User & Developer Survey 2024
Andrew Claster

Methodology

We conducted 682 interviews online among Julia users and developers June 4-26, 2024

Margin of error is +/- 3.75 percentage points

We recruited respondents online using Slack, Discourse, X, LinkedIn, email, JuliaLang.org and JuliaHub.com

The survey was administered in 6 languages: English, Chinese (Simplified and Traditional), Japanese, Korean and Spanish
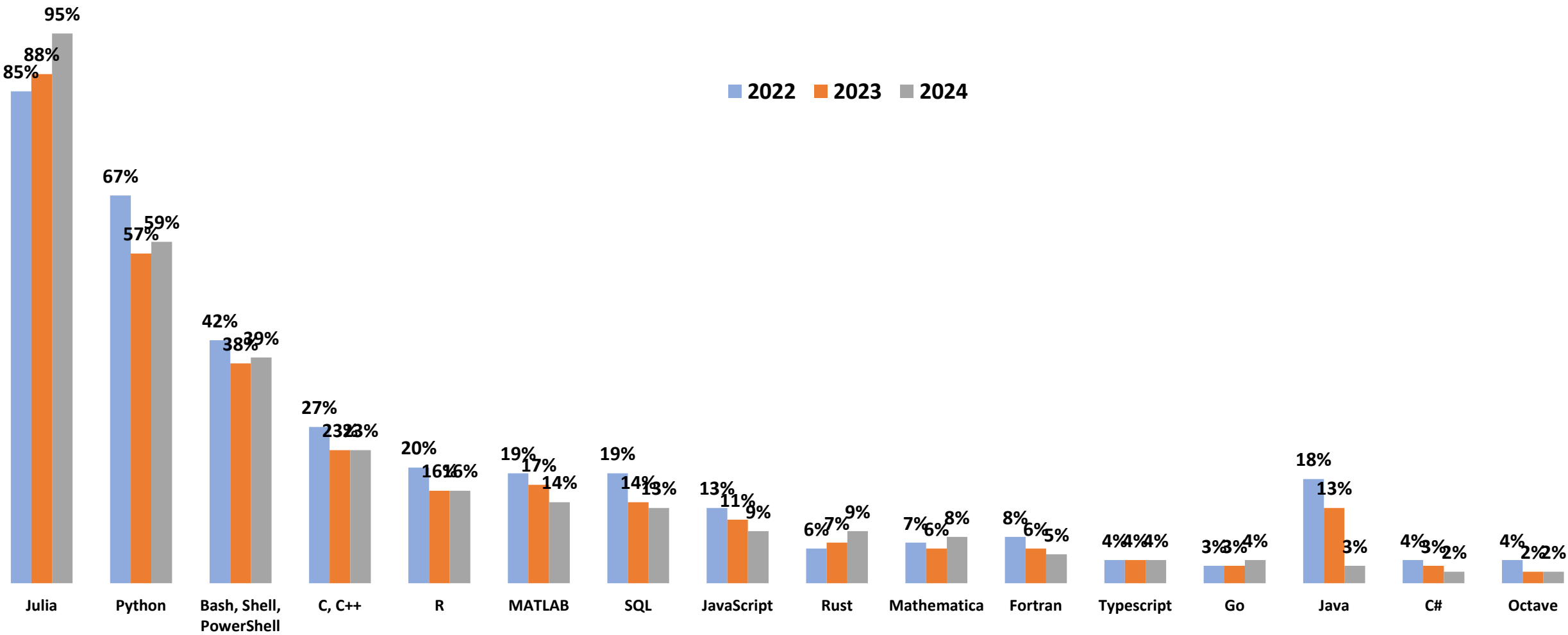
This is the sixth annual Julia User & Developer Survey we have conducted

Many of the questions and answer choices are the same from year-to-year so we have shown tracking data from previous years where that is the case.

Some of the questions and answer choices are new or updated based on new developments, previous results or feedback from the community. This is identified in the presentation.

Julia Use Has Increased Among Julia Users & Developers This Year; MATLAB, Fortran, Java, C# Continue to Decline; Rust Is Rising

Which of the following languages have you used regularly or frequently during the past year?

Legend: 2022, 2023, 2024

Language	2022	2023	2024
Julia	85%	88%	95%
Python	67%	57%	59%
Bash, Shell, PowerShell	42%	38%	39%
C, C++	27%	23%	23%
R	20%	16%	16%
MATLAB	19%	17%	14%
SQL	19%	14%	13%
JavaScript	13%	11%	9%
Rust	6%	7%	9%
Mathematica	7%	6%	8%
Fortran	8%	6%	5%
Typescript	4%	4%	4%
Go	3%	3%	4%
Java	18%	13%	3%
C#	4%	3%	2%
Octave	4%	2%	2%

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Julia Users Plan to Use More Rust Next Year and Less MATLAB, Python, Bash, Shell, PowerShell, R and Other Languages

Which of the following languages have you used regularly or frequently during the past year?
Which of the following languages do you plan to use regularly or frequently during the next year?

■ Past Year   ■ Next Year

	Julia	Python	Bash, Shell, PowerShell	C, C++	R	MATLAB	SQL	JavaScript	Rust	Mathematica	Fortran	Typescript	Go	Java	C#	Octave
Past Year	95%	59%	39%	23%	16%	14%	13%	9%	9%	8%	5%	4%	4%	3%	2%	2%
Next Year	95%	53%	33%	22%	12%	7%	12%	8%	14%	7%	4%	4%	4%	2%	2%	1%
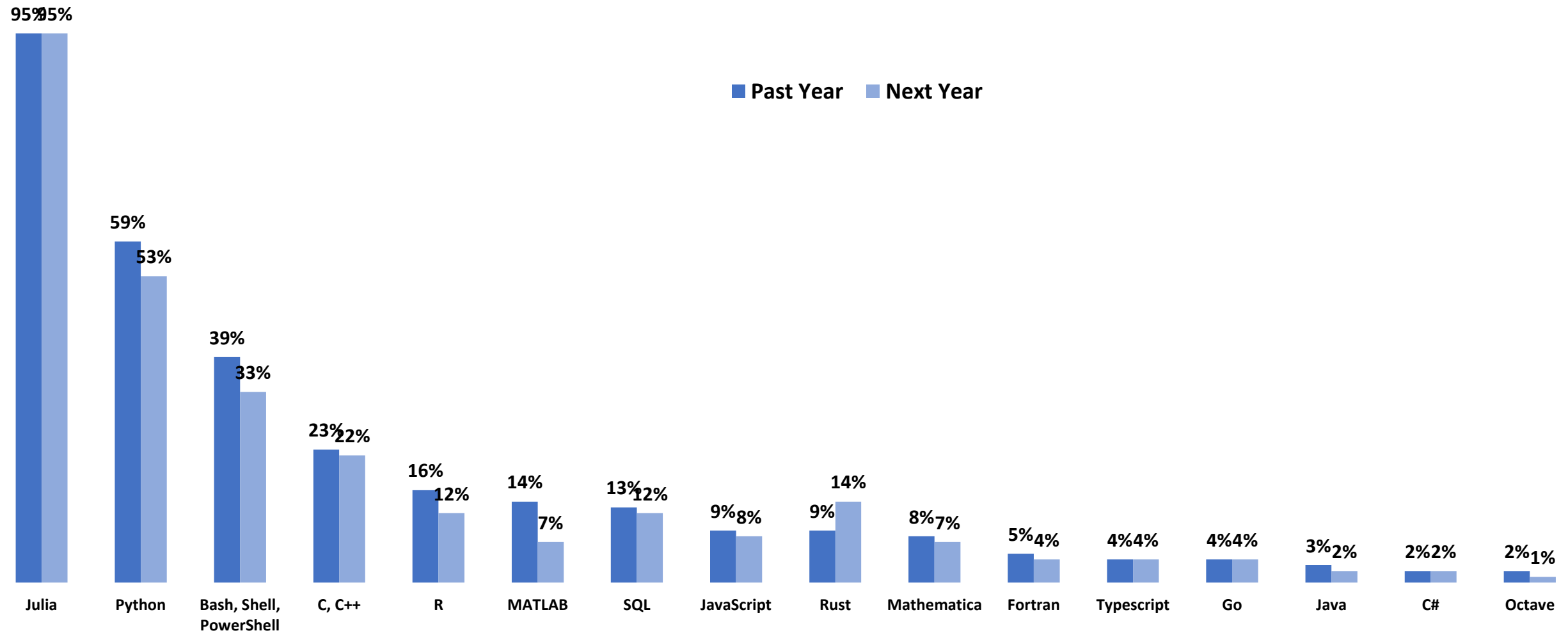
84% Say Julia Is 'One of My Favorite Languages' – Highest Ever
Python Has Been Declining Among Julia Users Since 2019

How much do you like each of the following languages?

