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The 2023 State of Open Source in Financial Services

November 2023

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The 2023 State of Open Source in Financial Services

90% of respondents agree that **open source** is valuable to the future of the *financial services industry*.



65% of those surveyed report having **more time** allocated to spend on open source contributions.



"Learning & personal development" and **"fun & enjoyment"** are the top reasons respondents engage with open source software (OSS).



88% of respondents agree that **open source** is valuable to the future of *their organization*.



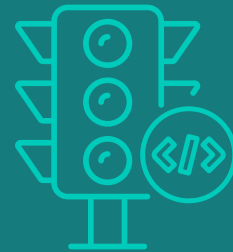
"Open sourcing internally developed projects" is the top factor for **increasing productivity at work**, with inner source close behind.



78% agree that their organizations are getting more value from open source compared to 2022.



94% of organizations represented have policies that allow consumption.



Only 5% of organizations surveyed prohibit open source contributions.

52% of respondents report having an OSPO in their organization.



Organizations with OSPOs are just over **80% more likely** to have a formal review process for evaluating OSS components.



A total of 91% of respondents are confident that the OSS they are consuming is **well-maintained and up to date**.



The most valuable open source technologies identified for the industry were **artificial intelligence (AI)** / **machine learning (ML)**, **cybersecurity**, and **cloud** / **container technologies**.

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Foreword

Dear reader,

Welcome to our third annual State of Open Source in Financial Services report, a resource that identifies current trends, opportunities, and challenges for open source within the financial services sector. The findings from this year's analysis are exciting, highlighting significant progress in adopting open source within financial services.

Two years ago, our inaugural report warned that falling behind in the adoption of open source would lead to missed opportunities in innovation, efficiency, and talent retention. It urged senior leaders to champion open source adoption and establish open source governance and policies. Currently, our data indicate substantial progress. Open Source Program Offices (OSPOs) are more prevalent, have better-defined processes for their use and contribution, and senior leaders are more actively involved. The percentage of respondents dedicating time to open source projects has increased significantly because of these shifts.

So, what's next? This report holds the answers. Whether you're an advocate, a senior executive, a seasoned open source contributor, or a newcomer, there's valuable information for everyone. The Fintech Open Source Foundation (FINOS) team

supports all community members, regardless of where you are on your journey or your role in your organization. We eagerly await your feedback as we plan our next steps together.

In my two years with FINOS, I've witnessed the potential of our projects to transform financial services technology and deliver better products to customers. I've learned that there *is* a faster and cost-effective way to drive innovation and solve industry challenges, and many individuals are eager to work together. Embracing this collaborative approach on a larger scale will significantly amplify the value and contribution of technology to financial services.

I'd like to express my gratitude to our survey participants, research partners, and report authors for their valuable insights and commitment to advancing open source in financial services. We hope this third annual survey and its insights will inspire you to engage more in the open source community, especially within FINOS.

Sincerely,

Jane Gavronsky

Chief Operating Officer, Fintech Open Source Foundation (FINOS)

Executive summary

This year's State of Open Source in Financial Services research report, based on a worldwide survey conducted from June to August 2023, undeniably confirms an upward trend for the industry in both open source consumption and contribution.

Three years of steady improvement

In the three years we've run this survey, we've kept many questions the same or similar to evaluate year-on-year trends. This year's report clearly shows that the industry is maturing. There is consistent recognition that open source is valuable to the financial services industry and individual organizations. Organizations are implementing more OSPOs, defining clearer strategies, allowing more consumption, and allocating more time for contributions. Smaller organizations are having a significant impact, while it takes larger financial institutions more time to shift internal culture and embed open source best practices and tooling across their tens of thousands of employees. As the larger corporations catch up, we look forward to continued growth and engagement.

OSPOs are on the rise and have a strong influence

Over half of the respondents told us their organizations have an OSPO, and 65% have defined a clear and visible open source strategy, making them strong candidates to introduce OSPOs within their organizations in the near to medium term. OSPOs are vital in fostering a culture that aligns open source best practices with business strategies. According to our research, organizations with OSPOs are more likely to have structured processes regarding open source consumption

and contribution. Correspondingly, they are more likely to encourage and support open source contributions.

KEY TAKEAWAY

Gaining a holistic grasp of open source consumption is vital for license compliance, security considerations, and unlocking key insights into how an organization uses open source, revealing efficiency improvements and collaborative opportunities.

The industry recognizes the value of open source usage

Nearly all organizations (94%) allow some level of open source consumption, and 78% report increased value from open source usage compared to a year ago. This is a significant increase over last year, when 62% of respondents reported getting more value. This rise suggests an accelerating recognition of the benefits of using open source, including improved productivity, enhanced software quality, and faster time to market. Notably, our respondents are far more confident in the maintenance of open source libraries used within their organizations than across other industries, perhaps because of the meticulous approach to consumption driven by the high levels of scrutiny and control in this industry. Our discussions with open source leaders in financial services underscore a thoughtful and thorough consumption approach, delving beyond compliance checks to evaluate community health and project support, ensuring sustainability and longevity.

Contributions are becoming more permissible

Contribution policies have become more permissive compared to last year, and 65% of respondents note an increase in the time and effort their organizations allocate for them to contribute to open source, reflecting a growing commitment to collaborative efforts. Inner source contributions are also more prevalent, with over half of respondents contributing to inner source each week. This partnership nurtures an internal culture of openness and knowledge exchange that substantially benefits organizations and individuals. Respondents confirm that contribution among financial services organizations takes many forms, including through collaboration in special interest groups (SIGs), which provide valuable opportunities for industry-wide discourse on challenges and opportunities.



There are numerous ways individuals can engage in open collaboration. Organizations should be establishing OSPOs and Inner Source programs, leveraging these to actively identify and promote acceptable ways for their employees to collaborate, based on the organization's level of open source maturity. Companies that wait to do this risk falling behind.

The problems aren't all solved, but opportunities abound

Multiple factors still hinder contributions to this highly regulated industry. One prime example is the requirement for financial services organizations to document external employee communications, constraining avenues for engaging with the broader open source community. Despite the challenges, respondents identified AI / ML, cybersecurity, and cloud / container technologies as the most valuable open source technologies for the future of the industry and improving productivity, digital identity, industry standards, and reducing operating costs as the areas that would most benefit from open source collaboration. Interviews consistently underscored the potential value open source can unlock in comprehending and standardizing regulatory requirements and compliance.



Common standards and collaborative innovation around regulatory requirements have clear benefits for participants across the entire industry, including for regulators, regulated entities, and consumers. This area is growing rapidly and has tremendous potential to increase transparency and significantly reduce implementation costs.

Introduction

The prevalence of open source software (OSS) spans various sectors, including the financial services industry, where organizations actively integrate open source technologies into their daily operations. The potential of open source strategy as a formidable route to gaining competitive advantage remains underestimated. Simultaneously, companies that disregard the relevance of open source do so at their peril. Broadly, open source offers financial service entities avenues for reducing IT infrastructure costs, expediting the release of digital applications, and maintaining a competitive edge in talent attraction and retention.

The advantages that open source presents must contend with distinct hurdles that hinder more comprehensive engagement within the financial services sector. Analogous to healthcare and public domains, there are requirements for financial institutions to follow rigorous regulatory frameworks for valid reasons, and non-compliance risks severe fines and reputational damage. Consequently, a judicious approach prevails in managing innovation, as internal policies governing open source involvement can range from outright prohibition to cautious restriction.

In the words of one of our interviewees, a senior technology leader at a large North American financial institution, “Regulatory considerations impact every technical conversation.”¹

FINOS is stepping in to navigate these regulatory imperatives while harnessing the potential of open source collaboration. The foundation furnishes guidance and charts a course toward sustainable innovation by fostering collaboration among a networked community of competitors united to address shared challenges and concerns while reaping manifold shared benefits.

Comprising over 76 member organizations, FINOS spearheads innovation in OSS, open standards, and specialized data technologies tailored to the financial services sector. These technologies span cloud services, financial desktop applications, and beyond.

Once again, in collaboration with Linux Foundation Research, FINOS has initiated a fresh study to delve into the adoption of open source within financial services, encompassing banks, asset managers, hedge funds, and fintechs. In partnership with GitHub, Red Hat, and Scott Logic, this empirical research is an industry-wide resource accessible to all financial entities.

From June to August 2023, we conducted a global survey completed by respondents from across the Linux Foundation and FINOS community members active in our social media, discussion email list, and other channels, as well as with participants from a panel provider. Please see the Methodology section of the report for further details on methodology and demographics.

This report undertakes an exploration and juxtaposition of the prevailing landscape of open source adoption, contribution, leadership, and governance within the financial services sphere. Its focus is capturing the industry's rapid evolution. Leaning on insights from subject matter experts at prominent organizations across the sector, the report illuminates strategic prospects and organizational merits stemming from open source. Furthermore, it probes the distinctive challenges faced by the industry, providing insights on how to solve them.

The aim is for the findings in this report to be a compass for creating or refining open source strategy in the sector, the rationale for which has its basis in year-over-year studies that commenced in 2021. Collectively, these reports illustrate encouraging, directional shifts for the state of open source in financial services.

Scope of open source financial services activity: GitHub data analysis

In this section, we find that:

- There has been a continued, yet modest, increase in financial services contributions observed on GitHub.
- Python and JavaScript are the most frequently used languages in open source projects.
- Popular topics for contribution span a range of subjects, including Kubernetes, Docker, React, NodeJS, and ML.

In this section, we explore the open source activities of financial services organizations through publicly available data from GitHub. It is challenging to capture the full extent of open source interactions because, as we highlight elsewhere in this report, policies and restrictions often push developers to use their personal accounts when interacting with GitHub.

Despite these challenges, we observe interesting patterns from the available data.

GitHub provided the analysis in this section using a list of FINOS-supplied email domains of over 400 of the largest financial services institutions (by revenue and / or assets under management) and financial services organizations known to this group to be active or interested in open source. We included data for GitHub users who made commits to any public repo with a primary email that matched an email domain in a FINOS-provided list or if the user was a member of an organization with a known GitHub corporate account.

This year, as shown in **TABLE 1**, we found that employees from financial services organizations contributed to around 37,000 repositories, representing a very modest increase from the previous year's findings.

TABLE 1

GitHub repositories with a financial services email domain

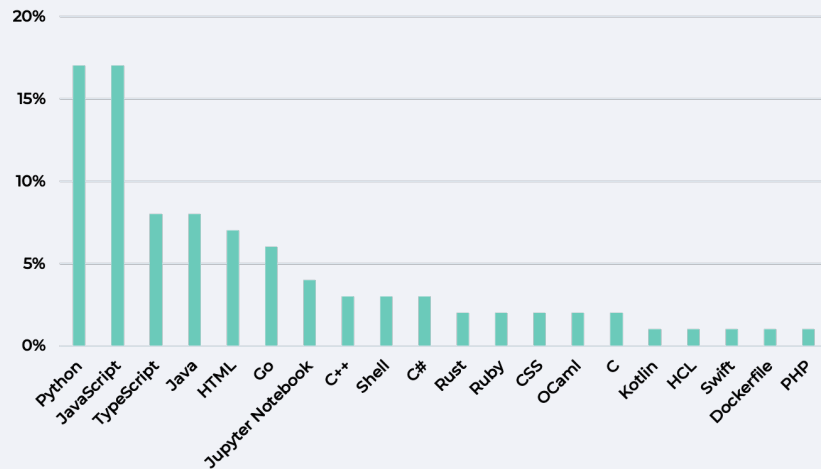
	GitHub repositories with a commit from a financial services email domain		
Year	Unique repositories with FinServ commits	Unique FinServ users	Total commits by FinServ users
2021	25,280	6,857	429,258
2022	36,107	8,552	535,974
2023	36,643	9,009	595,860

It's interesting and instructive to take a closer look at these open source projects to see where organizations are most active. **FIGURE 1** shows the most widely used languages by financial services organizations contributing to open source, revealing that Python and JavaScript have the lead, at around 17%, whereas we find the “workhorse” languages of financial services, Java and C#, are much lower down the list (8% and 3%, respectively). The leading position of Python is likely due to its dominance as a language for AI and data analytics, whereas JavaScript is the language of the web. Both are areas of significant open source collaboration.

There are a few GitHub projects where we observe multiple financial services organizations committing code and collaborating. The following are areas where three or more organizations have contributed code:

- **datadog / documentation:** This repository holds the source for Datadog’s documentation site and reflects a common pattern in open source where there is shared code and documentation that invite contribution.
- **finos / open-source-readiness, finos / devops-automation:** These are both FINOS projects. Open Source Readiness has various assets that help organizations accelerate their journeys toward strategically using and contributing to open source projects, whereas DevOps Automation provides continuous compliance and assurance.
- **jupyterlab / jupyterlab, jupyter-widgets / ipywidgets:** JupyterLab is an interactive environment for exploring data via a notebook-style interface, with the other projects providing widgets and extensions.
- **github / advisory-database:** This is a security vulnerability database inclusive of common vulnerabilities and exposures (CVEs) and GitHub-originated security advisories across the world of OSS.

FIGURE 1
The most widely used languages by financial services organizations contributing to open source



SOURCE: GITHUB, SEPTEMBER 2023

FIGURE 2

The most popular topics added to financial services GitHub repos



GENERATED VIA [HTTPS://WORDCLOUD2-JS.TIMDREAM.ORG/#](https://wordcloud2-js.timdream.org/#)

Looking more broadly across this dataset, GitHub allows users to apply “topics” to their projects. These don’t have a predefined taxonomy, although the user interface (UI) provides hints regarding topics that are in frequent use. In **FIGURE 2**, we see the 100 most frequent topics for projects that received contributions from the financial services community. Languages aside, popular topics include Kubernetes, Docker, React, NodeJS, and ML.

