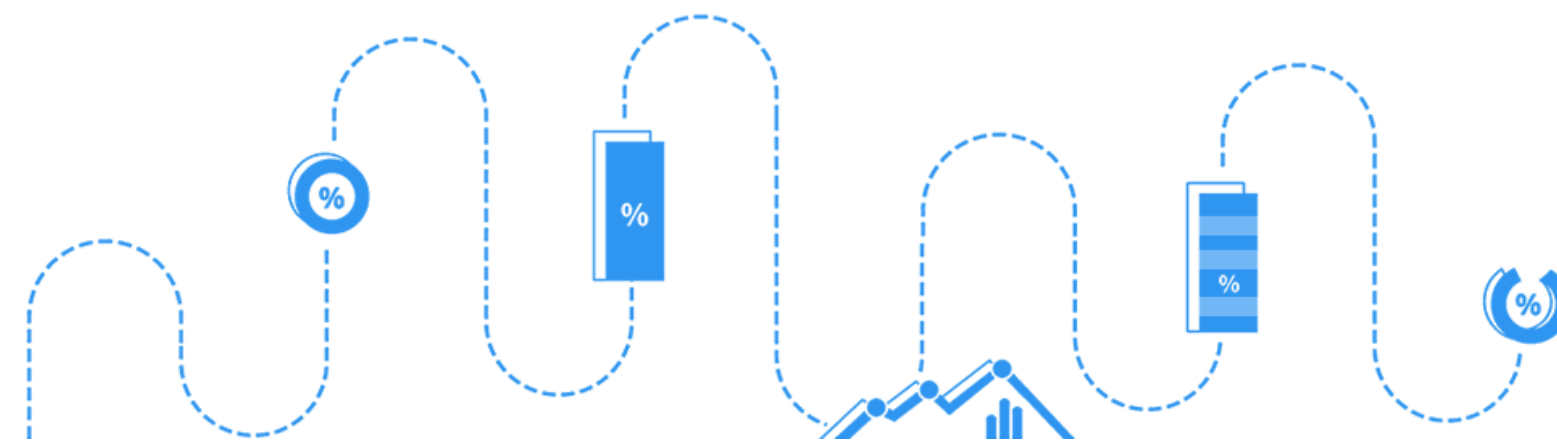MacroSoft™

An **ISO 9001:2015** Company

State of **Visual FoxPro** Applications and Industry Current Practices

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Results of Survey

June 2022

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Introduction

Macrosoft is a leader in providing professional technical services for both ongoing support of Visual FoxPro (VFP) applications and migration of VFP applications to modern technology platforms.

As a result of this expertise, Macrosoft conducted the second industry best practices survey during the last two weeks of April 2022. The survey was conducted using SurveyMonkey with 19 multiple-choice questions.

Requests to complete the survey were distributed to our client contact list of 5237 FoxPro professionals. Additionally, survey requests were published in three select FoxPro LinkedIn user groups.

- LinkedIn - Visual FoxPro Developers (1,812 members)
- LinkedIn - FoxPro Developers (2,515 members)
- LinkedIn - Visual FoxPro (1,223 members)

A total of 278 individuals from more than 228 identified companies participated in the survey. 77% of the participants completed the entire survey. Based on the diverse group that was requested to complete the survey, the robust responses across multiple companies and industries, and the high full survey completion percentage there is strong reliability in survey results.

Survey results are presented in aggregate form, so no single individual is identifiable. In addition to the direct tabulations and graphs of survey results we also provide our analysis of results, their implications and impact.

The choice of "I don't know" was provided in many questions. This number was always low being 1-2% typically. We removed this option as we present the results in the cleanest format possible.
We plan to perform an annual survey of the Visual FoxPro industry, although the questions will evolve over time.

Questions about this survey can be directed to **John Kullmann, COO, Macrosoft Inc**, **jkullmann@macrosoftinc.com**.

Macrosoft is prepared to provide an industry expert who can present these results as requested to industry user groups.

Summary of Key Insights from the Survey

- We see over three quarters of the companies utilize VFP application for client-facing application. The percentage is trending up compared to last year.

- The majority of the companies have to make updates or changes to their VFP applications at least a few times a year or even as often as monthly.

- Improved security and having a modern user interface are the top two factors for VFP application's migration effort.

- The top two reasons that prevent companies' migration effort is the concern for migration project time and the lack of technical and business documentation of the current applications.

- Enhancement needed and ensuring the long-term viability of the companies are the top two reason to trigger companies undergo a migration effort.

- The number one ideal target platform for VFP migration is Microsoft.Net Desktop platform.

- Majority of the companies expect to have the migration complete within a year with many indicating even less than 6 months.

In the following sections, we will take a closer look at each survey question and provide detailed analysis and our observation.

Is your VFP application used in-house to support your company, or used by your clients?

- Used in-house by our employees
- Used externally by our clients
- Used by both clients and employees
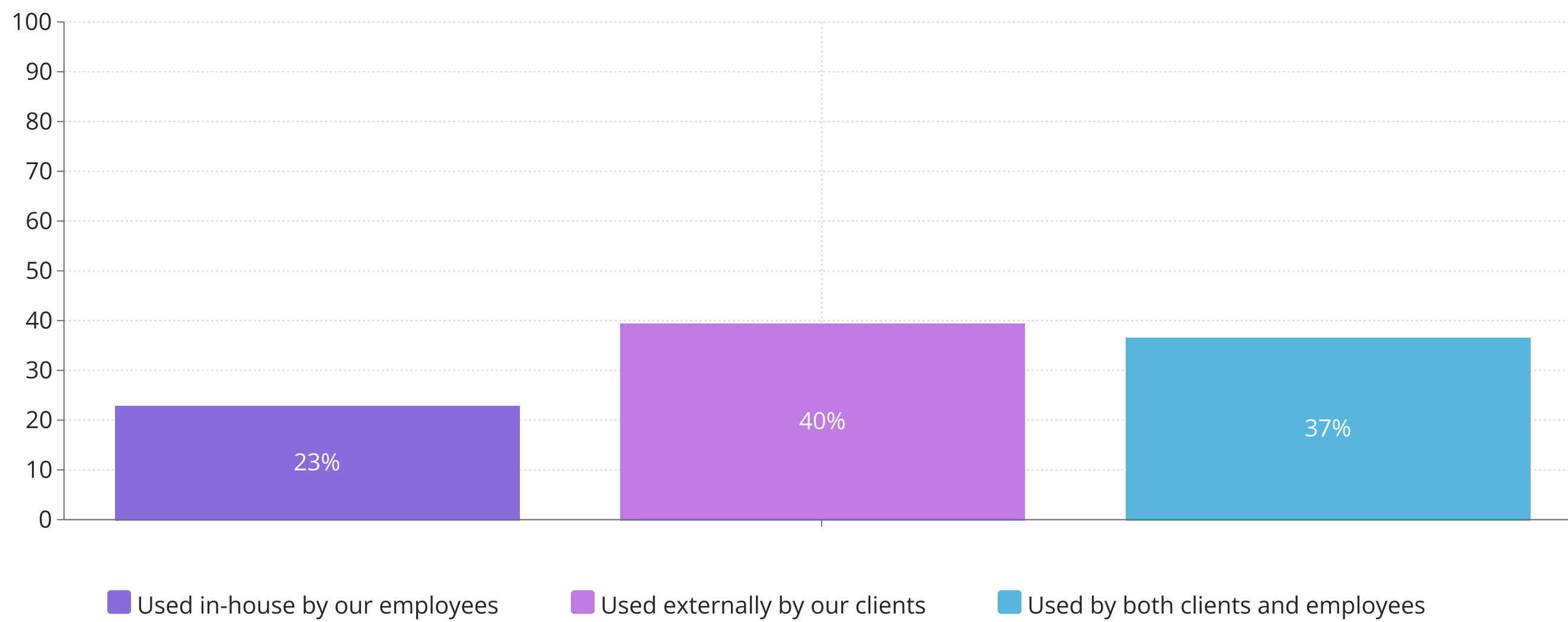
Survey Findings
A total of 77% of respondents indicate their application is used externally by clients or by both internal and external clients. 23% indicate the application is used entirely in-house.

Data Trend
Applications that are used externally or by both internal and external clients increased from 69% last year to 77% this year.

Analysis
Despite many of the support issues with a FoxPro application, we see over three quarters of the companies utilize it for client-facing application. We also see the percentage increased from last year. We are expecting this number to drop eventually over the years and would continue to track this in our survey next year.

Was your VFP program developed in-house or by an external software development firm? .

Results (%)

■ Developed in-house   ■ Developed by a software firm   ■ In-house + Outsourced
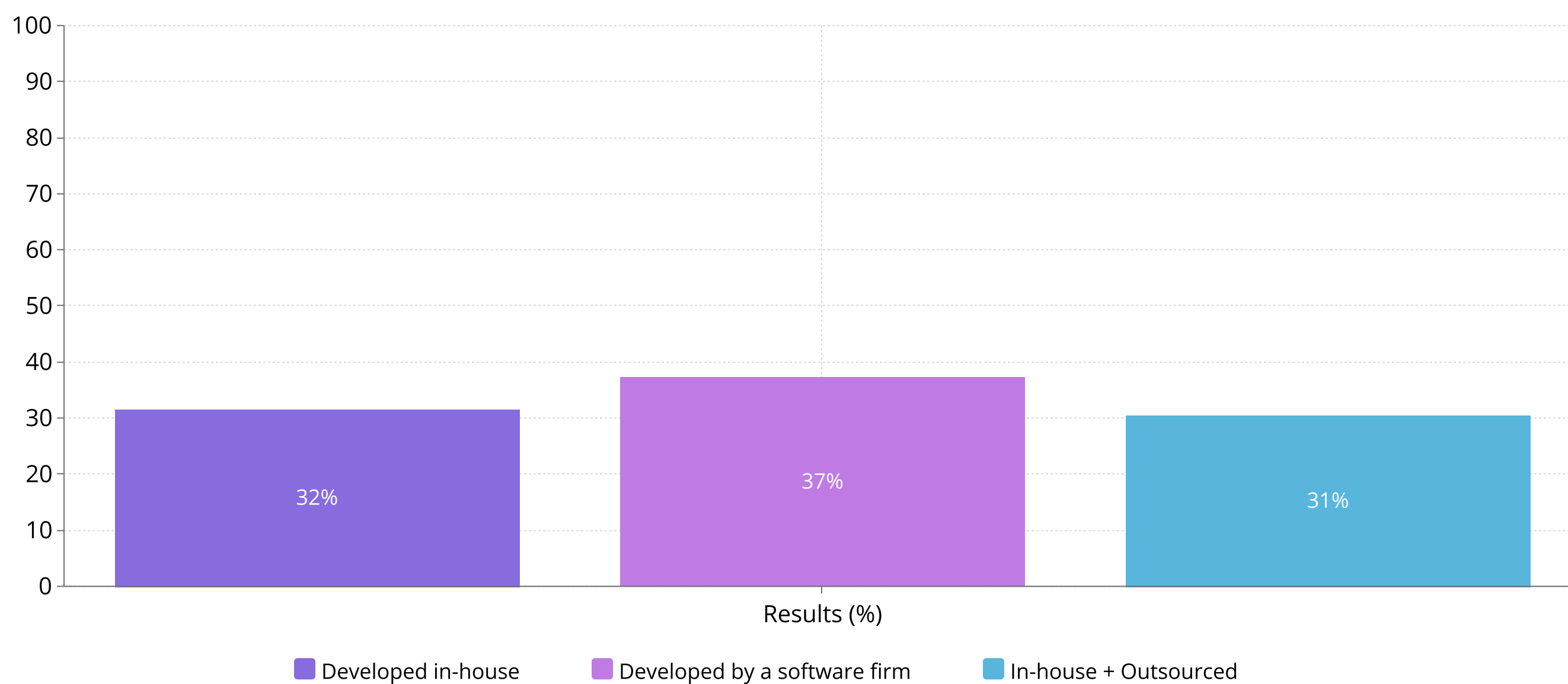
Survey Findings

32% of respondents indicate their application was developed in-house. 37% indicate it was developed entirely by an outsourced software development firm. Lastly, 31% say it was a blended effort between both in-house and outsourced developers.