Julia

■ **One of my favorite languages**   ■ Like

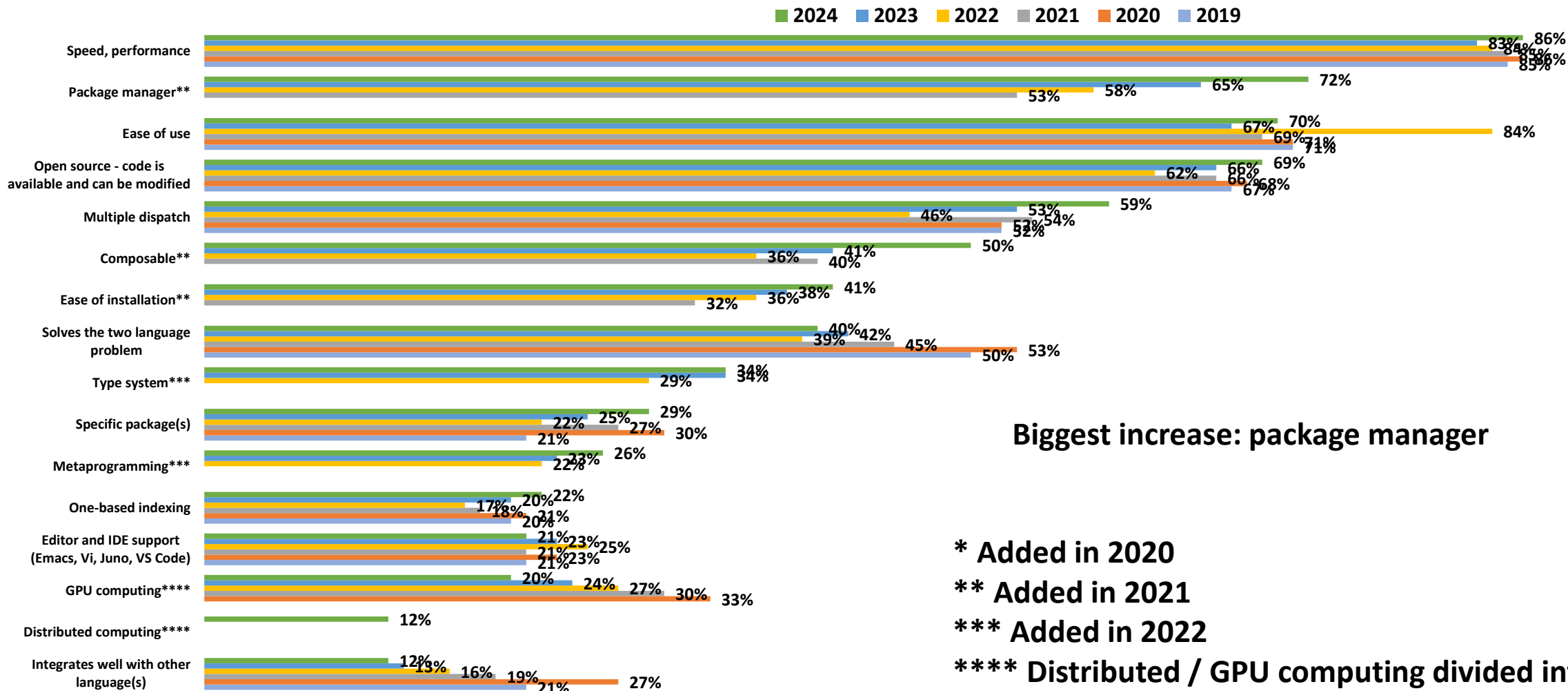| Year	One of my favorite languages	Like	Total
2019	73%	20%	93%
2020	75%	18%	93%
2021	78%	15%	93%
2022	75%	17%	92%
2023	80%	12%	92%
2024	84%	12%	96%

Python

■ **One of my favorite languages**   ■ Like

Year	One of my favorite languages	Like	Total
2019	26%	35%	61%
2020	27%	30%	57%
2021	23%	32%	55%
2022	24%	29%	53%
2023	17%	32%	49%
2024	11%	32%	43%
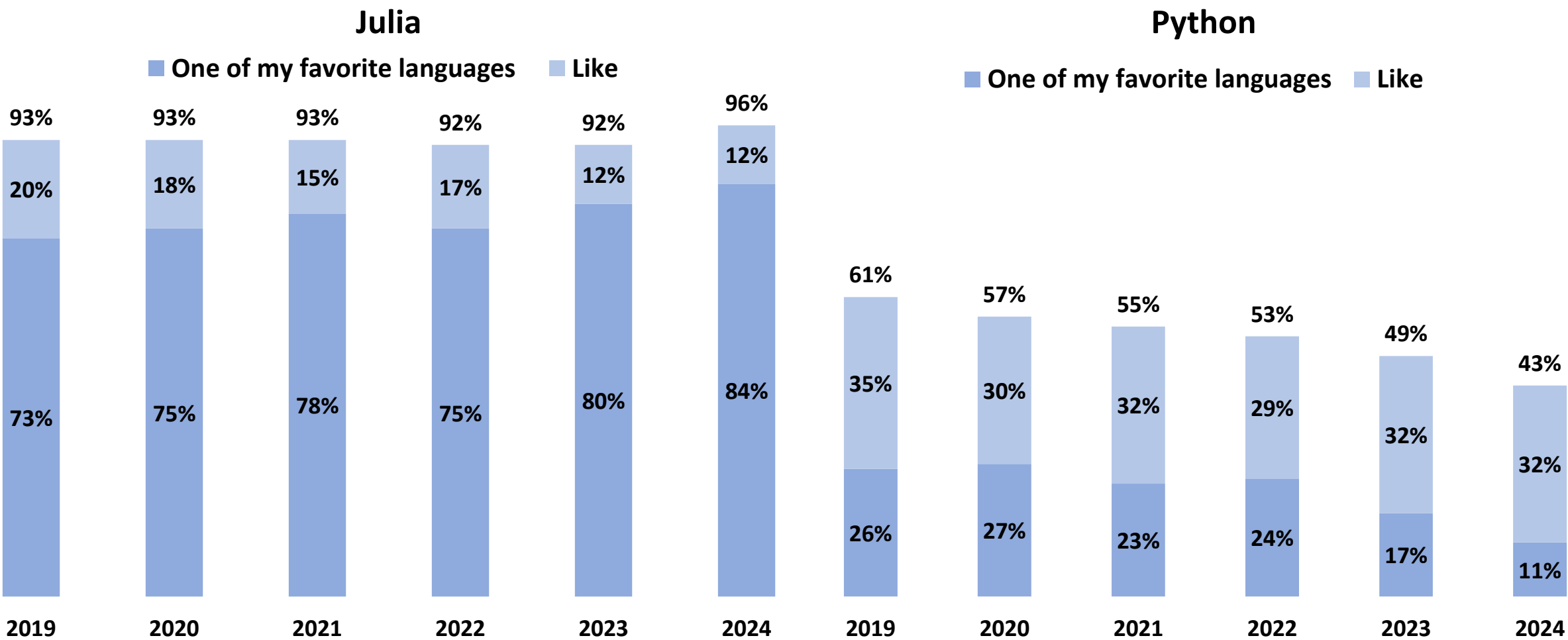
Other languages not shown include C/C++ (24% 'one of my favorite languages' + 'like'), Rust (24% 'one of my favorite languages' + 'like'), SQL (14% 'one of my favorite languages' + 'like'), Bash/Shell/PowerShell (13% 'one of my favorite languages' + 'like'), MATLAB (13% 'one of my favorite languages' + 'like') and R (13% 'one of my favorite languages' + 'like')

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The MOST Popular TECHNICAL Features of Julia Are Speed/Performance, Package Manager, Ease of Use, Open Source, Multiple Dispatch and Composability

Thinking only about the TECHNICAL aspects or features of Julia, what are the TECHNICAL aspects or features you like MOST about Julia?
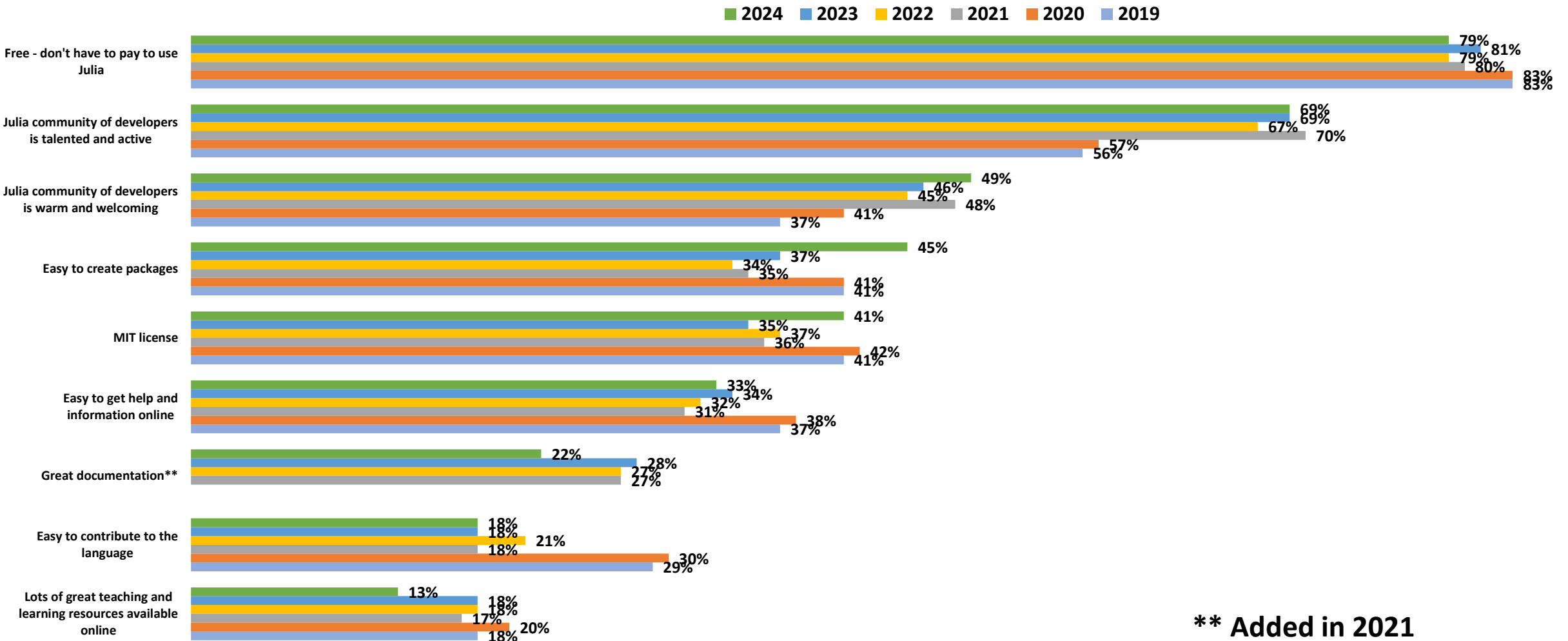
Legend: ■ 2024 ■ 2023 ■ 2022 ■ 2021 ■ 2020 ■ 2019

Speed, performance
- 2024: 86%
- 2023: 84%
- 2022: 83%
- 2021: 86%
- 2020: 86%
- 2019: 85%

Package manager**
- 2024: 72%
- 2023: 65%
- 2022: 58%
- 2021: 53%

Ease of use
- 2024: 70%
- 2023: 67%
- 2022: 84%
- 2021: 69%
- 2020: 71%
- 2019: 71%

Open source - code is available and can be modified
- 2024: 69%
- 2023: 66%
- 2022: 62%
- 2021: 66%
- 2020: 68%
- 2019: 67%

Multiple dispatch
- 2024: 59%
- 2023: 53%
- 2022: 54%
- 2021: 46%
- 2020: 52%
- 2019: 53%