Survey and interview findings

Value proposition

Open source in the enterprise is becoming commonplace—more common year after year. In a highly regulated environment, such as financial services, the risks are higher but possible to surmount with proper governance and strategy guardrails in place. Cyril Domercq shared, “We cannot run the bank without open source, so it has to be strategic.”² Here, we will discuss ways organizations are engaging and reasons why a contribution to open source is valuable.

Our findings are as follows:

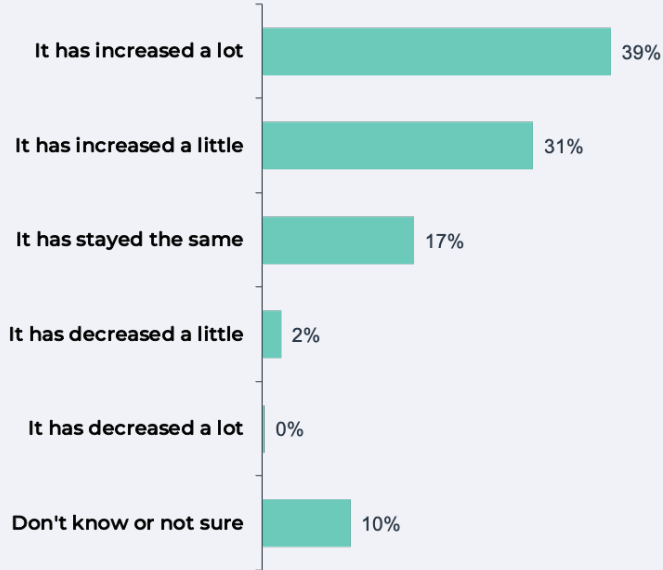
- Organizations have increasingly defined a clear open source strategy.
- OSPO implementation is on the rise.
- Compared to 2022 and 2021, OSPO strategies have significantly increased.
- A large organization is less likely to clearly define an OSPO or communicate its strategy.
- Organizations that contribute to open source are a more attractive place to work.

As more organizations realize the advantages of open source (**FIGURE 3**), many are looking for ways to integrate open source technologies and strategies into their business practices. They’ve learned, however, that simply throwing developers into an open source project and hoping for the best isn’t enough to reap those benefits.

“There are two ways that you can grow your contributions as a firm; you can either hire people who are already contributing, and that’s a tried and true way of doing things. You hire the maintainers for projects that are important to you, and that ensures the existence of those projects. And the second one is you take existing people who have a need internally to use something and turn them into contributors.”³

FIGURE 3
Changes in the business value of open source

Over the last year, how has the business value your organization derives from OSS use changed? (select one)



2023 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q15, SAMPLE SIZE = 319

We can see that 65% of organizations have defined a clear and visible open source strategy (**FIGURE 4**). More than half of organizations surveyed also recognize the need for building centralized OSPOs that nurture, guide, and align open source best practices with business strategy (see **FIGURE 5**). We found that 89% of smaller organizations (250 to 999 employees) engaged with open source currently implement an OSPO or have a clear strategy compared to 64% of organizations that have 10,000 or more employees (see **FIGURE 6**).

Moreover, OSPOs assist organizations with open source-related communication strategies, encourage their organizations to adopt open source tools, and educate their organizations' associates on open source benefits and best practices.

An OSPO also guides the organization's work in open source communities. "Open Source prospers not only from code but also diverse talents and perspectives. From project managers to analysts to communicators, every discipline shapes the landscape. Whilst engineering is the foundation of open source, inclusivity is essential for communities to thrive."⁴

The beauty of the open source model is that you aren't a powerless recipient or mere consumer of software—you can influence the direction of its development with hands-on contribution, change the software to meet specialized business needs, and grow its overall value to the organization in direct and tangible ways. Elspeth Minty shared, "Participation is driven by our ability to address issues or add functionality in the software that we rely on, and we use a lot of open source software. Working with open source software

FIGURE 4
Different types of organizational open source activity and engagement

Which of the following actions has your organization engaged in regarding OSS? (select all that apply)

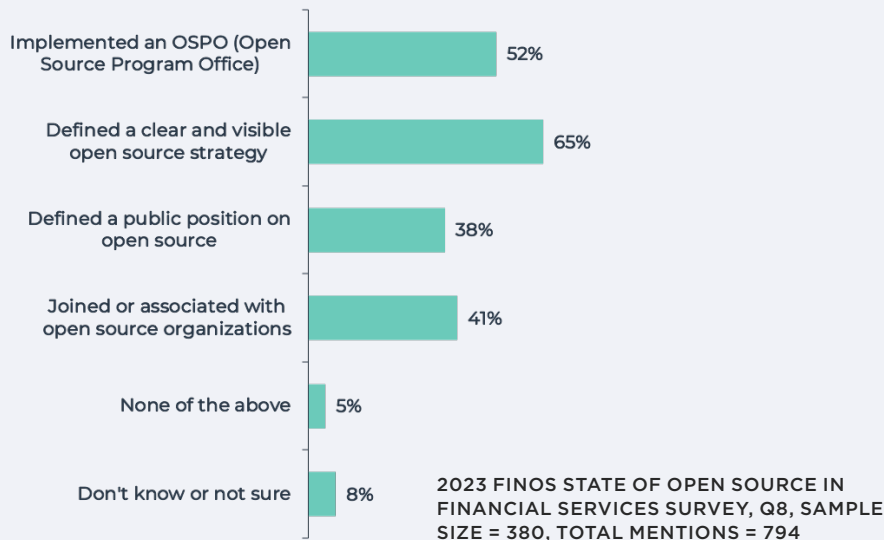


FIGURE 5
Trends in open source leadership, strategy, and OSPOs

Which of the following actions has your organization engaged in regarding OSS? (select all that apply)

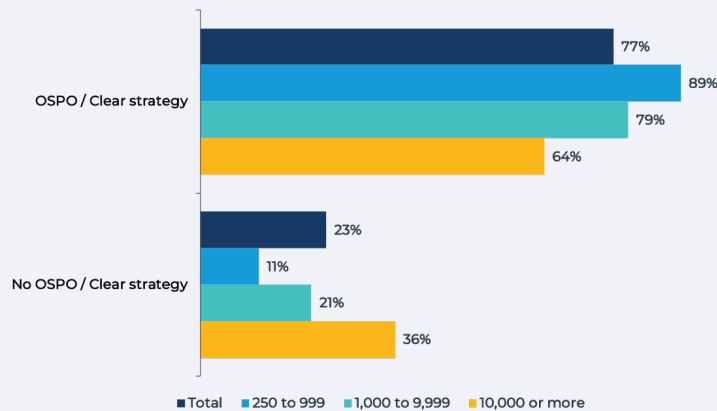


2023 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q8, SAMPLE SIZE = 380
 2022 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q9, SAMPLE SIZE = 249
 2021 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q9, SAMPLE SIZE = 135

FIGURE 6

Open source engagement by company size (number of employees)

Which of the following actions has your organization engaged in regarding OSS? (select all that apply) segmented by Please estimate how many employees the organization you work for has worldwide. (select one)



2023 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q8 BY Q7, SAMPLE SIZE = 343

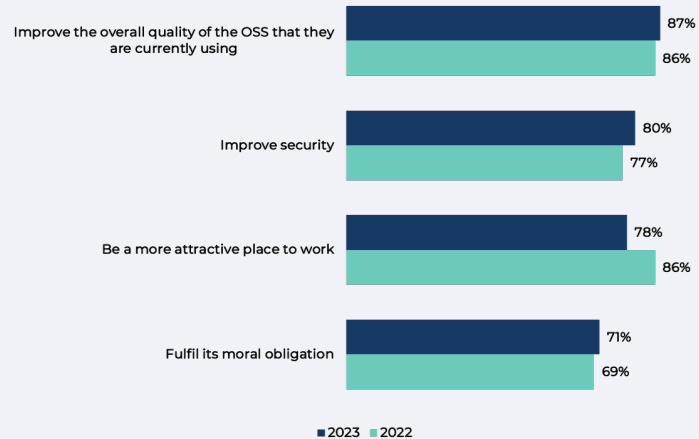
should be part of people’s roles because the software is critical to what we do.”⁵

Being a good open source citizen means doing more than contributing high-quality code to a software project. It also involves allowing developers to take an active and supportive role in open source communities in ways that help those projects grow and thrive. Mark Tate explained that “the bank

FIGURE 7

Perceived benefits of open source contribution

I feel my organization should contribute to open source in order to: (select one response per row) (percentage of responses indicating “Agree”)



2023 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q25, SAMPLE SIZE = 332-333 (DKNS EXCLUDED)
2022 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q26, SAMPLE SIZE = 198 (NO DKNS ANSWER CHOICE IN 2022)

aims to act like a tech company, and contributing to OSS helps attract top talent.”⁶ Developers (78%) are choosing employers that allow them to work with the latest technologies (see **FIGURE 7**). These latest technologies are now all open source—think Kubernetes, Linux, and JavaScript Frameworks. Collaborating directly with these project communities is the best way to reap the innovative benefits of open source projects.

Organizational Consumption

In this section, we focus on the consumption of open source within organizations, which is the use or incorporation of open source code, components, and tools in the creation and operation of an organization's digital products or services. Here, we find that:

- Most organizations (78%) are seeing an increased value derived from open source utilization. This is an increase from last year's response, when 62% reported an increase.
- Open source usage policies are becoming increasingly permissive.
- Organizations with an OSPO or clear open source leadership have a more structured approach to using open source components.
- Organizations are increasingly confident that they are using maintained and up-to-date open source components.
- Security concerns are the biggest obstacle to open source usage.

The usage of OSS is ubiquitous, touching every product, organization, and sector, with numerous reports quantifying this observation. Financial services are no different, with open source tooling and technology used extensively as the foundation for software projects. Most organizations (78%) are seeing an increased value derived from the use of open source (**FIGURE 8**), which is greater than the rise reported last year (62%), demonstrating an acceleration of benefits.

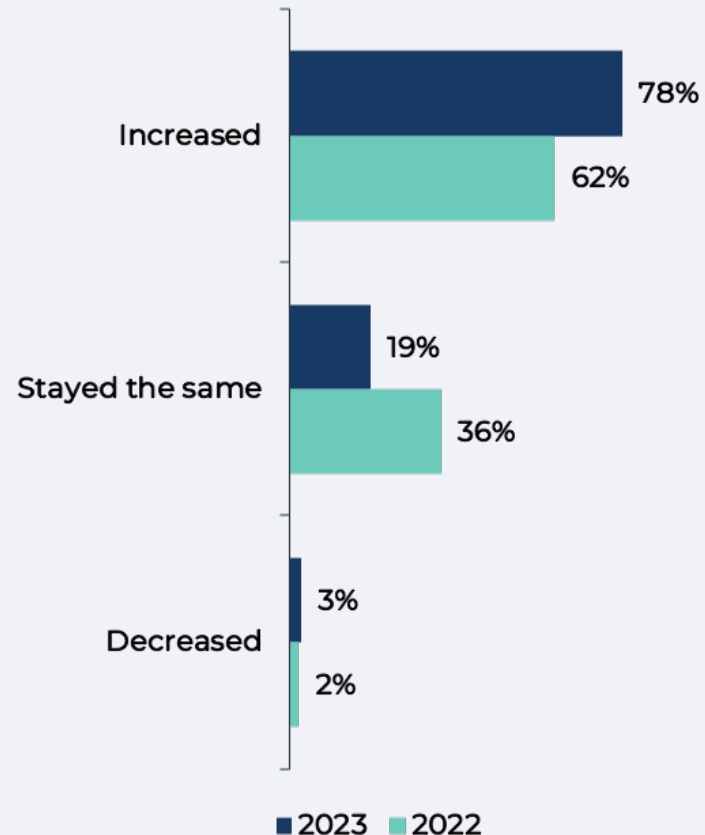
"I believe that open source will become the prevalent software model in the next 10 to 20 years, with even more organizations actively participating and contributing."

— COSMIN OPREA, ENTERPRISE ARCHITECT, LONDON STOCK EXCHANGE GROUP

FIGURE 8

Changes in the value of open source use

Over the last year, how has the business value your organization derives from OSS use changed? (select one)



2023 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q15, SAMPLE SIZE = 287 (DKNS EXCLUDED)
2022 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q16, SAMPLE SIZE = 189 (DKNS EXCLUDED)

The ubiquity and value of open source doesn't mean we should "open the floodgates," allowing it to freely flow into our organizations. We need to balance optimism with a suitable process that ensures the management of risks. We explored organizational consumption policies, with the results shown in **FIGURE 9**, finding a modest decrease in the organizations openly encouraging the usage of open source (44%, down from 47% last year), but a significant number (29%) indicating that development teams are able to make this decision for themselves. Taken in aggregate, these results are similar to the equivalent result in the recently published Europe-wide open source survey,⁷ where a cross-industry survey found that 53% receive the encouragement to consume and 24% allow development teams to decide. Considering financial services had been lagging in previous years, this is a very positive sign

for the industry; the gap has largely closed. Conversely, only 7% stated that there is no clear policy or that they could not use open source.

We explored the processes people undertake when consuming open source, which involved a breadth of activities ranging from formal processes, reviews, checklists, and training, with the results shown in **FIGURE 10**. Formal review processes are widespread, with 64% reporting that they require such a procedure to begin using OSS in their organization. This is a much higher percentage than the cross-industry equivalent reported in a recent survey⁸, where only 43% reported that there is a mandate for a formal process in their organization. This is a clear reflection of the heightened risks associated with developing financial services products and the need to have commensurate approaches.