Data Trend

The data distribution was similar to what we observed last year. No significant changes were spotted this year.

Analysis

This year again over two thirds of respondents outsourced some or all the development effort. It's common for organizations to rely on the expertise and additional resources of software development companies to build custom applications. It's worth mentioning our concerns that:

1. Company's internal developers must ensure they acquire full knowledge of the source code in order to update and maintain the application.

2. Companies must ensure they own the underlying source code allowing them to make changes, updates or do other modernizations to the application.

How frequently do you make changes / updates to the current VFP application?

Results (%)

- ■ Monthly or more (updated in the past few weeks)
- ■ Few times a year (updated in the past few months)
- ■ Once a year (updated about a year back)
- ■ Every few years (updated a few years back)
- ■ Never, as long as it is working (No recollection of when it was last updated)
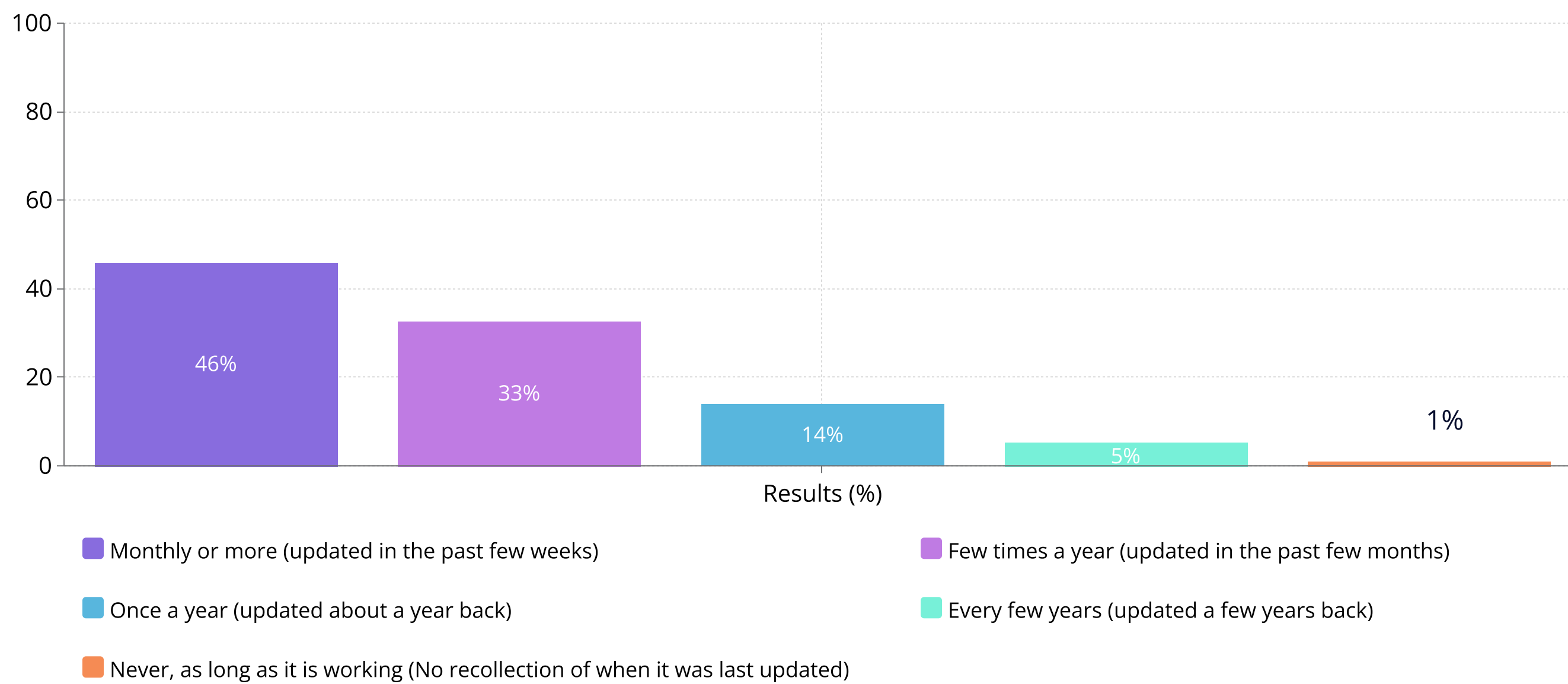
Survey Findings

6% of respondents indicate that it has been years since their FoxPro application has been changed or updated. 14% indicate changes occur approximately annually. 33% indicate changes are made a few times a year. And 46% indicate changes are made on a regular basis of monthly or more frequently.

Data Trend

The percentage of companies who make monthly or more update to their VFP applications increased significantly from 16% last year to 46% this year.

Analysis

This year we saw a total of 79% indicates their VFP applications undergo changes every few weeks or every few months. We strongly recommend these users to consider if FoxPro remains the right technology platform to support their organization. If companies have a VFP application that is constantly updated it is likely the organization will be better supported going forward by having a modern technology platform. We propose this for two reasons:

(1) The modern applications provides a much broader range of functionality (cloud, web, microservices, etc.); and

(2) There is a much larger pool of qualified developers to support a modern technology stack.

Rate the potential risks your legacy VFP application may face?

	High Risk	Some Risk	Low Risk	No Risk	I don't know
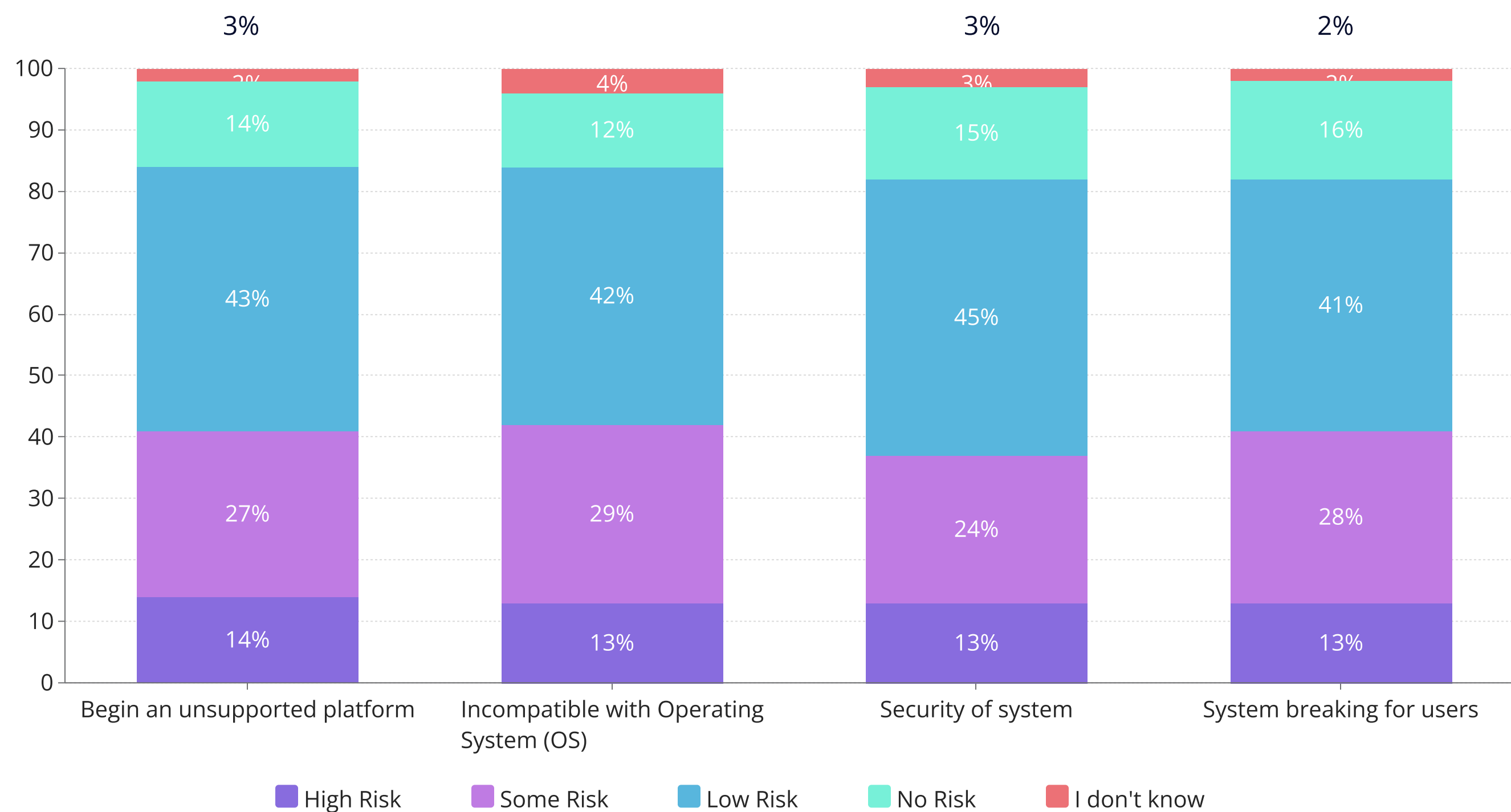
Survey Findings

As shown in the chart above, the survey lists 4 often-cited risks of VFP applications. 41% of respondents rated it as high or some risk with the application being on an unsupported development platform. 42% of respondents rated System Security as high or some risk. Incompatibility with modern operating systems were identified by 42% of participants as high or some risk, and system breaking for users were identified as high or some risk by 41% of participants.

Data Trend

Across all four choices. We saw less participants rating them high, or some risk compared to last year.
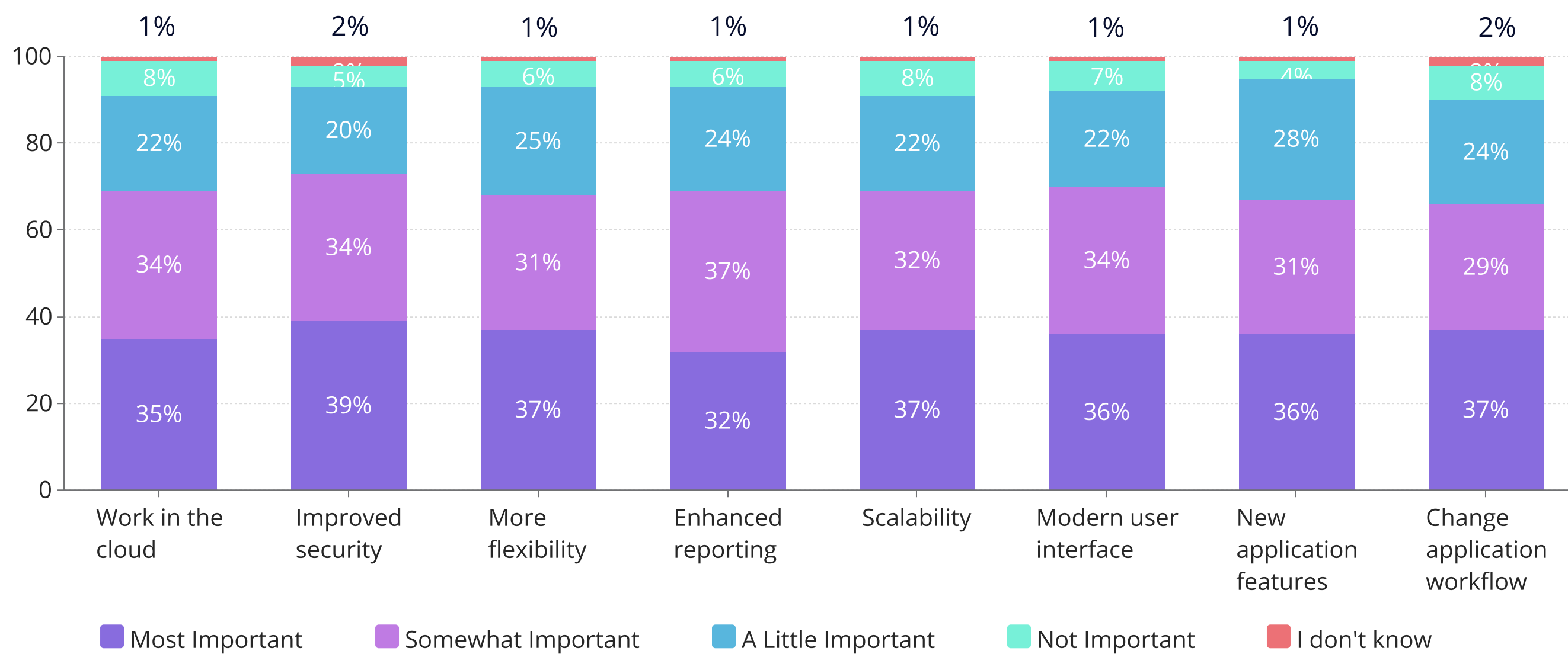
Analysis

We present the same four risks of VFP applications as last year, yet the rate of risk dropped for all of them. This could indicate

(1) VFP applications are working as expected for majority of the clients, despite FoxPro reached end of support.