Composable**
- 2024: 50%
- 2023: 41%
- 2022: 40%
- 2021: 36%

Ease of installation**
- 2024: 41%
- 2023: 38%
- 2022: 36%
- 2021: 32%

Solves the two language problem
- 2024: 40%
- 2023: 42%
- 2022: 39%
- 2021: 45%
- 2020: 50%
- 2019: 53%

Type system***
- 2024: 34%
- 2023: 34%
- 2022: 29%

Specific package(s)
- 2024: 29%
- 2023: 25%
- 2022: 22%
- 2021: 27%
- 2020: 30%
- 2019: 21%

Metaprogramming***
- 2024: 26%
- 2023: 23%
- 2022: 22%

One-based indexing
- 2024: 22%
- 2023: 20%
- 2022: 17%
- 2021: 21%
- 2020: 18%
- 2019: 20%

Editor and IDE support (Emacs, Vi, Juno, VS Code)
- 2024: 21%
- 2023: 23%
- 2022: 25%
- 2021: 23%
- 2020: 21%

GPU computing****
- 2024: 20%
- 2023: 24%
- 2022: 27%
- 2021: 30%
- 2020: 33%

Distributed computing****
- 2024: 12%

Integrates well with other language(s)
- 2024: 12%
- 2023: 13%
- 2022: 16%
- 2021: 19%
- 2020: 27%
- 2019: 21%

Biggest increase: package manager

* Added in 2020
** Added in 2021
*** Added in 2022
**** Distributed / GPU computing divided into 2 separate responses in 2024

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The MOST Popular NON-TECHNICAL Features of Julia Are Free (Don't Have to Pay) and the Julia Community

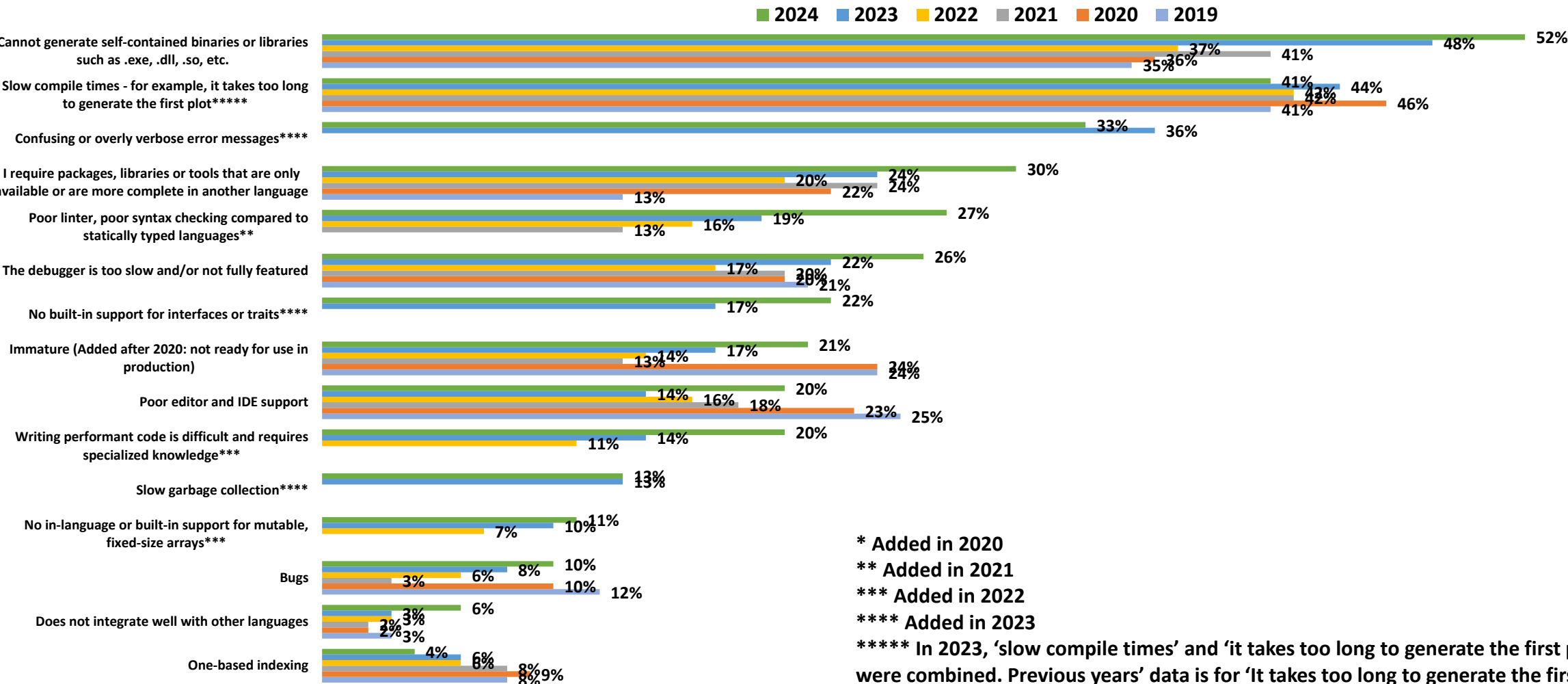*Thinking only about the NON-TECHNICAL aspects or features of Julia, what are the NON-TECHNICAL aspects or features you like MOST about Julia?*

■ **2024** ■ **2023** ■ **2022** ■ **2021** ■ **2020** ■ **2019**

Free - don't have to pay to use Julia
- 2024: 79%
- 2023: 81%
- 2022: 79%
- 2021: 80%
- 2020: 83%
- 2019: 83%

Julia community of developers is talented and active
- 2024: 69%
- 2023: 69%
- 2022: 67%
- 2021: 70%
- 2020: 57%
- 2019: 56%

Julia community of developers is warm and welcoming
- 2024: 49%
- 2023: 46%
- 2022: 45%
- 2021: 48%
- 2020: 41%
- 2019: 37%

Easy to create packages
- 2024: 45%
- 2023: 37%
- 2022: 34%
- 2021: 35%
- 2020: 41%
- 2019: 41%

MIT license
- 2024: 41%
- 2023: 35%
- 2022: 37%
- 2021: 36%
- 2020: 42%
- 2019: 41%

Easy to get help and information online
- 2024: 33%
- 2023: 34%
- 2022: 32%
- 2021: 31%
- 2020: 38%
- 2019: 37%

Great documentation**
- 2024: 22%
- 2023: 28%
- 2022: 27%
- 2021: 27%

Easy to contribute to the language
- 2024: 18%
- 2023: 18%
- 2022: 21%
- 2021: 18%
- 2020: 30%
- 2019: 29%

Lots of great teaching and learning resources available online
- 2024: 13%
- 2023: 18%
- 2022: 18%
- 2021: 17%
- 2020: 20%
- 2019: 18%

**** Added in 2021**

The Biggest TECHNICAL PROBLEMS with Julia Are Cannot Generate Self-Contained Binaries or Libraries and Slow Compile Times – Too Long to Generate First Plot

Thinking only about the TECHNICAL aspects or features of Julia, what are the TECHNICAL aspects or features you like LEAST about Julia?

Legend: ■ 2024 ■ 2023 ■ 2022 ■ 2021 ■ 2020 ■ 2019

Cannot generate self-contained binaries or libraries such as .exe, .dll, .so, etc.
- 2024: 52%
- 2023: 48%
- 2022: 37%
- 2021: 41%
- 2020: 36%
- 2019: 35%

Slow compile times - for example, it takes too long to generate the first plot***
- 2024: 41%
- 2023: 44%
- 2022: 42%
- 2020: 46%
- 2019: 41%

Confusing or overly verbose error messages**
- 2024: 33%
- 2023: 36%

I require packages, libraries or tools that are only available or are more complete in another language
- 2024: 30%
- 2023: 24%
- 2022: 20%
- 2021: 22%
- 2020: 24%
- 2019: 13%

Poor linter, poor syntax checking compared to statically typed languages**
- 2024: 27%
- 2023: 19%
- 2022: 16%
- 2021: 13%

The debugger is too slow and/or not fully featured
- 2024: 26%
- 2023: 17%
- 2021: 20%
- 2020: 20%
- 2019: 21%

No built-in support for interfaces or traits**
- 2024: 22%
- 2023: 17%

Immature (Added after 2020: not ready for use in production)
- 2024: 21%
- 2023: 17%
- 2022: 14%
- 2021: 13%
- 2020: 24%
- 2019: 24%

Poor editor and IDE support
- 2024: 20%
- 2022: 14%
- 2021: 16%
- 2020: 18%
- 2019: 23%
- (25%)

Writing performant code is difficult and requires specialized knowledge**
- 2024: 20%
- 2023: 14%
- 2022: 11%

Slow garbage collection**
- 2024: 13%
- (13%)

No in-language or built-in support for mutable, fixed-size arrays**
- 2024: 11%
- 2023: 10%
- 2022: 7%
- (10%)

Bugs
- 2024: 10%
- 2023: 8%
- 2022: 6%
- 2021: 3%
- 2020: 10%
- 2019: 12%

Does not integrate well with other languages
- 2024: 6%
- 2023: 3%
- 2022: 3%
- 2021: 2%
- 2020: 2%
- 2019: 3%