FIGURE 9 Organizational open source policy and decision-making

To what extent is the use of OSS permitted in your organization? (select one)

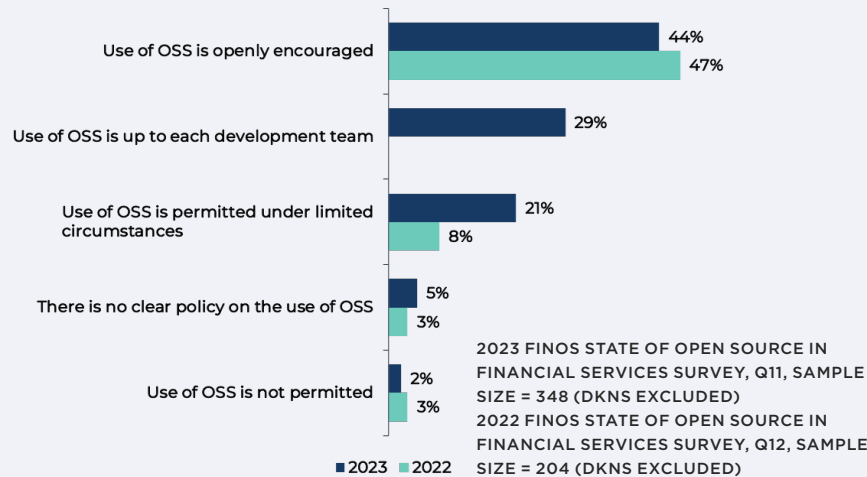


FIGURE 10 Common practices for organizational open source use

What practices does your organization follow regarding the use of OSS? (select all that apply)

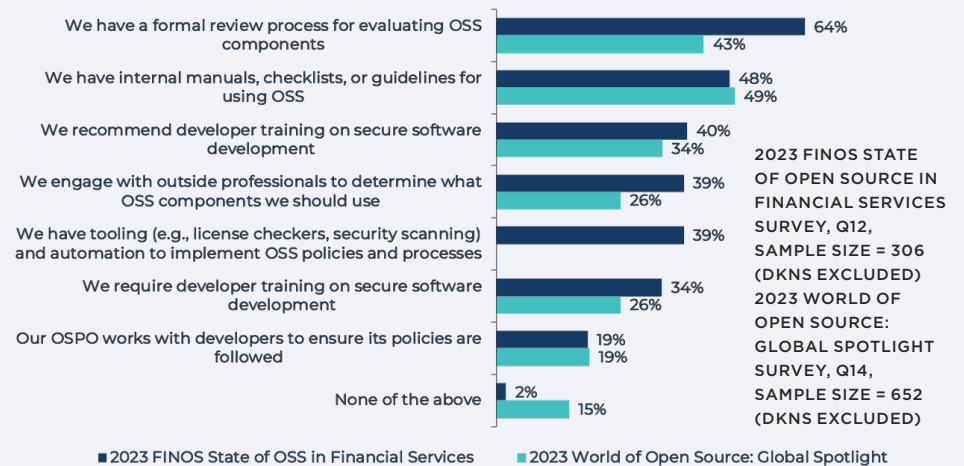
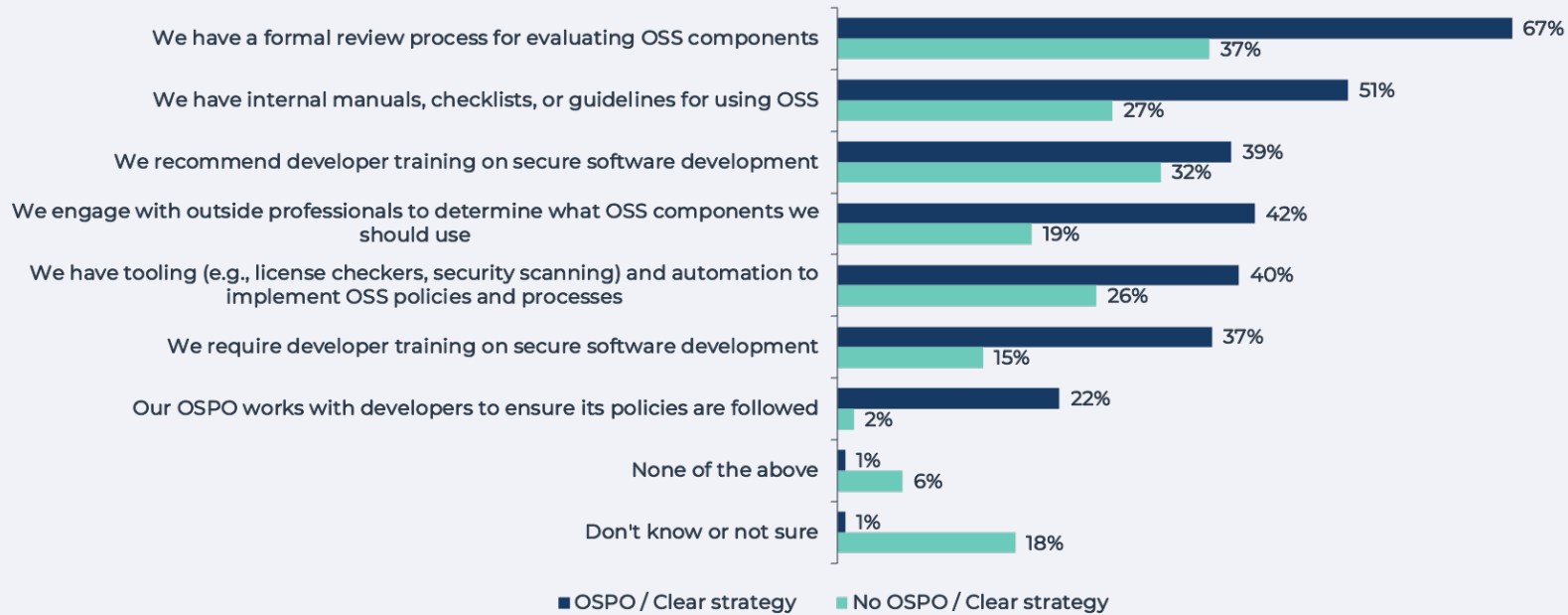


FIGURE 11

The impact of OSPOs and open source strategy on the use of OSS

What practices does your organization follow regarding the use of OSS? (select all that apply) segmented by
Which of the following actions has your organization engaged in regarding OSS? (select all that apply)



2023 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q12 BY Q8, SAMPLE SIZE = 319, TOTAL MENTIONS = 885

If we compare the responses from organizations with OSPOs or clear and visible open source leaders to those without (see **FIGURE 11**), we find that organizations without are less likely to have structured processes regarding open source consumption. For example, 67% of organizations with OSPOs / leadership have a formal review process for onboarding open source, compared to just 37% in organizations without. Structured leadership has a measurable impact on the maturity of open source processes, which will have an impact on reducing risks.

Our interviews with open source leaders in financial services organizations highlighted the processes of adopting a mature and considered approach to consumption, going beyond license compliance checks. This evolution includes looking at a community's overall health, and examining the support for the project to ensure its longevity.

“As part of Capital One’s Open Source Program Office governance structure, we have established well-managed processes around security, compliance, privacy, and

transparency. This includes automated scanning for all of our libraries prior to ingestion of open source software. It is important that we maintain a Software Bill of Materials to keep track of all the libraries ingested across different departments so that we can manage them efficiently. We also have a manual intake process to review large open source projects. Aside from the licensing and legal aspects, we evaluate the broader aspects of the software before bringing them in. For example, we try and understand the community health around each project - who is behind it and what kind of support does it have?”

— NUREEN D’SOUZA, DIRECTOR, OPEN SOURCE PROGRAM OFFICE, CAPITAL ONE

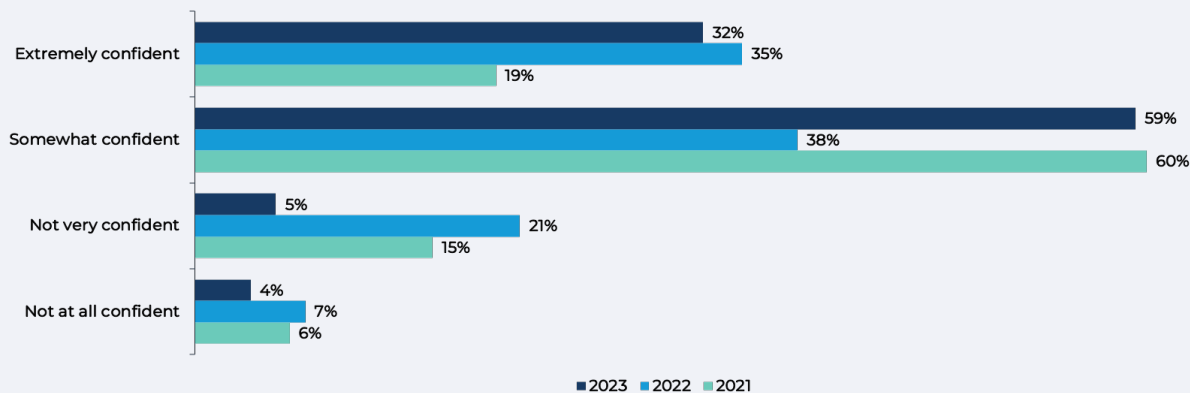
“We adopt different approaches to supporting open source packages and products; black box and white box. Black box is when we can’t compile the code and are not prepared to support it ourselves, in which case we encourage using commercially supported software. White box is when we are comfortable with the code and capable of fixing it ourselves”

— BEN KIBLER, PRINCIPAL ARCHITECT, WELLINGTON MANAGEMENT

There is growing confidence that financial services organizations are consuming maintained and up-to-date OSS, with 91% expressing that they are confident, compared with 73% last year (**FIGURE 12**). We would always advise caution given that a recently published Sonatype report indicated a level of confidence that was not evident in their data, where 68% of application developers were aware of vulnerabilities in their underlying components.⁹

FIGURE 12
Confidence level in open source components

How confident are you that the open source components your organization uses are maintained and up-to-date?
(select one)



2023 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q13, SAMPLE SIZE = 312 (DKNS EXCLUDED)
2022 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q14, SAMPLE SIZE = 200 (DKNS EXCLUDED)
2021 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q25, SAMPLE SIZE = 110 (NO DKNS ANSWER CHOICE IN 2021)

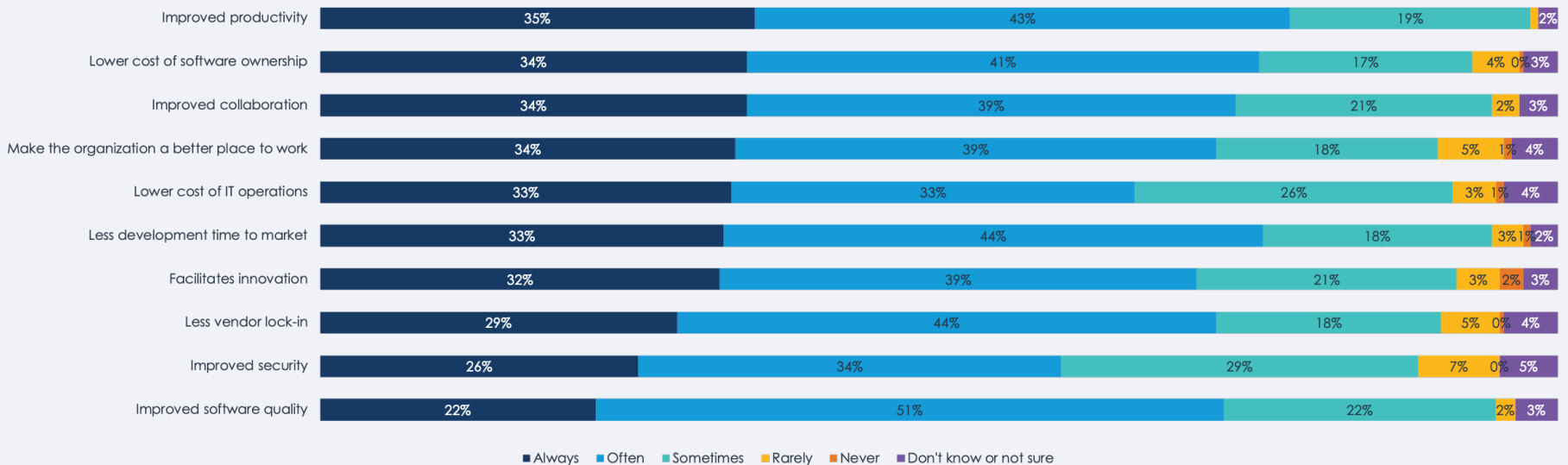
Currently, no broadly established quantitative approach exists to measure the value of open source, so our research explored sentiment and perceptions in more detail. Overall, our findings further highlight the diversity of benefits derived from open source, many of which the industry understands. Regarding **FIGURE 13**, and specifically the “always” and “often” responses, we find the following:

- Improved productivity and reduced costs: Our survey found that 78% find productivity gains using open source, likely a reflection that open source tooling tends to be “cutting edge.” Furthermore, 75% reported that open source reduces the total cost of ownership.

- Collaboration and a better place to work: There was a strong sentiment expressed about the positive impact open source has on the working environment, with 73% indicating that it improves collaboration and 73% sharing that it makes their organization a better place to work.
- Time to market and innovation: We noted that 77% indicated that open source contributes to a reduced time to market; often, open source technology is ahead of commercial alternatives. Similarly, 71% reported that open source fosters innovation.

FIGURE 13
Perceived benefits of organizational open source

How often does using OSS deliver the following benefits in your organization? (select one response per row)



We explored the factors that limit open source use and adoption (**FIGURE 14**). Security is the most significant concern, although respondents frequently cited all factors.

“In the past, financial services organizations have been hesitant in adopting open source due to perceived risks and conservatism. However, open source is now seen as essential for staying competitive and not falling behind.”

—COSMIN OPREA, ENTERPRISE ARCHITECT, LONDON STOCK EXCHANGE GROUP

Cloud and containerization have seen the highest open source usage (**FIGURE 15**), with an explosion of projects and innovation (see the Cloud Native Computing Foundation). This is a particular area of interest for financial services, where many organizations are still on a cloud migration journey.

