Deloitte.

Breaking blockchain open

Deloitte's 2018 global blockchain survey

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Momentum is shifting

Deloitte's 2018 survey of more than 1,000 blockchain-savvy executives globally is a leading indicator of where blockchain is headed. While blockchain is not quite ready for primetime, it is getting closer to its breakout moment every day. The academic hypotheses of five years ago are steadily becoming a reality. Momentum is shifting from a focus on learning and exploring the potential of the technology to identifying and building practical business applications.

The executives we surveyed hold pragmatic views and look poised to make some major moves over the next year. As you'll see below, those we surveyed see great value in blockchain's potential to reinvent processes across the business value chain as more investment is made in identifying and developing a wider range of use cases. Further, we see our clients making meaningful investments in the present day, starting new businesses based on the unique value proposition offered by blockchain and tokens.

Overview and methodology

The Deloitte US and global blockchain practices commissioned this survey in March and April 2018, primarily as a research vehicle to gain greater insights into the overall attitudes and investments in blockchain as a technology. The release of survey highlights in this document reflect those opinions and perceptions around blockchain and potential impact of the technology in the future.

The information shared in this report provides summaries of a subset of the overall data and insights collected. For questions or more information about the survey and its findings, please contact our US Blockchain Lab team (usblockchainlab@deloitte.com).

Methodology statement

This survey was commissioned by Deloitte Consulting LLP and conducted online between March 26 and April 5, 2018. The survey polled a sample of 1,053 senior executives in seven countries (Canada, China, France, Germany, Mexico, United Kingdom, and the United States) at companies with $500 million or more in annual revenue. Respondents had at least a broad understanding of blockchain and were familiar with and able to comment on their organizations' blockchain investment plans.

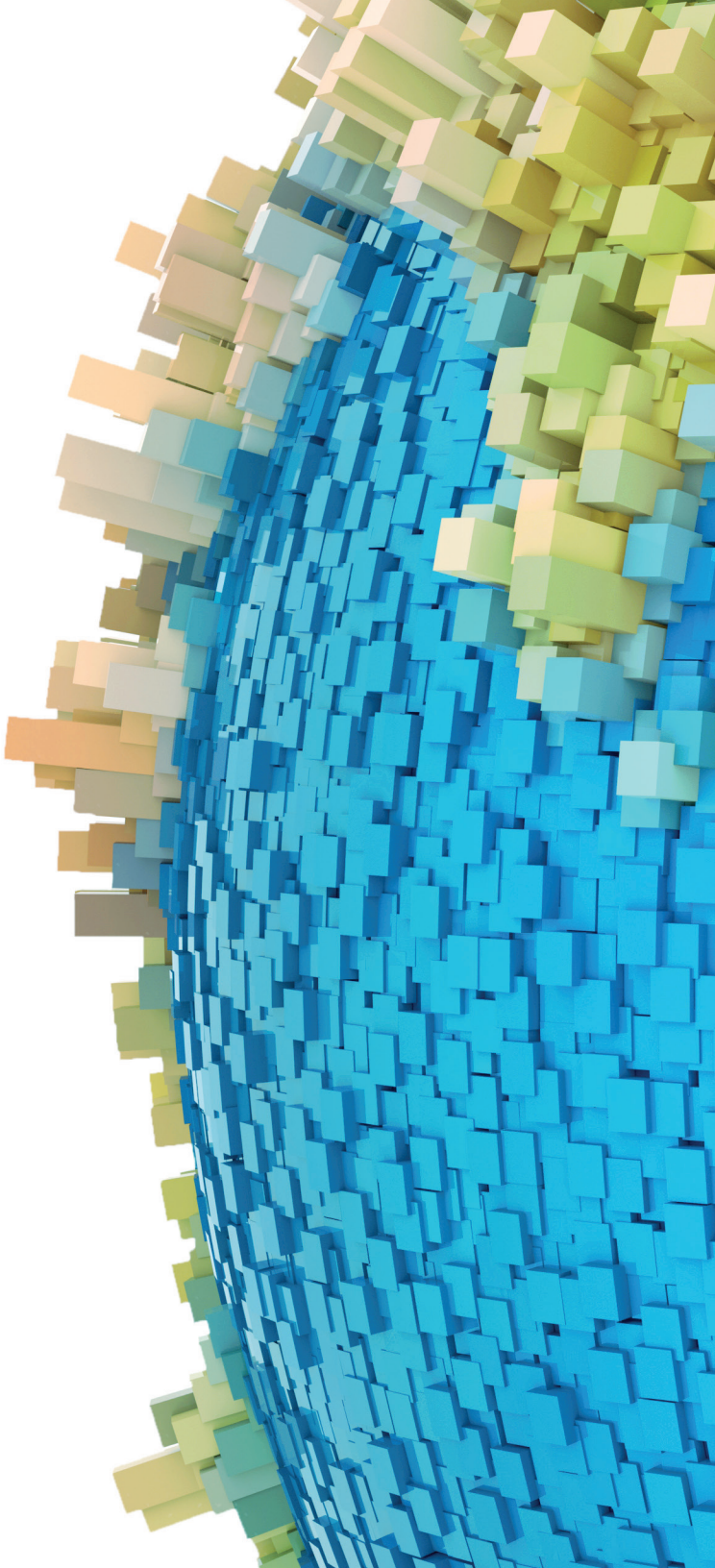
Blockchain today

Blockchain is at an inflection point, with momentum shifting from "blockchain tourism" and exploration to the building of practical business applications. This is particularly true among "digital enterprise" organizations [see enterprise vs. "emerging disruptors"], rather than in more traditional enterprises that are still working on how to incorporate digital into their existing operations and protocols. While our survey shows that these "enterprise digital" organizations may be lagging their fully digital brethren in this endeavor, the fact is, traditional enterprises are putting more resources behind blockchain than they had been in an effort to achieve greater efficiency and to develop new business models and revenue sources.

Despite enterprise digital respondents' interest in blockchain's capabilities, nearly 39 percent of the broad global sample said they believe blockchain is "overhyped." In the United States, this number is higher: 44 percent of respondents view blockchain as overhyped, up from 34 percent in a 2016 survey by Deloitte. This perception may be driven by the steep increase in token values over the last 18 months, and survey members conflating blockchain with the incentive layer of public blockchains, namely tokens.

On their own, these numbers seem to indicate that blockchain is moving in the wrong direction. However, we believe this change in attitude is more reflective of the shift toward the pragmatists in the blockchain community.

Because we are still early in blockchain's development, these fits and starts in its maturation are not surprising. While executives in the financial services sector, for example, are leading the way in using blockchain to reexamine processes and functions that have remained static for decades, their counterparts in other sectors remain more reserved as they work to develop appropriate use cases for blockchain. At the same time, there are a growing number of emerging disruptors across each sector, challenging traditional business models with the use of blockchain.



Theoretical vs. practical

When stripped to its core, blockchain is really just a sophisticated ledger system. It is a versatile technology that can record financial transactions, store medical records, or even track the flow of goods, information, and payments through a supply chain. While it can provide more security and, in some cases, anonymity, the truth is that on its own, blockchain doesn't actually do anything unless it is paired with a solid use case where it can serve as a sort of Trust-as-a-Service (TaaS) to ecosystem participants. Ultimately, it's more of a business model enabler than a technology.

That understanding is key to discerning the difference in how enterprise digital (legacy) organizations view blockchain in comparison to their digital enterprise (emerging disruptors) compatriots. For legacy organizations like well-established financial institutions and traditional brick-and-mortar retailers, we're starting to see a change in approach toward blockchain. Executives in these organizations are moving away from the pure platform view of "What is it? Let's figure out how the technology works, and let's find a use case" toward development of more sensible, pragmatic business ecosystem disruption.

In short, this is a move toward the viewpoint held by digital enterprise executives who have built their organizations around blockchain from the ground up, and who don't have to function within the confines of a 100-year-old business or cope with the same rules of consensus around their business.

What many enterprise digital executives are still struggling to see, however, is that blockchain represents a fundamental change to their business. In and of itself, this helps explain that while a majority (74 percent) of our survey respondents report that their organizations see a "compelling business case" for the use of blockchain technology, only 34 percent say their company has initiated some sort of blockchain deployment.

Adding to the uncertain state of blockchain adoption is the fact that while more than 41 percent of respondents say they expect their organizations to bring blockchain into production within the next year, 21 percent of global respondents—and 30 percent of US respondents—say they still lack a compelling application to justify its implementation.

What remains important for these executives to recognize is the first rule of blockchain adoption: This is a business model change where companies need to focus on more than just a solid proof of concept for implementation. Because blockchain, when properly implemented, should fundamentally change how a business operates, it impacts the entire organization, creating new tax and cyber implications along with a variety of governance and regulatory issues that need to be addressed.

Current vs. future state

From the early days when steam- and gas-powered automobiles began replacing the horse and carriage, new technology breakthroughs have always captured the public's attention, even at times when it wasn't yet ready for mainstream consumption.

Blockchain is, in our opinion, at a similar point in its development.

Among the general public, early adopters, such as cryptocurrency traders, have helped to bring mainstream notoriety to blockchain. For all this advocacy, however, there remain a significant number of skeptics who view blockchain as the overhyped engine behind a volatile and unregulated financial market.

Stagnant perceptions about blockchain's capabilities appear to be more entrenched outside of the United States, according to our survey. When asked if they believed that blockchain was just "a database for money" with little application outside of financial services, just 18 percent of US respondents agreed with that statement versus 61 percent of respondents in France and the United Kingdom.

Like their counterparts leading the cryptocurrency revolution, our survey data shows that a significant percentage of early adopters in the business community (59 percent) believe in blockchain's potential to disrupt and revolutionize their industries—and the overall economy. The problem, respondents say, is that for all the talk about blockchain's promise, there are very few active use cases they can currently employ to advance their beliefs.

As a result, a certain "blockchain fatigue" is beginning to set in among those who feel its potential has been over-communicated, while its real-world benefits remain elusive. While this viewpoint is understandable, we believe it is also somewhat self-fulfilling and, ultimately, self-defeating. Based on our view of where blockchain is today and, more importantly, its likely adoption rate within the next three years, we strongly believe that organizations need to evolve their thinking around the technology.

Jason Bloomberg, the founder and president of Intellyx and a *Forbes* contributor, agrees with this perspective[1] pointing out that the majority of attendees at the recent Consensus conference in New York were focused on the hot-topic issues of blockchain and cryptocurrency. In contrast to the "carnival huckster atmosphere" promulgated by these attendees who were seemingly only interested in short-term gains, Bloomberg said the real innovation is in the development of "essential business models that may actually deliver real business value" thanks to blockchain technologies. He points to the initiative spurred by FedEx, which is using the technology to "gain early traction in enterprises for multi-party supply chain and logistics use cases."

Instead of concentrating on how to use blockchain to support a specific product or idea, the time has come to focus on evolving blockchain itself. While most organizations have "dipped a toe" into the blockchain waters, we're seeing the most dramatic progress being made by those organizations that have willfully jumped into the deep end of the pool.

Of course, we know that some organizations are more conservative than others, and not everyone is ready to test the waters just yet. That's fine, and there's no reason for these organizations not to sit on the side waiting for others to create effective business cases that justify the expense and effort of implementing new blockchain solutions so long as they are willing to take the plunge once their concerns have been addressed.

For those organizations that do jump into the blockchain pool, it's important to note that there's no shame or harm by getting out again if they're not seeing the results they want. While 78 percent of our survey respondents believe they stand to lose competitive advantage if they do not eventually implement blockchain, they see a variety of obstacles moving forward, with a full one-third saying they believe their current return on investment in blockchain technology remains "uncertain."

In short, the only real mistake we believe organizations can make regarding blockchain right now is to do nothing. Even without a completely solid business case to implement, we believe that organizations should, at the very least, keep an eye on blockchain so that they can take advantage of opportunities when they present themselves.

Real-world challenges

Like the development of the Internet before it, blockchain is still, in many ways, looking for solid footing outside of early adopters. In the mid-1990s, the Internet was still very much a curiosity, hampered by slow connection speeds and disparate protocols that often made browsing the Web more frustrating than beneficial for anyone but the most dedicated users.

Just 10 years later, however, the Internet had not only become a ubiquitous global business tool, but it had actually changed how business was conducted, leading to the rise of web-based companies like Amazon that allow users to order anything they want—from anywhere they want—with just a few simple clicks.

And while blockchain use cases may only be dribbling into production at this point in time, there is an absolute gold rush of ideas out in the marketplace. Big thinkers are continually coming up with new ideas for how blockchain can be leveraged across their organizations.

Businesses around the globe are spending significant time and resources creating new use cases and patenting their innovations—even in the face of high short-term development costs and murky ROI. More than one-third of respondents to our survey say they've already brought a blockchain implementation to production; another 41 percent plan to bring blockchain to production in the next year.

Respondents tend to cite "greater speed" (32 percent) and "new business models" (28 percent) as major advantages of blockchain technology more than "lower costs" (16 percent). Indeed, companies looking to implement new blockchain solutions may not see immediate savings from their efforts, as they will likely continue to support existing systems until they can be completely retired and replaced. Similarly, companies may also face unexpected labor costs if they want to compete for qualified personnel in a tight labor market.

As with the production challenges, the burden is on the early adopters to demonstrate the real-world ROI of blockchain solutions.

In the near term, we also believe that blockchain consortia will continue to gain traction. According to our survey, approximately 29 percent of our respondents have already joined an existing consortium, with nearly 45 percent saying they are likely to join one within the next year. And more than 13 percent say they are interested in starting a consortium of their own.

As blockchain gains traction and influence, we believe the benefits of consortia, including their shared costs, ability to create unified industry standards, and advantages of scale, will make them even more attractive options for companies in finance, technology, and health care over the next two to three years. At the same time, a successful consortium is dependent upon a level of collaboration and agreement across a myriad of complex business and technology architecture decisions, bringing a significant challenge to these arrangements.

A different view: Enterprises vs. "emerging disruptors"

The problem with blockchain adoption in the United States today isn't really a problem at all.

Some of our colleagues at Deloitte argue that our recent blockchain survey results don't necessarily tell the whole story and might not adequately reflect the level of innovation infiltrating each industry sector. The reason: The survey focused only on enterprise organizations implementing legacy-constrained solutions, and not on start-ups or emerging disruptors.

It is also important to understand what's happening in the digital space. Most of these companies could be described as start-ups; however, we prefer to call them "emerging disruptors." We define emerging disruptors as those companies that entered their respective industry segments as start-ups but have grown rapidly to the point where they are currently—or will soon be—disrupting the larger players in their markets.

We use the phrase emerging disruptor because of the pace at which these new business models go from day one to explosive growth. They are typically well funded and managed by seasoned executives, well connected to key stakeholders, and well versed in the potential value offered by commerce reimagined by blockchain. They build teams who think in a gravity-free environment, unconstrained by legacy problems, but with a realistic view of the regulatory atmosphere.

By focusing only on "mature state" enterprises, critics say, Deloitte's survey is missing out on an important part of the blockchain story, and the "cool stuff" being done by emerging disruptors in the market.

Emerging companies aren't facing the problems expressed by enterprise companies in the survey—a lack of use cases for the technology and trouble justifying the ROI they hope to achieve by adopting blockchain. Instead, these companies are seeing explosive growth because they truly understand blockchain's potential and have devised specific business cases to take advantage of its unique value proposition.

In many cases, these companies are showing how blockchain is changing the nature of what transactions represent and eliminating many constraints of the past while enabling new forms of commerce for every industry and changing how consumers and enterprises perceive a transaction or a company's value proposition.

The companies truly pushing the future of blockchain are doing more than just disrupting legacy transactions and inventing new transaction types. These organizations are building whole new theories of what commerce could—and should—be like.

Established companies face several legacy concerns and are trying to make blockchain fit into an already existing business paradigm that may or may not benefit from its introduction. The emerging disruptors, on the other hand, have business models inspired by blockchain. They are experimenting and building without the constraints of a legacy business process, focusing on what is possible and then dealing with any challenges as they arise.

Based on their experience working with emerging disruptors, those most familiar with this new breed of blockchain-native organizations believe that while broad blockchain adoption may not be at an advanced level in the United States, the level of innovation and efforts to build scalable enterprise blockchain solutions is exploding.

***NOTE**: For a deeper dive into the impact that emerging disruptors are having on blockchain adoption, look for a soon-to-be-published Deloitte follow-on article.*

Pushing the future of blockchain: Spotlight on emerging disruptors

Storj Labs

Storj Labs is a distributed cloud storage provider that brings the excess capacity of users' hard disk drives and bandwidth (Storj calls them "farmers") into an incentivized marketplace where developers can use that infrastructure as a data layer in their applications for object storage (i.e., static content that is written once and read many times, like video, PDFs, and selfies) instead of utilizing traditional cloud providers.

"Storj now has farmers in more than 180 countries around the world, storing up to 100PBs, while not owning or operating a single data center," says Storj Labs Founder and Chief Revenue Officer John Quinn. By incentivizing farmers through the use of Storj's native token, STORJ, Quinn says, the company offers end-to-end encryption (more secure), high availability, and fast performance, at a 50 percent or greater discount because it does not need to build data centers to store the data. In this way, Storj is redefining object storage.

