD $30.21 million by integrating with cloud, and USD $24.07 million by moving off mainframe. Collectively—across all 71 respondents—our respondents saved a total of about USD $1.8 billion in one year by modernizing their mainframes.

While it's clear mainframe transformation projects can certainly be worth pursuing, respondents identify risks they must navigate. When considering the prospect of moving away from dependency on a mainframe environment, organizations report concerns around security risks (65%), increased costs (58%), and application compatibility (41%).

"Our aim is to improve system performance, scalability, and reliability while reducing costs."

– Line of business leader in a government organization

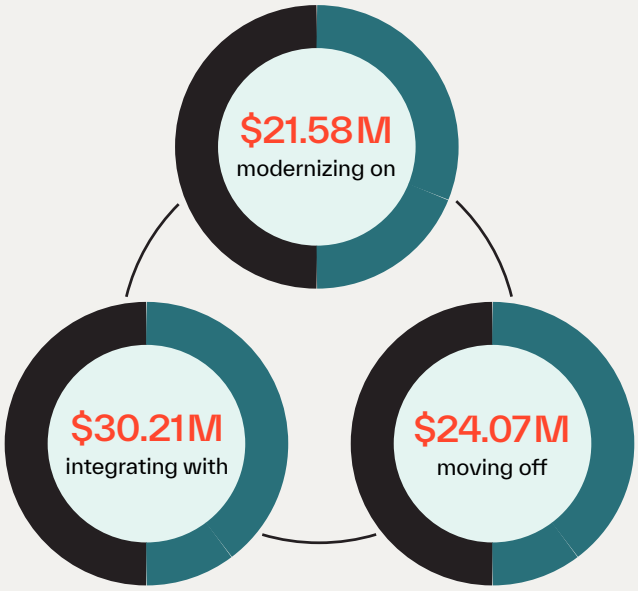

Figure 2: Average annual cost savings per government organization as a result of mainframe modernization

Modernization and security across industries

"We adopt a hybrid approach and keep certain applications on the mainframe while moving others to the cloud. Being a government [organization], we need to make sure [of] the privacy and security of the data and therefore, we will go for a hybrid cloud strategy."

– Line of business leader in a government organization

"Security is one of our primary concerns when moving to a cloud environment. We will need to ensure that data is protected from unauthorized access, theft, or loss."

– VP of IT at a multinational corporation

"When it comes to security, both mainframe and cloud environments have their own strengths and weaknesses. It is difficult to make a direct comparison between the two as they are fundamentally different in terms of architecture and design."

– VP of IT at a multinational corporation

"We were very reluctant in the initial phase of our modernization journey. Then our service partner showcased all the security measures they have in place, and we went ahead with our modernization journey without any worries."

– Chief Technology Officer of a financial enterprise in Latin America

Security and success: A shared concern

Government organizations shared one prevalent concern on the transformation journey: security.

In fact, security is the primary driver behind most government organizations' modernization approaches, with 85% of respondents naming security as the main influence on their choice to modernize on the mainframe. Across the board, respondents list security as one of the top two elements most crucial to the success of a mainframe transformation project. 54% of government organizations are currently investing in training on mainframe security and access controls, second only to database training (62%).

Mainframes often function as the hub of complex business operations, and organizations worry that security incidents could have massive ramifications. Fears include breaches, regulations, legal consequences, and reputational damage. Spanning all sectors, top security concerns across both cloud and mainframe environments are data loss and account hijacking. For government respondents, security concerns differ between cloud and mainframe. For cloud environments, account hijacking (55%) and data breaches (51%) top the security concern list. For mainframe environments, data loss (41%) and unauthorized access (42%) are nearly tied for the top security concern.

To update their systems with confidence, organizations must carefully evaluate the cybersecurity risks associated with their chosen platform. The vast majority (95%) of all respondents say they are implementing end-to-end encryption to protect data. That number is even higher for the government sector—98%. The majority of government respondents (68%) are working with an external supplier or partner with cross-platform security expertise to alleviate some security concerns as they update applications.