FIGURE 14
Factors limiting the use of OSS

Do you agree or disagree that OSS use in your organization is limited by: (select one response per row)

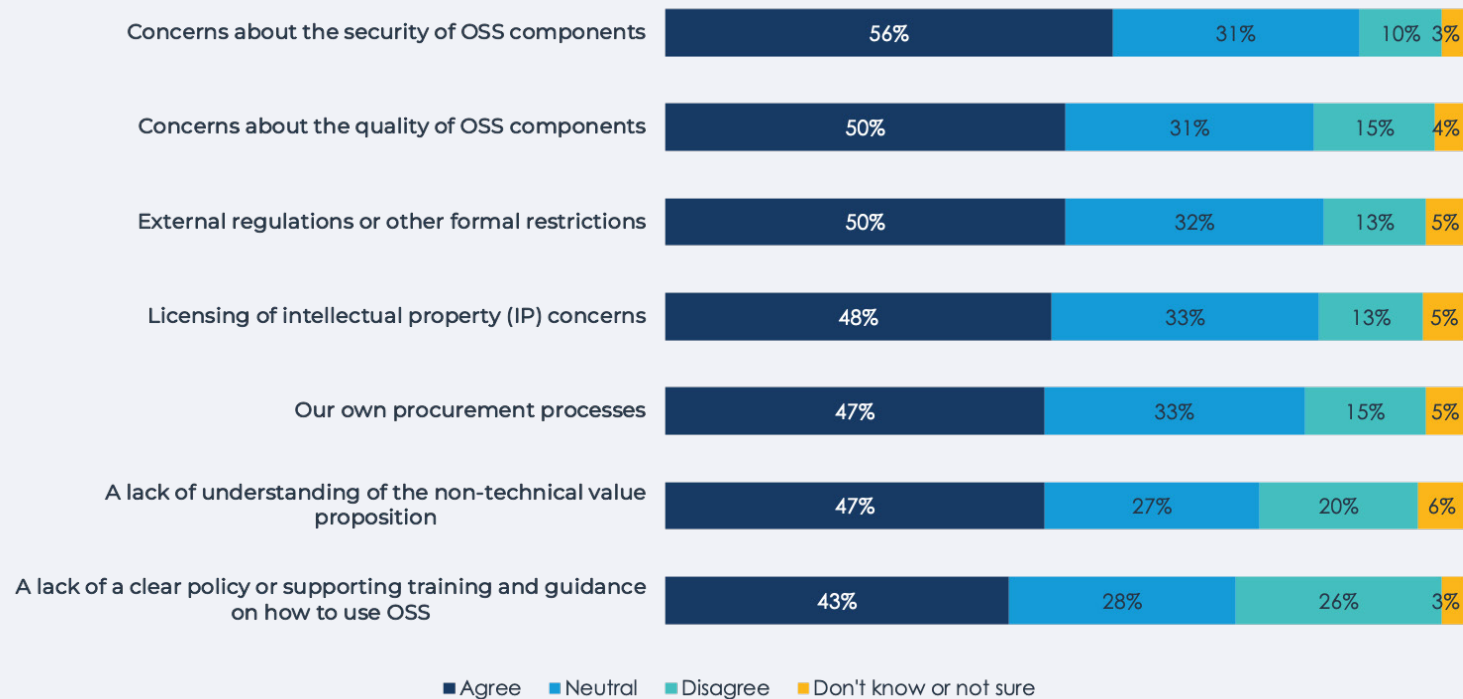
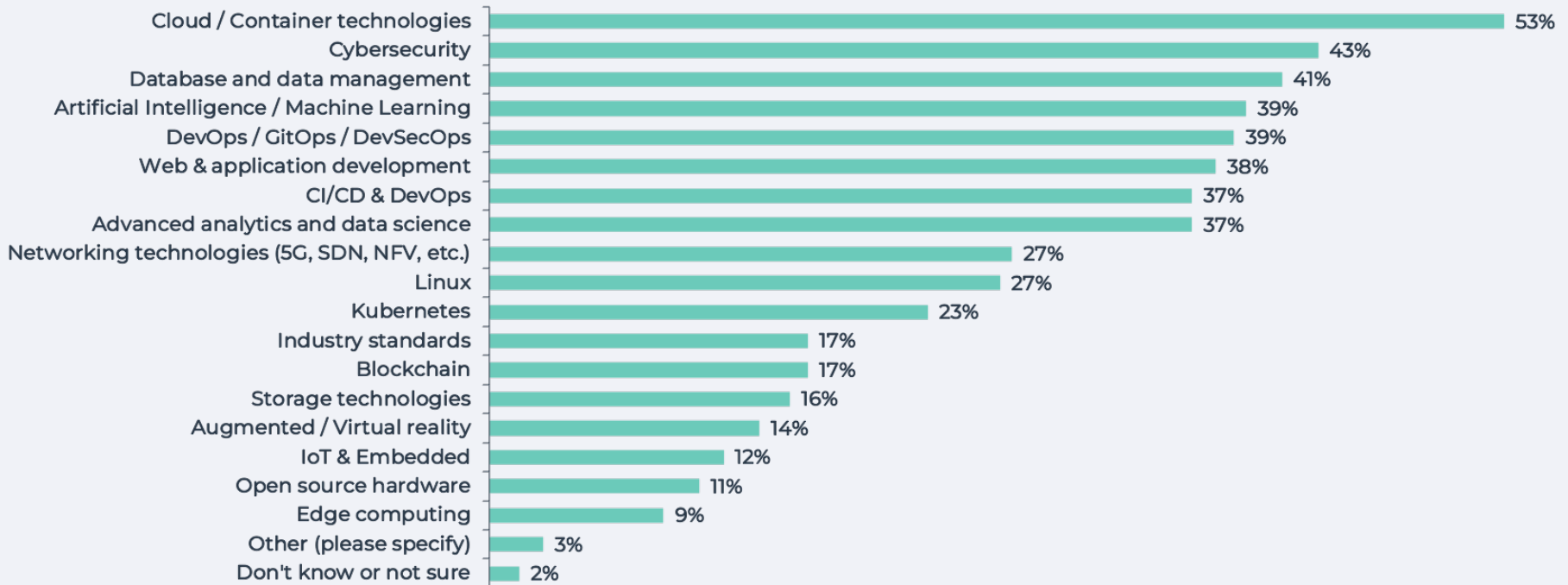


FIGURE 15

Types of open source software in use

In which of the following areas does your organization use OSS? (select all that apply)



2023 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q14, SAMPLE SIZE = 319, TOTAL MENTIONS = 1,607

ORGANIZATIONAL CONTRIBUTION

The ability to consume OSS safely and efficiently is critical, but it's not enough; financial services organizations must be able to make contributions to stay competitive, innovate, and support the open source ecosystem. The survey results show that organizations increasingly recognize the significance of open source engagement and are dedicating more time and effort toward contribution. This section explores if, how, and where organizations are enabling open source contributions and the challenges they face.

For clarity, our survey and this report include several activities in defining open source contribution. These are:

1. Sending any changes you make to an open source project back to the original maintainers for inclusion into upcoming releases
2. Submitting patches or pull requests to open source projects
3. Opening issues and taking part in online or in-person discussions relating to open source projects

We also explore inner source, which employs open source best practices and culture to encourage collaboration between teams on software developed within the same organization.

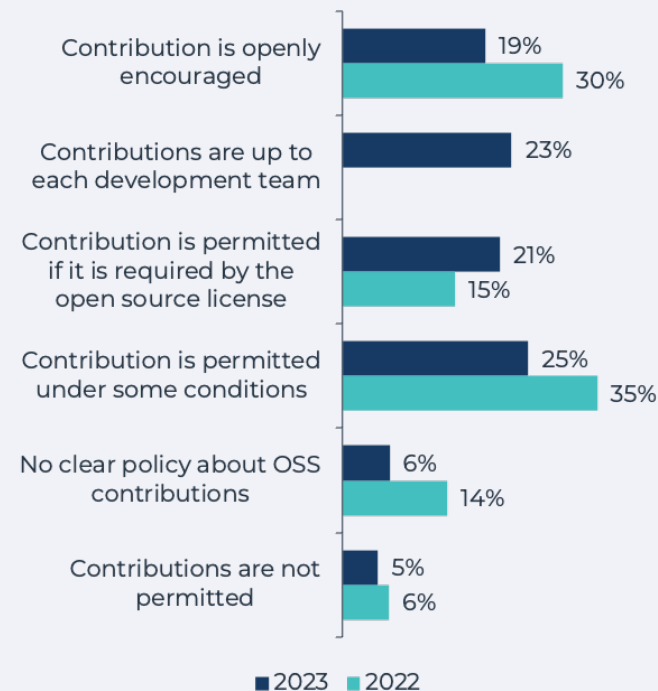
In this section, we find that:

- Overall, contribution policies are more permissive than last year.
- In total, 65% of respondents indicate that the time and effort their organization has allocated for them to contribute to open source has increased (compared with 45% in 2022).
- Well over half of the respondents are spending time each week on inner source.
- Contribution continues to take many forms.
- Top reasons to contribute are to “improve quality & security” and “be an attractive place to work.”
- Over 50% of respondents identified numerous factors limiting contributions and myriad areas for improvement.

A foundational element of an organization’s ability to contribute to open source is the policy defining whether and how employees can participate. This year’s data shows an increase in organizations with permissive open source contribution policies. While there is a marked decrease in the encouragement of open source contributions, looking across all the options, including the newly added response, “Contributions are up to each development team,” we see that 88% of respondents reported that they could contribute (**FIGURE 16**). Encouragingly, there continues to be a low (and decreasing) number of organizations that do not have permission to contribute.

FIGURE 16
Organizational policy on contributing to open source in 2022 and 2023

What statement is closest to your organization’s policy on contributing to open source projects? (select one)



2023 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q19, SAMPLE SIZE = 313 (DKNS EXCLUDED)
 2022 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q20, SAMPLE SIZE = 191 (DKNS EXCLUDED)

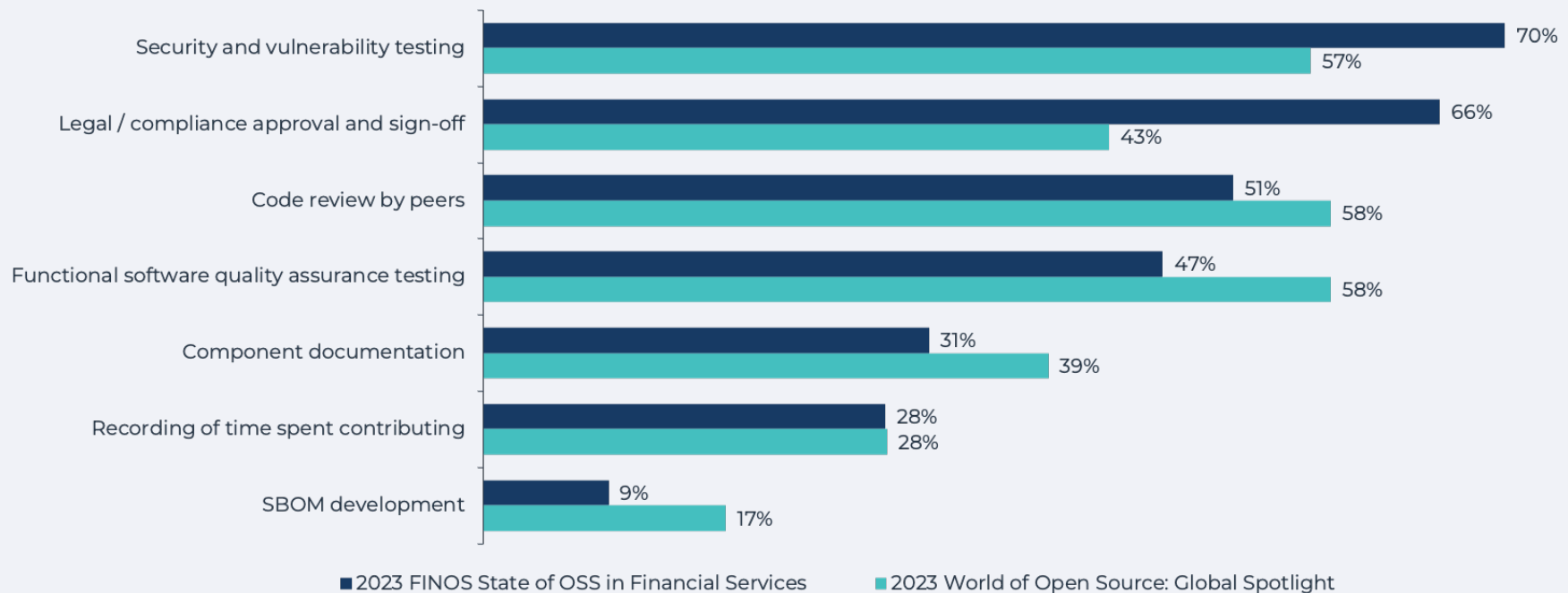
When asked about the specific policies governing open source contribution, 85% of respondents indicated that their organization’s open source policy “mandates a flow of steps (process) to be checked before releasing code outside of their organization.” When asked what steps were necessary, the two most common selections were “security & vulnerability testing” (70%), and “legal / compliance review” (66%). We often hear that because financial services is such a highly

regulated industry, there is a high degree of scrutiny on contribution policies and a general risk aversion. Comparing the results of our survey to those of the World of Open Source: Global Spotlight 2023¹⁰ (FIGURE 17), we see that significantly more financial services organizations require “legal / compliance approval and sign-off” compared to industries in general (43%).