(2) Companies have already taken steps to eliminate these risks.

What is most important to your business as you modernize your application?

	Work in the cloud	Improved security	More flexibility	Enhanced reporting	Scalability	Modern user interface	New application features	Change application workflow
I don't know	1%	2%	1%	1%	1%	1%	1%	2%
Not Important	8%	5%	6%	6%	8%	7%	4%	8%
A Little Important	22%	20%	25%	24%	22%	22%	28%	24%
Somewhat Important	34%	34%	31%	37%	32%	34%	31%	29%
Most Important	35%	39%	37%	32%	37%	36%	36%	37%

Legend: ■ Most Important ■ Somewhat Important ■ A Little Important ■ Not Important ■ I don't know

Survey Findings

Eight unique factors are listed in the survey as important drivers for modernization (see chart) and participants were asked to rate each according to its importance. At the high end of importance, Improved security was rated by 73% of respondents as a most or somewhat important factor. Having Modern UI comes at second at 70%. Overall, all eight factors are rated by 65+% of participants as most or somewhat important so clearly these are among the factors driving companies to consider modernization alternatives.

Data Trend

Overall, we see the rating for most important and somewhat important increased across all eight factors. The average rating for most important and somewhat important increased from around 50% to 68% this year.

Analysis

We want to make clear; FoxPro remains a robust well-performing application framework that has supported many successful companies for the last several decades and continues to do so. Moving to a new platform should be based on specific business needs and benefits, and we believe the above factors are among the keys that are driving modernization efforts. Improved security was rated the highest importance and indeed it's a key factor driving modernizations. Security audit requirements generally mandate that enterprise systems be on supported software platforms, and a company's auditors, clients or investors will often require it. In this case, it may end up being required for continuing to do

Each of the eight factors can have significant business impacts, and each business case evaluating modernization will be different.

How many users are currently working on the application?

Results (%)

■ 10 or fewer ■ 11-25 ■ 26-50 ■ Greater than 50
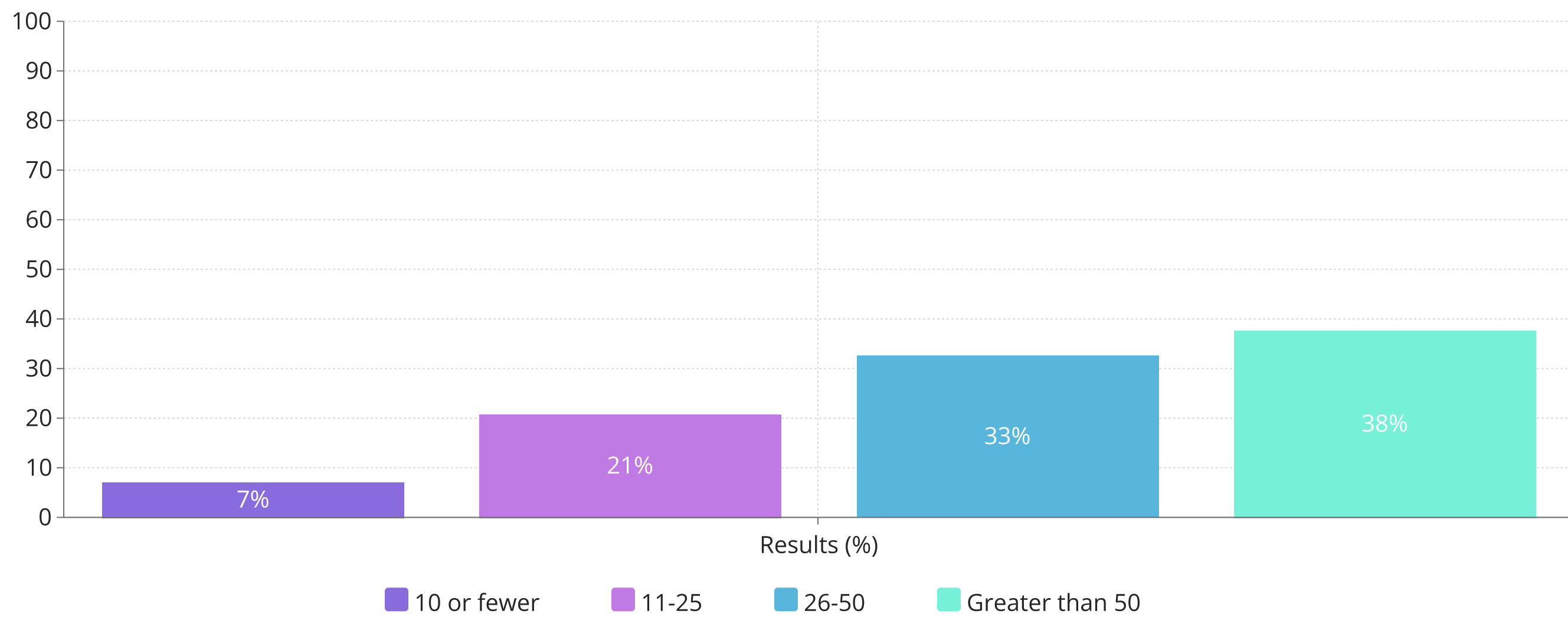
Survey Findings
A majority (71%) of respondents indicate their VFP application has 26 or more users. Only 7% of respondents indicated they have 10 or fewer system users. So, the VFP applications appear to be at least in the lower-mid-range of users or higher.

Data Trend
We saw the same results as last year that the majority of the VFP applications have 26 or more users.

Analysis
These results suggest to us that the VFP applications surveyed are being used by midsized companies or by mid-sized departments/organizations within larger companies. This further suggests the VFP applications fulfill a very well-defined set of functions in the company, one that is hard to replicate with off-the-shelf or open-source products.

At the smaller end of user range, 10 or fewer, we find only 7% of respondents. This contradicts the often-cited hearsay that the VFP applications remaining tend to be small and have very few users. Our survey results show that the bulk of VFP applications have reasonable-to-high user counts. So, these are custom-built systems supporting mid to large user bases, which of course makes them much more difficult to replace. These larger systems have remained in place for many years and continue to support organizations well.

What is your biggest impediment to modernizing to a new platform?

	1%	2%	3%	3%	3%	3%	3%
Not an Issue	9%	7%	10%	9%	9%	6%	7%
Small Issue	41%	40%	42%	43%	38%	42%	47%
Big Issue	28%	33%	29%	29%	35%	34%	29%
Biggest Issue	21%	18%	16%	16%	15%	14%	14%

Categories: Lack of a budget for the project · Time to do it · System performs fine now · Not knowing what to go with · Lack of documentation · Not result in new revenue · Unclear requirements

Legend: ■ Biggest Issue ■ Big Issue ■ Small Issue ■ Not an Issue ■ I don't know
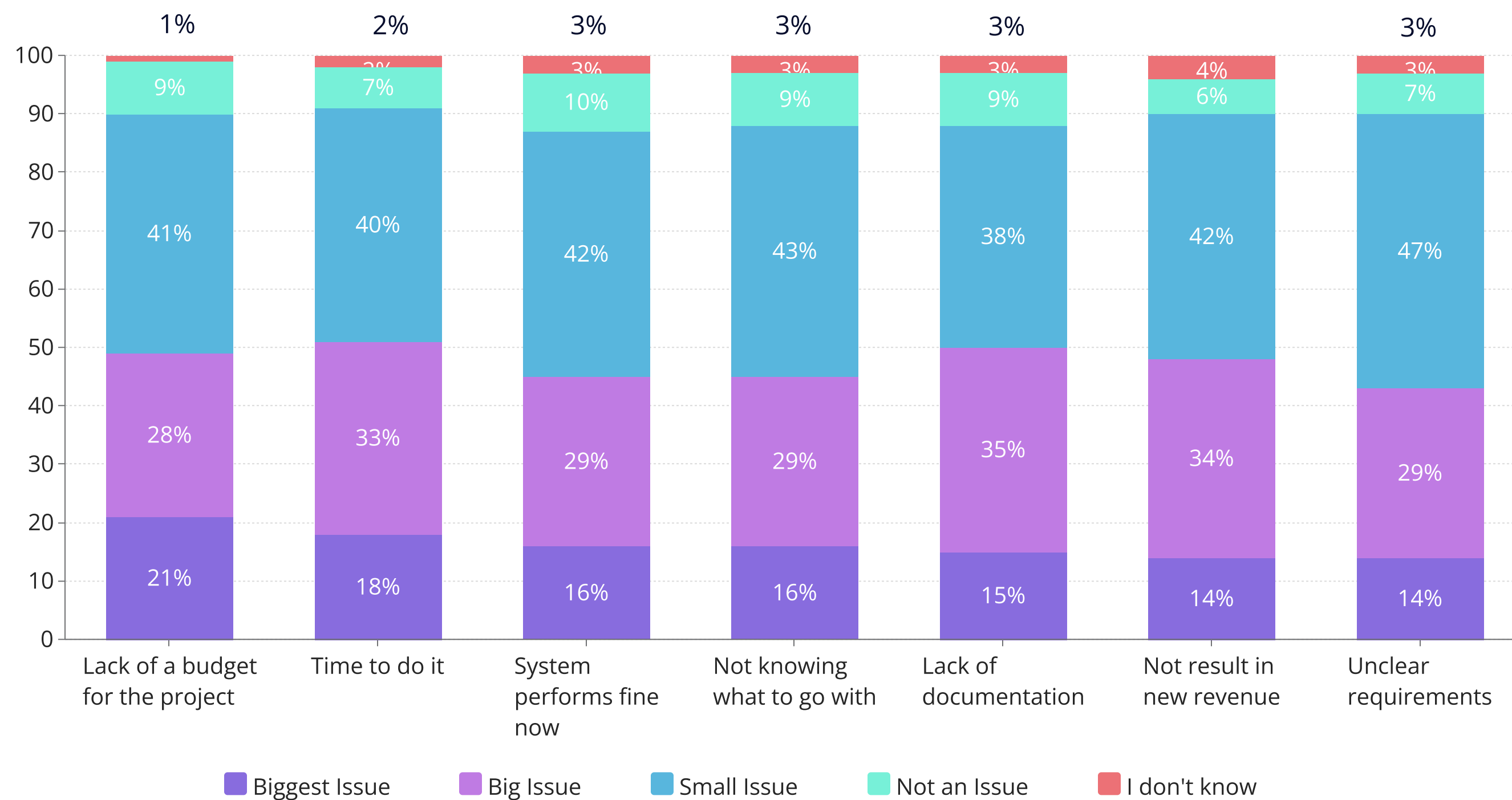
Survey Findings
The survey posed seven top reasons or impediments preventing companies from modernizing their Visual FoxPro application (see chart). Survey results show the leading reason to the often extended time to do it with 51% of respondents saying that is either a big or the biggest issue preventing them from starting.
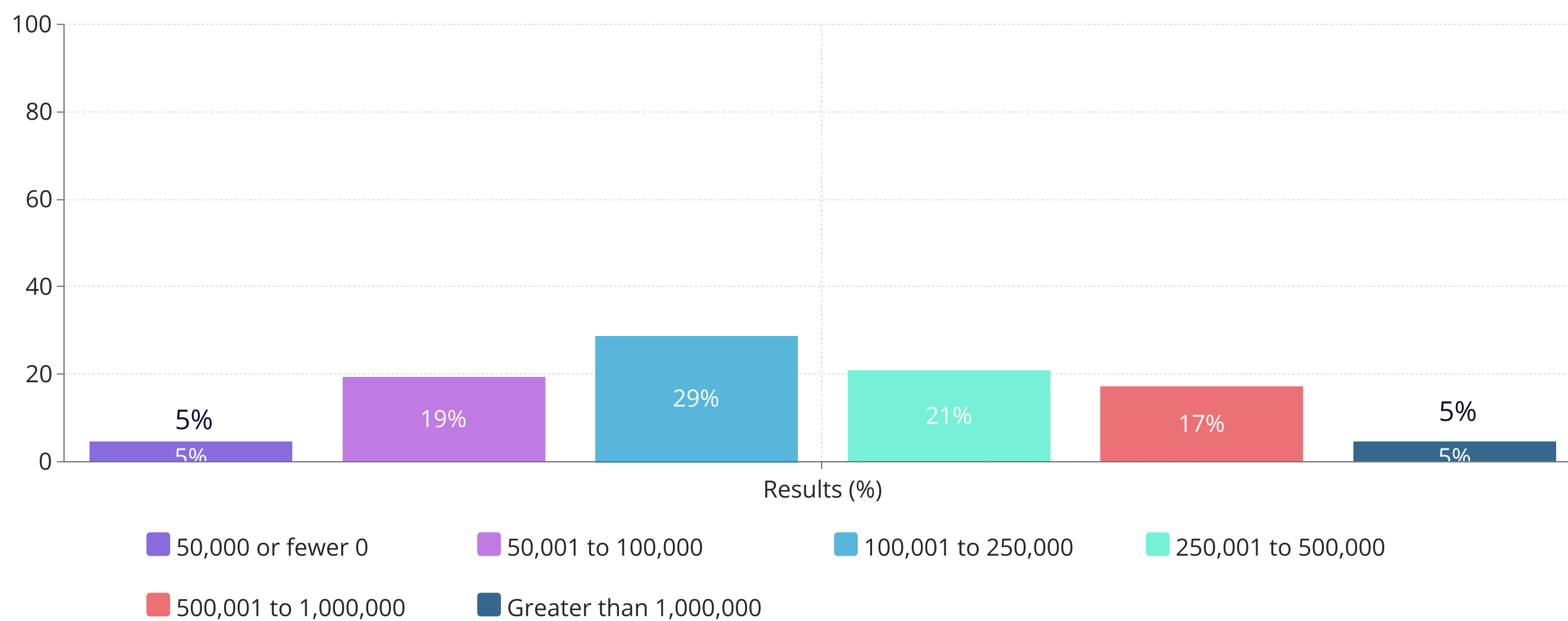
Data Trend
Lack of a budget for the project was the top impediments last year. Lack of technical and business documentation was among the least consider issues last year and this year it was the second top choice.