One-based indexing
- 2024: 4%
- 2023: 6%
- 2021: 6%
- 2020: 8%
- 2019: 8%
- (9%)
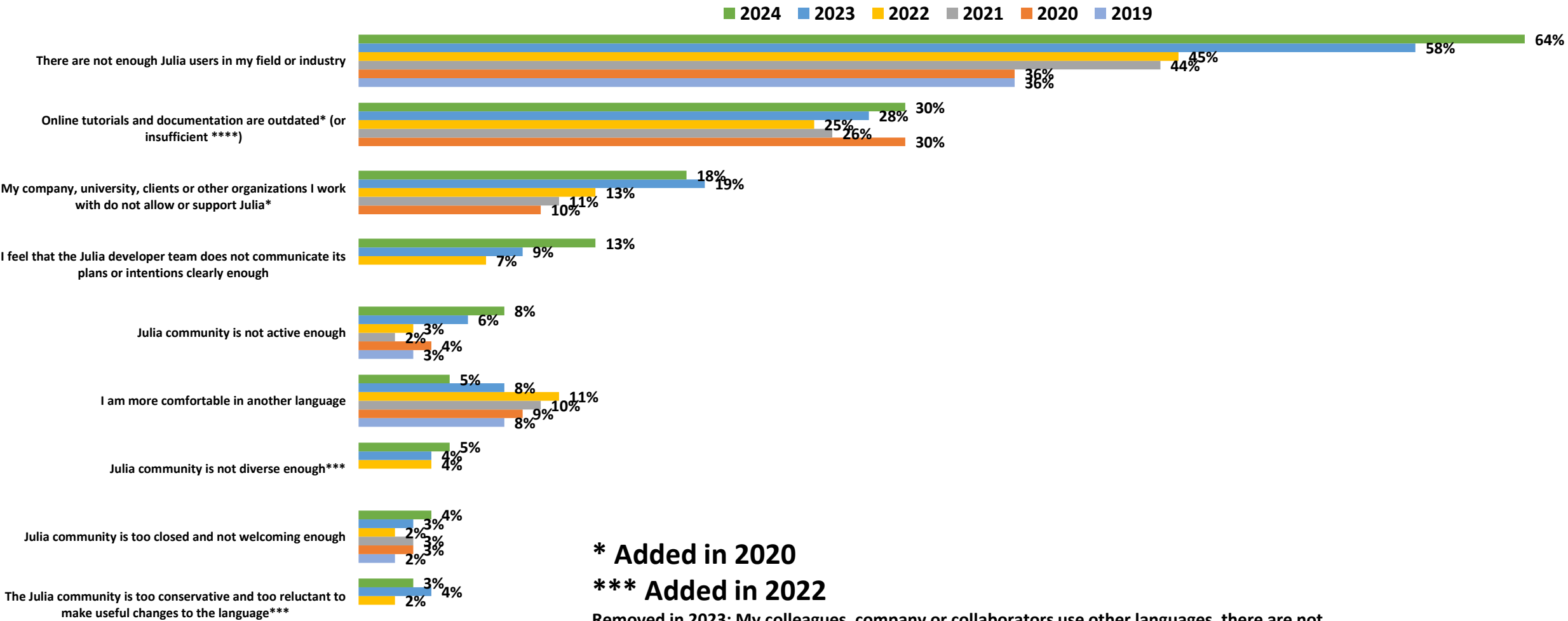
* Added in 2020
** Added in 2021
*** Added in 2022
**** Added in 2023
***** In 2023, 'slow compile times' and 'it takes too long to generate the first plot' were combined. Previous years' data is for 'It takes too long to generate the first plot'. Removed in 2023: Packages aren't as mature or as well-maintained as I need, doesn't have all the packages I need, not well-suited to certain tasks, not stable enough, package manager is confusing, difficult or doesn't do what I expect

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The Biggest NON-TECHNICAL PROBLEM with Julia Is Related to Adoption: Not Enough Julia Users

Thinking only about the NON-TECHNICAL aspects or features of Julia, what are the NON-TECHNICAL aspects or features you like LEAST about Julia?
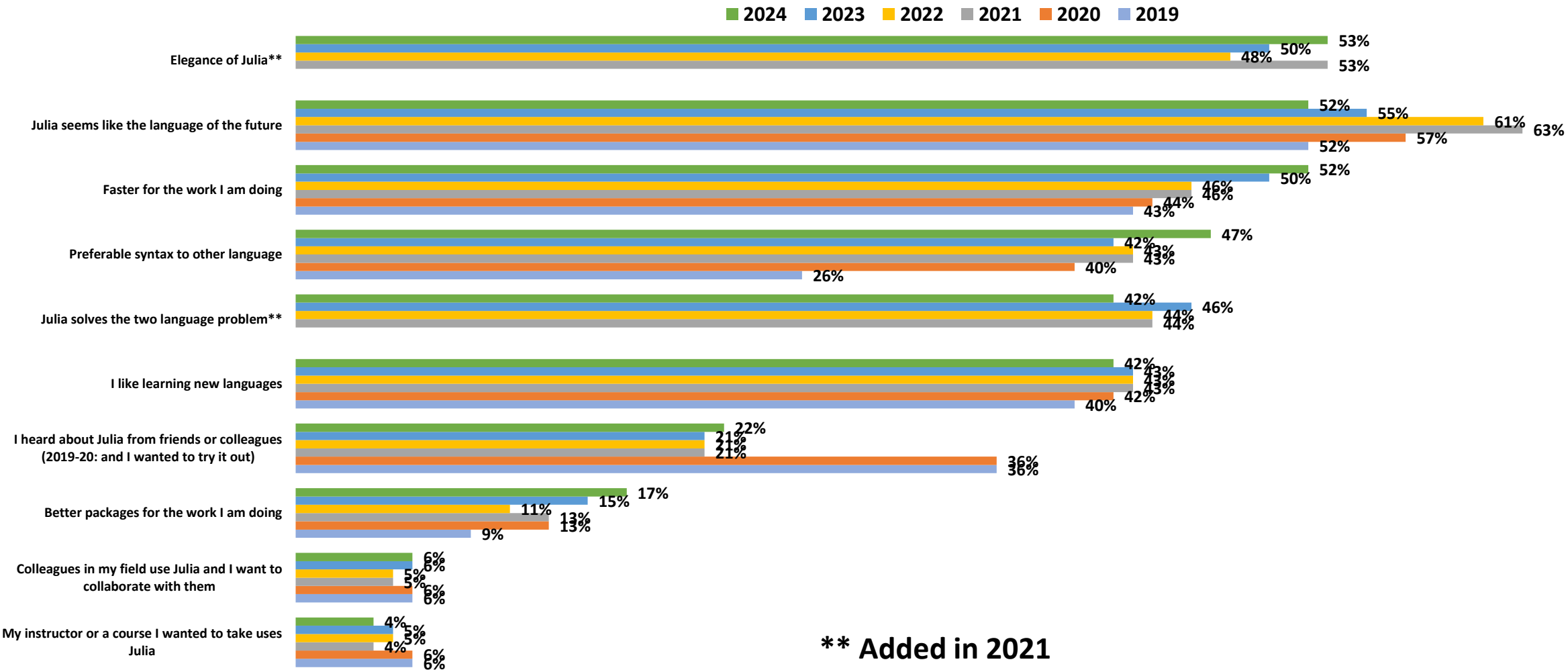
Legend: ■ 2024 ■ 2023 ■ 2022 ■ 2021 ■ 2020 ■ 2019

There are not enough Julia users in my field or industry
- 2024: 64%
- 2023: 58%
- 2022: 45%
- 2021: 44%
- 2020: 36%
- 2019: 36%

Online tutorials and documentation are outdated* (or insufficient **)**
- 2024: 30%
- 2023: 28%
- 2022: 25%
- 2021: 26%
- 2020: 30%

My company, university, clients or other organizations I work with do not allow or support Julia*
- 2024: 18%
- 2023: 19%
- 2022: 13%
- 2021: 11%
- 2020: 10%

I feel that the Julia developer team does not communicate its plans or intentions clearly enough
- 2024: 13%
- 2023: 9%
- 2022: 7%

Julia community is not active enough
- 2024: 8%
- 2023: 6%
- 2022: 3%
- 2020: 2%
- 2019: 4%
- 3%

I am more comfortable in another language
- 2024: 5%
- 2023: 8%
- 2022: 11%
- 2021: 10%
- 2020: 9%
- 2019: 8%

Julia community is not diverse enough*
- 2024: 5%
- 2023: 4%
- 2022: 4%

Julia community is too closed and not welcoming enough
- 2024: 4%
- 2023: 3%
- 2022: 2%
- 2021: 3%
- 2020: 3%
- 2019: 2%

The Julia community is too conservative and too reluctant to make useful changes to the language*
- 2024: 3%
- 2023: 4%
- 2022: 2%

* Added in 2020
*** Added in 2022

Removed in 2023: My colleagues, company or collaborators use other languages, there are not enough Julia users in general, insufficient documentation, there are not enough teaching and learning resources available online, there are too many things I don't know how to do in Julia

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Reasons for Choosing Julia: Elegance, Seems Like the Language of the Future, Speed, Syntax, Solves the Two Language Problem

Why did you start using Julia?

Legend: ■ 2024 ■ 2023 ■ 2022 ■ 2021 ■ 2020 ■ 2019

Elegance of Julia**
- 2024: 53%
- 2023: 50%
- 2022: 48%
- 2021: 53%

Julia seems like the language of the future
- 2024: 52%
- 2023: 55%
- 2022: 61%
- 2021: 63%
- 2020: 57%
- 2019: 52%

Faster for the work I am doing
- 2024: 52%
- 2023: 50%
- 2022: 46%
- 2021: 46%
- 2020: 44%
- 2019: 43%

Preferable syntax to other language
- 2024: 47%
- 2023: 43%
- 2022: 42%
- 2021: 43%
- 2020: 40%
- 2019: 26%

Julia solves the two language problem**
- 2024: 42%
- 2023: 46%
- 2022: 44%
- 2021: 44%

I like learning new languages
- 2024: 42%
- 2023: 43%
- 2022: 43%
- 2021: 43%
- 2020: 42%
- 2019: 40%

I heard about Julia from friends or colleagues (2019-20: and I wanted to try it out)
- 2024: 22%
- 2023: 21%
- 2022: 21%
- 2021: 21%
- 2020: 36%
- 2019: 36%

Better packages for the work I am doing
- 2024: 17%
- 2023: 15%
- 2022: 11%
- 2021: 13%
- 2020: 13%
- 2019: 9%

Colleagues in my field use Julia and I want to collaborate with them
- 2024: 6%
- 2023: 6%
- 2022: 5%
- 2021: 6%
- 2020: 5%
- 2019: 6%

My instructor or a course I wanted to take uses Julia
- 2024: 4%
- 2023: 5%
- 2022: 3%
- 2021: 4%
- 2020: 6%
- 2019: 6%

** Added in 2021
Removed in 2023: I need or want a specific feature

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Discourse, GitHub, Slack and Zulip Are Growing; Stack Overflow, YouTube, Twitter (X), Reddit and Forem Are Shrinking

Where do you interact with the Julia community?