FIGURE 17

Comparing steps in the code contribution processes between financial services and all industries

What steps are followed for contributing OSS code in your organization? (select all that apply)



2023 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q21, SAMPLE SIZE = 268 (DKNS EXCLUDED)
 2023 WORLD OF OPEN SOURCE: GLOBAL SPOTLIGHT SURVEY Q23, SAMPLE SIZE = 436 (DKNS EXCLUDED)

This suggests that highly regulated industries have legal and compliance teams with significant influence over open source activities. As Sally Ellard from Deutsche Bank explains, “Our engineers want to fix things quickly, including addressing vulnerabilities or adding new features, and they want this process to be seamless and automated. That makes sense because they want to deliver high-quality software quickly. Conversely, we need to ensure that, from a legal, risk, and control perspective, we have the right processes and controls

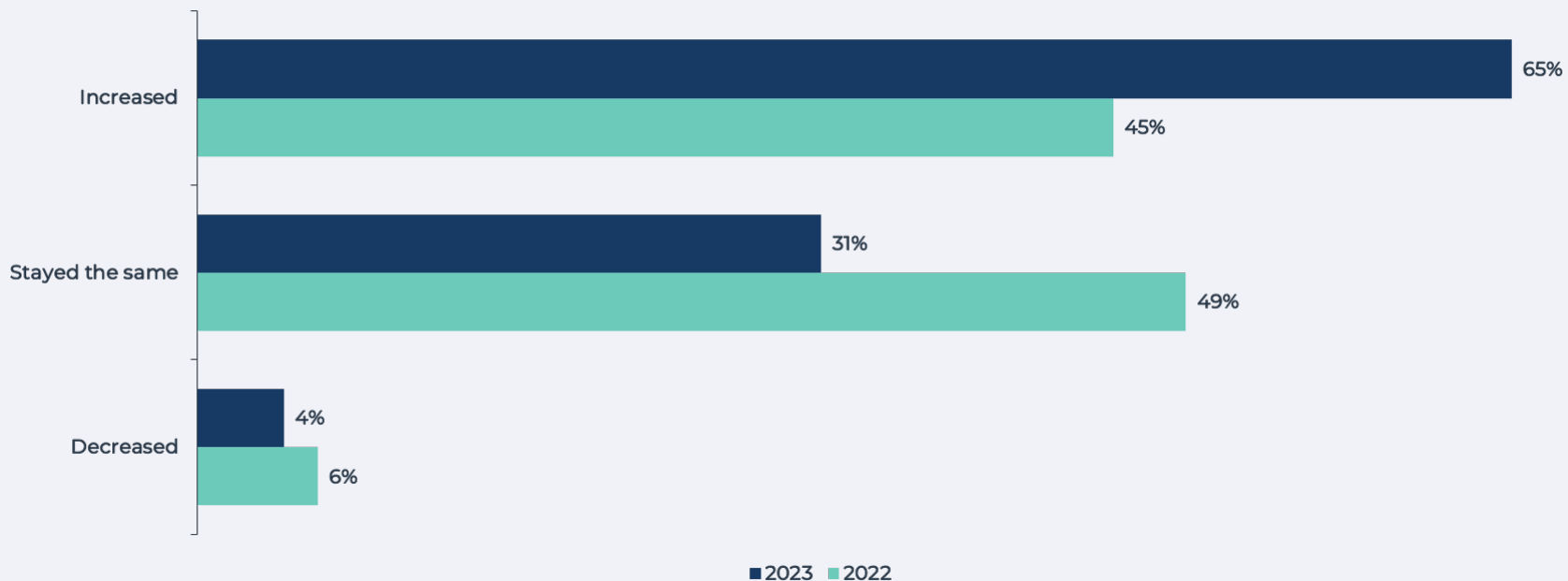
in place. We have to balance that innovation requirement with that control requirement.”¹¹

Turning to look at how much time individuals are spending on open source contribution (**FIGURE 18**), the data presents a promising upward trend, with 65% of respondents indicating an increase in the amount of time their employers allocated for open source contribution in the last year. This is a significant increase over the 2022 value of 45%.

FIGURE 18

The change in time that organizations allocate to open source contributions

Over the last year, the time and effort your organization has allocated for you to contribute to open source has: (select one)



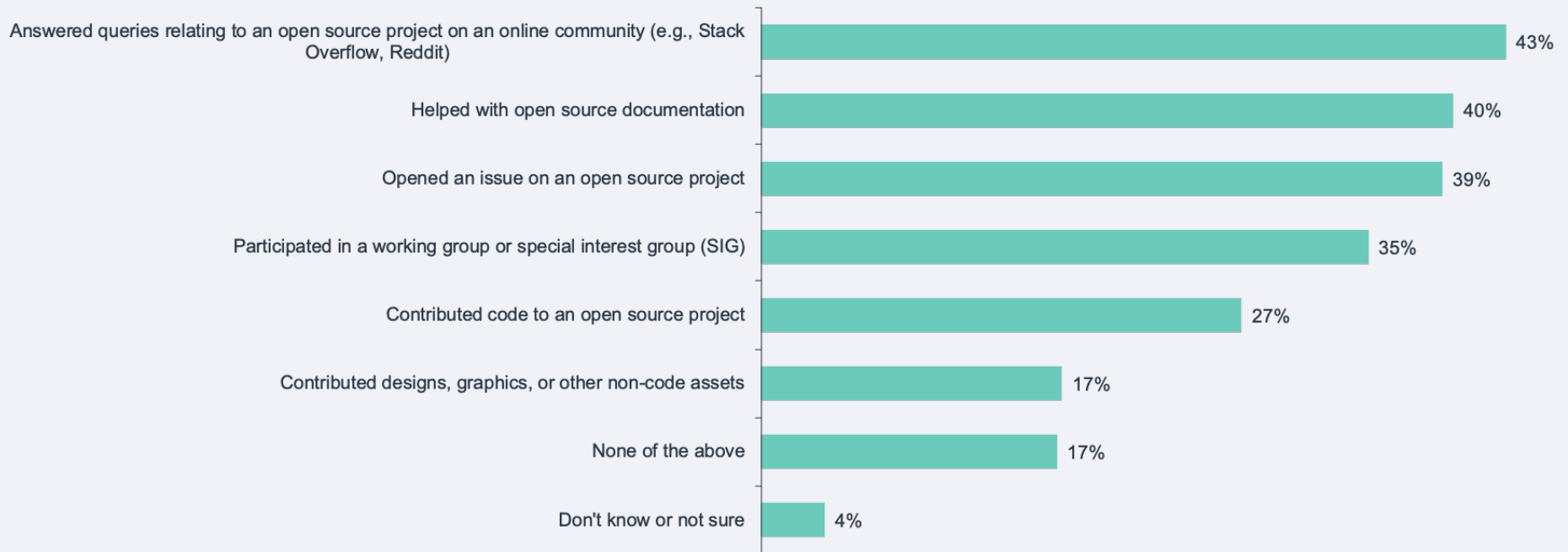
2023 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q23, SAMPLE SIZE = 279 (DKNS EXCLUDED)
2022 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q24, SAMPLE SIZE = 166 (DKNS EXCLUDED)

There was a particularly large increase (83%) in the number of smaller organizations allocating more time for open source contribution, reflecting greater agility in these organizations when it comes to defining and implementing open source contribution policies and processes.

Figure 19 shows the types of contributions individuals make are wide-ranging. This variety is essential for the success, growth, and sustainability of open source projects and helps to promote and engage a diverse group of contributors.

FIGURE 19 Types of open source contributions

On behalf of your organization, have you ever: (select all that apply)



2023 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q24, SAMPLE SIZE = 331, TOTAL MENTIONS = 732

This year, we added a new response option to understand participation in SIGs, which 35% of respondents report participating in. SIGs provide opportunities for the financial services industry to discuss industry challenges and opportunities in a way that is acceptable for the highly regulated industry. FINOS has a range of SIGs that discuss topics, including open source readiness, inner source, DevOps, financial objects, emerging technologies, regulation, and diversity.

“There’s a huge amount of value to having a forum to talk through approaches to open source adoption, rather than every individual bank having these discussions on their own.”

-ELSPETH MINTY, MANAGING DIRECTOR, RBC CAPITAL MARKETS

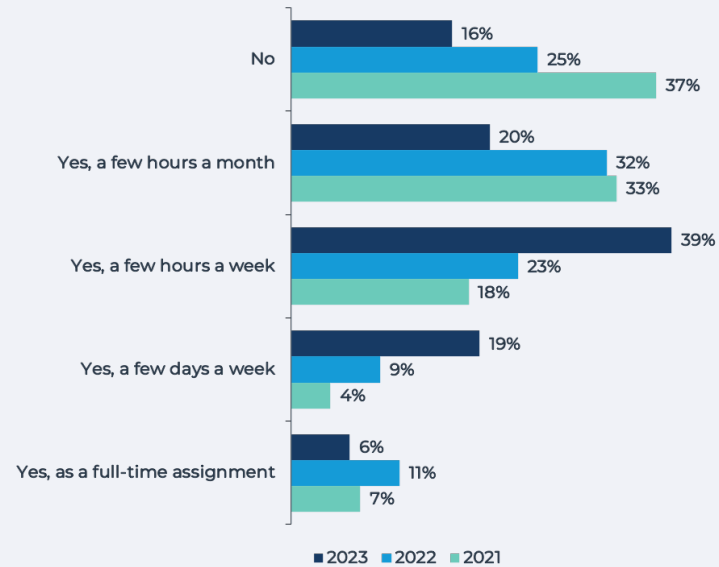
In addition to ways in which individuals are contributing, we asked several questions to explore how much time they are spending on contribution, and we saw increases across the board. Specifically, we asked about the time they spent contributing:

- To projects managed by other teams in their organization (inner source)
- To external open source projects contributed, managed, or sponsored by their organization
- To third-party open source projects
- Their personal time

In **FIGURE 20**, we see a continued trend of more time spent on inner source.

FIGURE 20
Work time spent contributing to inner source projects in 2021, 2022, and 2023

Do you spend any time at work contributing to projects that are managed by other teams within your organization (i.e., inner source projects)? (select one)



2023 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q28, SAMPLE SIZE = 288 (DKNS EXCLUDED)
 2022 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q30, SAMPLE SIZE = 188 (DKNS EXCLUDED)
 2021 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q41, SAMPLE SIZE = 94 (NO DKNS ANSWER CHOICE IN 2021)

IN THEIR WORDS

“Inner source is important in helping us to foster the right culture and mindset to contribute to open source.”

—Pooi Ling Cheong, Open Source Mission Lead, Lloyds Banking Group

“Inner source culture is an important stepping stone for open source adoption. It gets people used to the way it works, the act of making code contributions in public, and getting people comfortable with that. Sharing code is also a way to connect internal team members who are based in different locations around the world, whether they’re in Canada, the United States, the U.K., or somewhere else.”

—Elspeth Minty, Managing Director, RBC Capital Markets

“Capital One supports an inner sourcing culture because it encourages innovation through collaboration among our employees. We provide teams with governed access to software source code and encourage the sharing of ideas and resources in a way that is easy to manage. This improves the overall quality of the code through contributions and increases developer productivity through reuse. There is no doubt that we are constantly trying to make progress when it comes to reinforcing the appropriate behaviors, which entails working on our culture as well. In order to motivate inner sourcing, we try to reward those who do it well.”

—Nureen D’Souza, Director, Open Source Program Office, Capital One

“Part of our architecture review process is to check that developers have reviewed the internal open source libraries for everything they’re building. We also ask if they are building anything that can be shared more broadly internally. Our thought is that everyone should be finding something to contribute somewhere.”

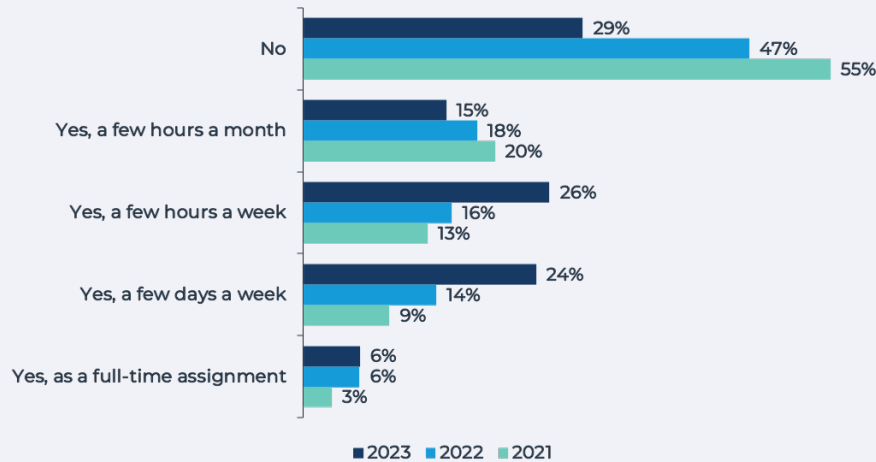
—Ben Kibler, Principal Architect, Wellington Management

Inner source can provide significant value to both organizations and individuals by empowering collaboration, accelerating innovation, and fostering a culture of transparency and knowledge sharing. With inner source, organizations tap into the collective intelligence of their internal talent, break down silos, and drive efficiency, agility, and continuous improvement. In addition to the inherent value inner source brings an organization, it can help with open source adoption and success.

Looking at the time allocated for contributing to open source projects founded, adopted, or sponsored by their employers (Figure 21) and third-party open source projects (Figure 22), we see that same positive trend. It's worth calling out the massive decreases over the last three years of individuals reporting that they don't spend any time contributing to open source.