Analysis
We saw the often extended time for a migration project stands squarely in the way of progress of modernization effort. This is in line with the conventional wisdom. The other top two reasons are lack of technical and business documentation. This is a problem many companies face as they find themselves with an VFP system that is not fully documented, and as current team members leave the organization, or retire, there is further loss of technical understanding of the underlying application.

How big is the application in terms of number of lines of code?

Legend:
- 50,000 or fewer 0
- 50,001 to 100,000
- 100,001 to 250,000
- 250,001 to 500,000
- 500,001 to 1,000,000
- Greater than 1,000,000

Bar values: 5%, 19%, 29%, 21%, 17%, 5%

Results (%)

Survey Findings

Survey results show the VFP applications of many of our respondents are definitely not small systems. 23% cited applications with more than half a million lines of code. On the other side of the size range, 5% had fewer than 50,000 lines of code. The bulk of the respondents (69%) cited midsize applications with 50,000 to 500,000 lines of code.
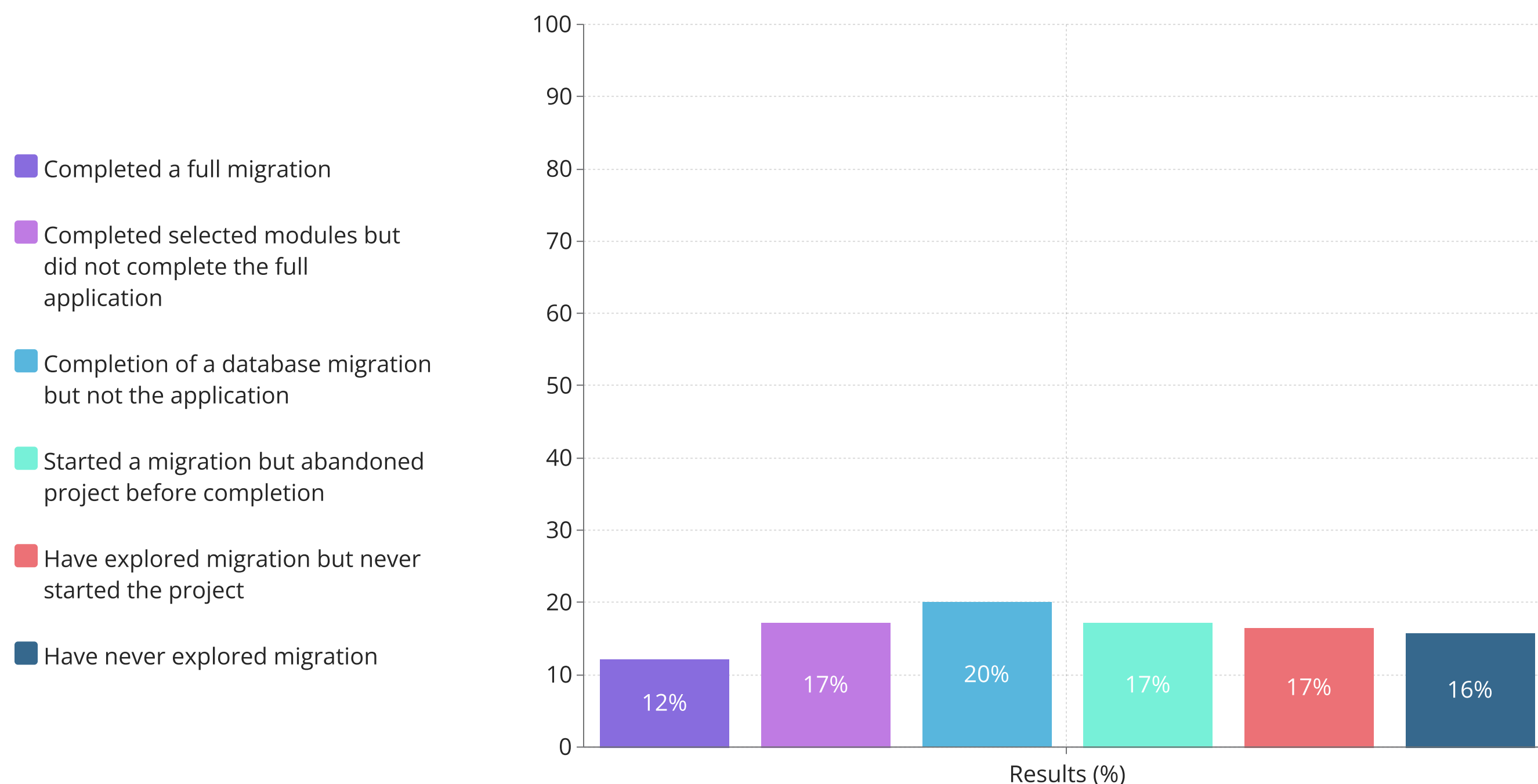
Data Trend

Compared to last year, we see fewer small size VFP system with only 5% having 50,000 lines of code or fewer and more large VFP application as systems having more than half a million lines increased from 9% to 23% this year.

Analysis

Lines of code are one relevant measure of the overall size of an VFP application, but it is not the only measure. Future surveys will take a deeper dive into other size and complexity issues such as: programs, forms, controls, reports, etc. For companies wanting a deeper understanding of the size of their current VFP application, we recommend utilizing the free tool, Code Matrix, which will provide them an Excel analysis detailing the size statistic of the application.

Code Matrix is one of Macrosoft's automation products for assisting clients in VFP conversions or migrations. See the Macrosoft website for more information and a free download of the Code Matrix Application.

Have you ever begun the process to Migrate your VFP application?

Completed a full migration

Completed selected modules but did not complete the full application

Completion of a database migration but not the application

Started a migration but abandoned project before completion

Have explored migration but never started the project

Have never explored migration

	12%	17%	20%	17%	17%	16%

Results (%)

Survey Findings
Participants were asked if they ever had begun the process of migrating their VFP application and if they had what was the current status. 12% indicated their company had completed the full migration. 17% had completed select modules but not the full application and 20% had migrated the database but kept the application in the VFP framework. 17% abandoned the process before completion.
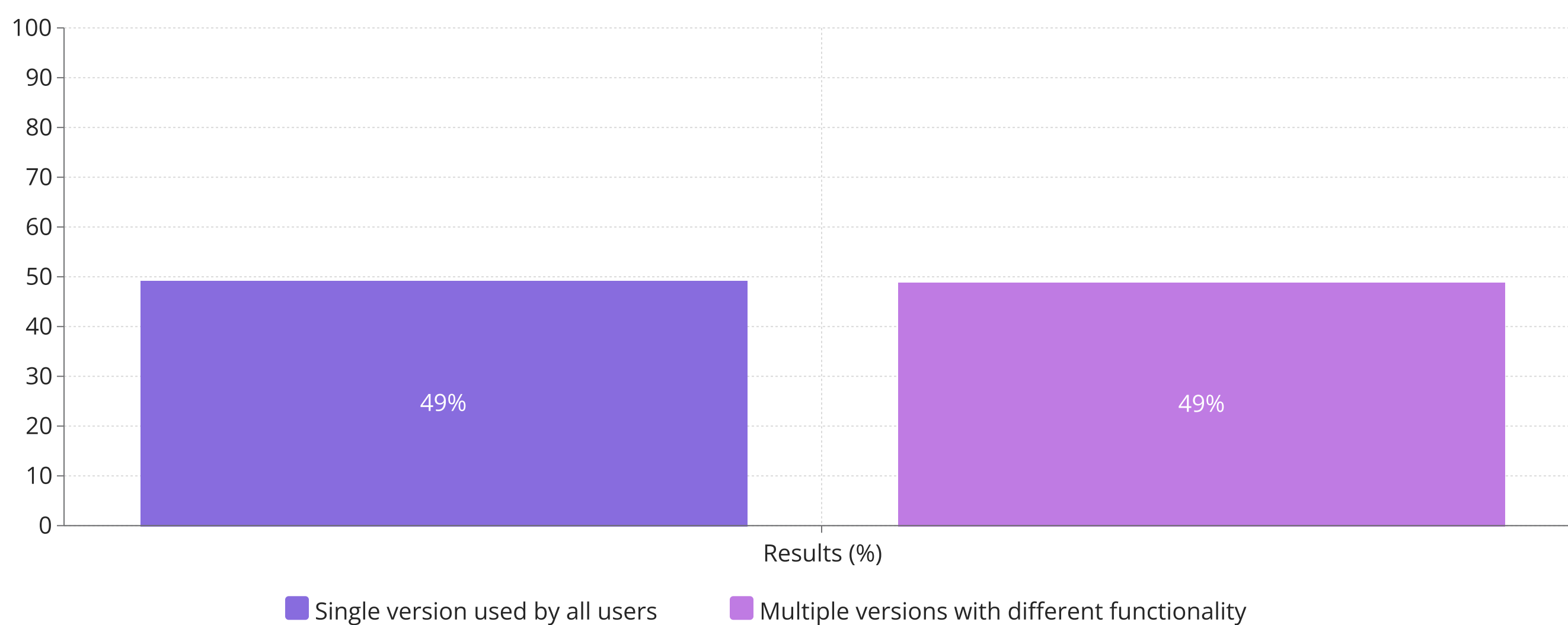
Data Trend
Data distribution was about the same as last year with no significant changes spotted.