Rivetz Corp.

Companies such as Rivetz Corp. are using blockchain for an entirely new approach to transaction types. Rivetz is providing a store of value for devices to pay for, and control, cybersecurity services. Steven Sprague, Rivetz's cofounder and CEO, says the blockchain provides a new model to deploy and manage global key management and device integrity. Rivetz's vision is to extend the software-defined network to include the endpoint device and provide provable cybersecurity controls. Proving a control was in place may address a core compliance challenge in the post-GDPR market.

Filecoin

Filecoin is a decentralized file storage network and a native token powered by a blockchain. Filecoin's mission is to use cutting-edge advances in cryptography and blockchain technologies to bring together massive amounts of storage from "miners" all over the world, and provide a superior service with strong guarantees of availability, resilience, and great price. The value of the Filecoin token is designed to track the amount of value created by the network, meaning that miners earning Filecoin tokens for storing files are earning a stake in the network itself. The more tokens any individual participant earns and holds, the more incentive they have to support the network and ensure its success. This incentive alignment and feedback loop causes creates an extremely strong network of collaborating participants who will all greatly benefit from the success of the network.

The bottom line

When looking at the insights developed from our 2016 survey, the data suggested that blockchain adoption—and its move into production—would have happened at a faster pace than we have seen so far in 2018. Still, even though blockchain is rolling out in a more moderated fashion than expected, its adoption remains promising.

One of the keys we see holding blockchain back is in the very way that most people and organizations look at it—and its potential to redefine their businesses. Specifically, organizations should stop looking at blockchain as a "new" technology, because it's really not.

Just as Uber achieved success by building a unique business case by combining three existing technologies and protocols (automobiles, online reservations, and online payments) into a new, disruptive model that changed public transportation, blockchain holds the same promise for business across the various industries.

As Nolan Bauerle so eloquently explained in his *CoinDesk* article, "What is blockchain technology?,"[2] blockchain is "the particular orchestration of three technologies (the Internet, private key cryptography, and a protocol governing incentivization)" that resulted in a secure system for digital interactions without the need for a trusted third party to facilitate digital relationships.

When viewed in this light, organizations can stop wasting time and effort focusing on the technology and, instead, focus on identifying areas of friction and outmoded processes that can benefit from the democratization of trust and the ability to more securely verify the authenticity of both B2B and B2C digital transactions.

While early adopters—the digital enterprises and emerging disruptors that have built their businesses around blockchain from the very beginning—are quickly moving their blockchain efforts from their corporate test beds to production, enterprise digital (legacy) organizations are not moving at the same pace.

Nor should they be.

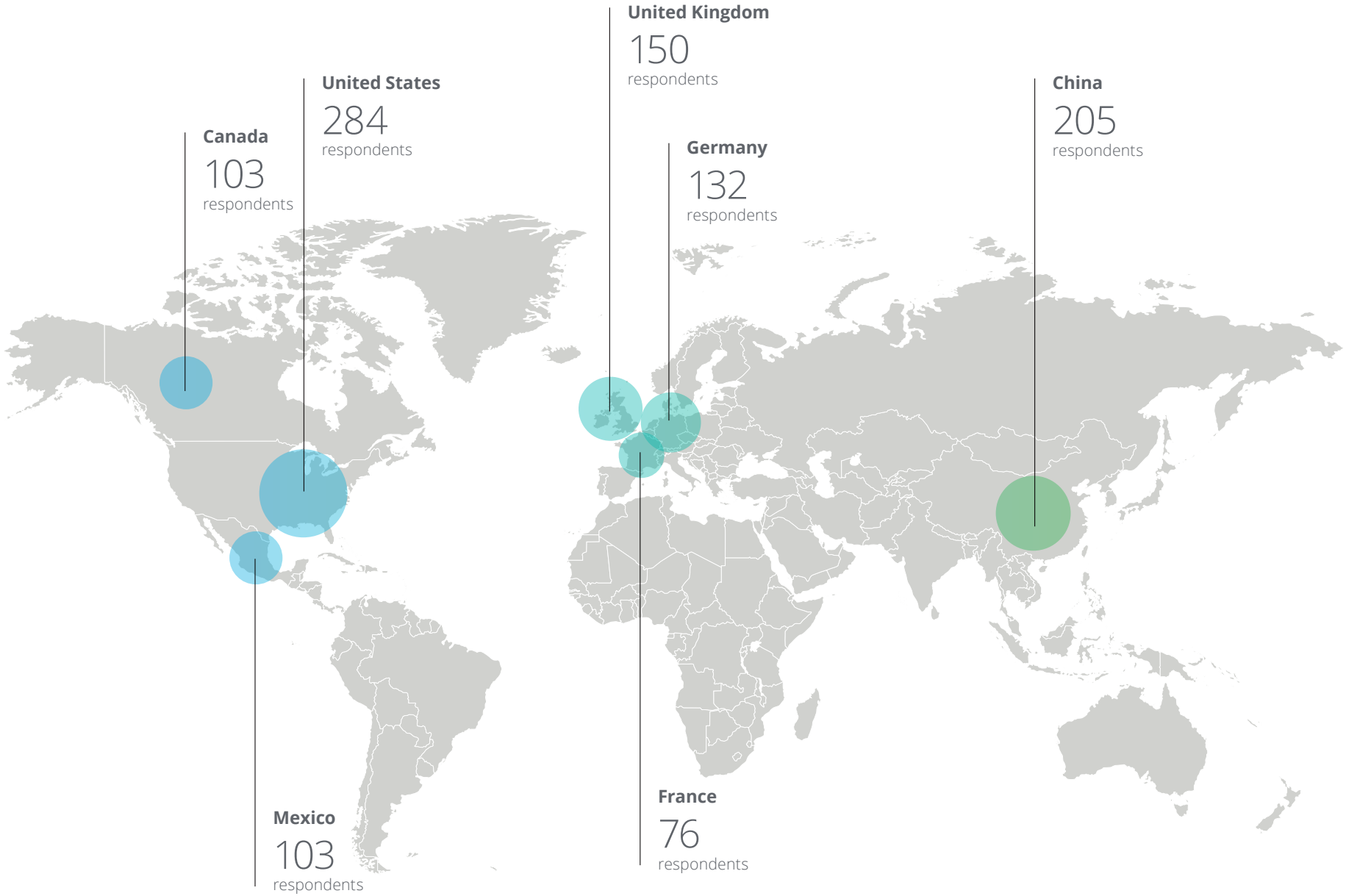
While these organizations can't afford to ignore blockchain, or its potential to disrupt the way they've done business for decades or even centuries, they also don't need to feel pressured to "keep up with the Joneses" by adopting new business solutions before they're ready to do so. Having a healthy fear of disruption is fine, but there's no need for legacy organizations to feel anxious and move toward blockchain without first identifying and developing a solid use case.

As more organizations put their human and financial resources behind blockchain and come to better realize how it can improve their business processes and their bottom lines, we expect blockchain to gain significant traction as its cost savings, competitive advantages, and ROI benefits become more pronounced.

The view further down the road is an inspiring one. We see blockchain enabling a completely new level of information exchange both within and across industries. As connections are made between blockchain and other emerging technologies, particularly the cloud and automation, we see the potential for blockchain to help organizations create and realize new value for businesses beyond anything we can imagine with existing technologies.

Survey overview

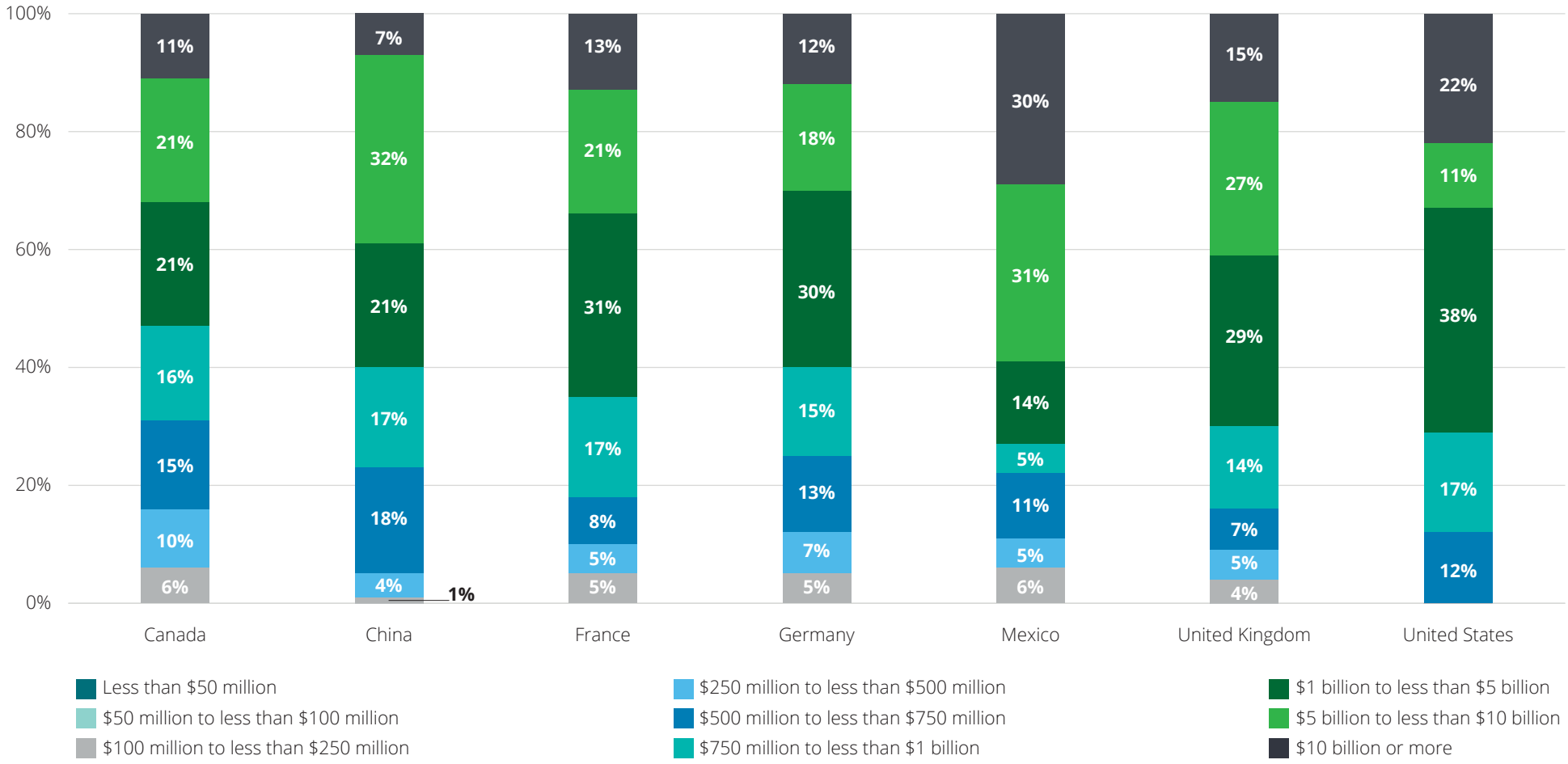
To summarize, the survey was fielded across seven countries (Total number of respondents = 1,053):



Company overall annual revenues in 2017

Respondents are senior-level executives at mostly large companies across a variety of industries.

Q: Which of the following best represents your company's overall annual revenues in 2017?

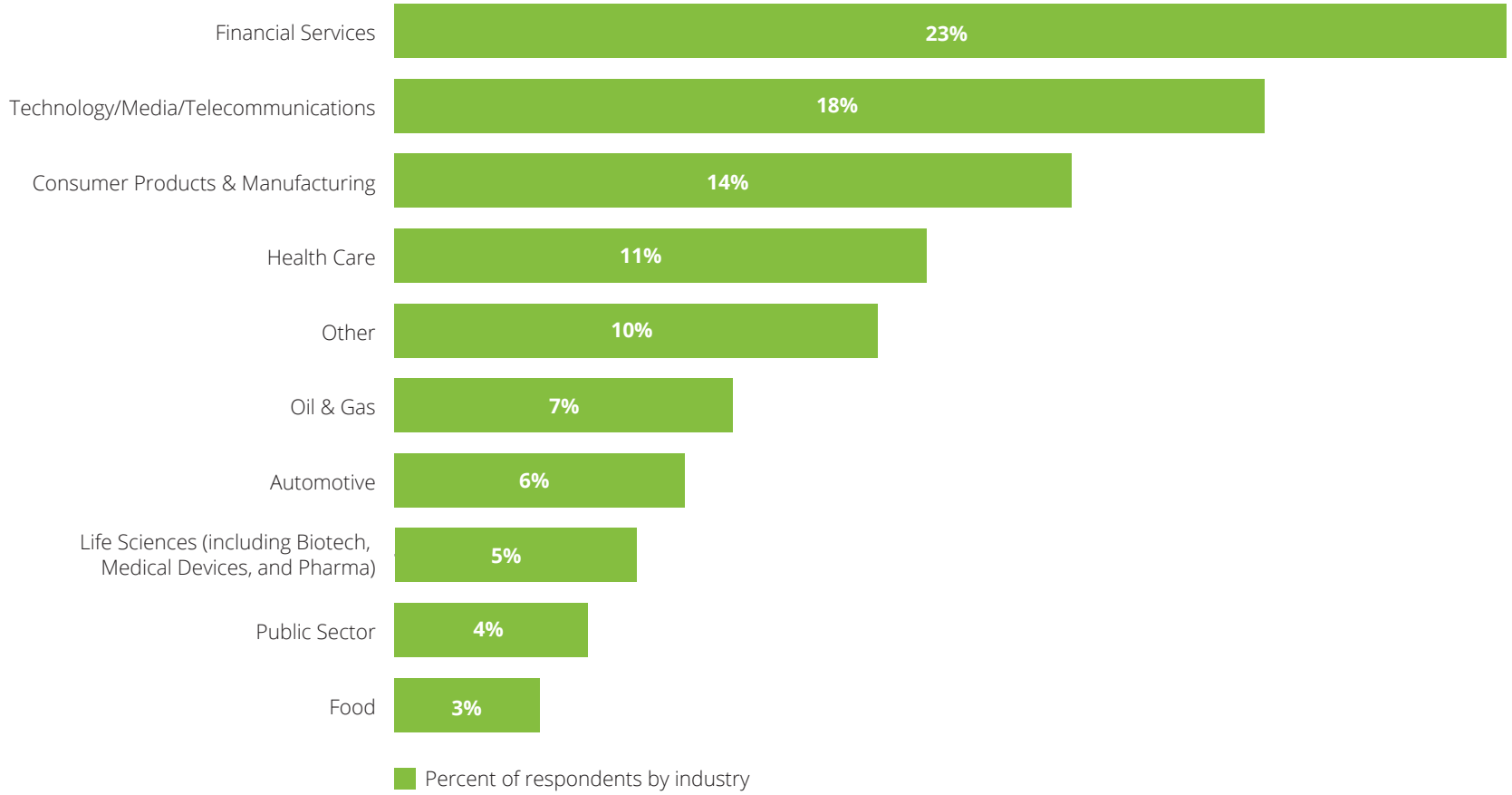


N= 1,053 (global)

Primary operations of organizations by industry

Survey respondents hail from 10 different industries—the majority from financial services, technology/media/telecommunications, and consumer products and manufacturing.

Q: In which of the following industries does the organization you work for primarily operate?