■ 2021 ■ 2022 ■ 2023 ■ 2024
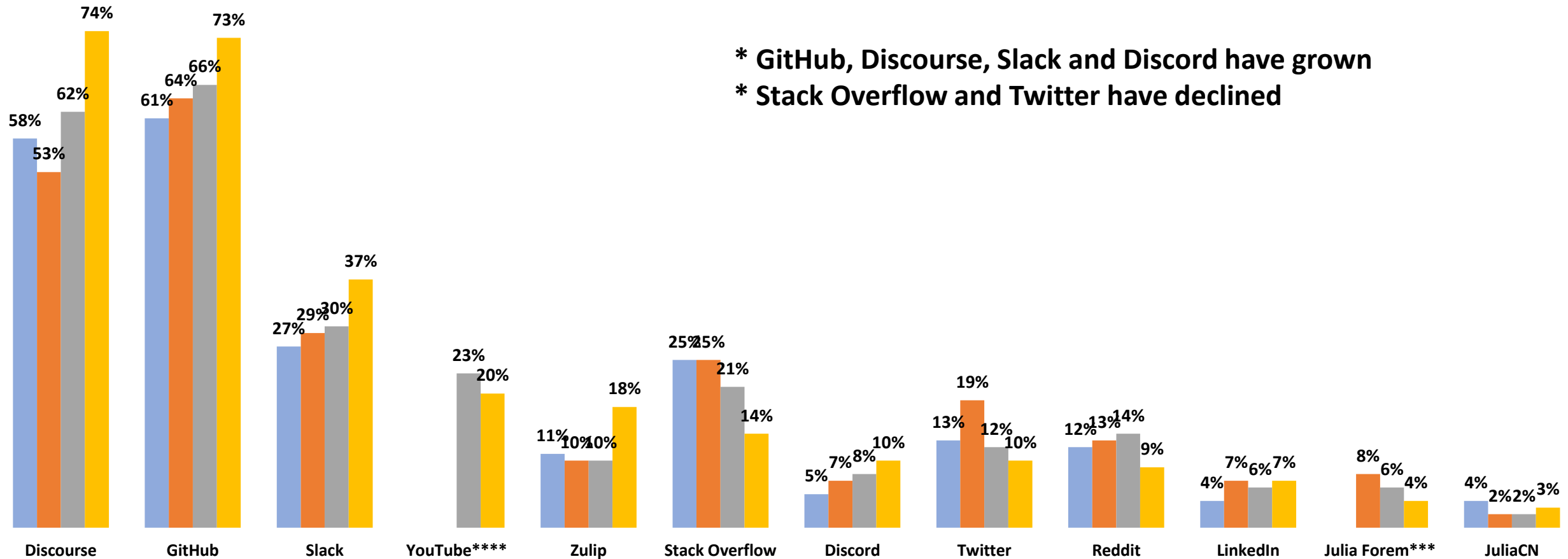
* GitHub, Discourse, Slack and Discord have grown
* Stack Overflow and Twitter have declined

***Added in 2022
****Added in 2023

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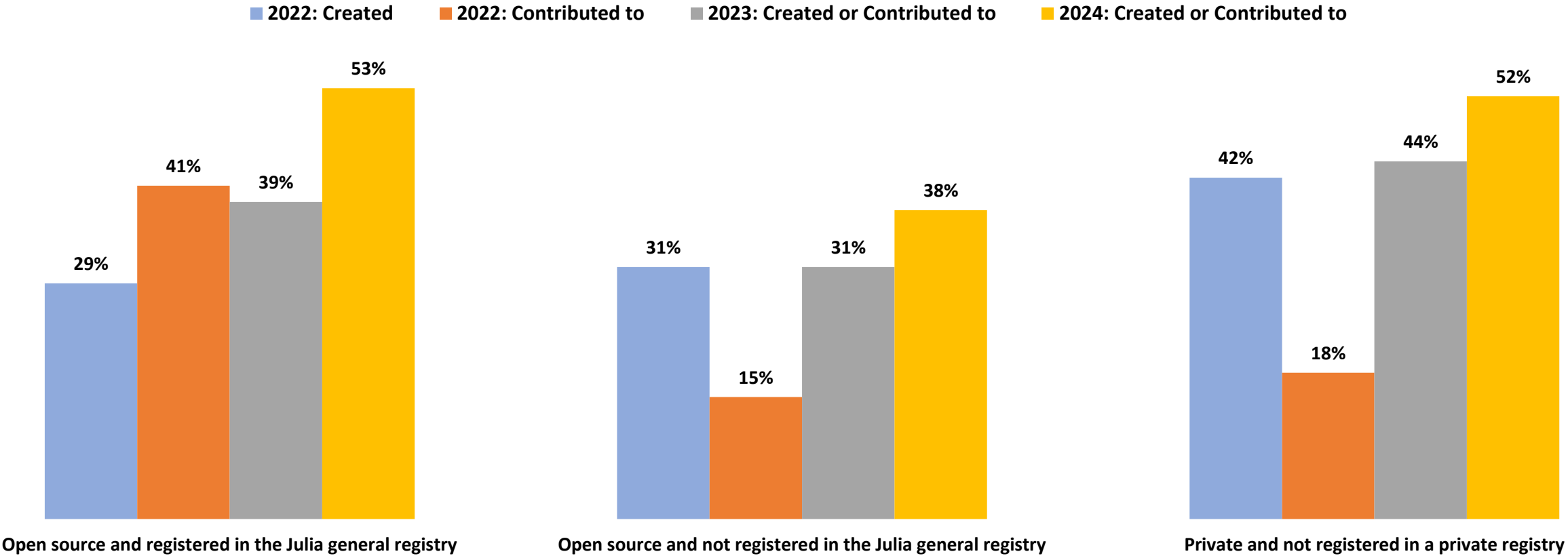# Most Use Julia for Research, Hobby and Individual Work; Research, Individual Work, Team Development, Teaching and Business-Critical Task Use Have All Grown

Which of the following best describe your use of Julia?

■ **2024** ■ **2023** ■ **2022** ■ **2021** ■ **2020** ■ **2019**

I use Julia for research
- 71%
- 67%
- 64%
- 70%
- 70%
- 73%

I use Julia for work individually
- 56%
- 51%
- 50%
- 57%
- 56%
- 54%

I use Julia for hobby programming***
- 51%
- 51%
- 56%

I use Julia for development as part of a team
- 29%
- 20%
- 17%
- 15%
- 14%
- 15%

I use Julia for teaching
- 22%
- 17%
- 18%
- 15%
- 15%
- 16%

I use Julia in production for a business critical task
- 16%
- 12%
- 10%
- 10%
- 11%
- 10%

I use Julia because it is required for classes at my university
- 1%
- 2%
- 3%
- 2%
- 2%
- 2%

*** Added in 2022

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Open Source and Private Packages Have Grown

2023: Which of the following types of Julia packages have you created or contributed to?
(2022: Which of the following types of Julia packages have you created?
Which of the following types of Julia packages have you contributed to, including documentation or filing issues, but not created?)

■ 2022: Created   ■ 2022: Contributed to   ■ 2023: Created or Contributed to   ■ 2024: Created or Contributed to

Open source and registered in the Julia general registry
29% | 41% | 39% | 53%

Open source and not registered in the Julia general registry
31% | 15% | 31% | 38%

Private and not registered in a private registry
42% | 18% | 44% | 52%

More Julia Users & Developers Are Getting Paid for Julia Work

■ 2023 ■ 2024

Completely voluntary	Write Julia as a component of other paid work, such as research for academics	Part paid, part voluntary	Paid programmer
50% / 46%	46% / 49%	14% / 16%	11% / 9%

Most Open-Source Creators and Contributors Spend 1-10 Hours Per Week Working on Open Source Julia Projects or the Julia Community

IF OPEN-SOURCE CREATOR OR CONTRIBUTOR: How many volunteer hours do you spend working on open-source Julia projects or the Julia community per week?

15
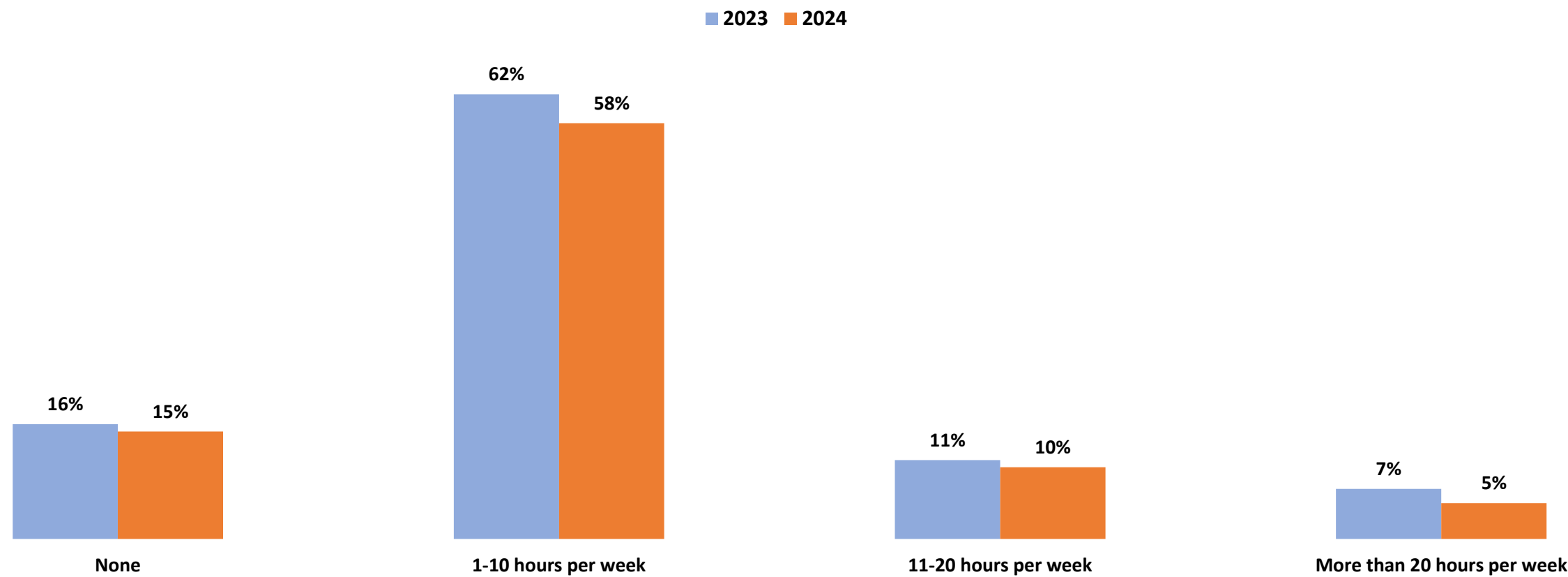
Most Users & Developers Started Using Julia Between 2018 and 2022

When did you first start using Julia?