Analysis
20% of companies having a VFP application have taken the step of moving the data out of the FoxPro database. This is definitely a good step in the right direction for modernization. This shift may have been precipitated by security concerns associated with protecting the VFP system's underlying data.

Unfortunately, 17% of companies that began a migration abandoned the process before completion, but we are not surprised by this finding. It is a major undertaking especially for large VFP applications, one that takes excellent know-how and best practices, and a lot of incremental development resources, both of which are often beyond a company's steady-state capabilities. Future surveys will dig deeper into the reasons causing companies to abandon their efforts before completion.

Do you have a single instance/version of your application or multiple customized versions per client?

Chart bars:
- 49% — Single version used by all users
- 49% — Multiple versions with different functionality

Results (%)

Survey Findings
We got the same amount of VFP applications with single version used by all users and multiple versions with different functionality. Both are at 49%.
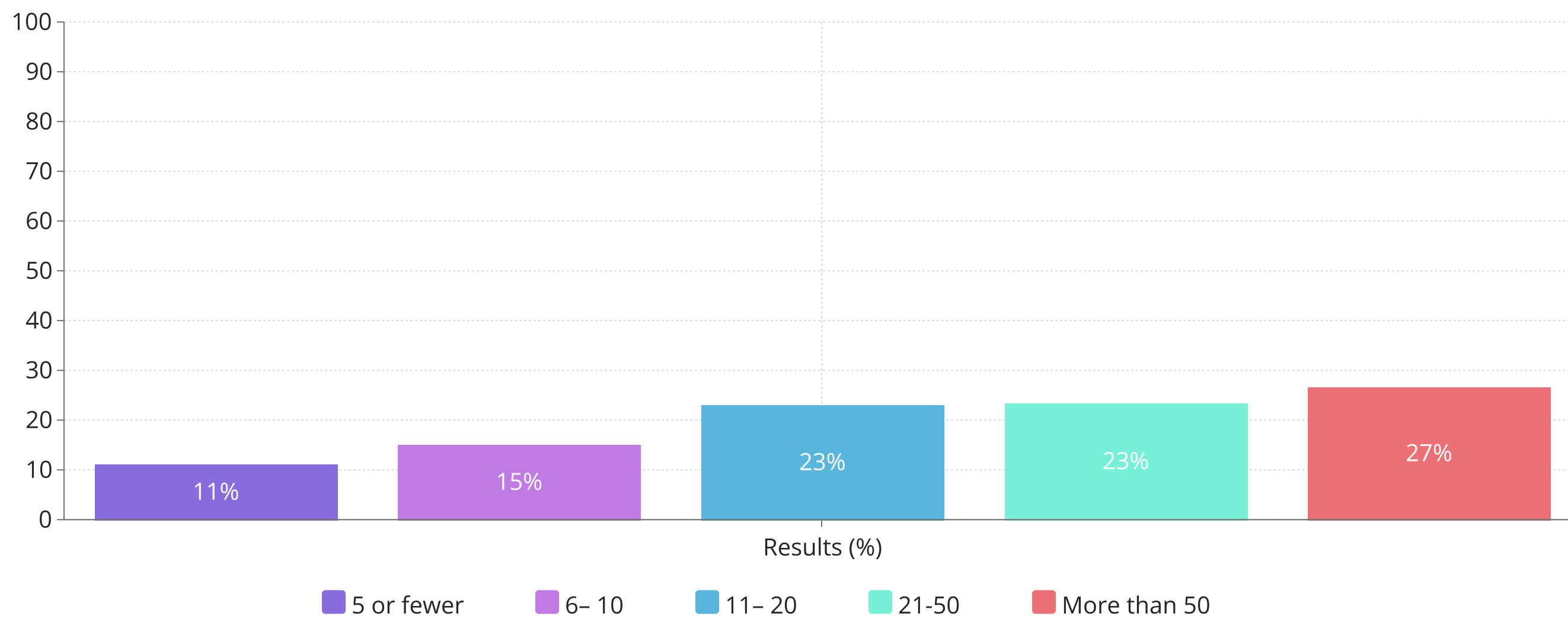
Data Trend
Data distribution was about the same as last year with no significant changes spotted.

Analysis
It is of course not a good thing in general for companies to customize the functionality of an application to support individual clients' needs and requirements or to permit clients to do so themselves. Best practice dictates that new functionality should be built into the core of the system with clients able to configure functionality to their specific needs. It is critical to have a complete documentation providing understanding of every version used by clients.

If undertaking a modernization or migration project, it's generally best to start with the most complex version of the application and then have partitions to allow select functionality to be available for some clients and masked for others. So, the core application provides all functionality, it's simply whether or not parts of the application become enabled for an individual client requirement. Deployment as a single version greatly assists in upgrading and support/maintenance of the application.

How many people are part of your in-house development staff?

Results (%)

- ■ 5 or fewer
- ■ 6– 10
- ■ 11– 20
- ■ 21-50
- ■ More than 50

Survey Findings
27% of responders have more than 50 developers in house and 46% has 11 to 50 developers.

Data Trend
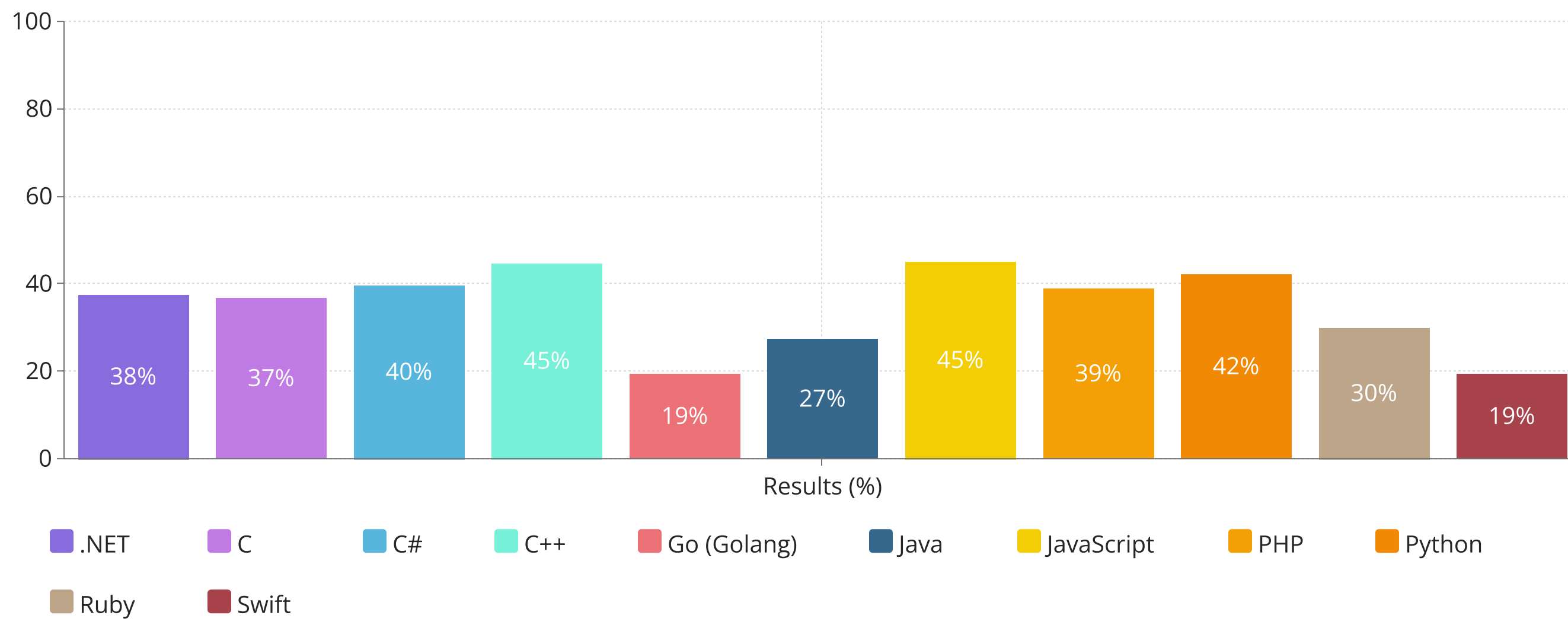Unlike last year where the majority of the companies having less than 20 developers. This year 60% were more than 20 developers.

Analysis
We have mostly mid-size to large in-house developer teams in this survey. Those companies would have enough in house resource to accomplish a full migration. Companies with fewer developers have to look for support from an outside vendor to undertake a full migration.

What languages does your team develop in besides VFP?

Bar chart — Results (%)

Language	%
.NET	38%
C	37%
C#	40%
C++	45%
Go (Golang)	19%
Java	27%
JavaScript	45%
PHP	39%
Python	42%
Ruby	30%
Swift	19%

Legend: .NET, C, C#, C++, Go (Golang), Java, JavaScript, PHP, Python, Ruby, Swift