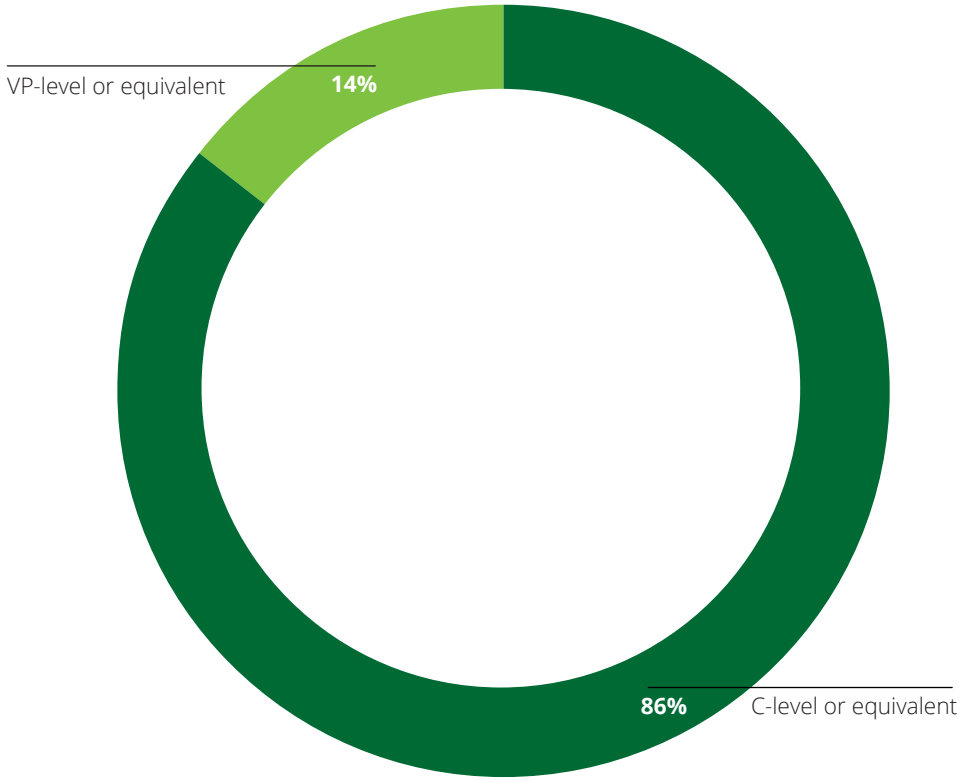
N= 1,053 (global)

Respondents by job level and role

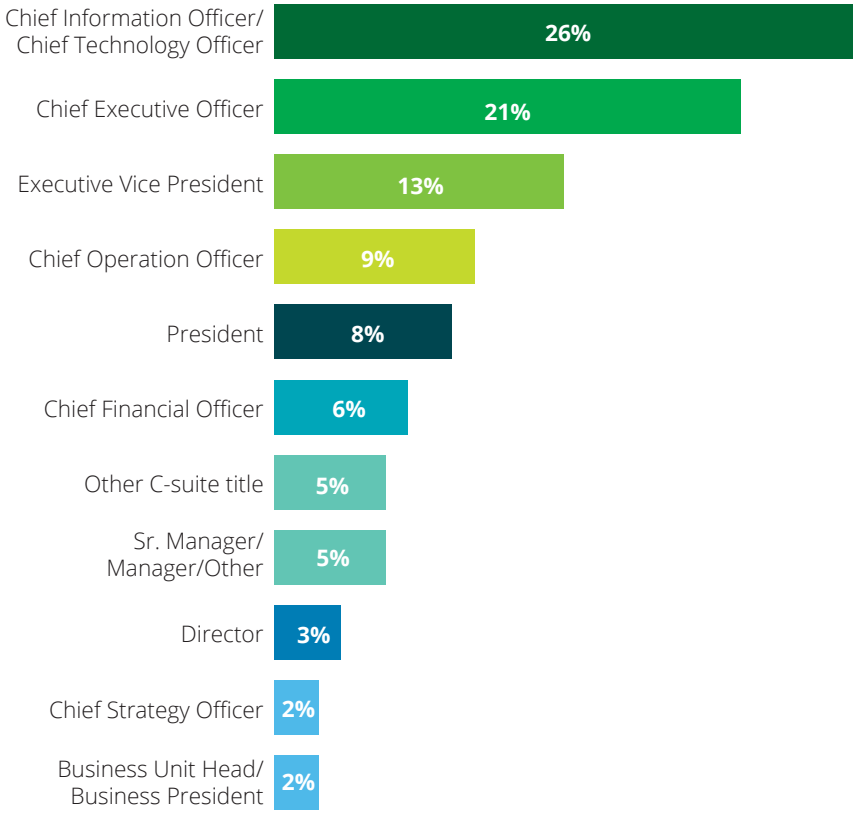
The overwhelming majority of survey respondents hold C-level or equivalent positions. Forty-six percent are CIOs/CTOs or CEOs.

Q: Which of the following best describes your current job role/title?

Respondents by job level



Respondents by role

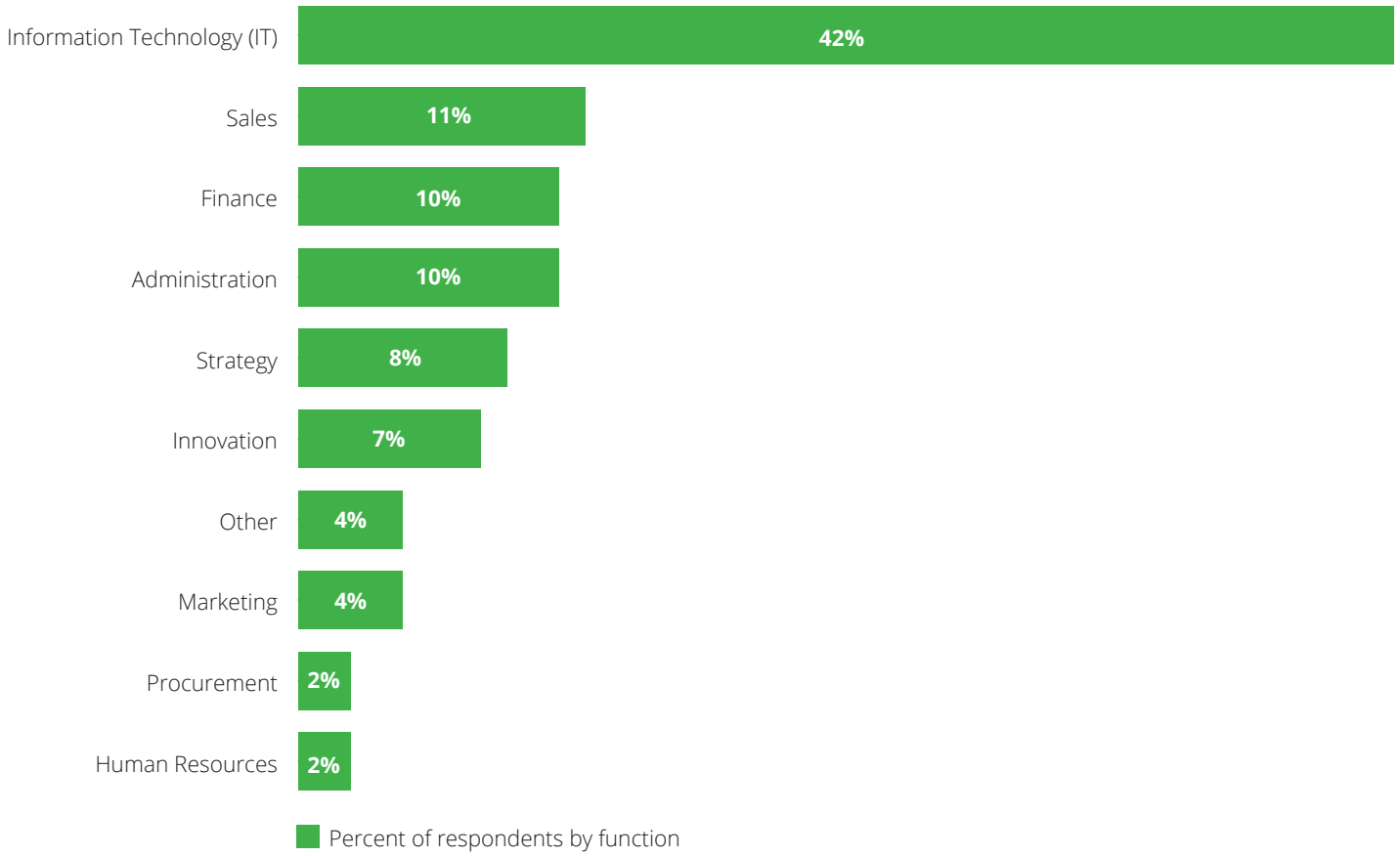


N= 1,053 (global)

Respondents by functional area

Information technology is the largest functional area represented in the survey responses.

Q: In which functional area do you work?

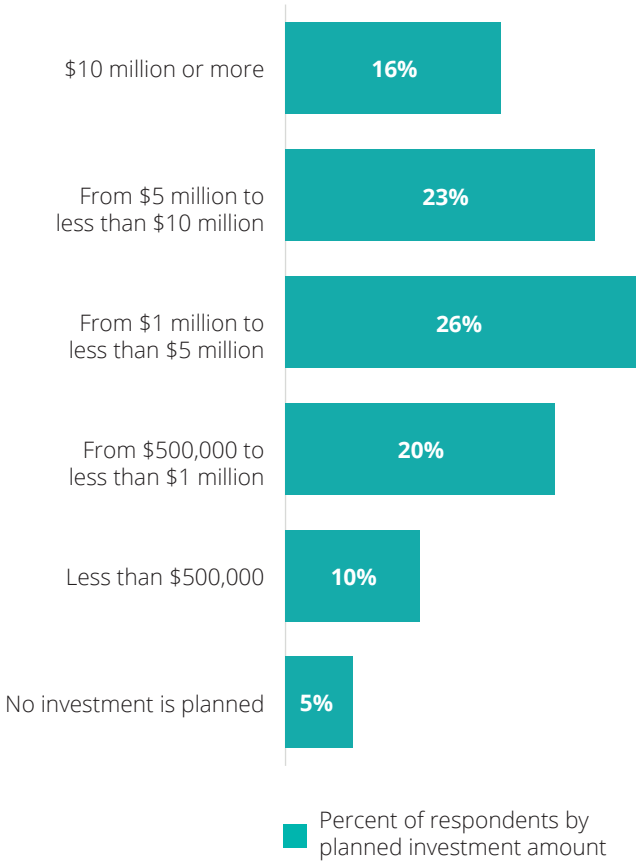


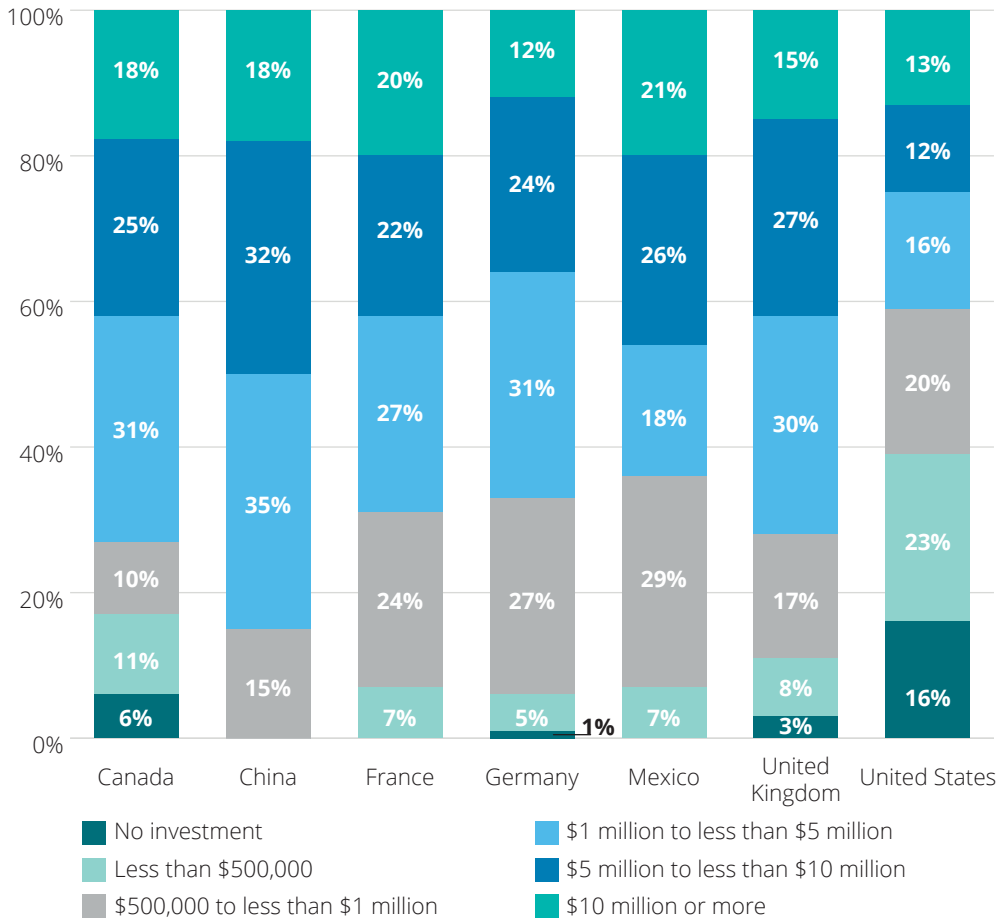
N= 1,053 (global)

Approximate blockchain investment that organizations will make in the next calendar year

Blockchain is a priority investment for many companies. Thirty-nine percent of respondents reported that their organization will invest $5 million or more in blockchain technology in the coming year.

Q: Thinking specifically of blockchain technology, what is the approximate investment your organization will make in the next calendar year in this area?



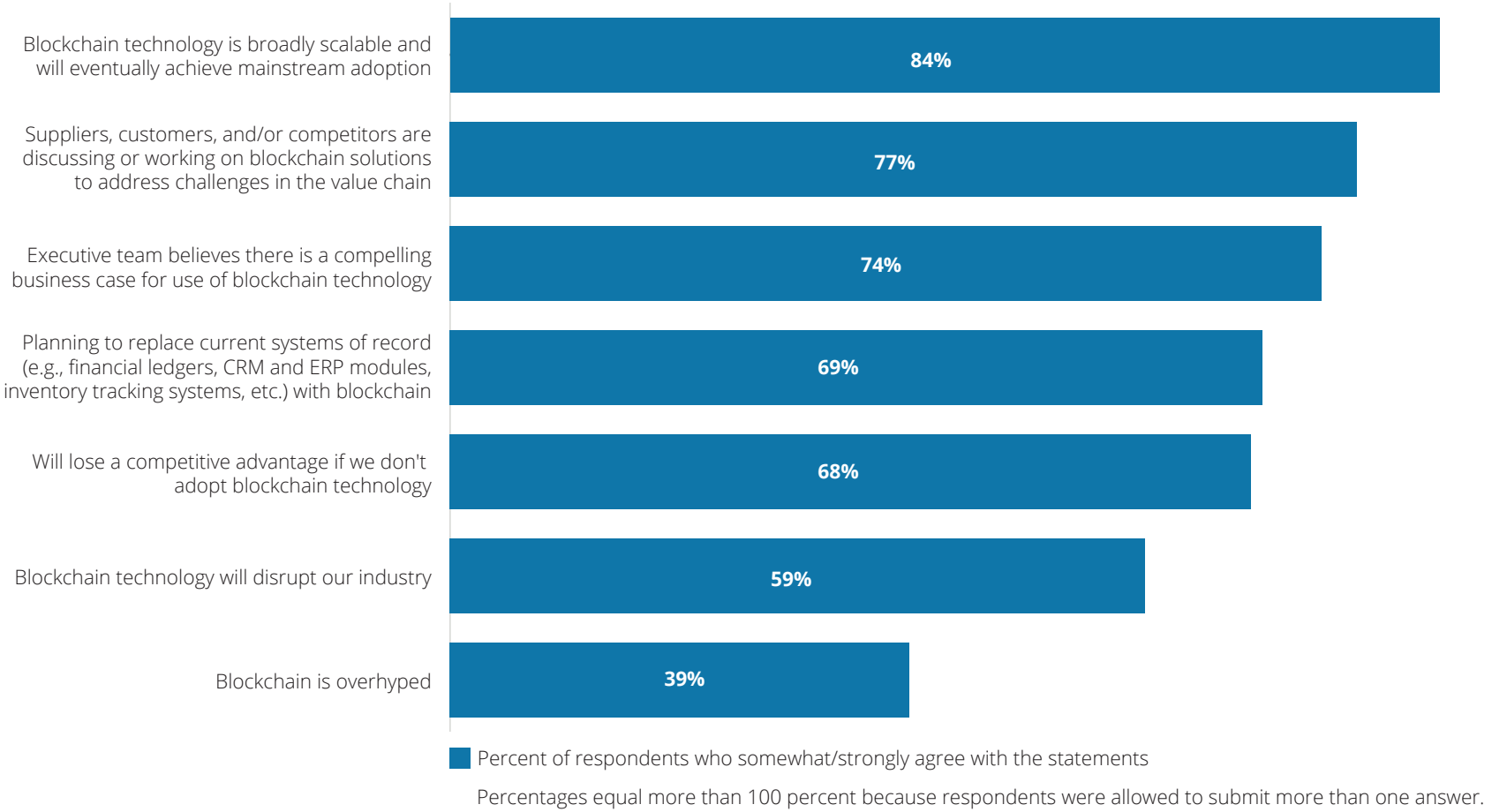


N= 1,053 (global)

Survey respondents' attitudes on blockchain and its adoption

Overall, respondents are extremely bullish on blockchain's potential, namely its ability to broadly scale and reach mainstream adoption. A majority also agreed that blockchain technology will disrupt their industry. Despite these high expectations, 39 percent of respondents agreed that blockchain technology is overhyped, suggesting that even blockchain believers think some of the rhetoric on the technology's potential is overly optimistic.

Q: What is your level of agreement or disagreement with each of the following statements regarding blockchain technology?