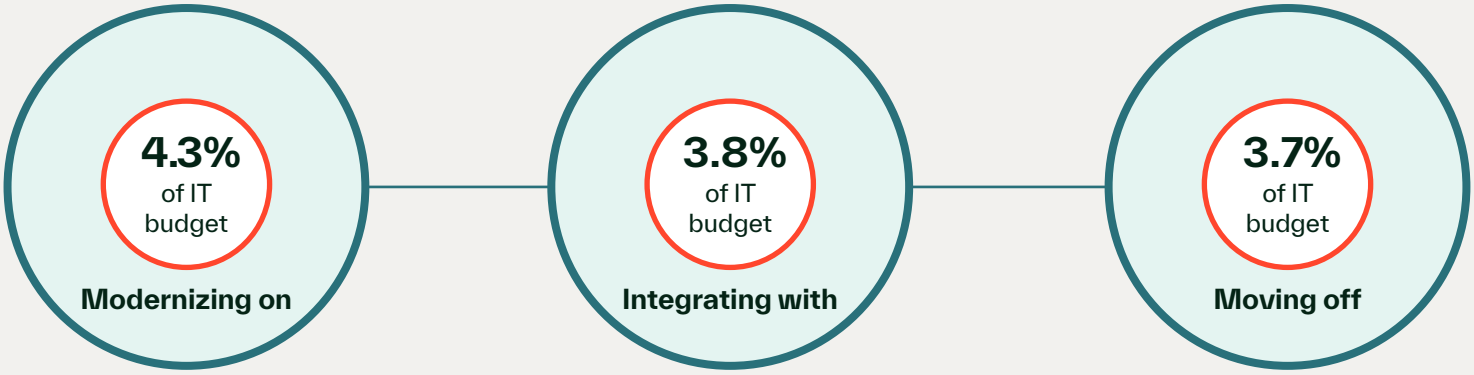

Figure 3: Average modernization budget as a proportion of overall IT budget across all organizations and all industries surveyed.

Commonalities across approaches

One of the most surprising discoveries of this survey is how consistent mainframe transformation projects are across all sectors, in terms of cost and use of external vendors as trusted advisors.

Costs

According to the survey, the average cost of a mainframe transformation project across all industries is 3.9% of an organization's IT budget. Even though many organizations worried about staying on budget, most respondents say they found the cost of modernization to be very similar to their predictions.

Bringing a companion on the modernization journey

Perhaps because of the challenges discussed earlier in this report, only about a quarter (26%) of all surveyed organizations are attempting the transformation project on their own. Three-quarters of respondents (74%) worked with a partner to guide or support their journey. Government organizations are more evenly split between using a mix of internal and external resources, relying solely on an external partner, or transforming using only in-house resources (35%, 33%, and 32%, respectively).

As the line-of-business leader in **one government organization noted:***"We are using external partners for updating mainframe applications because I feel that they have specialized expertise and experience, which may not be available in-house at our organization. This expertise can help ensure that the transformation project is done efficiently and effectively."*

They went on to say: *"Our external partners ensure the reliability of critical applications and their environment [and] they may have access to new technologies and tools which will accelerate the modernization process and deliver us… better results. Our external partners provide additional resources and support to help ensure the project is completed on time and within budget. And not only this, but they also help us in managing these risks by providing a structured approach to the modernization process and ensuring that the new systems are thoroughly tested and validated before deployment."*

The gap in legacy skills and a lot of change: Looking to the future

There are some uncertainties ahead as technology leaders plan for the future. A lack of skilled workers in the IT industry who can support mainframe environments is a significant concern for survey respondents. The majority of all respondents (56%) lament the fact that most people entering the workforce do not have mainframe skills; that number is even higher for government organizations (58%).

Overall, nearly half (47%) of respondents note that staff with mainframe expertise are retiring—and that number grows to 52% for government organizations. This problem is prompting organizations to adopt new development languages and methods, which 54% believe will attract more early professional hires.

One certainty: change is sweeping mainframe IT. These transformation projects are likely to drive further evolution as digital technologies advance. Even for those 14% of government organizations surveyed who say their mainframe modernization project is complete, tomorrow may well present additional opportunities for further digital transformation.

Conclusion

Beyond cost savings and revenue optimization, government organizations are improving customer experience and operational efficiency by recognizing that mainframe transformation is not an all-or-nothing bet—meaning an all-or-nothing strategy is unlikely to be the best solution.