Survey Findings
We found a wide range of development languages being used by companies that participated in the survey. These are companies that have one or more Visual FoxPro applications to maintain. The most common languages used by 40% or more of the respondents include the C#, C++, JavaScript and Python.
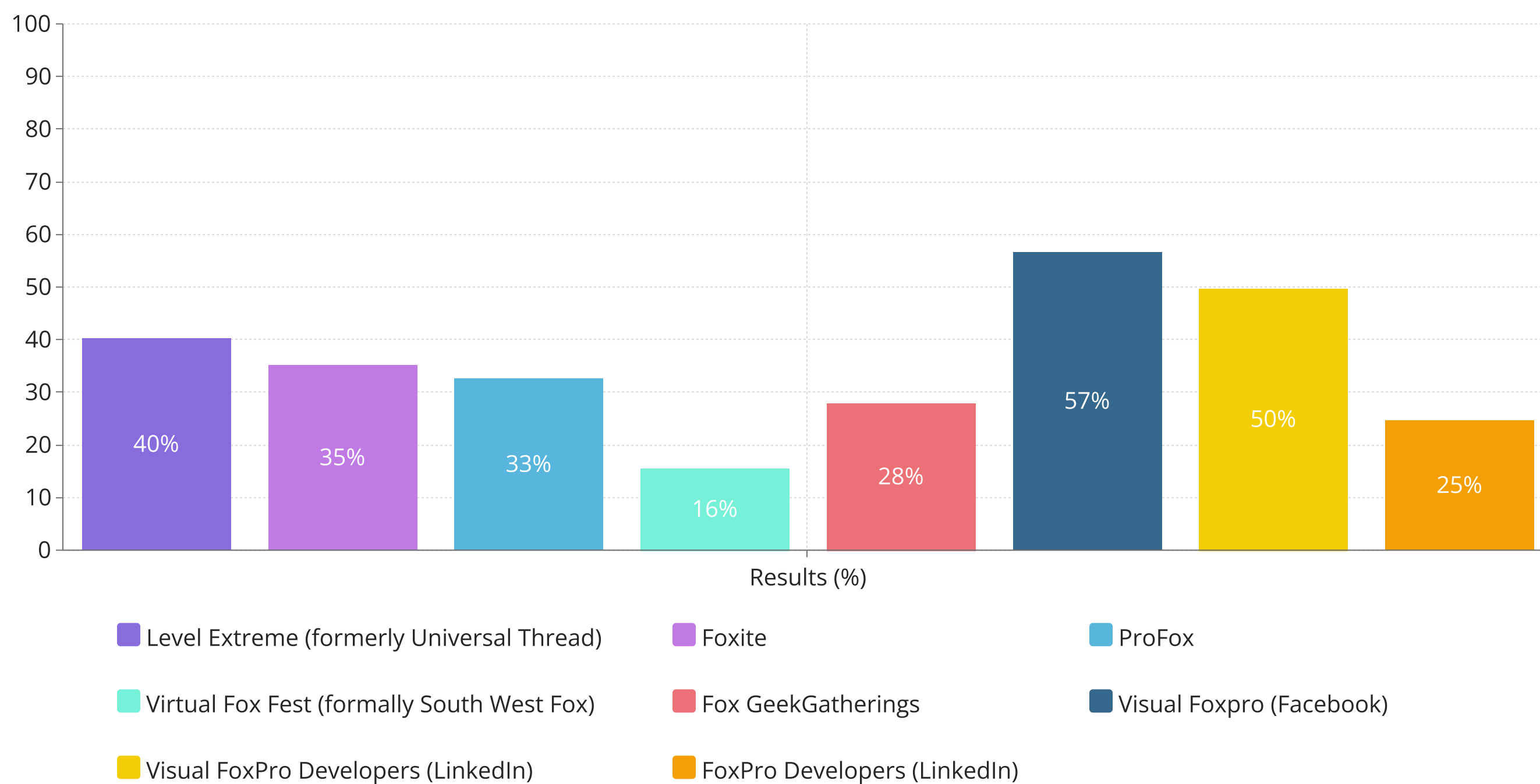
Analysis
It is an interesting juxtaposition within some companies surveyed. They have VFP applications and are at the same time involved with some of the newer like Python as well. In our view, this is a somewhat rocky mix of development talents, and may signal that a migration of the VFP application is in the offing for the near future.

One thing is sure, the developers working with the newer languages cannot (and most often will not) work to build up VFP skills to maintain the company's VFP applications. These developers and those that are in the VFP sphere almost live in different worlds.

Our view is that there is a steady and accelerating trend towards open-source development languages both for application development as well as for databases. The industry is seeing the maturity of open-source technologies. We will see if subsequent surveys bear this out.

Which online forums/organizations do you participate in? (Select all that apply)

Legend:
- **Level Extreme (formerly Universal Thread)**
- **Foxite**
- **ProFox**
- **Virtual Fox Fest (formally South West Fox)**
- **Fox GeekGatherings**
- **Visual Foxpro (Facebook)**
- **Visual FoxPro Developers (LinkedIn)**
- **FoxPro Developers (LinkedIn)**

Bar values: 40%, 35%, 33%, 16%, 28%, 57%, 50%, 25%
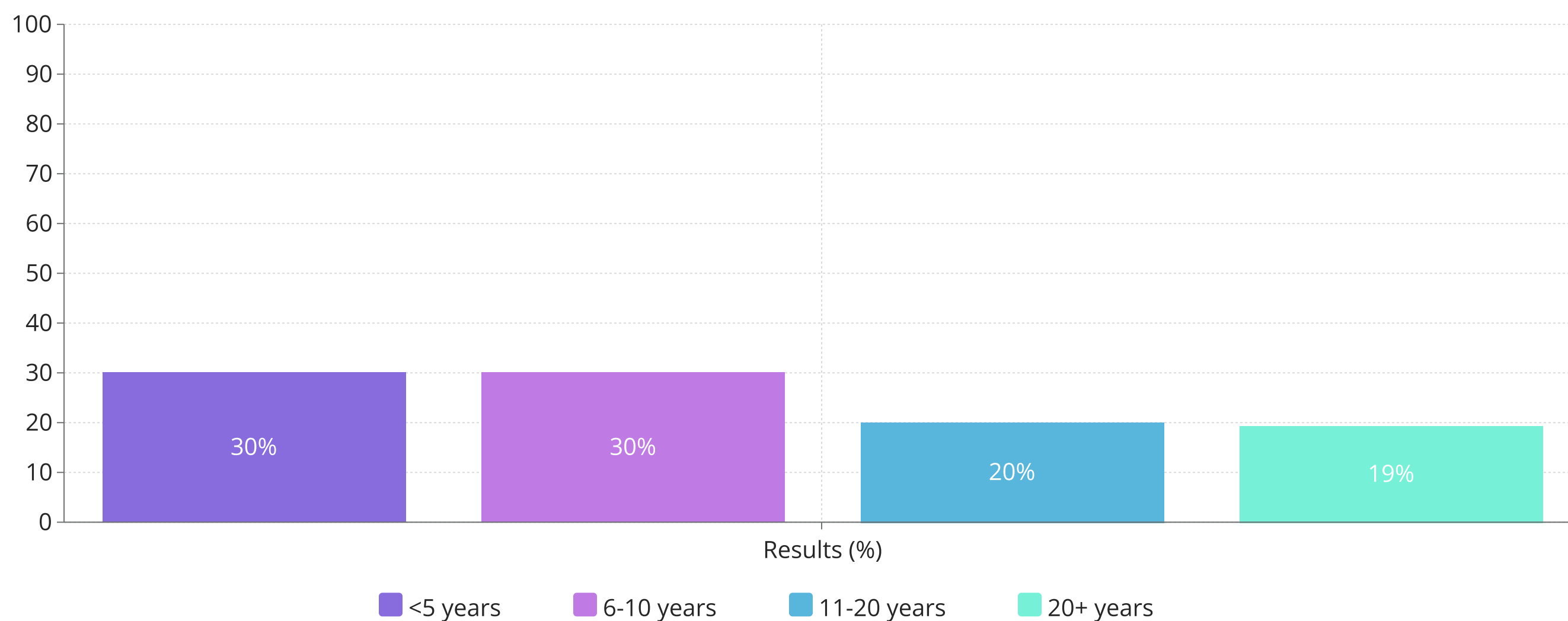
Survey Findings

The survey found participants utilized several of different online VFP community forums. Most popular amongst these are Visual FoxPro group on Facebook, Visual FoxPro Developers on LinkedIn, and Level Extreme.

Analysis

Our perception of the VFP community from these survey results is one of collaboration and sharing best practices. These survey results show an active community of developers interested in sharing new ideas and methods. While critics may say loudly VFP is at end of life, it does not appear to be so from the numbers implicit in these forums and community gatherings. From this perspective, VFP is still a very active and important

Looking at these different groups, posts appear to be coming weekly or more often with users supporting each other on questions, posting for job opportunities, or simply networking to grow

How many years have you been using your VFP application?

Legend: <5 years | 6-10 years | 11-20 years | 20+ years

<5 years	6-10 years	11-20 years	20+ years
30%	30%	20%	19%

Results (%)

Survey Findings
Survey results shows 30% utilizing the language for five or fewer years. We see 19% have been using FoxPro for over 20 years. The other half have used FoxPro for 6 to 20 years.
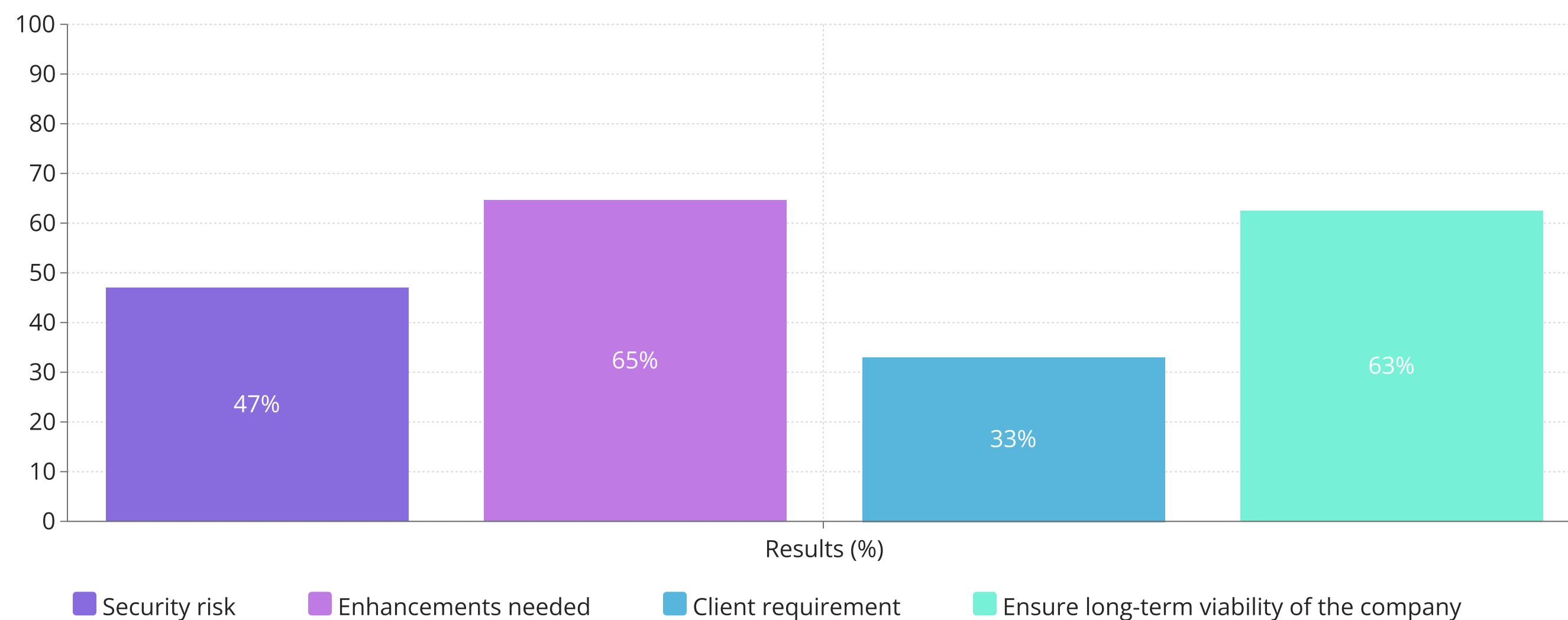
Data Trend
Number of participants utilizing the language for five or fewer years has increased significantly from 7% last year to 30% this year.

Analysis
Unlike last year, we see the VFP community with many more new entrants based on this year's survey results. Still the majority of the users have utilized VFP for years. As current members move on to other languages or retire, fewer developers will remain available to support maintain and enhance existing Visual FoxPro applications.

It is our view that very few new Visual FoxPro applications are being created but rather existing applications are being supported to continue to deliver business value.

What would cause you to begin a migration/modernization? (Select all that apply)

Bar chart showing results (%): Security risk 47%, Enhancements needed 65%, Client requirement 33%, Ensure long-term viability of the company 63%.

Results (%)

- Security risk
- Enhancements needed
- Client requirement
- Ensure long-term viability of the company

Survey Findings

Users were asked what would cause the need for their company to begin a modernization or migration of an existing FoxPro application. The top two choice are enhancements needed and ensure long term viability of the company.

Analysis

It is our view that enhancements should be the number one driver towards modernization or migrations, but often within companies generalized security risks are the trigger that gets movement started. Though FoxPro is solid and not vulnerable to security hacks, it is an unsupported language. Overzealous security compliance or audit departments can often require the modernization of a legacy FoxPro

The second top choice, to ensure the long-term viability of their company, is indeed a very dramatic statement. We presume these respondents who said yes are referring to the fact that migrations of their VFP application would open up the many benefits of modern technology and without those benefits their company will likely fall further behind competitors. Those companies clearly have to take a close evaluation of whether or not to migrate and enumerate the benefits they will derive from

What would you do with your current old system data if you moved to a new platform?