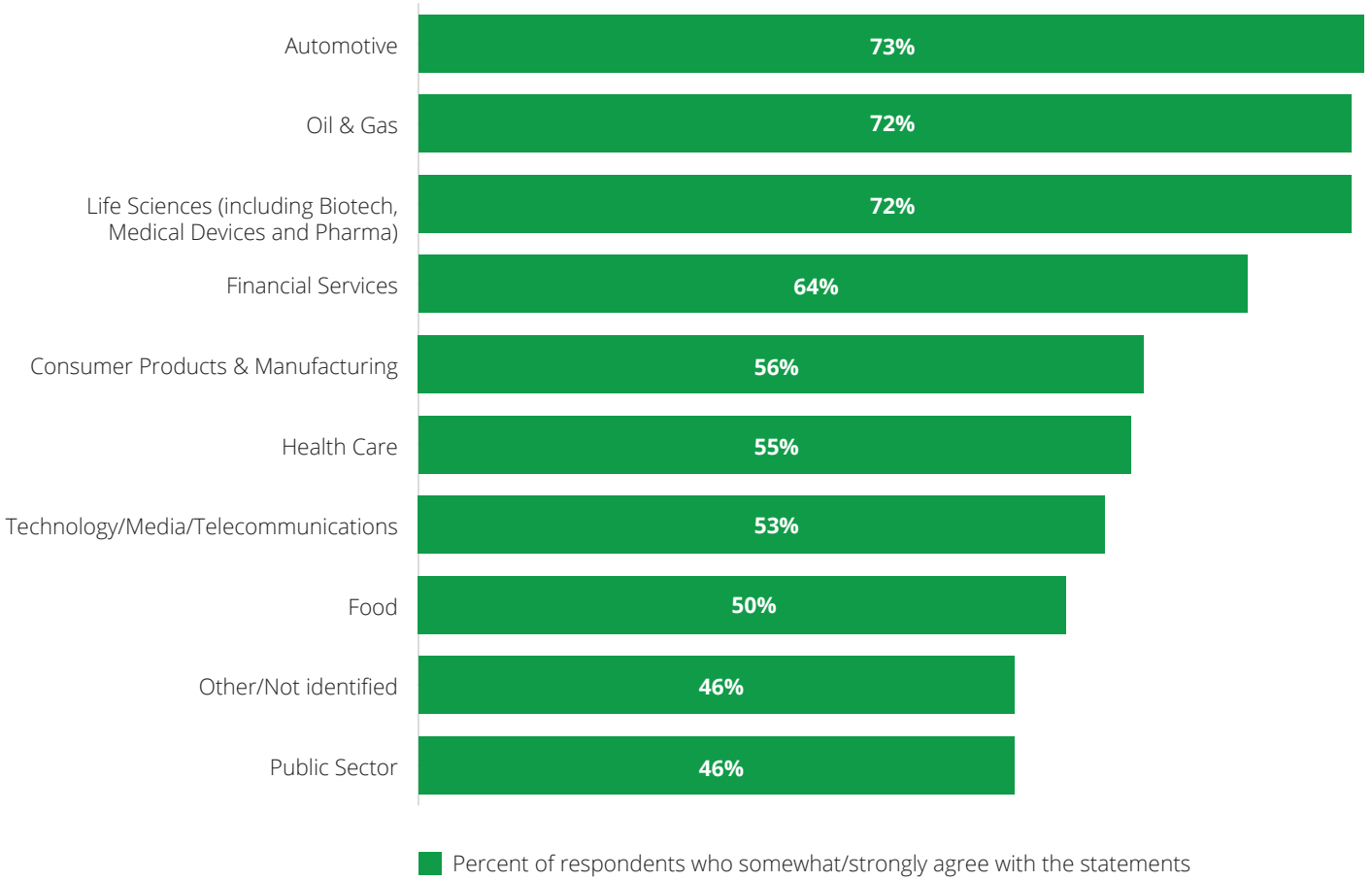


Percentages equal more than 100 percent because respondents were allowed to submit more than one answer.

N= 1,053 (global)

Perceived disruption of blockchain technology – by industry

Q: Blockchain technology will disrupt my organization's industry – What is your level of agreement or disagreement with this statement regarding blockchain technology?

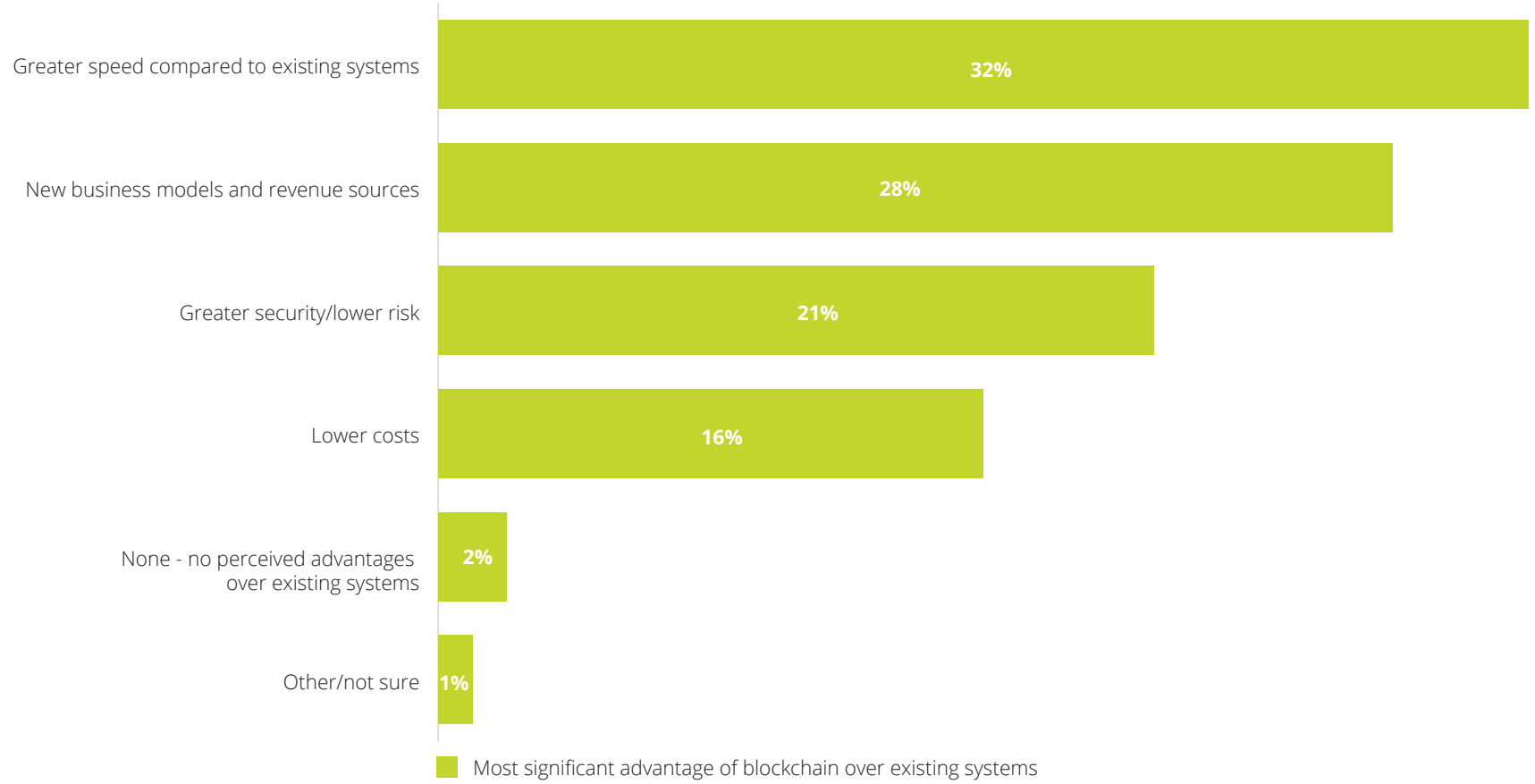


N= 1,053 (global)

Most significant advantages of blockchain over existing systems

The most common answer when asked about blockchain's advantages over existing systems was greater speed. This suggests companies are interested in leveraging blockchain's real-time information exchange capabilities to speed up business processes and gain operational efficiencies. Additionally, 28 percent of respondents believe that blockchain can help them unlock new revenue sources and business models, underscoring the technology's disruptive potential.

Q: Which one of the following, if any, do you believe is the most significant advantage of blockchain over existing systems when thinking of your specific industry?

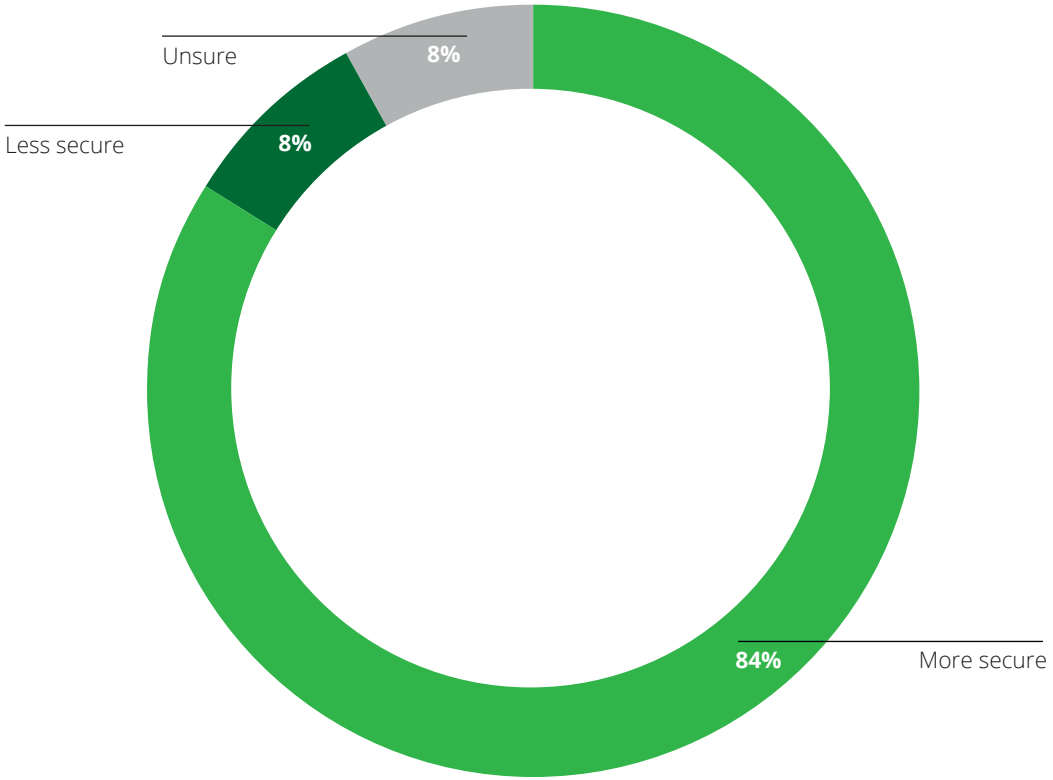


N= 1,053 (global)

Is a blockchain-based solution more or less secure than conventional IT systems?

The overwhelming majority of respondents believe that blockchain is more secure than conventional IT systems.

Q: Do you believe that a blockchain-based solution is currently more secure or less secure than systems built from more conventional information technologies?

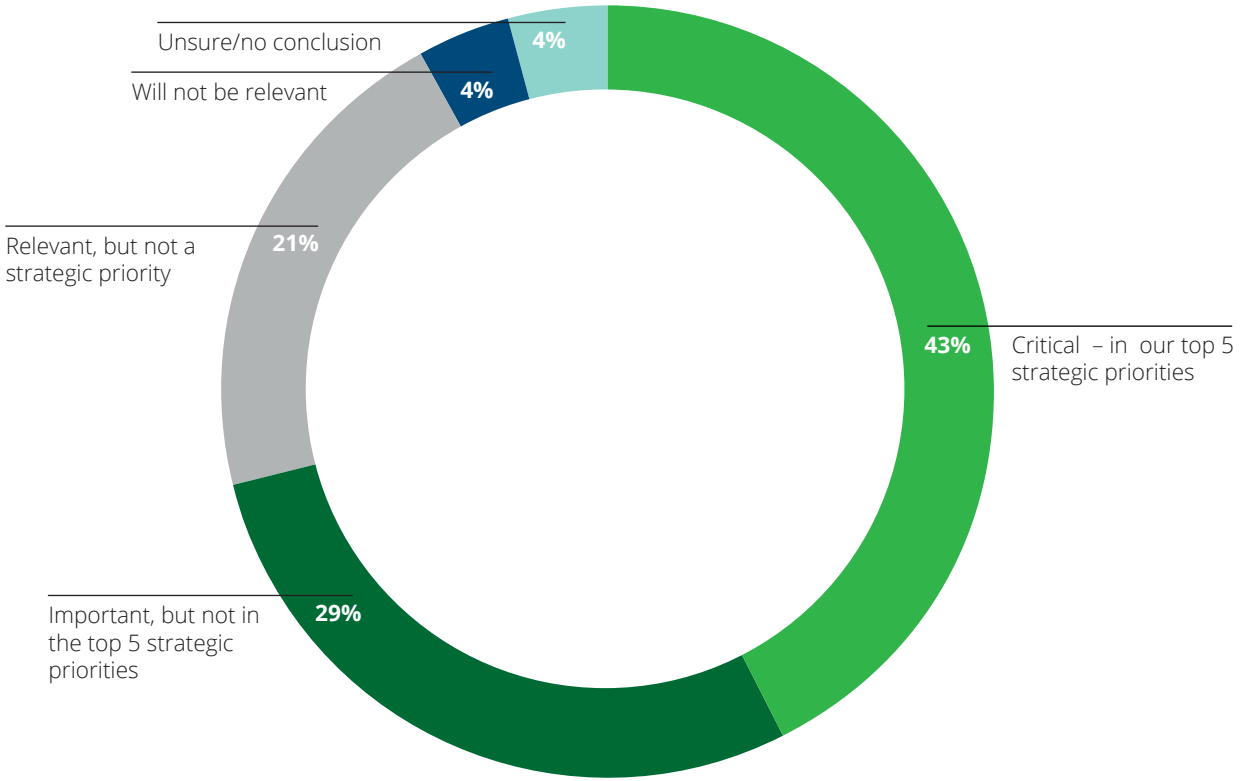


N= 1,053 (global)

Views of blockchain relevance within organizations

A significant majority of respondents consider blockchain technology to be very important to their organization, with more than 40 percent calling it one of their "top 5 strategic priorities." This is in line with the investments in the technology many respondents' companies are making or planning to make.

Q: Which of the following best describes how your organization currently views the relevance of blockchain to your organization?



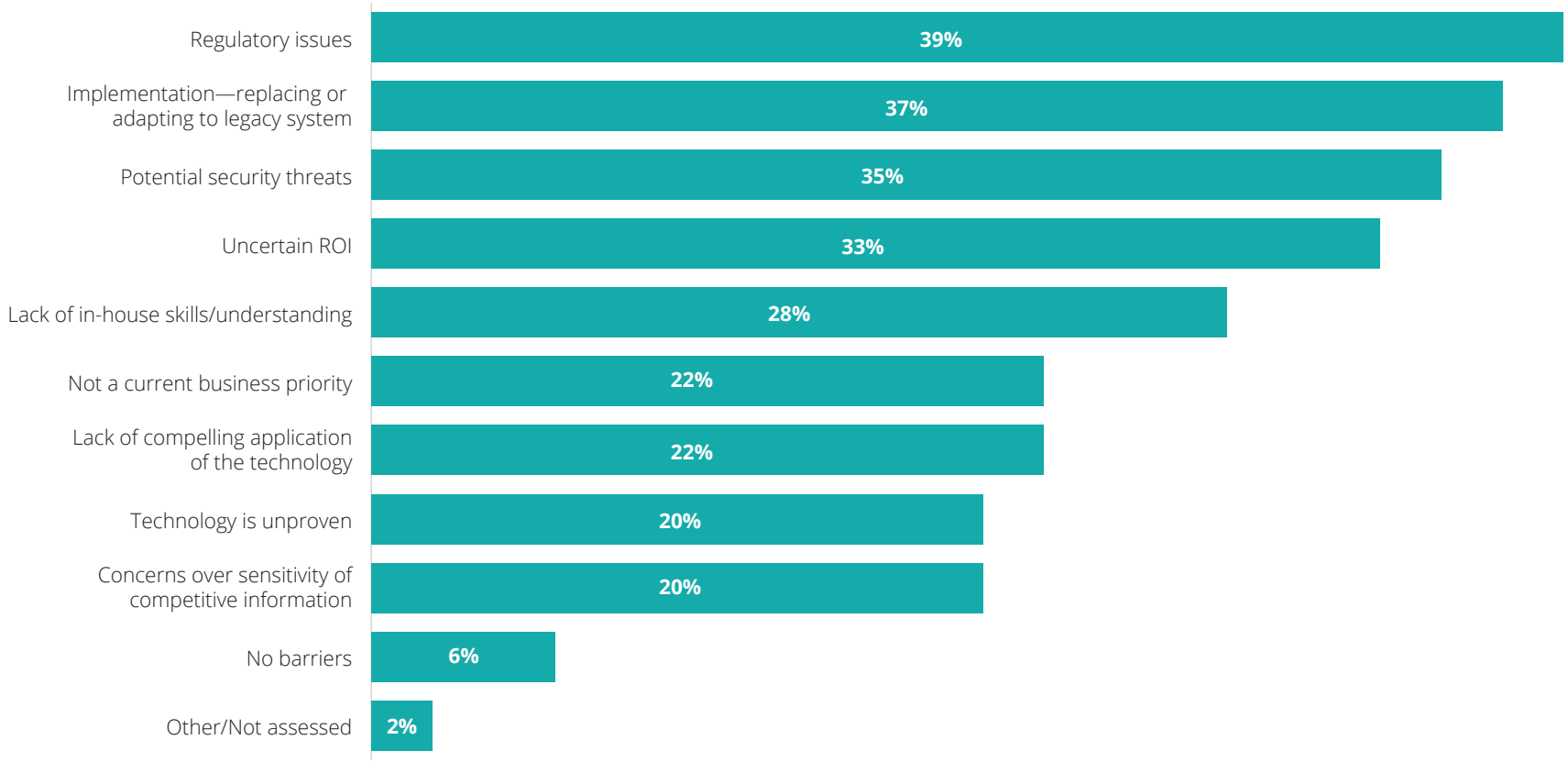
Note: Some totals may not add up to 100% due to rounding.