■ 2019 ■ 2020 ■ 2021 ■ 2022 ■ 2023 ■ 2024
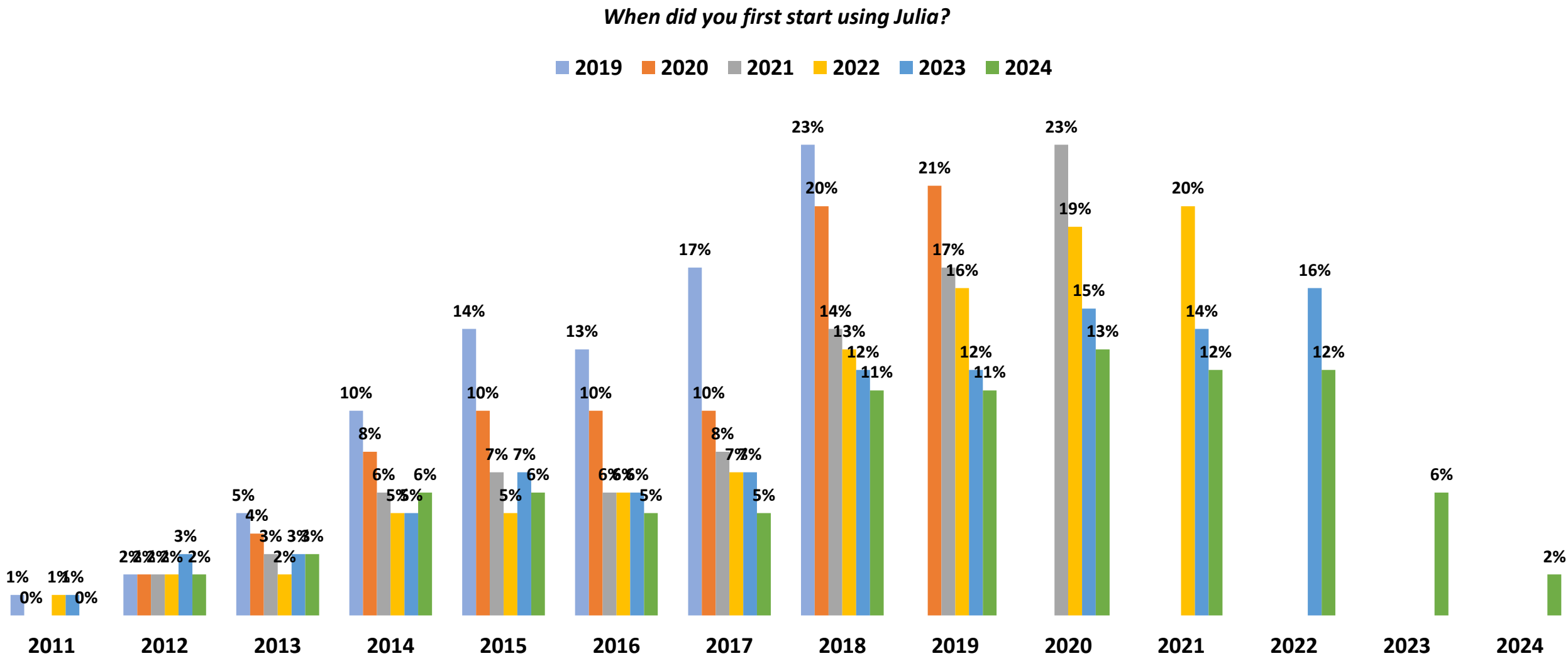
For the First Time, Most Julia Users & Developers Do More than 60% of Their Programming in Julia

What percentage of the programming work you do is in Julia?

■ 2021 ■ 2022 ■ 2023 ■ 2024

	0-19%	20-39%	40-59%	60-79%	80-100%
2021	31%	13%	12%	14%	27%
2022	31%	14%	12%	13%	24%
2023	31%	11%	14%	14%	30%
2024	24%	11%	9%	17%	38%
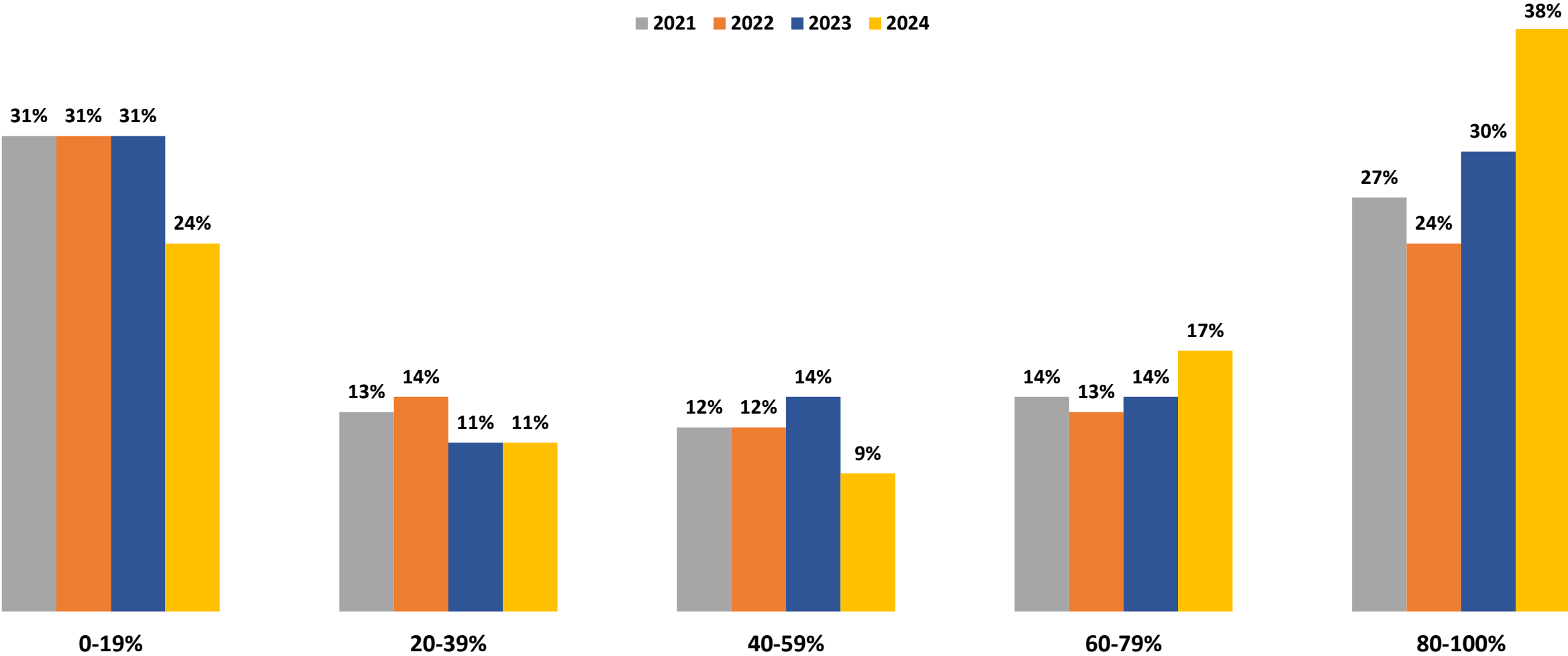
79% Say the Julia Package Ecosystem Is 'Very' or 'Somewhat' Robust

How robust is the current Julia package ecosystem?