Results (%)

■ Archive it ■ Migrate data to a new system
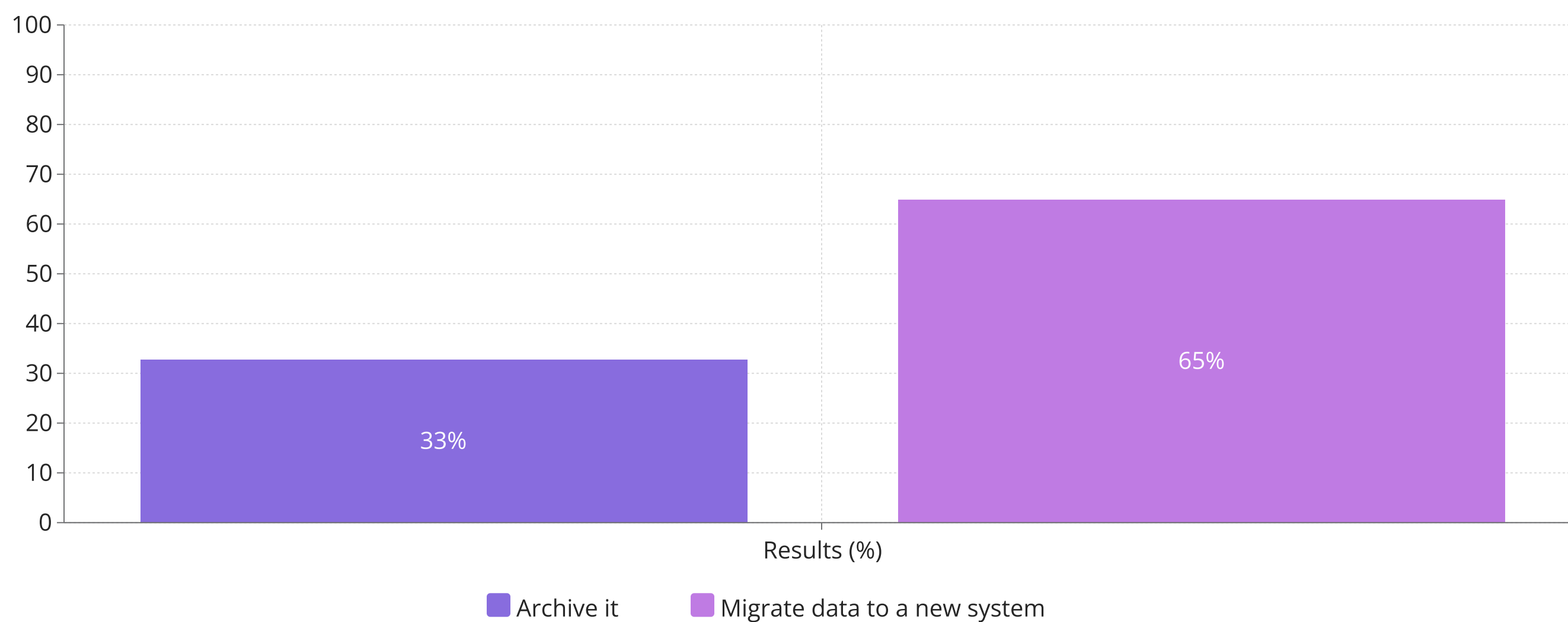
Survey Findings
The majority of respondents (65%) indicate they would migrate their system data to the new application rather than archive it if they went through a migration or modernization process.

Data Trend
Last year we got 77% wishing to migrate data to a new platform instead of 65% this year.

Analysis
It is not surprising that current FoxPro users would want to migrate all their existing data. The FoxPro applications that are in use today are beneficial because they do exactly what an organization needs and have exactly the data the organization requires. Companies would not want to archive this valuable data but continue to use it in any new or modern application.

Yet, the migration of data can be extremely messy or problematic if not properly planned and implemented. Applications built in FoxPro have grown over many years, sometimes as many as 20 years. This means they likely have been updated through multiple versions, with the early code starting as DOS, going into FoxPro and then shifting through the multiple versions of Visual FoxPro up and through version 9. Some of these legacy codes may still be in the currently active application. This greatly complicates the migration process.

How big is the application in terms of number of screens?

Results (%)

■ 10 or fewer 0 ■ 11 to 25 0 ■ 26 to 50 0 ■ Greater than 50
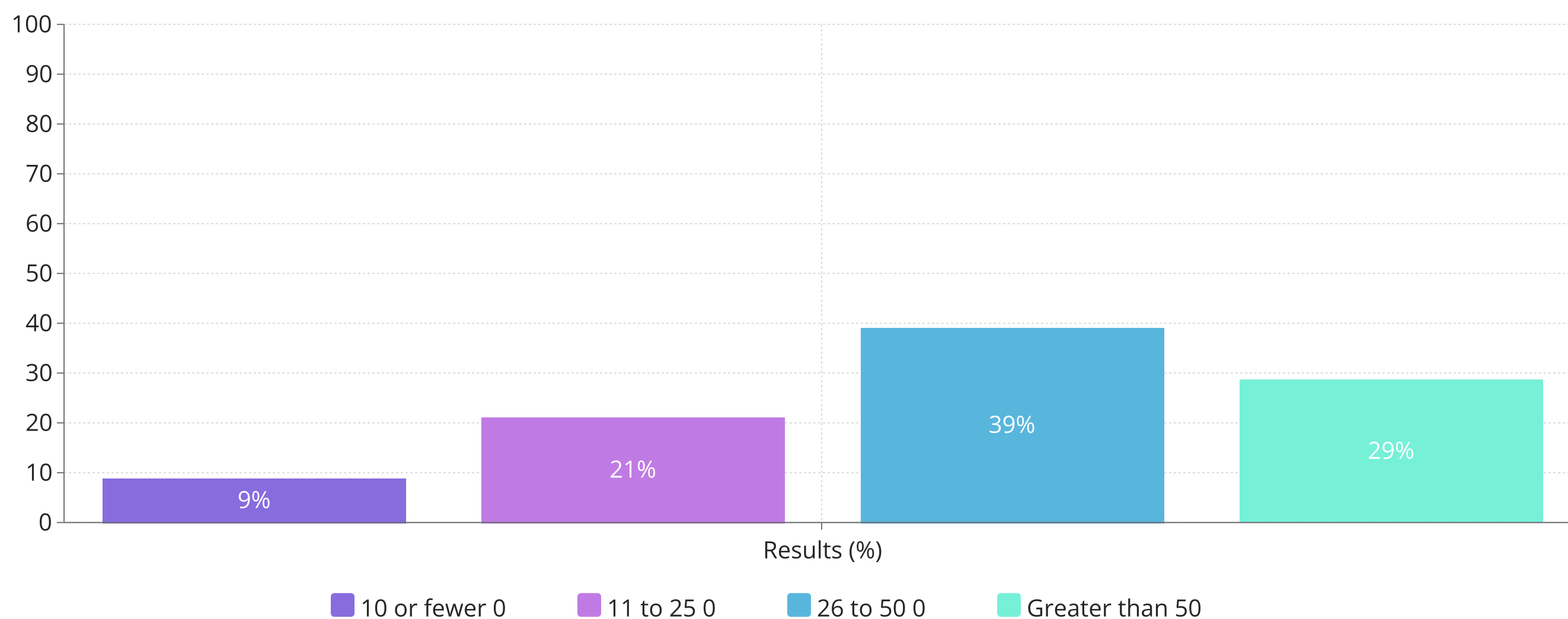
Survey Findings
Respondents to the survey indicated their Visual FoxPro applications are quite large with 29% having greater than 50 screens in the application. A majority 60% indicate their VFP system has between 11 and 50 screens. Only 9% of respondents have systems with 10 or fewer screens.

Data Trend
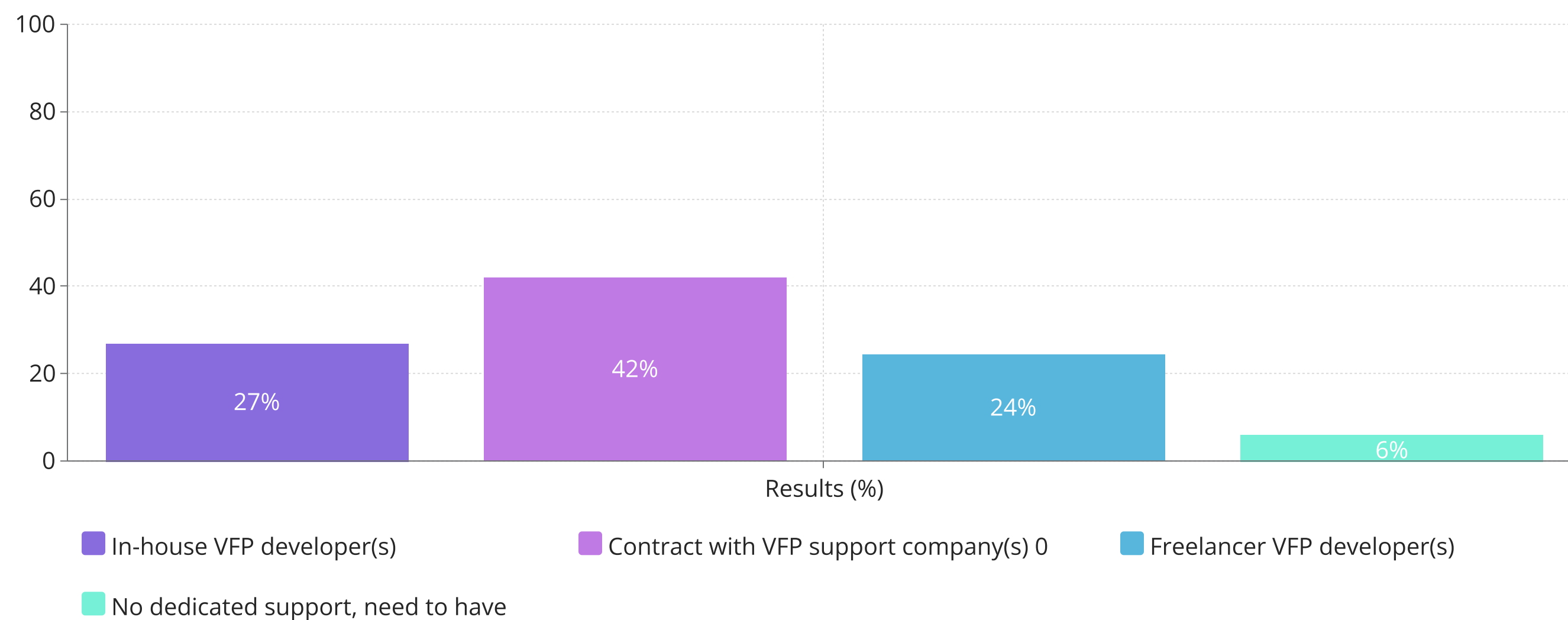Data distributions was about the same compared to last year.

Analysis
The number of screens is another measure of the complexity of a VFP application, and it compliments an earlier survey question on number of lines of code.

The complexity associated with multiple screens is very critical when considering an application modernization or migration. It is not simply what is happening on a single screen, which is easy to test during a migration. More complex and more important are the workflow or user stories that occur screen to screen.

A new design in a modern technology platform might offer the opportunity for screen consolidation allowing complete tasks or functions to be completed without navigating across multiple screens. Improving workflow and screen design is critical to a successful modernization project. It is important to have application users directly involved in any migration to ensure the best user experience. Consider a migration project not as just a 'migration of functionality', but rather as an opportunity to enhance how users experience the application.