N= 1,053 (global)

Organizational barriers to greater investment in blockchain technology

Companies face a wide variety of barriers to further investment in blockchain, with the most common being regulatory barriers, replacing or integrating with legacy systems, potential security threats, and uncertain return on investment.

Q: What are your organization's barriers, if any, to greater investment in blockchain technology?

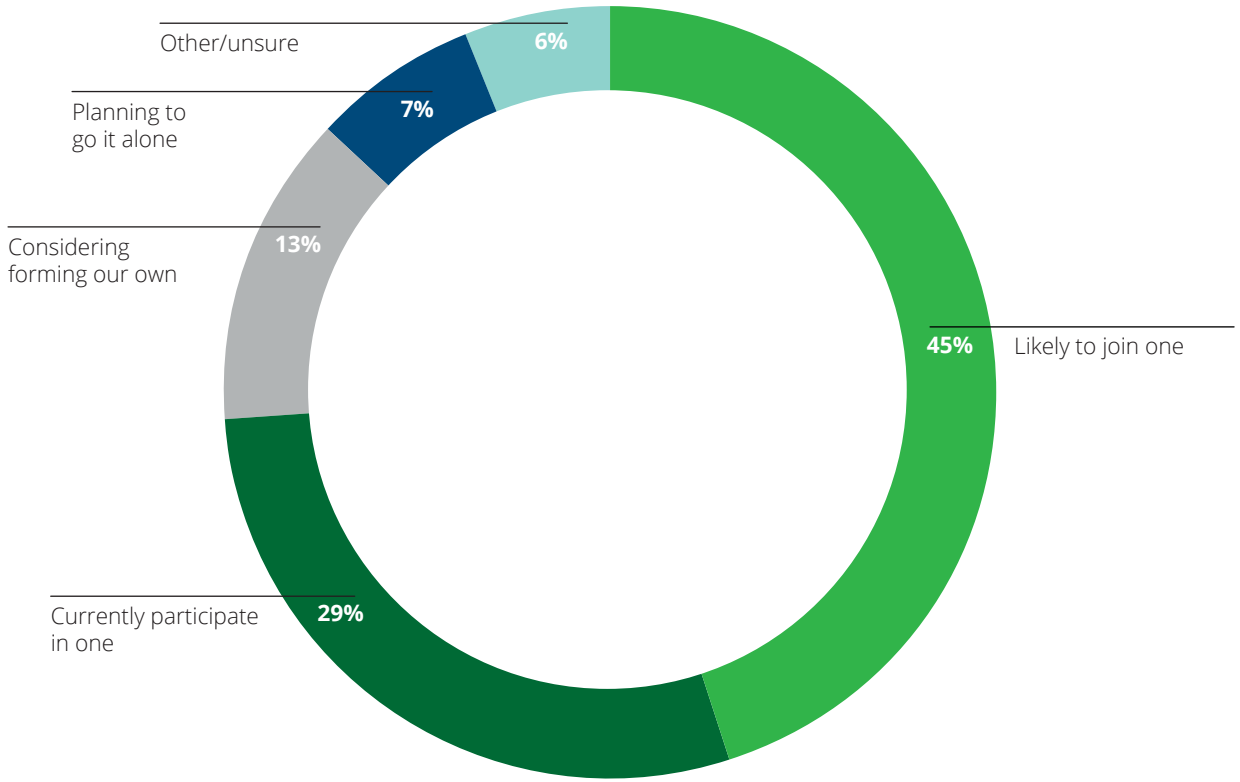


N= 1,053 (global)

Organizations' positions on participating in a blockchain consortium with competitors

The vast majority of respondents (74 percent) said that they either already participate in or will likely join a blockchain consortium. Consortiums will remain highly relevant in the near future as a resource for companies to learn about and develop blockchain applications.

Q: Which of the following best describes your organization's position on participating in a blockchain consortium with competitors?

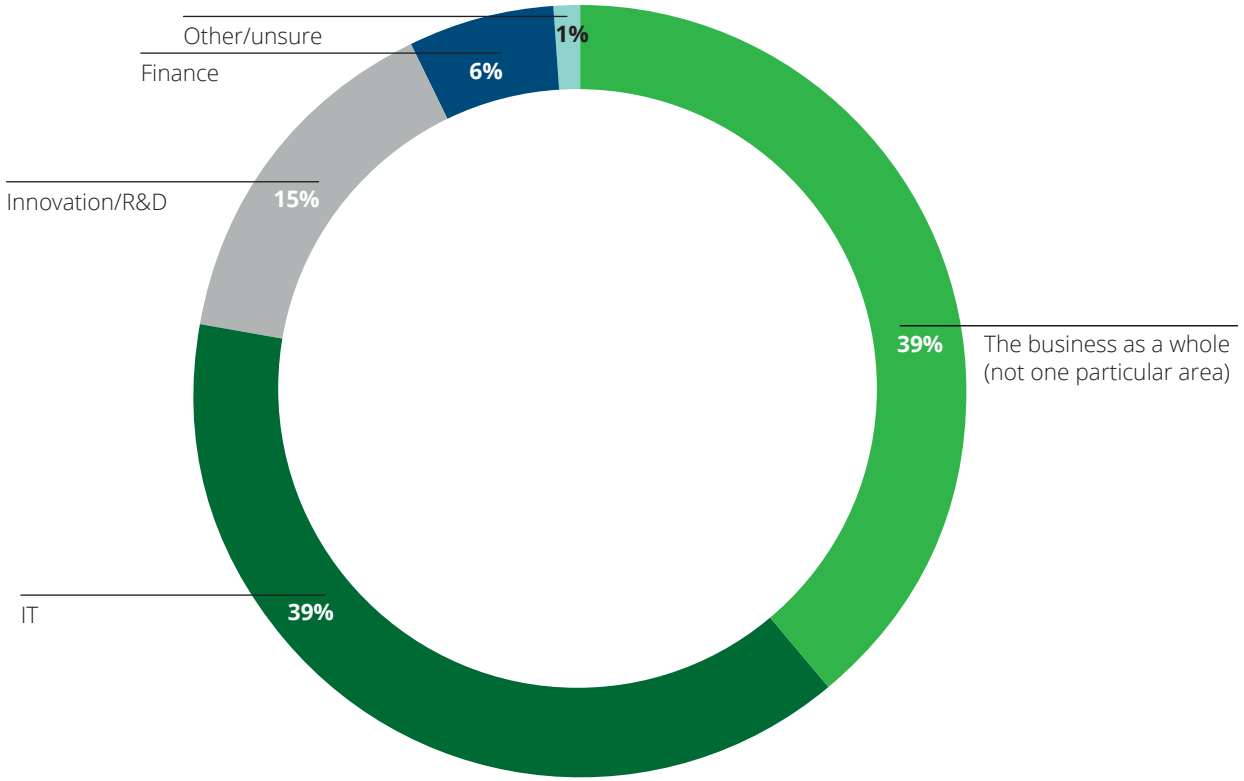


N= 1,053 (global)

Which department is making the key business decisions about blockchain activities

For the majority of respondents, blockchain activities are being directed either by their IT functions (39 percent), or innovation/R&D functions (16 percent). This suggests that these companies still see blockchain as a technology-driven priority rather than a business one. Chinese respondents stood out as an exception though, with 60 percent saying blockchain activities were being directed by the business as a whole, and only 24 percent reporting that IT is managing their blockchain activities.

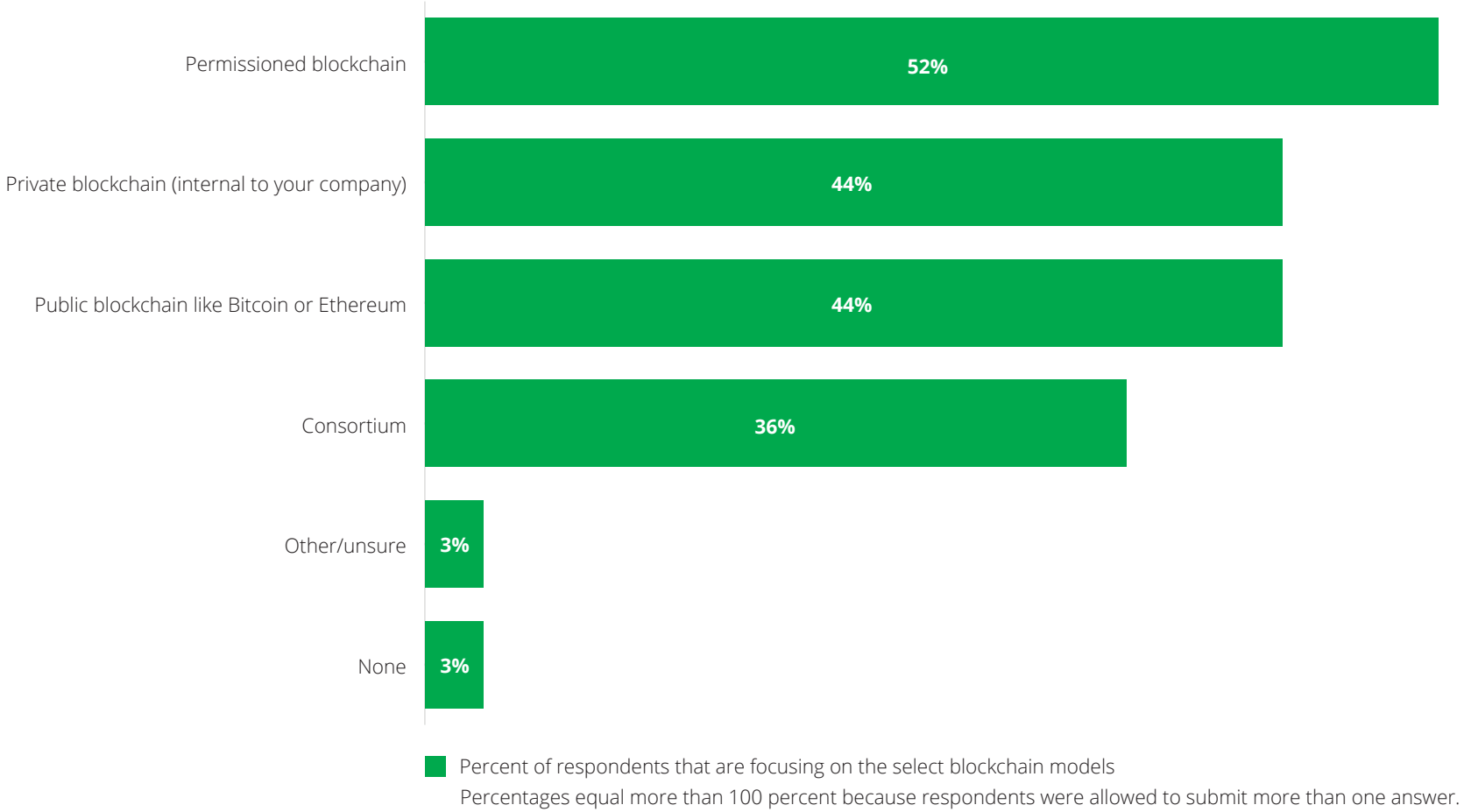
Q: Which area of your company is making the key business decisions about its blockchain activities?



N= 1,053 (global)

Blockchain models

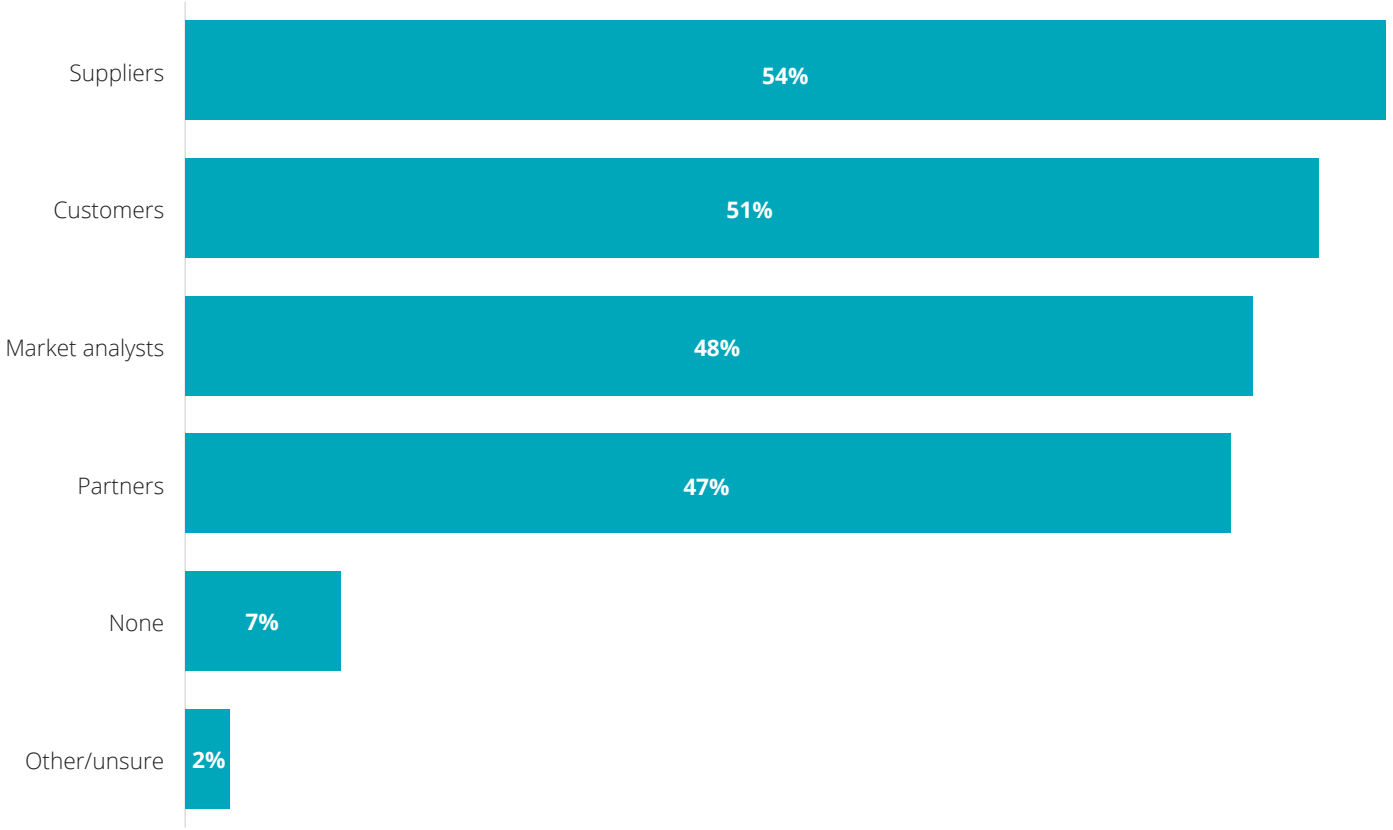
Q: Which blockchain model are you focusing your activities on?



N= 1,053 (global)

External stakeholders engaged in blockchain strategy

Q: Which stakeholders outside your company are asking or engaging with you about your blockchain strategy?