All applications are not equal: they do not share the same requirements for scalability and performance, nor the same need for accelerated development speed to market. Increased agility is not a benefit for applications that do not change, and low-transaction applications may not need to be updated for mass scalability. Each application and its associated data must be examined individually in the context of cost and business and technical requirements.

As organizations accelerate their transformation journeys, the majority rely on providers and partners to ensure they have the skill sets needed to accomplish their goals. Finding a trusted advisor and integrator with deep expertise and experience is essential to success. Such providers can help identify optimal strategies, advise on the right platform decisions, execute modernization projects, and manage the resulting environment—on, with, or off the mainframe.

"Despite the introduction of newer technologies, mainframes have remained relevant in numerous large-scale, mission-critical applications for more than 50 years. Mainframes may continue to play a significant role in the IT sector for many years to come thanks to ongoing advancements in hardware and software, especially in sectors like finance, healthcare, and government, that demand a high level of security, dependability, and processing power."

– Line of business leader in a government organization

Learn more about Kyndryl at

kyndryl.com/us/en/services/mainframe.

About the survey

The 500 business leaders surveyed include senior IT decision-makers and line-of-business representatives working in government, enterprise, and mid-market organizations with an average global revenue of USD $4.4 billion.

The respondents work for organizations based in North America (27%), Latin America (24%), the Asia-Pacific region (24%), and Europe, the Middle East, and Africa (25%). They work in banking and financial services, retail, healthcare, insurance, travel and transportation, and federal and government organizations. 14% of respondents are in government. Respondents hold roles like Chief Information Officer, Chief Technology Officer, VP/Director of IT, and line-of-business positions within areas like operations and management.

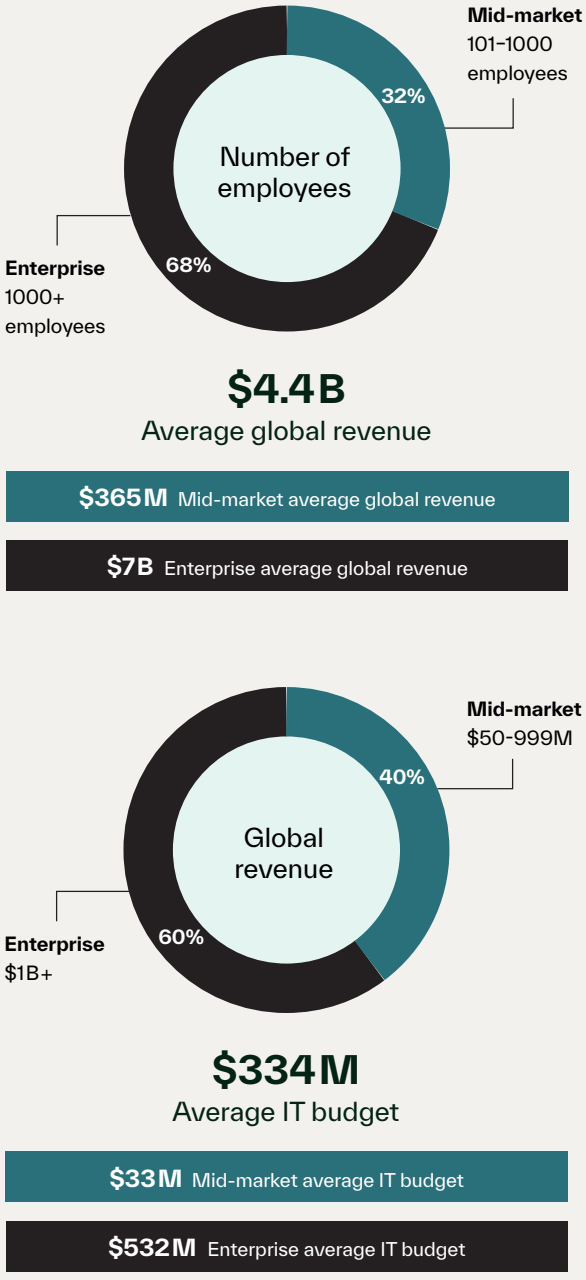

Figure 4: Demographics of mid-market and enterprise organizations included in the survey

Kyndryl commissioned Coleman Parkes Research to survey 500 enterprises that rely on mainframes. This paper outlines the key findings of this survey and the implications for mainframe decision-makers.