FIGURE 21
Work time spent contributing to employer-sponsored open source projects in 2021, 2022, and 2023

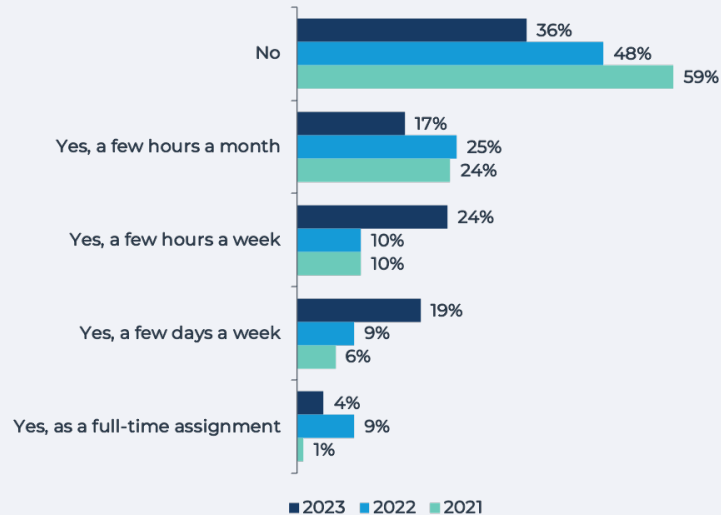
Do you spend any time at work contributing to externally distributed open source projects that your employer founded, adopted, or sponsors? (select one)



2023 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q29, SAMPLE SIZE = 296, 288 (DKNS EXCLUDED)
 2022 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q31, SAMPLE SIZE = 187 (DKNS EXCLUDED)
 2021 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q42, SAMPLE SIZE = 96 (NO DKNS ANSWER CHOICE IN 2021)

FIGURE 22
Work time spent contributing to third-party open source projects in 2021, 2022, and 2023

Do you spend any time at work contributing to third-party open source projects (i.e., those where your employer has no commercial relationship)? (select one)



2023 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q30, SAMPLE SIZE = 289 (DKNS EXCLUDED)
 2022 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q32, SAMPLE SIZE = 187 (DKNS EXCLUDED)
 2021 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q43, SAMPLE SIZE = 94 (NO DKNS ANSWER CHOICE 2021)

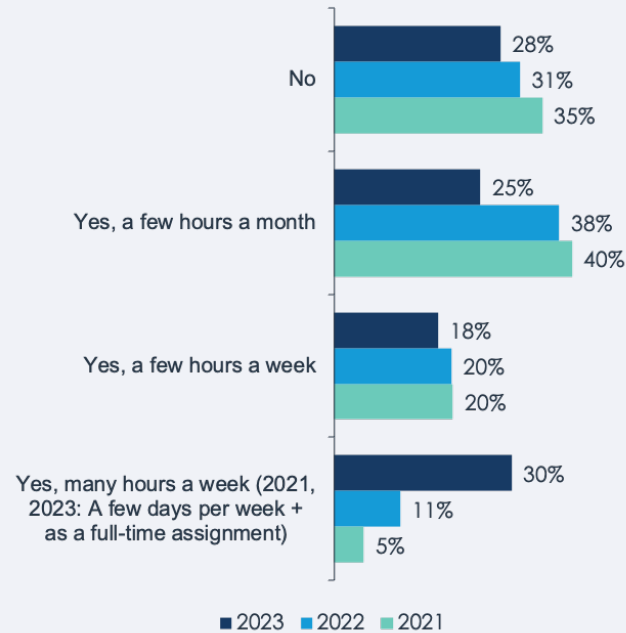
A huge 72% (**FIGURE 23**) of respondents further report spending personal time making contributions. The amount of personal time spent contributing to open source projects reinforces the assertion that there is a significant interest and appetite amongst individuals to engage with open source for the numerous reasons previously covered.

There is another reason we expect to see many individuals contributing in their personal time, namely, that there are still many financial services organizations that don't allow employees to contribute using their work IDs. In many cases, though not all, employers allow, or even encourage, contributions through personal IDs. This also explains the discrepancy between the modest increase in GitHub contributions (covered earlier) and the significant increase in individuals self-reporting spending more time contributing. The GitHub data will likely underestimate actual contributions made by financial services professionals since it only includes contributions made through a corporate email address.

Having explored how much time individuals devote to contributing, let's turn to the technological areas where they spend that time. In the earlier section on consumption, we saw that cloud / container technologies were the top area of OSS use (53%), followed by cybersecurity (43%) and database and data management (41%). **FIGURE 24** shows where organizations are making contributions, and the same three domains make the top three, albeit with lower overall numbers for contribution than for consumption.

FIGURE 23
Personal time spent contributing to open source projects in 2021, 2022, and 2023

Do you spend any of your personal time contributing to open source projects? (select one)

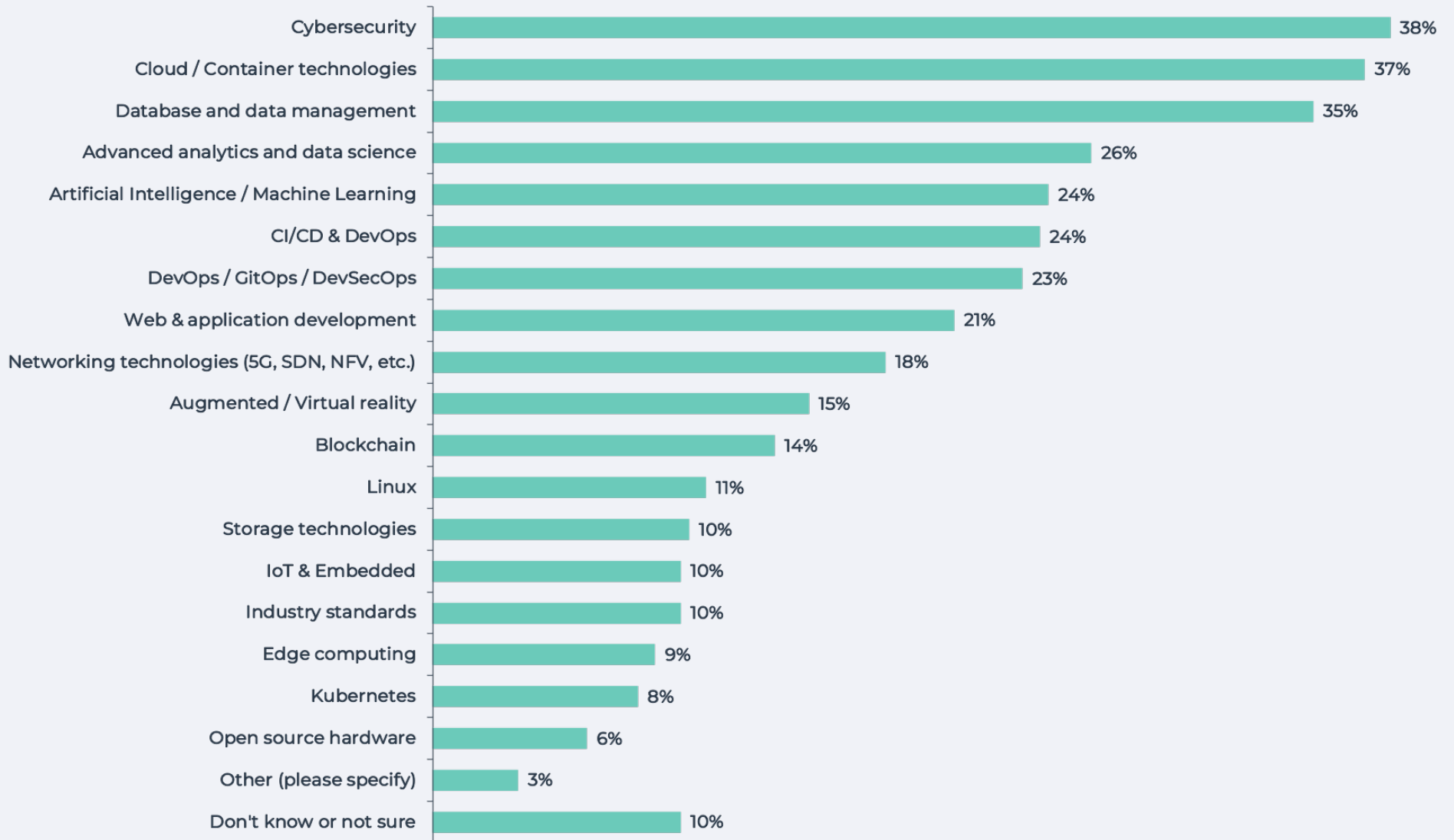


2023 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q28, SAMPLE SIZE = 288 (DKNS EXCLUDED)
 2022 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q30, SAMPLE SIZE = 188 (DKNS EXCLUDED)
 2021 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q41, SAMPLE SIZE = 94 (NO DKNS ANSWER CHOICE IN 2021)

FIGURE 24

Areas of open source contribution

In which of the following areas does your organization contribute OSS? (select all that apply)



This substantial year-over-year (YOY) increase in the time allocated and spent on open source contributions is a clear indication of the growing importance of open source in the industry, but there is no shortage of challenges to address before the industry can make up a larger percentage of overall contributors.

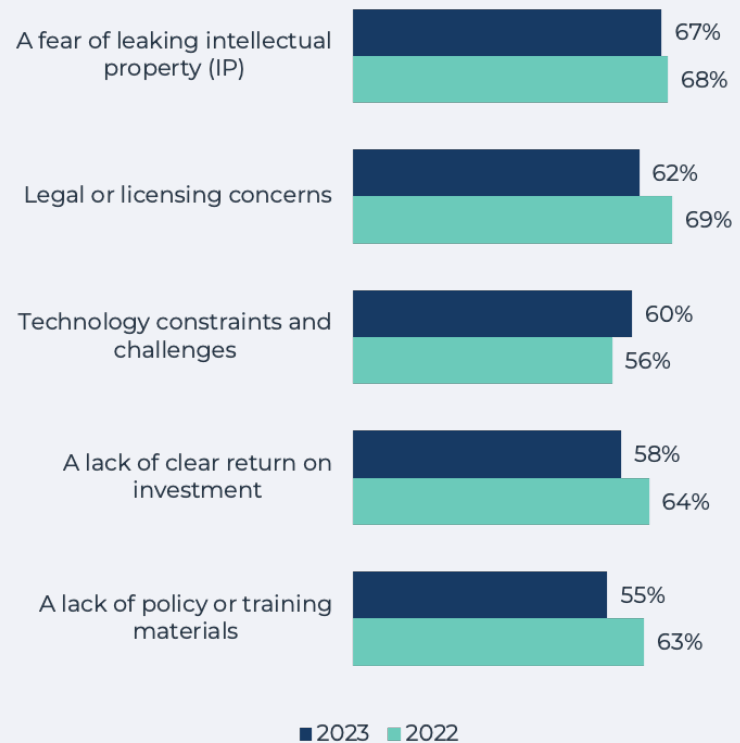
When asked about specific factors limiting OSS contribution, most respondents identified all response options as issues (**FIGURE 25**), albeit at very slightly lower numbers than in 2022. Although the improvements are modest, continuing this trend will have a significant positive impact on the industry in the coming years.

During interviews, we heard about the myriad challenges involved in meeting the high regulatory burden that financial institutions face. One example is that financial services organizations need to record all external employee communications, so this limits the avenues through which employees can fully and openly engage in open source community discussions, e.g., through Slack, Discord, GitHub, GitLab, etc. In large organizations, getting the word out about inner source and open source policies and opportunities is also difficult. Many organizations run “open source days” or an open source stream at internal tech summits to spread information and generate enthusiasm.

With that in mind, our respondents identified many areas where additional investment could increase open source contribution. While there is still plenty of work to do, this is not unique to financial services, as we see in **FIGURE 26**.

FIGURE 25
Factors limiting open source contribution

I feel that my organization's willingness to contribute to open source is limited by: (select one response per row)

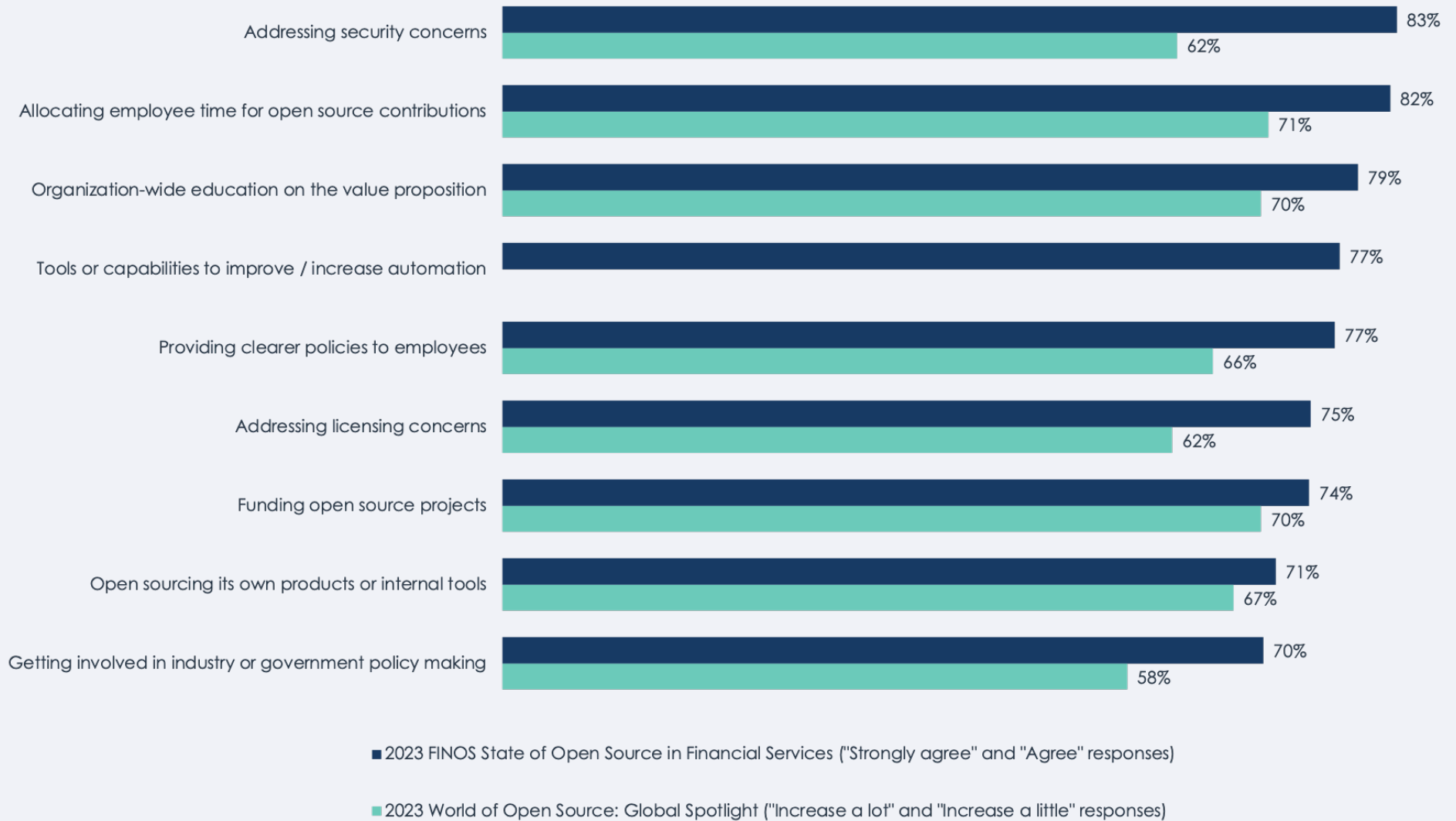


2023 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY Q26, SAMPLE SIZE = 337
 2022 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY Q27, SAMPLE SIZE = 198