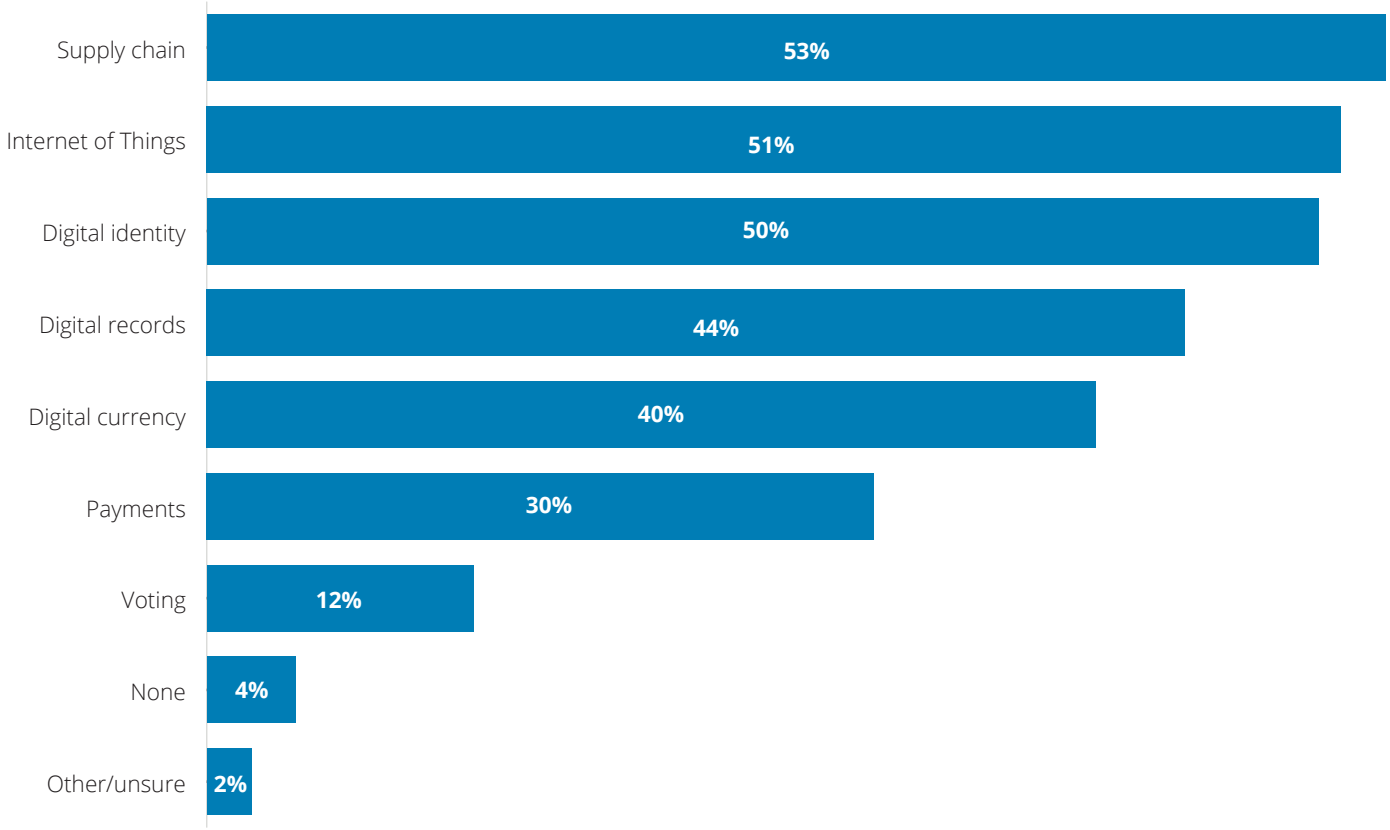


Percentages equal more than 100 percent because respondents were allowed to submit more than one answer.

N= 1,053 (global)

Blockchain use cases

Q: Which of the following blockchain use cases is your company working on?



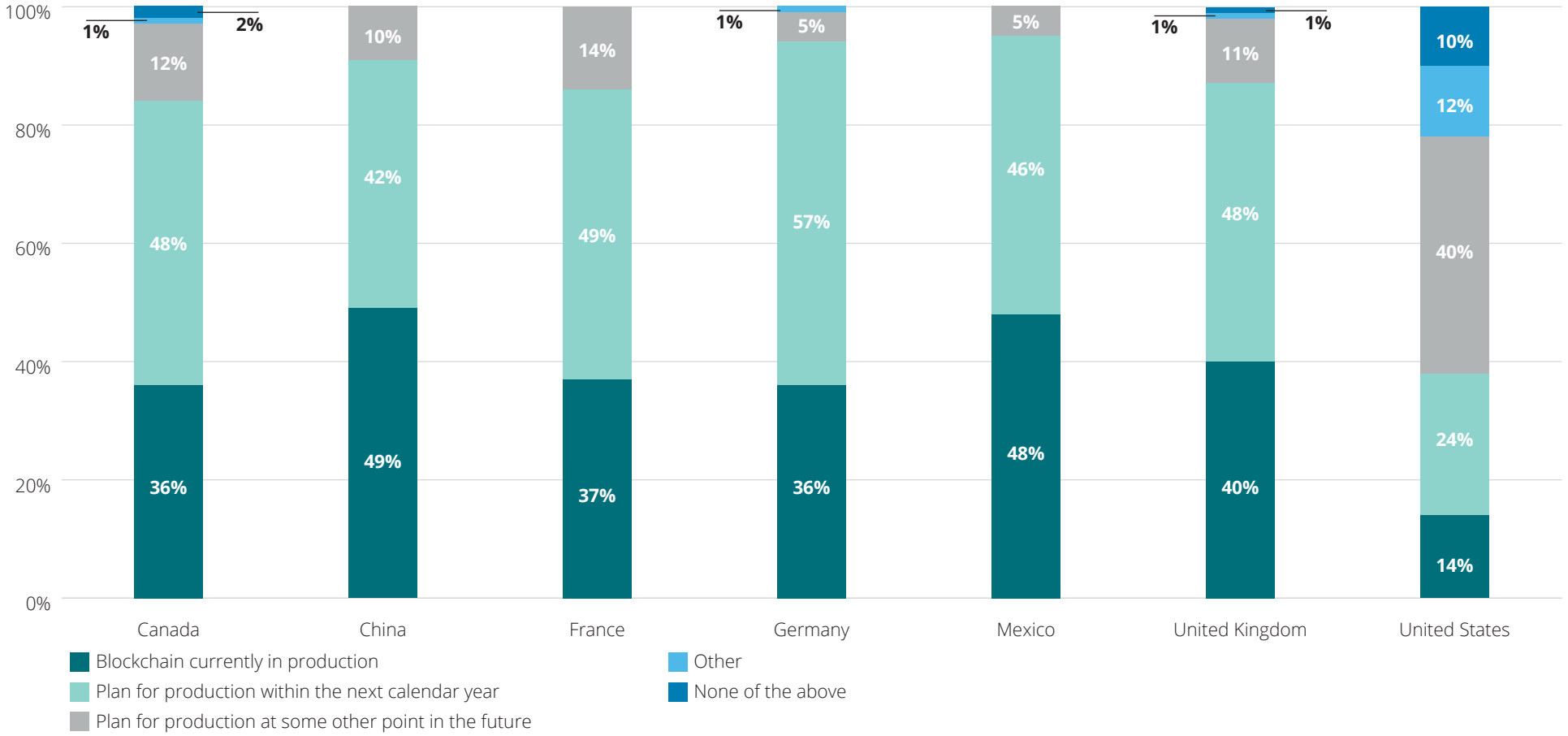
N= 1,053 (global)

By-country data and insights

Organizations with blockchain in production or plans to do so in the future

US respondents say their company has deployed blockchain technology in production at a significantly lower rate than those in other surveyed countries. Only 14 percent of US respondents said blockchain was already in production in their organization, compared to nearly 50 percent in some other countries, including China and Mexico.

Q: Has your organization either brought blockchain to production or plans to do so at some point in the future?



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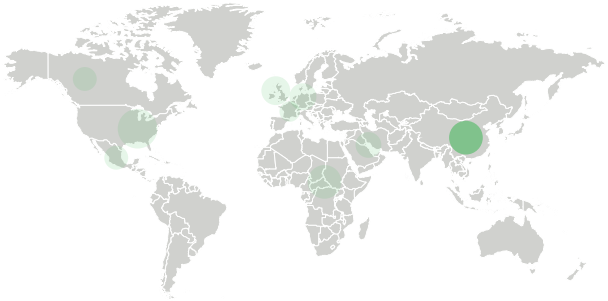
The Asia/Pacific perspective



While the hype surrounding public blockchain has captured the imaginations of many organizations, serious use of the permissioned blockchain as a strategic weapon in mainstream enterprise is happening fast, representing more than 50 percent of all blockchain models.

These projects are usually sponsored by top management, with a significant paradigm shift from competition to collaboration in the ecosystem. Huge productivity gains, creation of cross-industry big data, and elimination of fraud have created unprecedented synergy in many blockchain platforms, facilitated by a faster, more secure, and highly power-efficient, underlying, distributed ledger technology.

Initiatives, such as the "Belt-and-Road strategy," will further fuel blockchain's development on the regional and, potentially, global level.

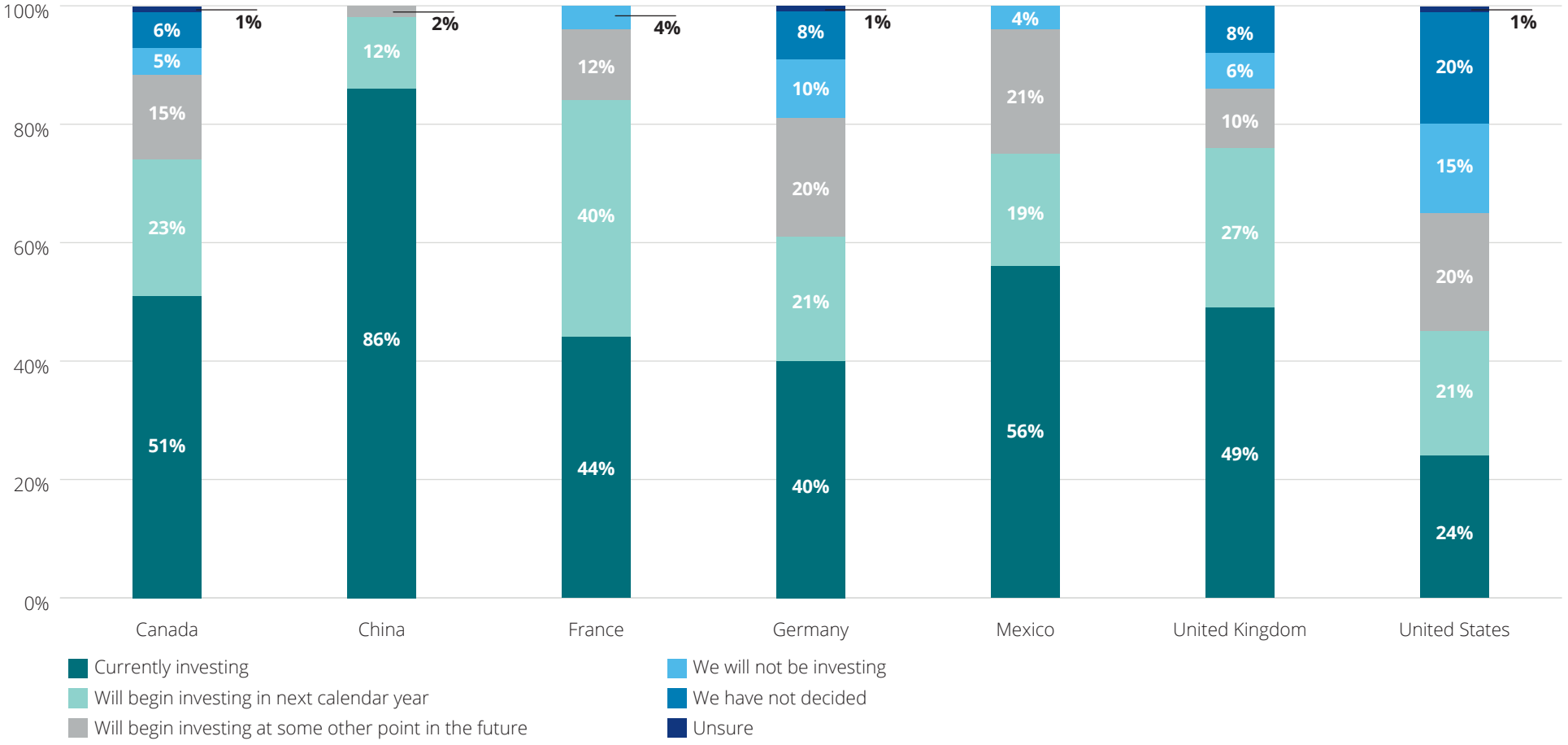
China's Belt and Road Initiative[3]

Launched in 2013 as "one belt, one road," this initiative involves China underwriting billions of dollars of infrastructure investment in countries along the old Silk Road linking it with Europe. The ambition is immense: China is spending roughly $150 billion a year in the 68 countries that have signed up to the scheme.

Hiring staff with blockchain experience

US respondents lagged well behind those in other countries in investing in new staff that possess blockchain knowledge and expertise.

Q: Is your organization investing in hiring staff with blockchain experience now and in the future?



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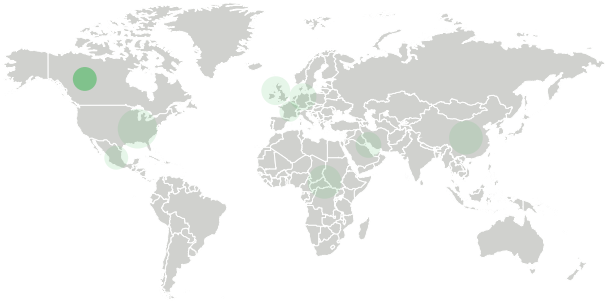
The Canadian perspective



Canada hosts a vibrant and growing community of blockchain enthusiasts and entrepreneurs.

From the early days of Ethereum, Canadian organizations, both small and large, have been at the forefront of blockchain and cryptocurrency innovation, and we see no signs of slowdown, as there has been strong momentum and a steady rise of Canadian crypto-ventures in the past year.

Enterprises continue to experiment with, and test, blockchain's applicability across a variety of industries and domains. For example, there are several initiatives underway with several Canadian financial services firms around wholesale payments, securities settlements, and digital identification. Additionally, blockchain-based business registrations, led by a collection of government agencies, have seen global recognition and put Canada firmly on the global map as a pioneer in the blockchain space.

We are now seeing a clear shift from education to experimentation, with several organizations working on scaling experiments and taking them to production. As the survey reflects, four in every five Canadian executives have stated an excellent understanding of blockchain. Canada's position at the vanguard of the technology and its elevated level of education correlate well with the level of investment the country is seeing.

By the time of the survey, 70 percent of the Canadian firms had invested more than $1 million in blockchain, and an even higher percentage (74 percent) plan to spend more than $1 million in the next year. These investments have had a material impact on the job market, as half of the firms surveyed state they have staff with blockchain expertise. With the surge in educational blockchain offerings (globally and in Canada), the local talent shortage has slowly started to decline.

This may only be the beginning of Canadian companies' foray into the blockchain space. The scope of proof-of-concept has grown to include integration with traditional systems to augment and transform a number of existing business models. Nearly half of Canadian firms plan to bring blockchain to production in the next calendar year, and the majority of Canadian respondents believe that blockchain will reach mainstream adoption.

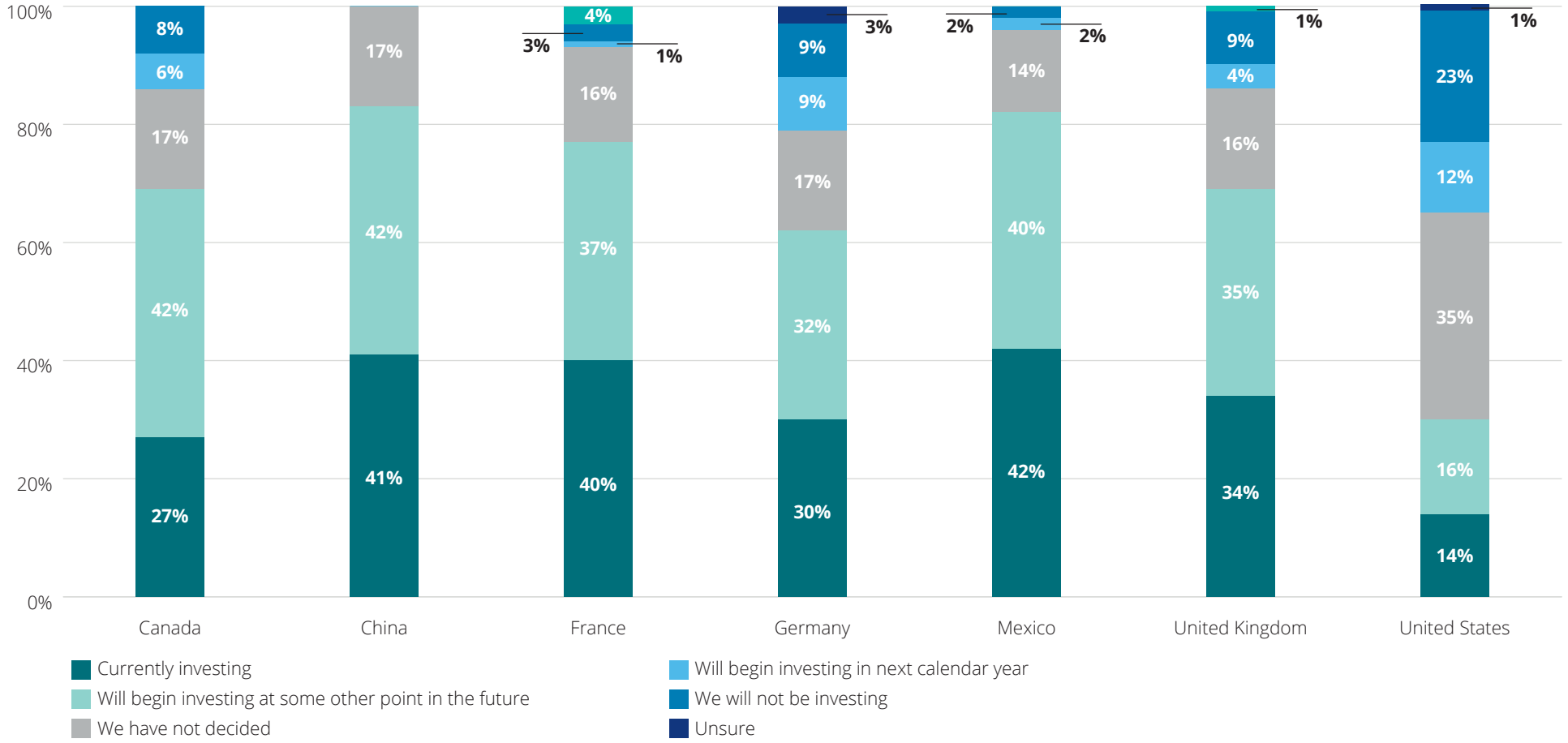
Regulatory bodies continue to evolve their role and position to keep pace with the change that blockchain introduces. Because of this, two-thirds of organizations do not believe that regulatory issues will be a barrier for increasing blockchain investments in Canada.