Do you have current VFP Developers to support the VFP application?

Results (%)

- 🟪 In-house VFP developer(s)
- 🟪 Contract with VFP support company(s) 0
- 🟦 Freelancer VFP developer(s)
- 🟩 No dedicated support, need to have

Survey Findings

Respondents were asked whether their application is being supported by an inhouse development team, contract support team, or freelance developer, or lastly has no support at all. Top choice was contracting with VFP support companies (42%) or using freelance VFP developers (24%). 27% of companies have in-house VFP developers on staff. 6% report having no dedicated support.
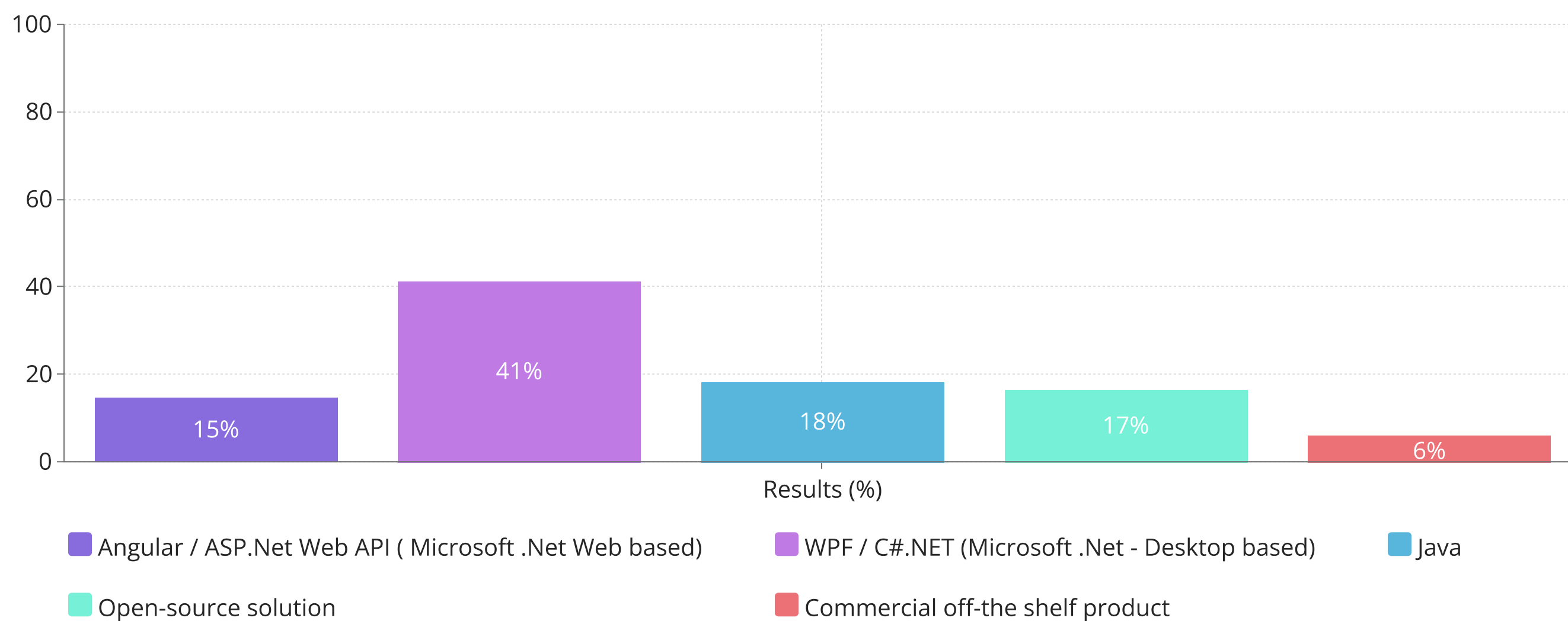
Data Trend

Freelancer VFP developers dropped from 42% last year to 24% this year while more companies choose to contract with support companies. Percentage for in house VFP developers also increased from last year's result.

Analysis

At one level, it is not surprising that the majority (66%) of organizations are using outside support for their Visual FoxPro application. IT organizations within many companies are centered around newer development languages and platforms. But at another level, this can be concerning, since it leaves the well-functioning VFP application as an island within the company with only outside support, in many cases performed from overseas.

What would be the ideal target platform for the application?

Legend:
- Angular / ASP.Net Web API (Microsoft .Net Web based)
- WPF / C#.NET (Microsoft .Net - Desktop based)
- Java
- Open-source solution
- Commercial off-the shelf product

Chart values: 15%, 41%, 18%, 17%, 6%

Survey Findings

Survey participants were asked what their ideal target development platform is for a newly migrated application. The top choice for ideal target is Microsoft .NET desktop at 41%. Followed by Java at 18% and open-source solution at 17%.

Data Trend

Microsoft.Net desktop is the top selection this year instead of Java being the first choice. Commercial off the shelf product was the least ideal pick, this is the same as from last year.
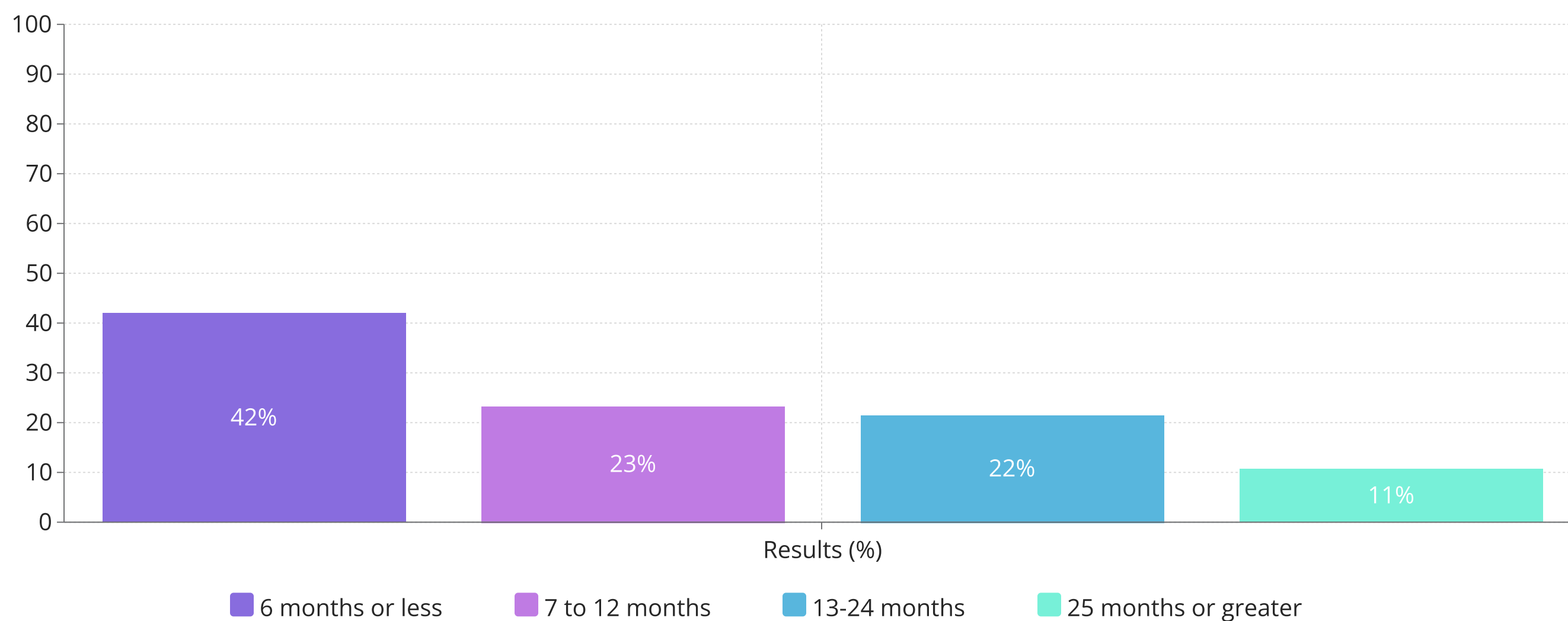
Analysis

Considering our result from last year and this year. We found the same patterns:

(1) A lack of interest in commercial off the shelf solutions, and

(2) Web-based solutions.

These results once again show that existing VFP application users and companies are satisfied with the desktop functionality of their current VFP application and want any new system to look as much the same as possible.

Once started, what is your expected time frame to complete a migration?

Chart legend:
- 6 months or less
- 7 to 12 months
- 13-24 months
- 25 months or greater

Values: 42%, 23%, 22%, 11%

Survey Findings

Users were asked what they expected the time period would be to complete a migration to a modern technology platform. 65% felt that it can be completed in less than a year, with 42% indicating 6 months or less.

Data Trend

Significantly more users were expecting the migration should be completed with a year or less than 6 months.

Analysis

Knowing how long the migration will take is an important factor in determining if it is right to do for your business and when is the right time. Even if you do not plan to do it in the near term it is worth having an analysis done to determine a plausible migration schedule.

New ever-more powerful automation tools such as Code Morph and Data Morph (offered by Macrosoft) as well as other tools offered by other vendors, can greatly help to speed up migration and significantly reduce project completion timespans. To the extent a company can devote significant resources to the testing phase of a VFP migration project that will greatly help reduce project timespans.

Also, there can be a phased migration approach where certain modules or functional components of the VFP application are released along the way, so a company does not need to wait till full completion to gain some of the benefits of the migration.

Concluding Comments

This concludes our summary of results from the 2022 Survey of Conversational Analytics Industry Best Practices in the US, conducted during the last two weeks of April 2022.

The bottom line of the survey results, in our opinion, shows an industry in major flux, with sharp differences of views about the role of VFP applications in the present technology world. That is not surprising.

From the very beginning of its life, VFP has always had its strong proponents because of its tremendous power and flexibility as an application programming language. Even now 20 years later, facing significant end-of-life challenges, and with other key technologies moving forward around it, we still see in survey results participants who view VFP as the language/platform of choice.

Best practice advocates and tech support vendors will have a field day in working with companies in all parts of the response curves to this survey, to assist those companies in their current use of VFP applications and possible future migrations or modernization efforts.

All participants to the survey will receive this paper and will be able to compare and contrast their views versus their peers in the industry. All readers will be able to see the wide diversity of responses to fundamental questions affecting and driving the VFP industry and where it goes from here.

As noted, we plan to conduct this survey on an annual basis, which will bring a lot of new contexts to the responses as we see how the survey responses evolve over time.
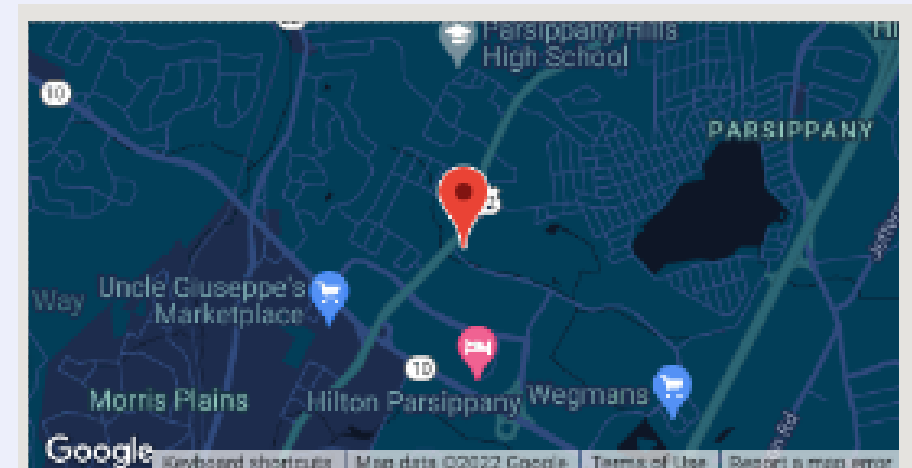
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