■ 2021 ■ 2022 ■ 2023 ■ 2024

Very
- 17%
- 17%
- 20%
- 17%

Somewhat
- 57%
- 56%
- 60%
- 62%

Not Very
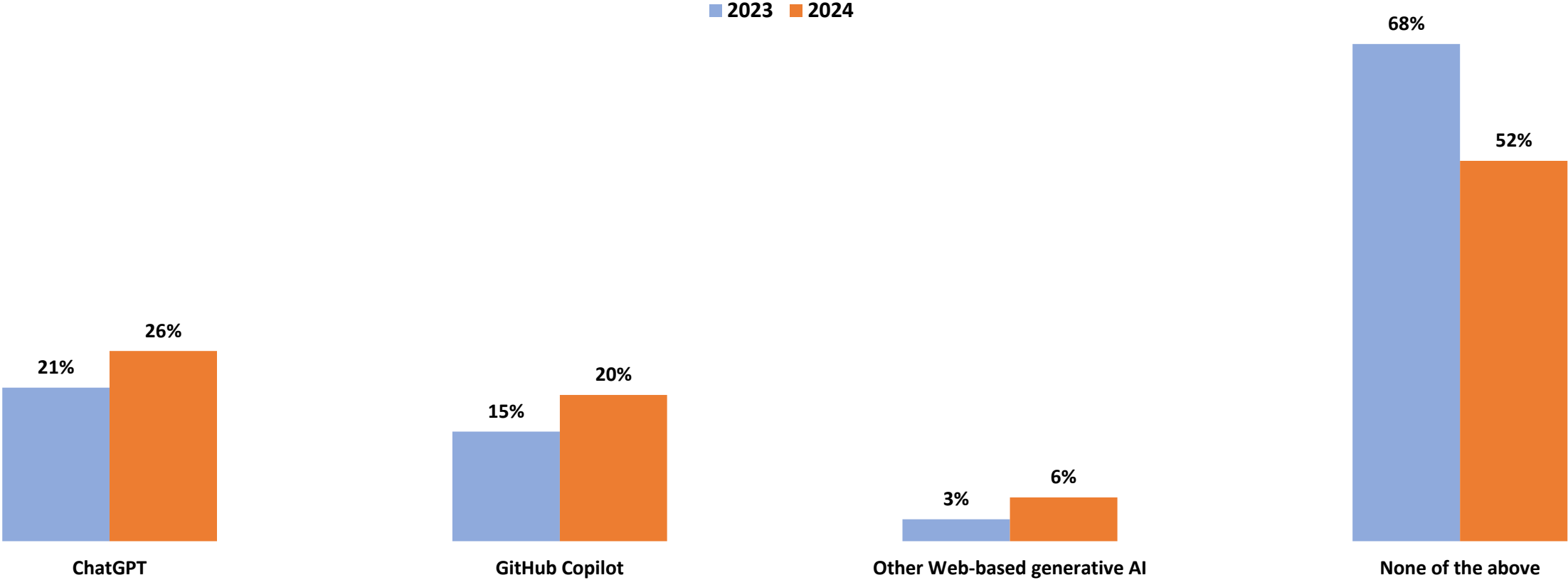- 13%
- 14%
- 11%
- 14%

Not At All
- 1%
- 2%
- 2%
- 3%
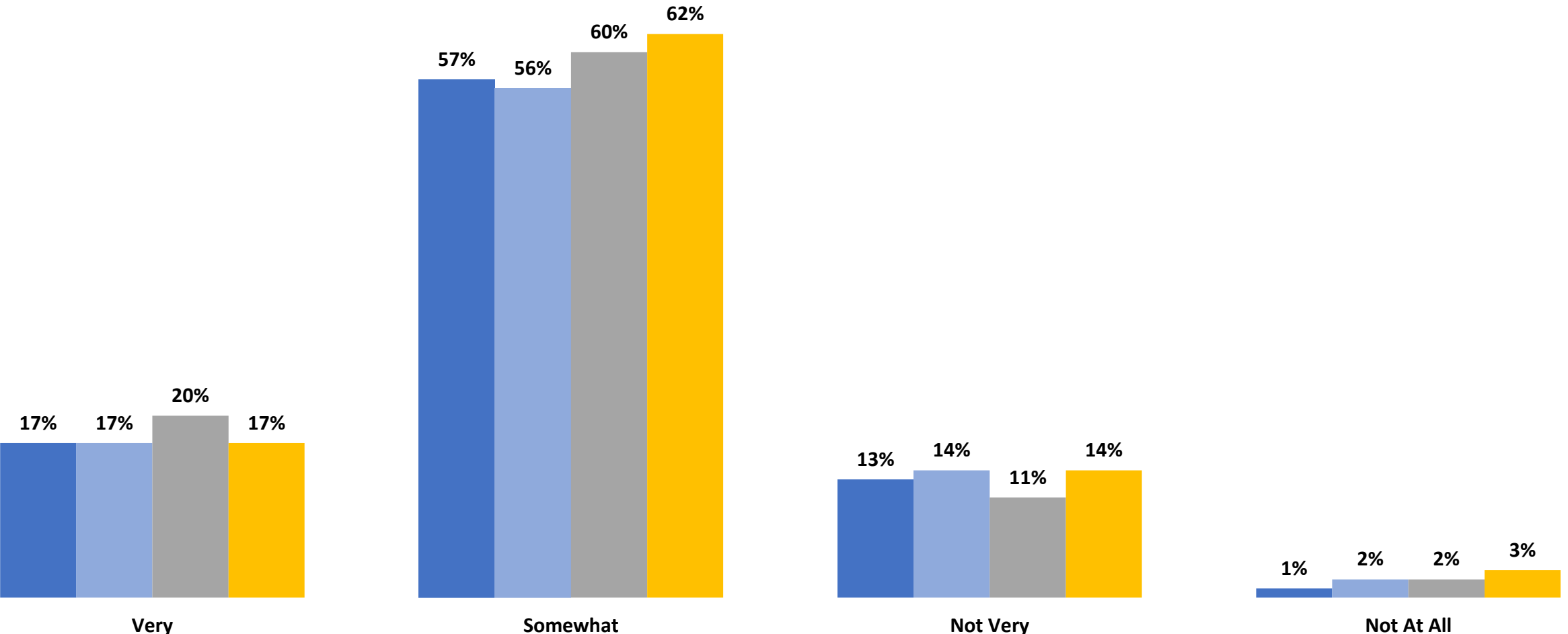
VS Code, Pluto and Vi/Vim/Neovim Are the Leading Editors or IDEs for Julia Users & Developers
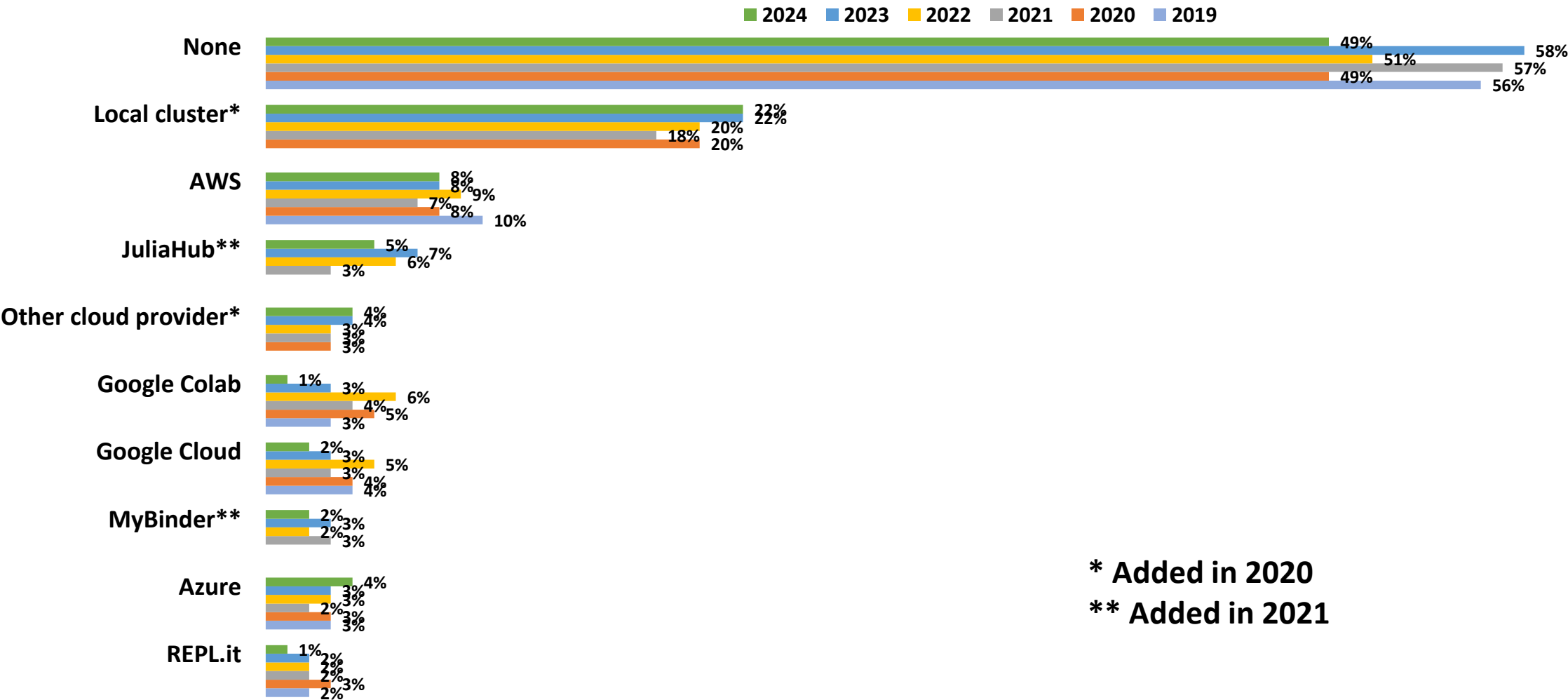
Which editors or IDEs do you use frequently?

■ 2024 ■ 2023 ■ 2022 ■ 2021 ■ 2020 ■ 2019

VS Code (2020-21: with Julia plugin)
- 77%
- 78%
- 75%
- 62%
- 31% 35%

Pluto**
- 25% 26%
- 23% 23%
- 23%

Vi/Vim/Neovim (2019-2020: Vi/Vim)
- 24% 25%
- 22%
- 21% 23% 24%

Jupyter**
- 18%
- 32%
- 36%
- 20%

JupyterLab
- 13% 14%
- 17% 20%
- 25% 31%

Emacs
- 11% 11%
- 10% 11%
- 10% 12% 14%

Rstudio
- 5% 6% 8%
- 7%

Sublime Text
- 5% 5%
- 6% 7%
- 10% 11%

Notepad++
- 4%
- 7% 7%
- 5%
- 7% 9%

InteliJ or other Jetbrains product (2019-2020: InteliJ)
- 3% 3%
- 4% 5%
- 5% 6%

Kate*
- 2%
- 2%

None - I write all my code in the Julia REPL*
- 3% 2%
- 1% 2% 3%

Nano/Pico***
- 1% 3%
- 2%

Juno
- 1% 2%
- 8%
- 13%
- 25% 39%

* Added in 2020
** Added in 2021

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Nearly Half of Users & Developers Use AI Assistance, Up from 32% Last Year

What types of AI assistance do you use frequently with Julia?

■ 2023 ■ 2024

- ChatGPT: 21% (2023), 26% (2024)
- GitHub Copilot: 15% (2023), 20% (2024)
- Other Web-based generative AI: 3% (2023), 6% (2024)
- None of the above: 68% (2023), 52% (2024)

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About Half Use One or More Cloud Solutions; Local Cluster Is Most Common