Based on the country's successful history, and increasing levels of public-private collaboration to develop its blockchain landscape, Canada will continue to lead innovation in the blockchain space across all industries over the next year.

Investment in blockchain-based changes to existing systems

Many respondents indicate their companies are replacing parts or all of their existing systems with blockchain-based enhancements. At some of these companies, blockchain will be integrated into core operations, while others are building new applications. This kind of activity is most prevalent in Mexico, China, and France—and least in the United States.

Q: Is your organization investing in replacing parts or all of your existing systems with blockchain-based enhancements now or in the future?



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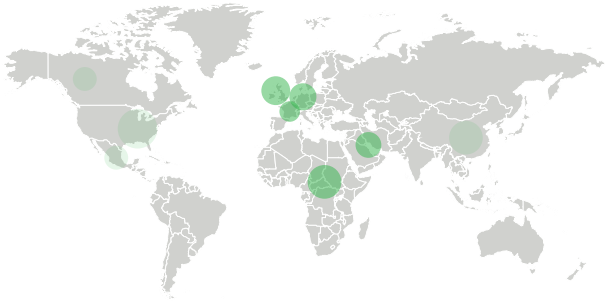
The EMEA perspective



The adoption of blockchain is still in its early stages across EMEA, although at different speeds in different sectors and geographies. Overall, however, there is strong belief in the long-term impact of blockchain to help transform business and government services.

Government organizations are coming to the forefront in spearheading the adoption of blockchain. The European Commission has supported the signing of a 27-country pact on blockchain, the European Blockchain Partnership, that will see EU-wide collaboration on regulatory and technical matters. The EU will allocate €300 million in blockchain investment over the next three years. It has also established the European Blockchain Observatory to undertake research on how blockchain can be applied.

In the Middle East, the United Arab Emirates has developed a visionary strategy for blockchain with the intent of having 50 percent of government transactions on blockchain by 2021. Elsewhere, individual countries are working to advance their own specific initiatives, such as Sweden's blockchain-based land registry project.

At a regulatory level, many of the national and regional regulators are adopting a wait-and-see approach, preferring to explore and understand blockchain's regulatory and policy implications before moving forward. Regulators in the United Kingdom are more advanced at pioneering sandbox environments to test product and solution development.

At an industry level, there are emerging consortia being formed to drive industry-specific uses cases. In the oil and gas sector, several large oil companies are teaming up to build commodity trading solutions on blockchain. In reinsurance, B3i—made up of 14 reinsurances—is building solutions for its members.

R3, the global financial services consortium, has a major development platform in London, while a number of banks have formed the Digital Trade Chain consortium to build a trade finance solution. In Norway, DNV GL went live last year with a business certification solution on blockchain and, in France, a consortium of asset managers has launched a blockchain fund distribution platform, Iznes.

Despite this significant activity, a number of factors are impacting the pace of adoption:

- Reputational issues with cyptocurrencies are contaminating blockchain investment decisions and causing board-level concerns
- Slow progress on the development of the necessary regulatory frameworks, legislation, and industry standards that are required to move from pilots to production
- A lack of available talent with blockchain expertise
- Governance challenges around consortia

While progress is being made on preparing the ground for further development in locations, such as the United Kingdom, Sweden, United Arab Emirates, Ireland, and Switzerland, it is also clear that there is more to accomplish to accelerate blockchain adoption in this region over the next two to three years.

Spotlight on the German market

Blockchain is a primary digital focus area for Germany. In fact, blockchain was included in the coalition agreement of the new government, and there is intense interest in blockchain throughout the German corporate world.

Two large global financial institutions, which are founding members of the highly visible B3i consortium (the Blockchain Insurance Industry Initiative), are headquartered in Germany, and several firms from a variety of industries have gone public with their blockchain use cases. Additionally, several key players behind Ethereum and IOTA are located in Germany, and there is a strong desire not to miss out on this digital transformation opportunity.

Blockchain cases in the area of "track and trace" resonate particularly well with the supply chain–centric business model of the German *Mittelstand*—the medium-sized engineering companies that are so typical for the German economy—and with automotive OEMs. Moreover, there is intense interest in "track and trace" cases for proving the origin of goods and raw materials in the context of sustainability.

In addition, there is strong interest in reaping the efficiency benefits provided by blockchain (e.g., by creating platforms between different banks and investors for issuing and trading bonded loans, or for supporting the still highly manual processes in trade finance), which is particularly relevant given the export focus of the German economy.

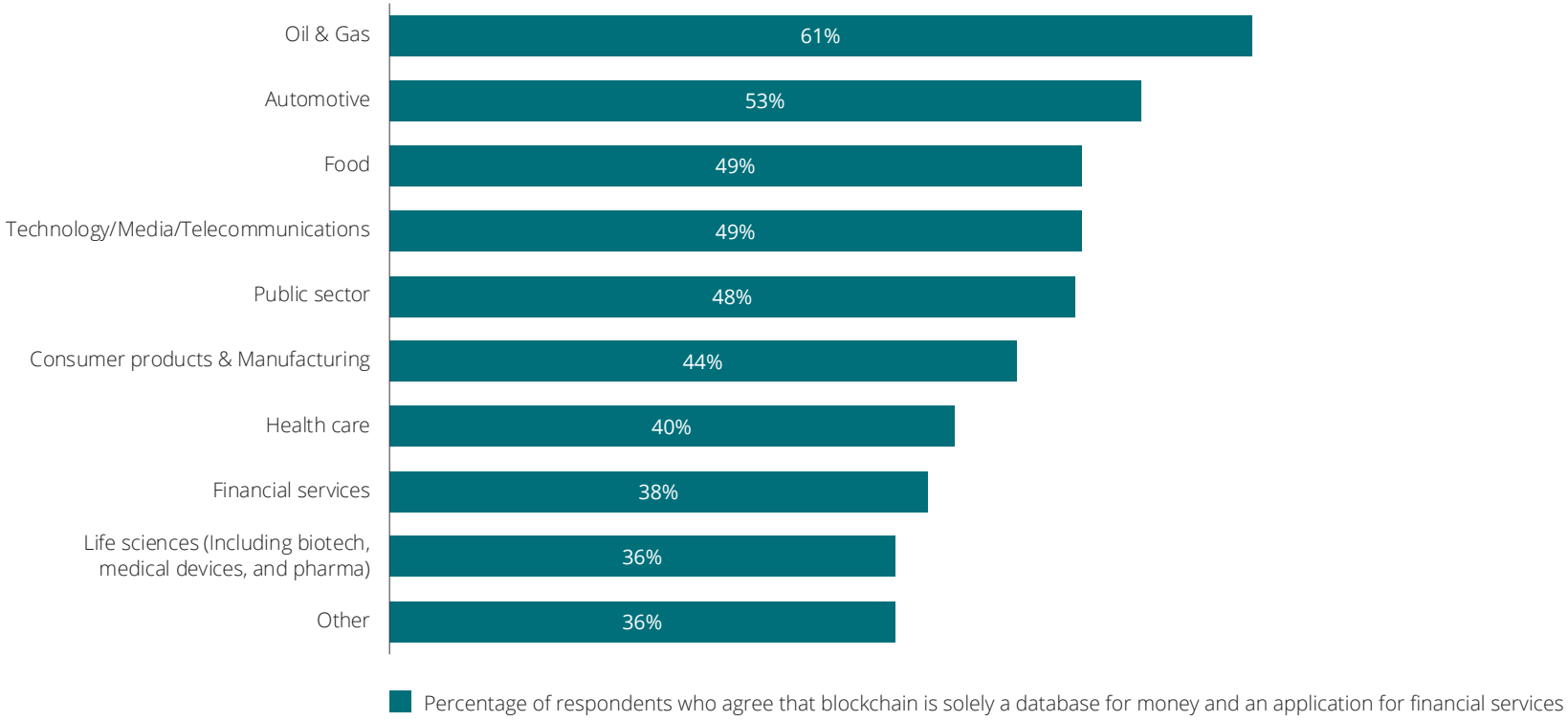
Under the current regulatory setting, which is not very open for cryptocurrencies, there is comparatively little activity in the initial coin offering (ICO) space, with most such business being executed out of Switzerland.

By-industry data and insights

Perception of blockchain solely as an application for financial services

Over half of all respondents in the Oil & Gas and Automotive industries believe that blockchain technology is primarily a database for money or an application for the financial services industry. This finding would potentially conflict/contradict with the overwhelmingly high number of executives from those industries who claim to have excellent- to expert-level knowledge of blockchain technology. The vast majority of those in Health Care, Financial Services, and Life Sciences do not believe that blockchain is simply a database for money or an application primarily for financial services.

Q: At the end of the day, blockchain is a database for money. It doesn't make sense to use it for applications outside of financial services or facilitating financial transactions. – Do you agree or disagree with the statement?



N=1,053 (global)

Financial services perspective

The financial services sector was one of the first industries to explore blockchain and is recognized globally as an industry with high potential to be truly impacted by blockchain technology. For this reason, nearly one-quarter (23 percent) of respondents in the Deloitte Blockchain Survey identified themselves as working in financial services.

After years of looking at blockchain as something of a curiosity, the financial services sector has now begun to expand its view of blockchain both as a threat and an opportunity. At Deloitte, we are seeing a demonstrable shift within financial services from efficiency and cost savings toward a broader portfolio of blockchain applications designed to include new revenue streams.

At a practical level, decentralized and distributed ledger technologies have the potential to fundamentally redesign the ways in which financial institutions interact with each other, regulators, and their customers. Historically, use cases for blockchain technology in financial services include trade finance, customer onboarding, regulatory reporting, and cross-border payments. Moving forward, revenue-generation use cases for crypto-trading services, loyalty programs, securities-lending services, and others have started to come into focus.

While global institutions begin to spin up blockchain-focused teams, and internal investment increases, it is important to note the emerging disruptors in this space. As discussed in our earlier examination of enterprise organizations vs. emerging disruptors, new blockchain start-ups are not constricted with legacy technologies, operating systems, or business models. Many incumbents are taking note, and some of the biggest names in the financial services space are currently investing heavily in and acquiring blockchain capabilities. According to our survey, 39 percent of respondents plan to spend more than $5 million, and 16 percent plan to spend more than $10 million in 2018.

Still, blockchain is not without its challenges:

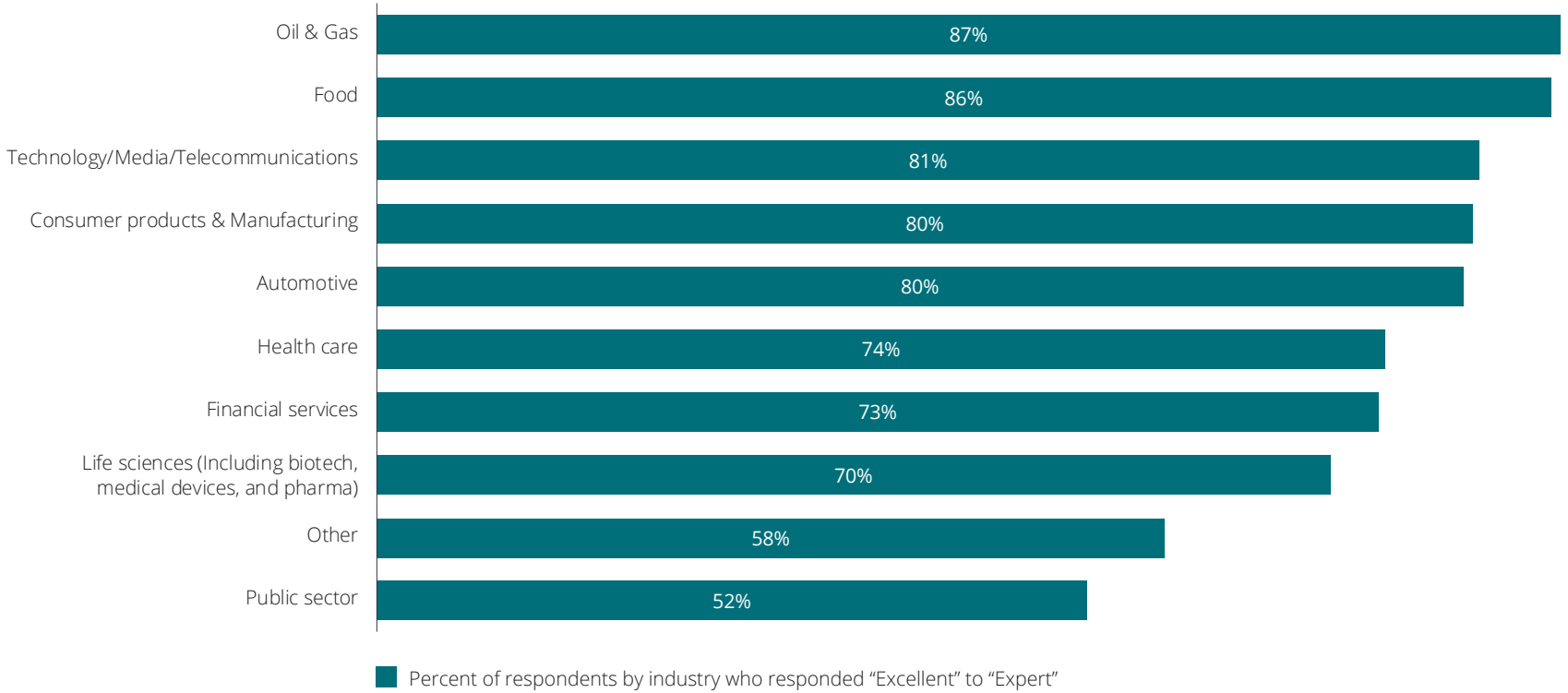
- **Scalability** is a key issue to address as organizations look to explore the many potential blockchain solutions available to them.
- **Security** is an important consideration: 84 percent of respondents indicated they believe blockchain-enabled solutions will be more secure but remain unclear as to what new threat matrix may develop.
- **Consortia creation and collaboration** is imperative to enable the financial services industry to unlock the true potential of the technology. According to our global survey, 45 percent of respondents said they would look to join a consortium and partner with others to develop and reap the benefits of blockchain.

It is clear the financial services industry is at the tipping point of critical change, and those who understand both the opportunities and challenges will emerge as winners.

"Excellent" to "Expert" level understanding of blockchain technology by industry execs

Our survey focused on a select group of executives who self-identified as being blockchain knowledgeable—those with at least a broad understanding of blockchain—who worked at companies with $500 million or more in annual revenues and were familiar with and able to comment on their organizations' blockchain investment plans. Of this group, the majority considered themselves to possess excellent or expert knowledge of the technology—particularly executives in Oil & Gas, Food, Tech/Media/Telecom, Consumer Products & Manufacturing, and Automotive. At least 80 percent of respondents in these industries rated their knowledge of blockchain technology as "excellent" or "expert."

Q: How would you describe your level of understanding of blockchain?



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Life sciences and health care perspective

The life sciences and health care industry view on blockchain has rapidly evolved over the past 12 months, moving from a point of curiosity and education to a point of recognition that action must be taken to prepare for imminent disruption.