FIGURE 26

Areas of investment to increase open source contribution—comparing finance and all industries

My organization's contribution to open source would increase if it focused investment or effort on:
(select one response per row)



2023 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q27, SAMPLE SIZE = 324-330 (DKNS EXCLUDED)
2023 WORLD OF OPEN SOURCE: GLOBAL SPOTLIGHT SURVEY, Q29, SAMPLE SIZE = 541-573 (DKNS EXCLUDED)

Leadership

The value creation and interests of different stakeholders within one OSS project influence the project’s development over time. Embracing open operating principles alongside open source tools can spur cultural change beneficial to transformation. According to the Open Organization Definition,¹² open organizations are those that embody five characteristics:

- Transparency
- Inclusivity
- Collaboration
- Community
- Adaptability

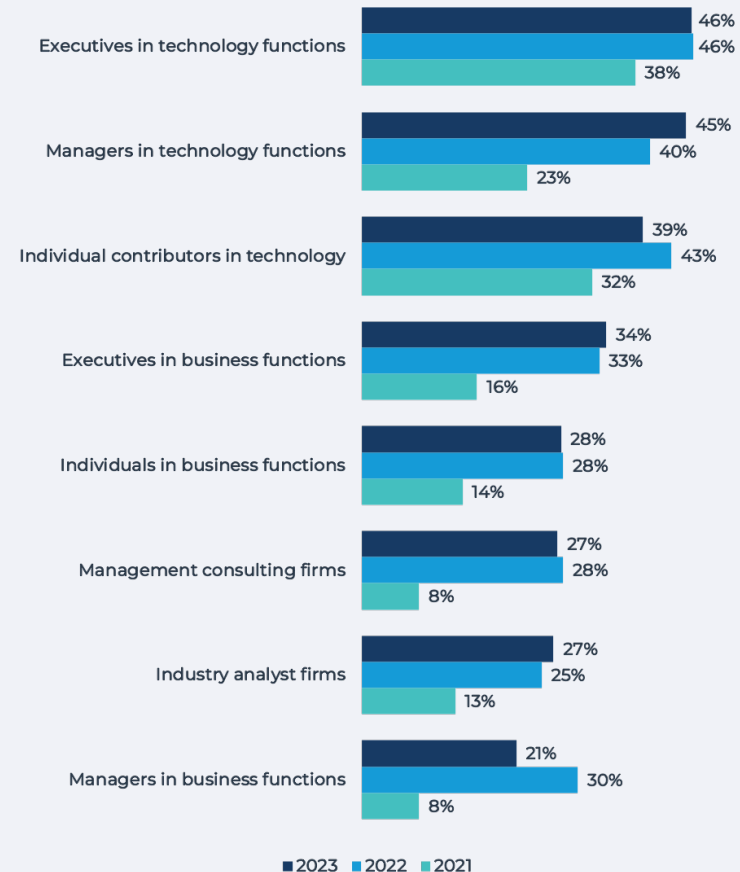
Because many stakeholders are influencing any open source project (**FIGURE 27**), the result can be conflicting agendas and a lack of consensus regarding which requirements to implement and prioritize, creating misalignment with internal processes and complicating contribution strategies. OSPOs can help organizational leaders consistently and clearly communicate the value of the organization’s open source strategy to internal stakeholders and externally. Organizations with successful open source strategies routinely contribute to open source projects, and OSPOs ensure their organizations conduct this work effectively.

Nureen D’Souza, a leader in Capital One’s OSPO, “manages the policy, standards, controls, and automation of open source tooling. As a result, the OSPO has a significant influence on internal partners who manage and support the open source governance process. The OSPO regularly meets with stakeholder groups in compliance, risk, legal, communications, and other partner organizations to ensure a secure software supply chain.”¹³

FIGURE 27

The influence of leaders in open source

To what extent do you agree or disagree that each of the following have influence over the direction of open source in your organization: (select one response per row) (percentage of respondents indicating “Strongly agree”)



2023 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q10, SAMPLE SIZE = 309-314
 2022 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q11, SAMPLE SIZE = 245-249
 2021 FINOS STATE OF OPEN SOURCE IN FINANCIAL SERVICES SURVEY, Q38, SAMPLE SIZE = 88-91

This cross-functional convening creates transparency, opportunities for collaboration and risk mitigation for all - everyone has access to the same information and materials necessary to build upon each other's ideas or to help each other not make a mistake due to unknown priorities.

Open source allows multiple people, regardless of their geographic location, to continuously contribute to code so that it improves over time and is freely available for all to use. As Pooi Ling Cheong shared, "It is important to have open source on our agenda. Through working together, better standards and solutions are created to collate all the challenges and comprehensive issues as an industry."¹⁴ Open people, practices, and platforms interlock to alter organizational culture in powerful ways.

Opportunities

Embracing open source collaboration enables financial services to collectively tackle industry challenges, foster innovation, and drive positive, industry-wide transformation. The industry is ready to identify and then act on the opportunities that will shape it.

In this section, we find that:

- 90% of respondents agree open source is valuable to the future of the financial services industry.
- 88% of respondents agree open source is valuable to the future of their organization.
- "AI / ML," "cybersecurity," and "cloud / container technologies" are open source technologies the industry values highly.
- "Improving productivity," "digital identity," "industry standards," and "reducing operating costs" are areas where financial services can most benefit from open source collaboration.

The overwhelming majority of respondents agree that open source is valuable to the future of the industry (90%) and their organization (88%). In this section, we examine what they think is the best way to achieve that value.

In **FIGURE 28**, we see "AI / ML" in one of the top spots. By pooling resources and expertise through open source platforms, financial institutions can collectively drive innovation in largely non-competitive areas such as fraud detection and security, risk assessment, customer service optimization, operational efficiency, and more.

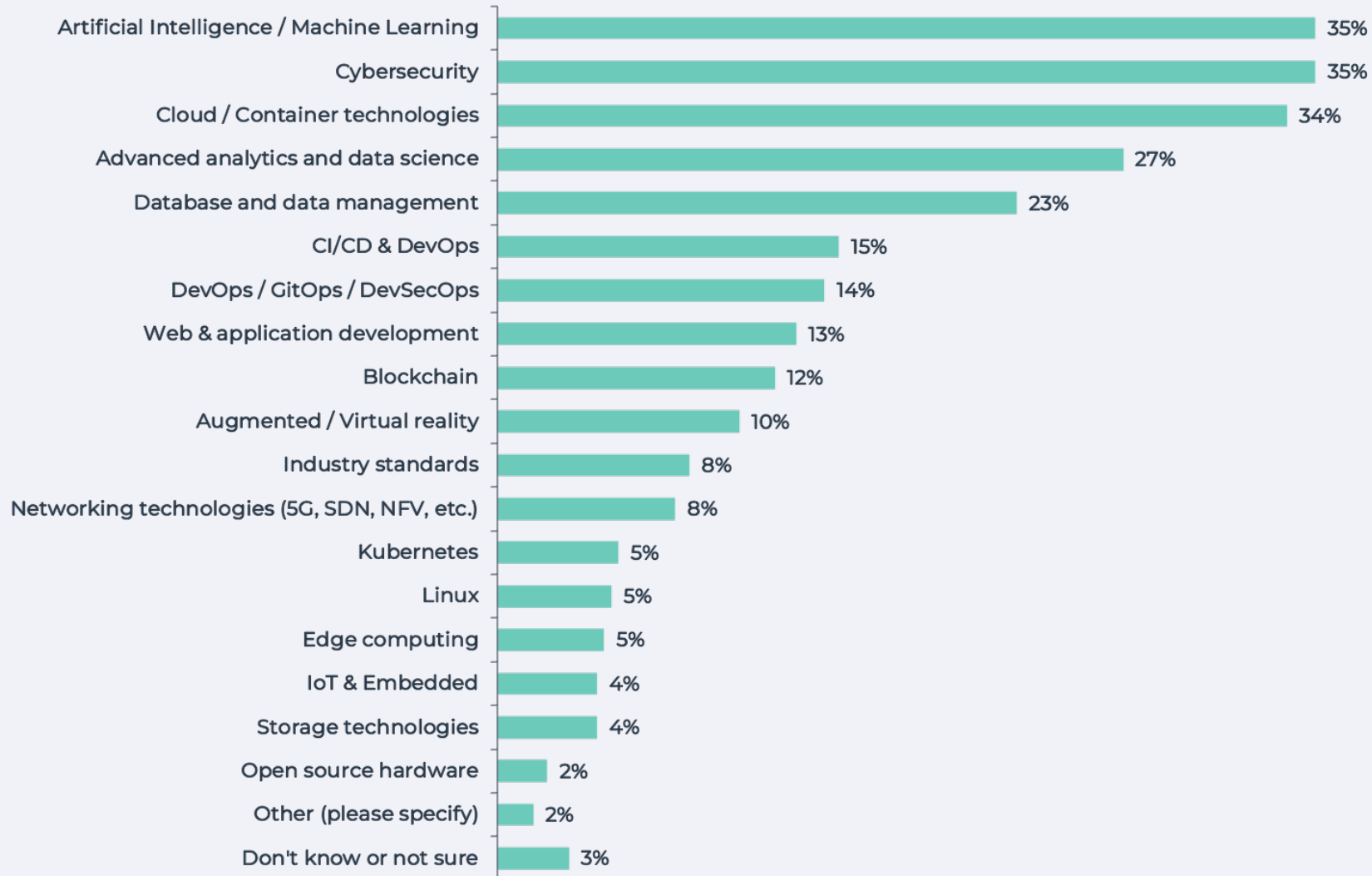
In cybersecurity, collaborative efforts can lead to the creation of standardized frameworks for compliance with industry-specific regulations, enhancing overall security and reducing the burden on individual organizations. Given the importance of cybersecurity across industries, this also represents a natural opportunity for financial services developers to engage with open source developers from other fields. The Open Source Security Foundation (OpenSSF) is a great example of this type of collaboration.

"Cloud / container" technologies were the most used open source technology and present significant opportunities for collaborative efforts to help financial services institutions scale their infrastructure, enhance resilience, and optimize resource utilization. In addition to opportunities to work across industries mentioned earlier, FINOS recently announced the formation of a new open source standard project, "which aims to develop a unified set of cybersecurity, resiliency, and compliance controls for common services across the major cloud service providers (CSPs)."¹⁵

FIGURE 28

Open source technologies valuable to the future of financial services

Which open source technologies do you feel are the most valuable to the future of your industry?
(select between one and three responses)



“Augmented / virtual reality” and blockchain are a couple of other areas to watch. While they generally rank mid-pack for value, they have some of the narrowest gaps between reported use, contribution, and value, indicating a balanced and sustainable open source ecosystem. As Ben Kibler, from Wellington, points out, “For many years, we’ve been talking about the importance of blockchain. It provides a compute and a persistence infrastructure that is potentially shared and it’s open and unambiguous in the way it works.”¹⁶

Finally, we asked respondents to select up to three aspects of financial services that they believe would most benefit from open source. The top response this year was “Improving productivity” at 35%, which is a big jump from 18% in 2022. “Digital identity” (28%, down from 31% in 2022), “Industry standards” (27%, up from 25% in 2022), and “Reducing operating costs” (27%, up from 19% in 2022) rounded out the top four.