As our survey results show, 55 percent of organizations in this industry believe that blockchain will cause disruption, while more than 60 percent believe that they will lose a competitive advantage if they don't adopt blockchain. This disruption will bring new opportunities and new threats that must be addressed. In particular, these organizations believe that blockchain can provide significant value across the following dimensions:

- **Disintermediation:** Reducing reliance on costly intermediaries that can be replaced by participants in a blockchain or by smart contracts
  Examples: Medical data aggregators, provider data-validation servicers, patient outreach programs, claims clearinghouses
- **Transparency and auditability:** Improving transaction visibility among ecosystem partners can improve operational efficiencies
  Examples: Value-based care payments; pharmaceutical, commercial, and clinical supply chains; fraud, waste, and abuse
- **Industry collaboration:** Realizing efficiencies through the sharing of information
  Examples: Provider credentials and directories, longitudinal view of the patient, clinical trial records
- **New business models:** Establishing new revenue-generation opportunities founded on blockchain
  Examples: Enabling patient data ownership and monetization, artificial intelligence (AI) analysis of newly available data made possible by blockchain

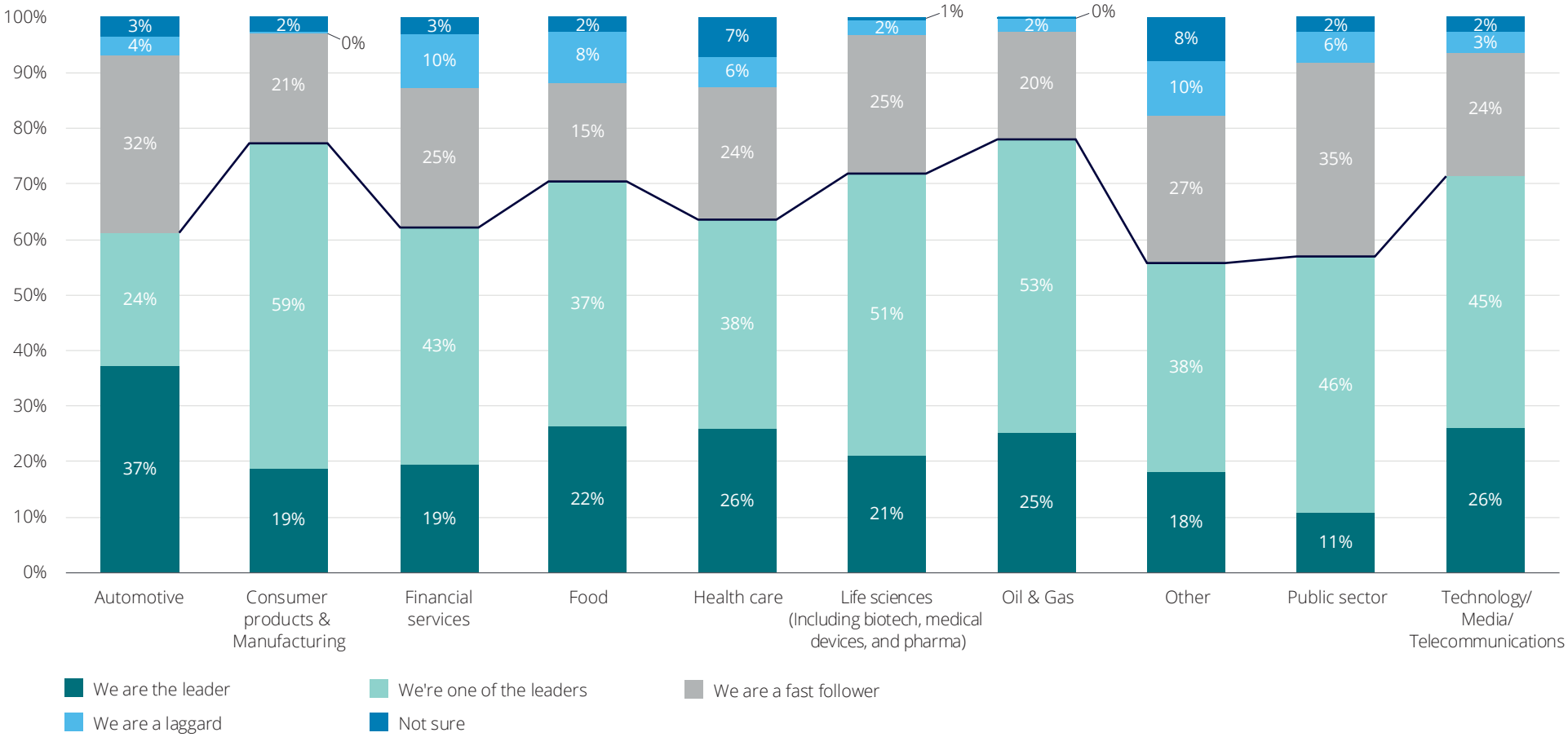
In recognition of these opportunities, 63 percent of health care organization respondents (providers and health plans) say they are planning to invest more than $1 million over the next calendar year. The figure is even higher for life sciences organizations where 33 percent plan to invest between $5 million and $10 million over the same period. Furthermore, life sciences organizations are more optimistic on blockchain's potential than other groups in the industry, as 60 percent of these organizations believe that blockchain will be a critical (top-5 priority) for their organization, compared to only 39 percent for other health care organizations.

This level of optimism is seen today through the numerous proof-of-value projects being pursued by the biggest names in the market and by the diversity of consortia that have been formalized. Over the next 12 months, the outcomes from these pursuits will provide tangible evidence of blockchain's value and provide experience that can help rationalize the ecosystem of consortia to support industry-wide solutions that can transform health care.

Respondents' current adoption of blockchain compared to competitors

The vast majority of respondents feel that their companies are one of the leaders and potentially the leader in the adoption of blockchain as compared to their competitors. Those in Consumer Products & Manufacturing, Oil & Gas, Life Sciences, Tech/Media/ Telecom, and Food industries appear to be most confident in their adoption of blockchain as compared to their competition.

Q: How does your organization's current adoption of blockchain compare to that of your direct competitors?



N=1,053 (global)

Note: Some totals may not add up to 100% due to rounding.

Public sector perspective (US)

A common perception of the government's adoption of emerging technologies, like blockchain, tends to understate the levels of innovation that happen within these governmental organizations. Over the past several years, we have witnessed an increase in activity, with blockchain beginning to form within the walls of government agencies.

For example, nearly half of the government respondents (46 percent) agree that blockchain technology would disrupt their organization's industry. At Deloitte, we are seeing government's perspective shift from curiosity to experimentation, to longer-term strategic thinking and increased investments as organizations learn more about how blockchain can tangibly impact their organizations.

When envisioning the future of blockchain in government, the potential use cases are endless. Common use cases for blockchain in the public sector include digital identity, inter- or intragovernmental transactions, data integration, and supply chain traceability. These use cases align with blockchain's benefits as identified by survey respondents: real-time transaction speed, new and improved business models, and increased data security. As such, we are excited to support leaders in the government space as they identify how to integrate these broad blockchain use cases into their strategic plans.

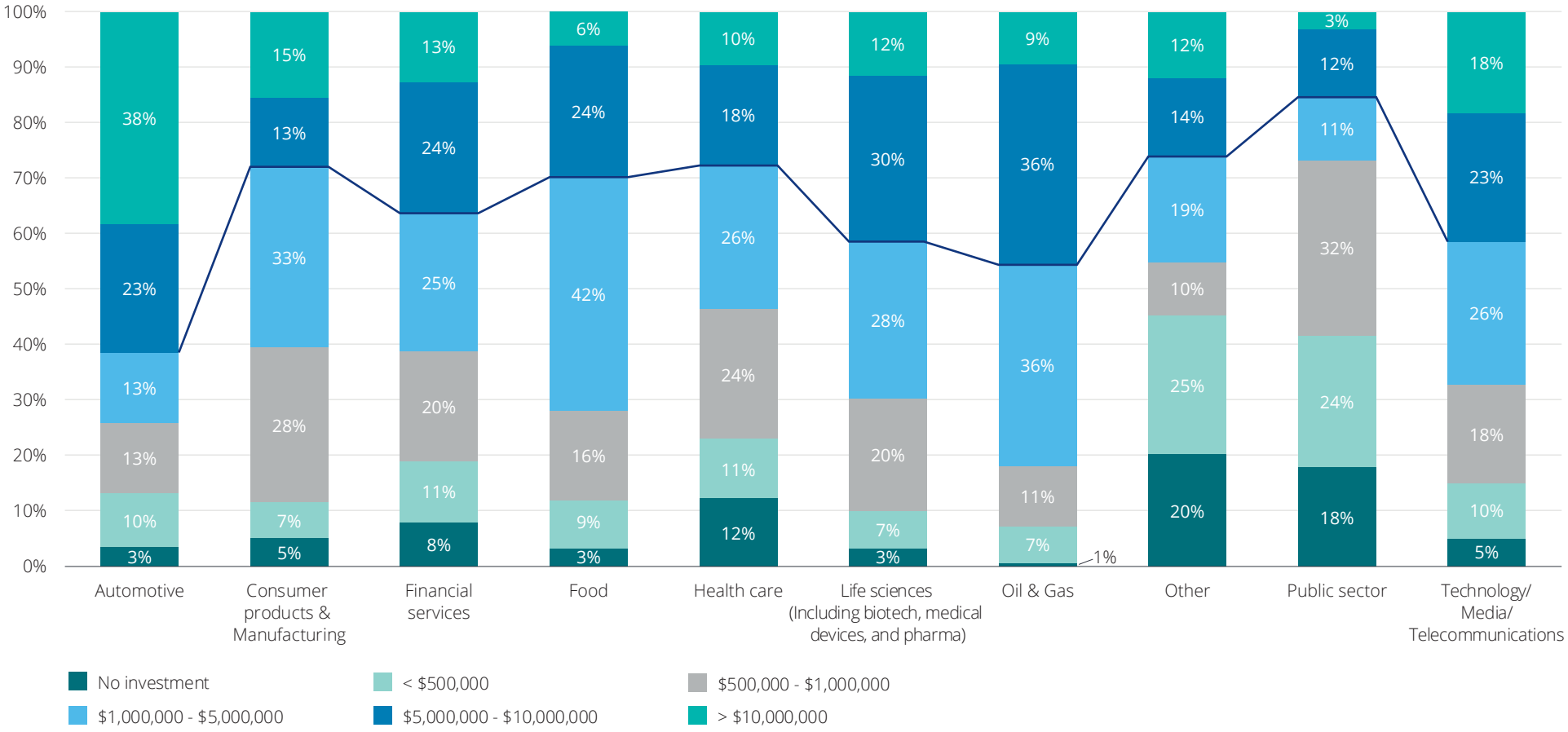
Blockchain innovation requires organizations to be nimble and open to change. Within government, many of the barriers to adoption lie outside of blockchain but focus on regulation, security, and general resistance to change. The challenges of interoperability with blockchain can also loom large when agencies begin their blockchain journey, as noted by the fact that 37 percent of our survey respondents indicated adaption to legacy systems as a key barrier to blockchain technology in their organization. Data security, privacy, and lack of regulation also stand out as paramount focal points in government, slowing agency adoption because of the current levels of uncertainty.

With all the inhibitors that uniquely stand against this technology, we still see organizations challenging themselves to innovate. Blockchain has the potential to disrupt government in apparent and subtle ways, and agencies that identify and act on this potential will be at the forefront of the paradigm shift.

Spend to date on blockchain technology by industry

Automotive, Life Sciences, Oil & Gas, and Tech/Media/Telecom appear to have invested the most in blockchain technology to date. Surprisingly, Financial Services is slightly behind those leading industries. And Consumer Products & Manufacturing, Health Care, and Public Sector lag all industries in terms of their investments. High percentage in Automotive could be related to blockchain initiatives for supply chain.

Q: Thinking specifically of blockchain technology, approximately how much has your organization invested cumulatively to date in this area?



N=1,053 (global)

Note: Some totals may not add up to 100% due to rounding.

Technology, media, and telecom (TMT) perspective

Amid the hype and confusion, TMT companies have been approaching blockchain in different ways. Cloud providers are adding blockchain development tools to their platform service offerings, and chipmakers are creating specialized graphics processing units (GPUs) and application-specific integrated circuits (ASICs). Telecom has been active in experimenting with blockchain capabilities, while media and entertainment companies are moving more cautiously. However, successes in financial services and logistics, as well as a better understanding of blockchain's capabilities and the nuances of architecting them effectively, are incentivizing all TMT leaders to action.

According to the survey, 18 percent of respondents identified as a TMT business. Of all survey respondents, 68 percent agree that their business will lose a competitive advantage if blockchain technology isn't adopted, and 59 percent agree that blockchain will disrupt their industry. Leaders in TMT are beginning to see that blockchain has the power to create a greater balance in the value exchange between customers and the businesses that serve them, while establishing more rigorous trust and transparency between counterparties. Increased trust and transparency may drive greater competition and more value for customers.

The technology sector will continue to enable blockchain adoption while steadily applying its capabilities to their own IT systems. For media and entertainment companies, blockchain can help track and monetize content, address piracy, and manage digital assets from creator to consumer. Tracking content usage and returning royalties to rights holders has become overburdened and underperforming in the face of digital economies. Revenue losses from piracy and unauthorized use hurt creators and media businesses. Blockchain has the potential to solve these challenges with a twenty-first-century framework for identifying, recording, and settling content interactions wherever they happen.

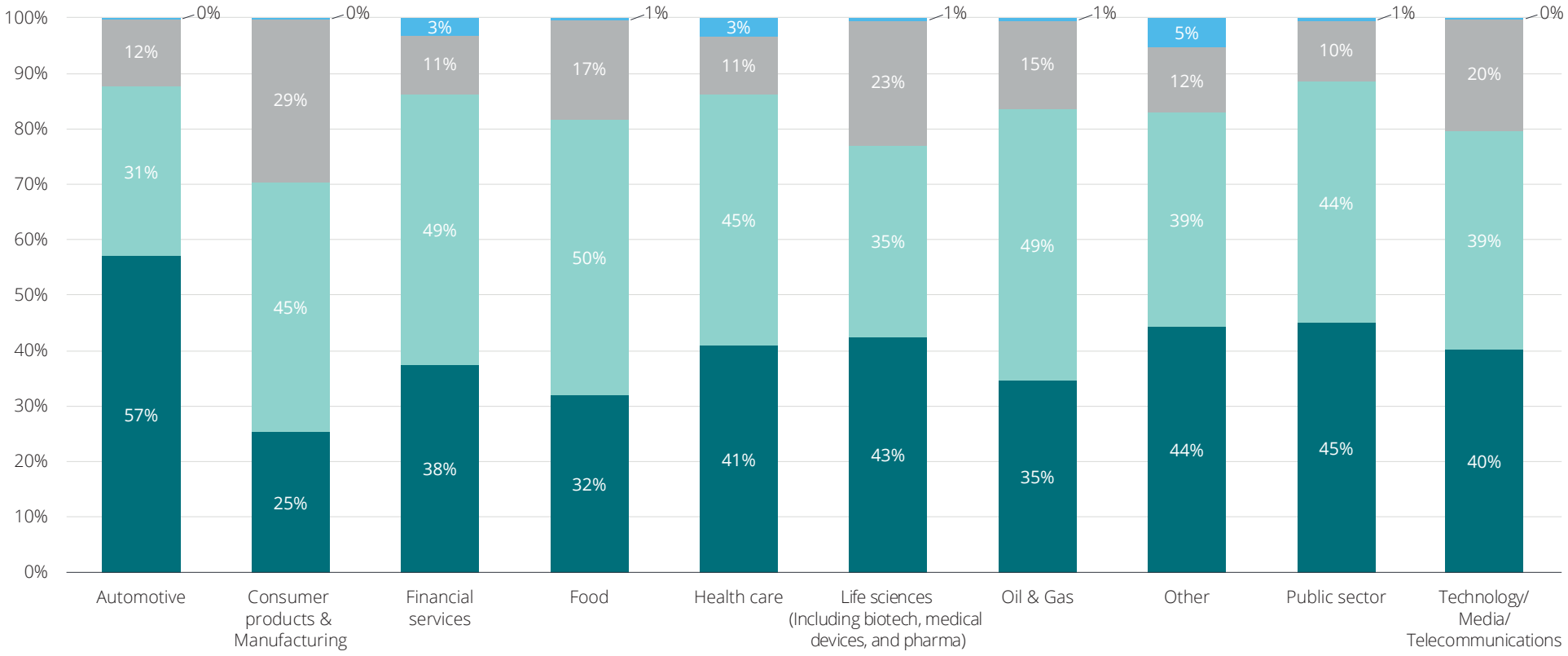
For the telecom industry, blockchain can simplify billing systems, decrease roaming fraud, create decentralized and immutable records for accounting and audits, and enable more dynamic and flexible next-generation network services. With blockchain, telecom operators could ultimately sell Identity as a Service (IDaaS) for customers and connected devices. Notably, 50 percent of leaders surveyed are working on applying blockchain to digital identity.

Start-ups and independent consortia are also working to develop blockchain solutions for identity, value exchange, and open models that anchor content rights to creators. Such efforts could potentially disintermediate telecom and media and entertainment companies from playing a strong role in identity and content management. For leaders in TMT, the competitive pressures are heating up, but the opportunities are becoming clearer.

Company progress in the blockchain journey by industry

Not surprisingly, most respondents are in the awareness and experimenting phases in their blockchain journeys. But interestingly enough, nearly 30% of the Consumer Products & Manufacturing respondents say they are in production phase with blockchain, followed by Life Sciences (23%) and Tech/Media/Telecom (20%).

Q: Where is your company in its blockchain journey?



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Endnotes

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