The increases in reported improvements to productivity and reduced operational costs reflect a common industry sentiment. According to a leader of a large U.S. bank, “We can do this better, leveraging more code through inner source, smarter vulnerability management, and intelligent guidance on how to best use open source. To me, it’s about cutting waste and becoming more efficient.”¹⁷

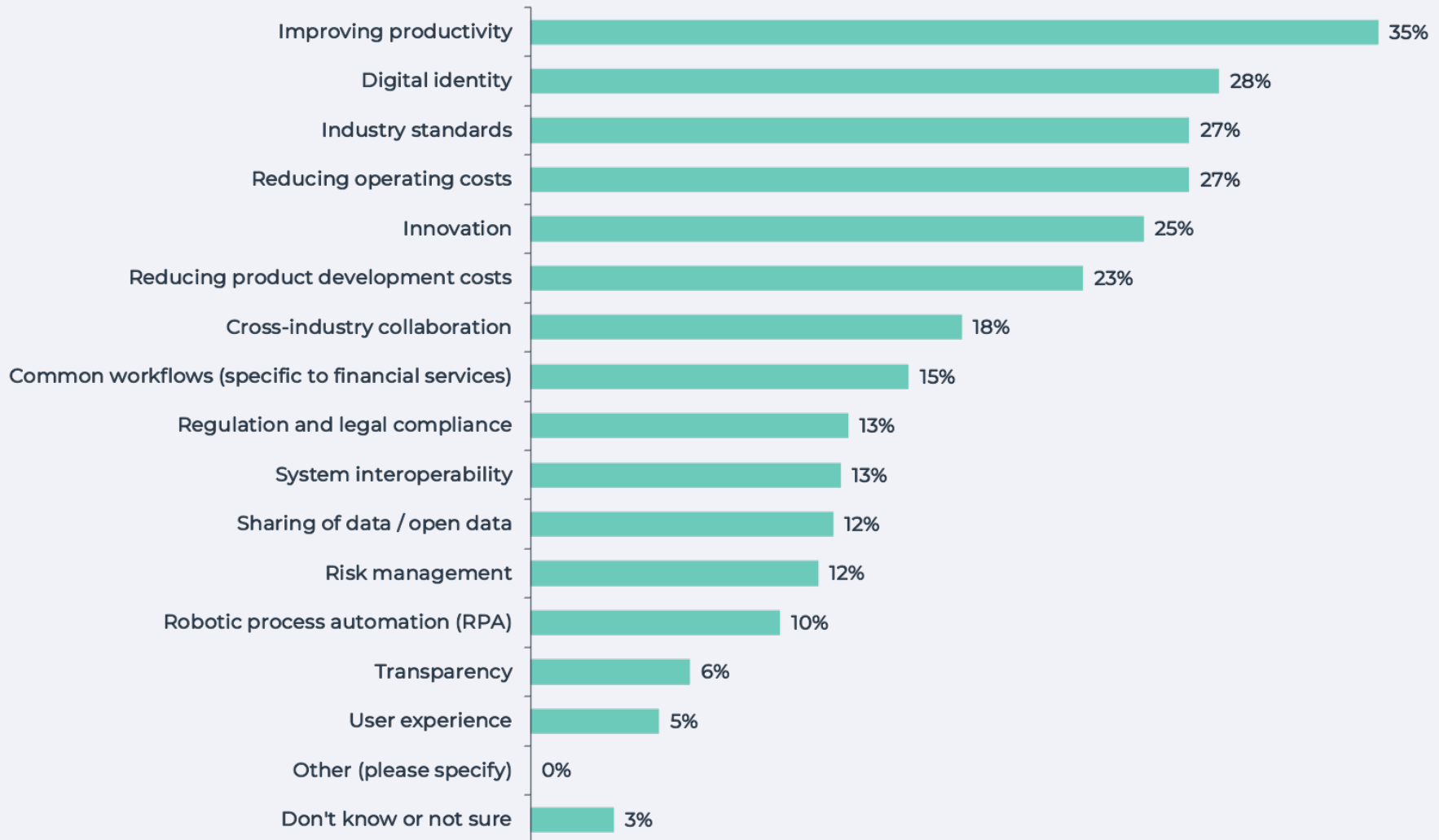
Many of the individuals we interviewed highlighted the opportunity to leverage open source for comprehending, developing, and implementing shared, industry-wide standards around regulations and regulatory requirements. As Elspeth Minty from RBC explains, “There is such a clear advantage for the financial services institutions to come together with the regulators to work on common data models and develop shared modeling platforms. There are advantages to the financial industry, and there are advantages to the regulators. If we don’t engage with this initiative, we’re going to be left behind.” She adds, “For RegTech to be successful, it needs all the banks engaging in open source. Even though we’re all at different stages, we have the same questions and the same concerns.”¹⁸

Organizations that continue to develop both their consumption and contribution policies and processes will be able to take advantage of the opportunities and value open source collaboration provides. As Mark Hoare from Deutsche Bank explained, “As we continue to look at open source consumption, we expect to identify projects and libraries that we find very useful, but that may not be as well-maintained as they could be. These represent a great opportunity for us to become active contributors to that project community. Additionally, where we can identify the use of the same or similar libraries across the organization, we can identify strategic areas of consolidation and contribution that will provide the greatest value to our teams and organization.”¹⁹

FIGURE 29

Areas of financial services that would benefit from open source collaboration

Select up to three of the following aspects of financial services that would most benefit from open source?
(select up to three responses)



Conclusions and actionable insights

Open source facilitates collaborative technology development, allowing the distribution of work across a community so you can concentrate on key value generators for your firm. The survey findings underscore the positive momentum and enthusiasm within the industry toward embracing open source as a valuable and collaborative approach. As we continue to monitor these trends, it is evident that the financial sector is recognizing the significance of open source contributions in driving innovation, fostering collaboration, and ultimately enhancing the industry's collective capabilities.

“Financial services has turned a corner with respect to open source. Perhaps laggards compared to other industries and maybe appropriately so, maybe banks needed to be conservative. But we recognize the value of open source and are now more actively treating it as the legitimate and fundamental component to technology that it truly is.”²⁰

While open source is gaining traction in financial services, there still are many opportunities for firms to consider when approaching open source, such as:

- Establishing and / or supporting an OSPO
- Encouraging developer engagement, training, and mentoring
- Allowing for the use of technology for collaboration, e.g., GitHub and Slack
- Educating your organization through internal events such as Open Source Days or Developer Days and encouraging attendance at external open source events

There also is an opportunity within the open source world to conduct closed-door sessions following the Chatham House Rule. This approach ensures compliance with industry regulations while fostering an environment where individuals can openly discuss issues and ideas. By providing a confidential forum, this type of interaction alters the dynamics, encouraging active participation from business and technology leaders. Not all open source advocates and engineers can speak freely, so having opportunities to engage openly with peers is vital in regulated environments. FINOS regularly hosts roundtables to enable these types of discussions. Recent roundtables have covered RegTech, payments, AI / ML, cloud controls, architecture as code, and many more topics.

Today, open source technologies dominate the tech landscape, and organizations must actively collaborate with these projects to remain innovative, attract top talent, and ensure they stay at the forefront of the evolving industry. The Resources section provides a variety of valuable materials to help individuals and organizations as they strive to achieve more through open source.

Methodology

This research report draws on survey data, industry data, and insights culminating from 12 qualitative interviews. We invited senior IT leaders fluent in open source technologies, communities, and challenges to share their insights.

In-depth interviews

We recorded the interviews so that we could produce transcripts. We strictly controlled the transcripts and used them only for this report. If there was no permission for a recording, then we took detailed notes. We used email to share the questions for completion. Unless the named individuals and / or their organizations gave explicit approval for quotes, we anonymized the sources.

About the survey

From June to August of 2023, FINOS and its research partners fielded a worldwide survey of qualified individuals within (or providing services to) the financial services industry on various questions related to organizational open source consumption, contribution, opportunities, and challenges.

We designed the quantitative survey to engage key stakeholders at the intersection of open source and financial institutions, including developers, IT leaders, executive management, security, legal, procurement, and human resources, and combined it with the distillation and benchmarking of previous work conducted by the Linux Foundation and FINOS. We distributed and promoted the survey across research partner social media channels, websites, newsletters, and direct email campaigns. The survey sample also included qualified responses from a third-party panel provider.

The data from the 2021 and 2022 studies and this 2023 survey are **openly available** on data.world. The 2023 survey, like the previous one, focused on end-user organizations and fintech vendors. End-user organizations are primarily consumers of IT products and services, whereas fintech vendors are primarily producers of IT products and services. We made comparisons between 2021, 2022, and 2023 questions where possible.

Percentage values in charts may not add up to 100% due to rounding.

Screening criteria

The qualified sample size analyzed for the 2023 survey was 393. This sample size reflects those respondents who passed various screening and filtering criteria, including the following:

- A respondent had to be employed full-time, part-time, or be self-employed
- A respondent had to be employed by or working closely with the financial services industry
- A respondent had to be somewhat familiar, very familiar, or extremely familiar with their organization's approach to open source
- A respondent had to self-identify as a real person
- A respondent had to answer the first content question after the screening and demographic questions

The margin of error for this sample size (N = 393) is +/- 4.1% with 90% confidence.

Year-over-year comparisons

We made comparisons between data collected in 2021, 2022, and 2023, question and response design permitting. Respondents had to answer nearly all questions in the survey, so there are situations when a respondent is unable to answer a question because it is outside the scope of their role or experience. For this reason, we presented a “Don’t know or not sure” (DKNS) to the respondent. The share of DKNS responses in a question influences the percentage values of the remaining responses. Generally, we present the percentage of respondents who answer DKNS as a valid response to each question.

One exception is when we are performing YOY comparisons. Differences in the percentage of DKNS responses between questions YOY will skew the comparative results. Therefore, when performing YOY comparisons, we exclude DKNS

responses and recalculate percentages so that we have a normalized basis for comparing the remaining percentage values.

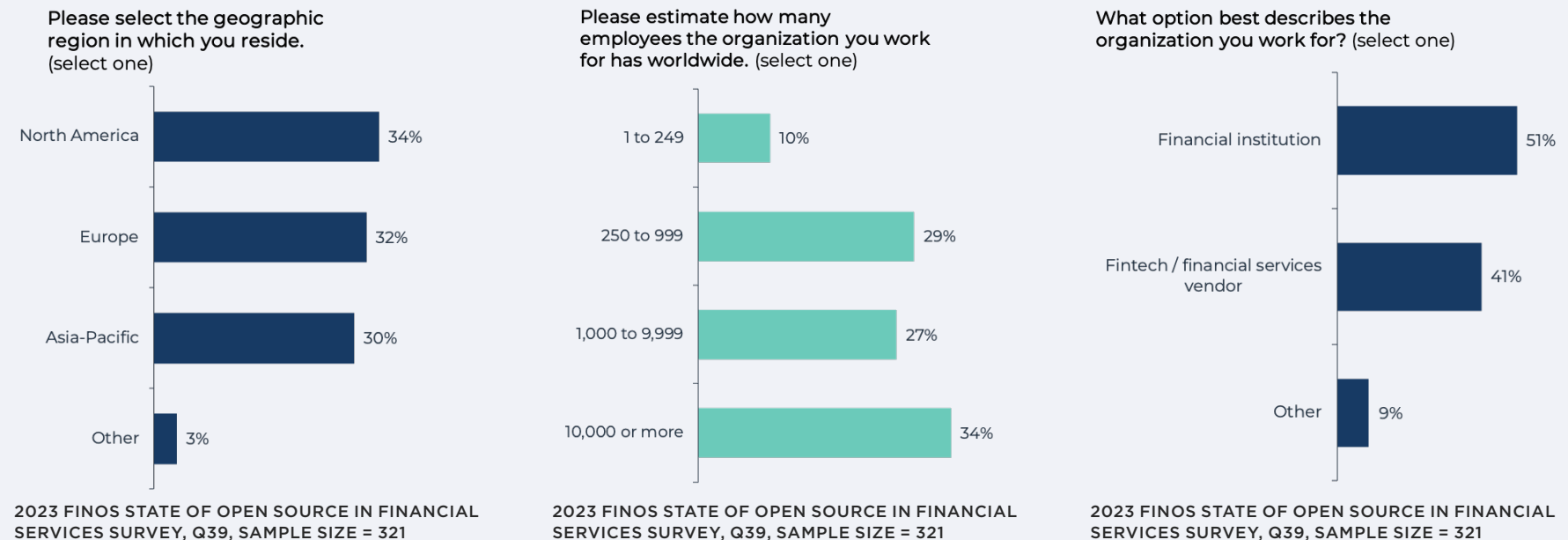
Demographics

Figure 30 presents demographic data from the survey. This was a worldwide study, with 34% of respondents residing in North America, 32% in Europe, and 30% in Asia-Pacific countries. We show the company size data (number of employees) in the second panel as aggregated into four categories.

We included all company sizes in the survey sample, but when we used this variable for segmentation, we decided to exclude organizations with less than 250 employees due to data reliability. The third panel classifies the organization of the respondents and shows that 51% of respondents work in financial institutions, and 41% are employed in the fintech / financial services sector.

FIGURE 30

Selected demographics of the 2023 FINOS State of Open Source in Financial Services Survey



Resources

Reports

- [A Guide to Enterprise Open Source](#)
- [The 2023 State of OSPOs and OSS Initiatives](#)
- [World of Open Source: Europe Spotlight 2023](#)
- [The 2022 State of Open Source in Financial Services Report](#)
- [A Deep Dive into Open Source Program Offices: Structure, Roles, Responsibilities, and Challenges](#)
- [A Guide to Open Source Software for Procurement Professionals](#)

Guides & Training

- [Open Source Body of Knowledge](#) (Financial Services focused)
- [A Beginner's Guide to Open Source Software Development](#) (Free Training)
- [Using Open Source Code](#)
- [Releasing Internal Code into a New Open Source Project](#)
- [Marketing Open Source Code](#)
- [Tools for Managing Open Source Programs](#)
- [How to Create an Open Source Program Office](#)
- [Open Source Program Office 101](#) (Free Training)

SIGs and Projects

- [FINOS Open Source Readiness Special Interest Group](#)
- [FINOS Inner Source Special Interest Group](#)
- [Open Source Project Catalogs](#) ([FINOS](#), [Linux Foundation](#), [Apache Foundation](#), [Eclipse Foundation](#))

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Endnotes

1. Zoom interview, August 2023.
2. Cyril Domercq, Technology Governance Lead, Societe Generale.
3. Interview with an open source leader at a large global asset management firm.
4. Rhyddian Olds, Head of UI & Services, Citi.
5. Elspeth Minty, Managing Director, RBC Capital Markets.
6. Mark Tate, Executive Director, JP Morgan.
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16. Ben Kibler, Principal Architect, Wellington Management
17. Zoom interview, August 2023.
18. Elspeth Minty, Managing Director, RBC Capital Markets.
19. Mark Hoare, Open Source Software Governance Lead, Deutsche Bank.
20. Senior open source leader from a North American financial institution.



The Fintech Open Source Foundation (FINOS) is an independent nonprofit organization focused on promoting open innovation during a period of unprecedented technological transformation within financial services. FINOS believes that organizations that embrace open source software and common standards will be best positioned to capture the growth opportunities presented by this transformation.

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