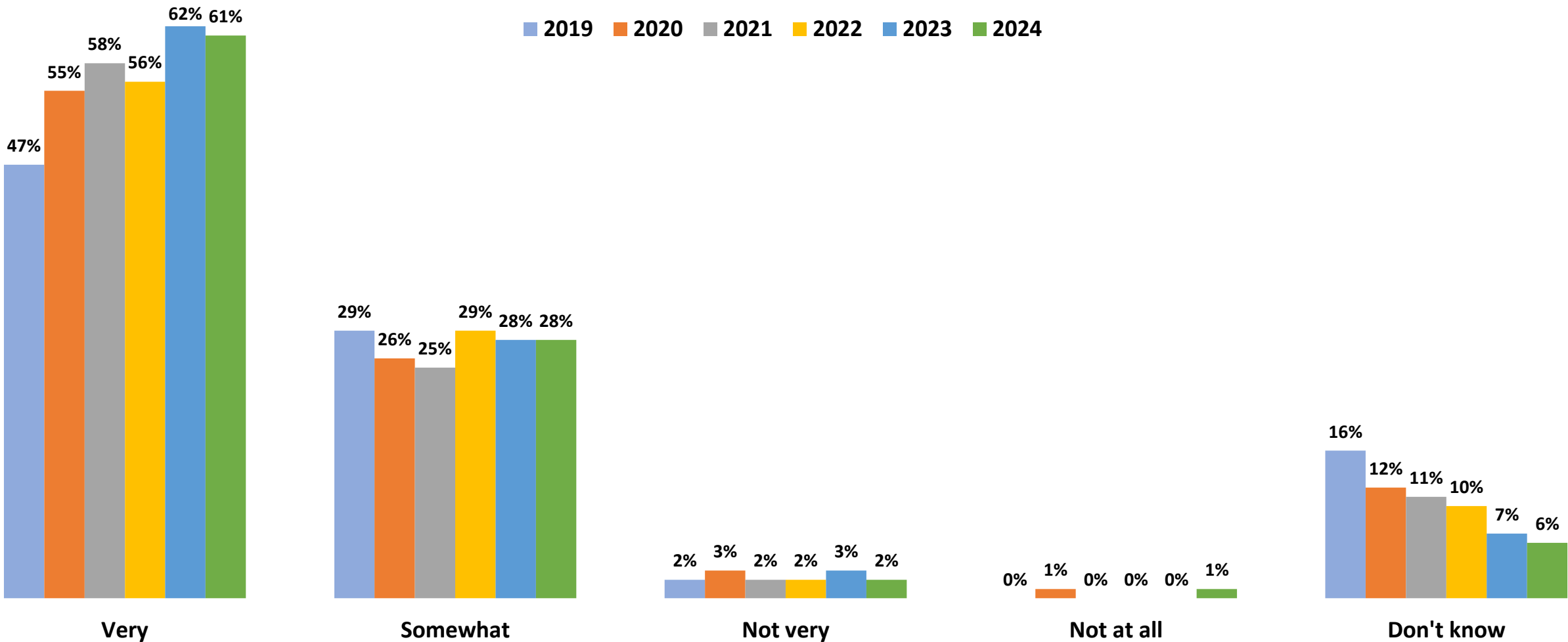*Which cloud solutions, if any, do you use together with Julia?*

■ **2024** ■ **2023** ■ **2022** ■ **2021** ■ **2020** ■ **2019**

None
- 49%
- 58%
- 51%
- 57%
- 49%
- 56%

Local cluster*
- 22%
- 22%
- 20%
- 18%
- 20%

AWS
- 8%
- 8%
- 9%
- 7%
- 8%
- 10%

JuliaHub**
- 5%
- 7%
- 6%
- 3%

Other cloud provider*
- 4%
- 4%
- 3%
- 3%

Google Colab
- 1%
- 3%
- 6%
- 4%
- 5%
- 3%

Google Cloud
- 2%
- 3%
- 5%
- 3%
- 4%

MyBinder**
- 2%
- 3%
- 2%
- 3%

Azure
- 4%
- 3%
- 3%
- 2%
- 3%

REPL.it
- 1%
- 2%
- 2%
- 3%
- 2%

* Added in 2020
** Added in 2021

89% Say the Julia Community Is Very or Somewhat Helpful and Collaborative
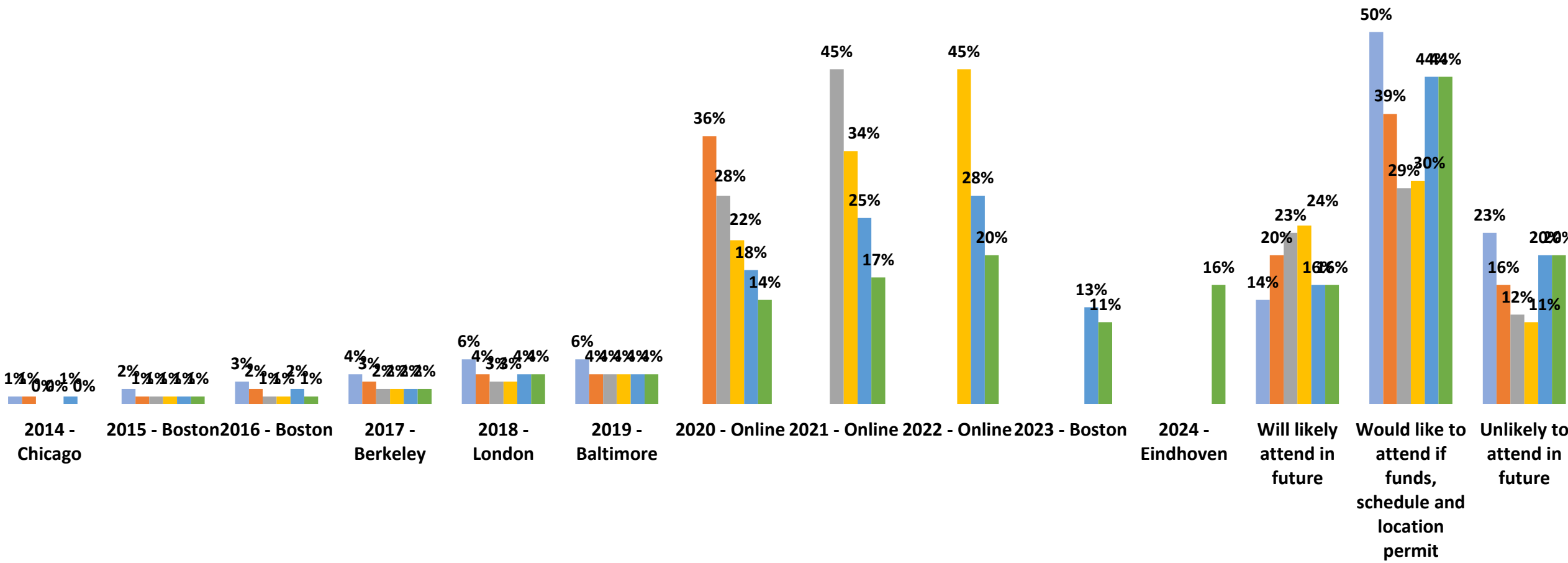
How helpful and collaborative is the Julia community?
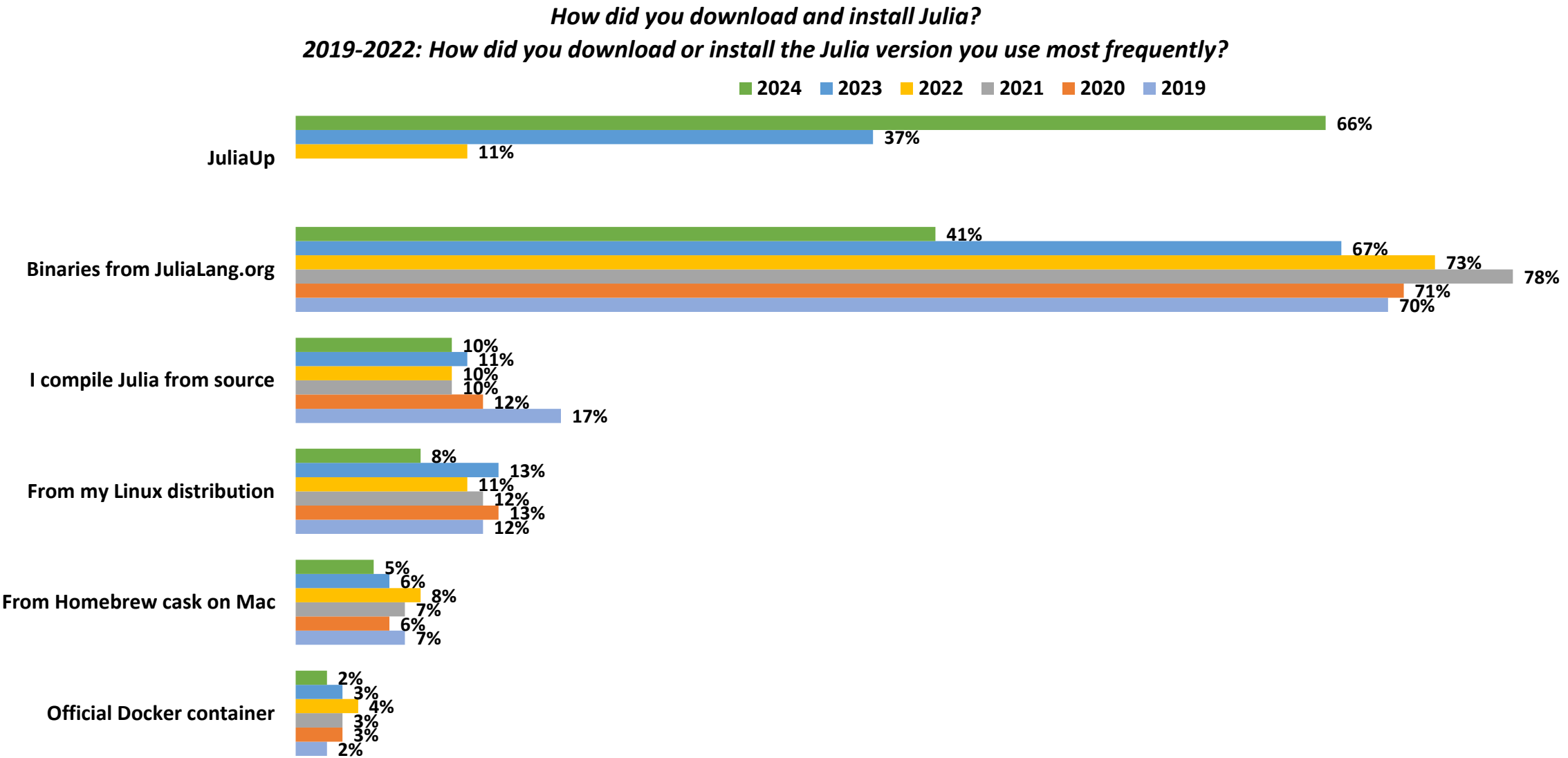
■ 2019   ■ 2020   ■ 2021   ■ 2022   ■ 2023   ■ 2024

Very
- 47%
- 55%
- 58%
- 56%
- 62%
- 61%

Somewhat
- 29%
- 26%
- 25%
- 29%
- 28%
- 28%

Not very
- 2%
- 3%
- 2%
- 2%
- 3%
- 2%

Not at all
- 0%
- 1%
- 0%
- 0%
- 0%
- 1%

Don't know
- 16%
- 12%
- 11%
- 10%
- 7%
- 6%

16% of Respondents Plan to Attend JuliaCon This Year – Highest Planned In-Person Attendance Ever

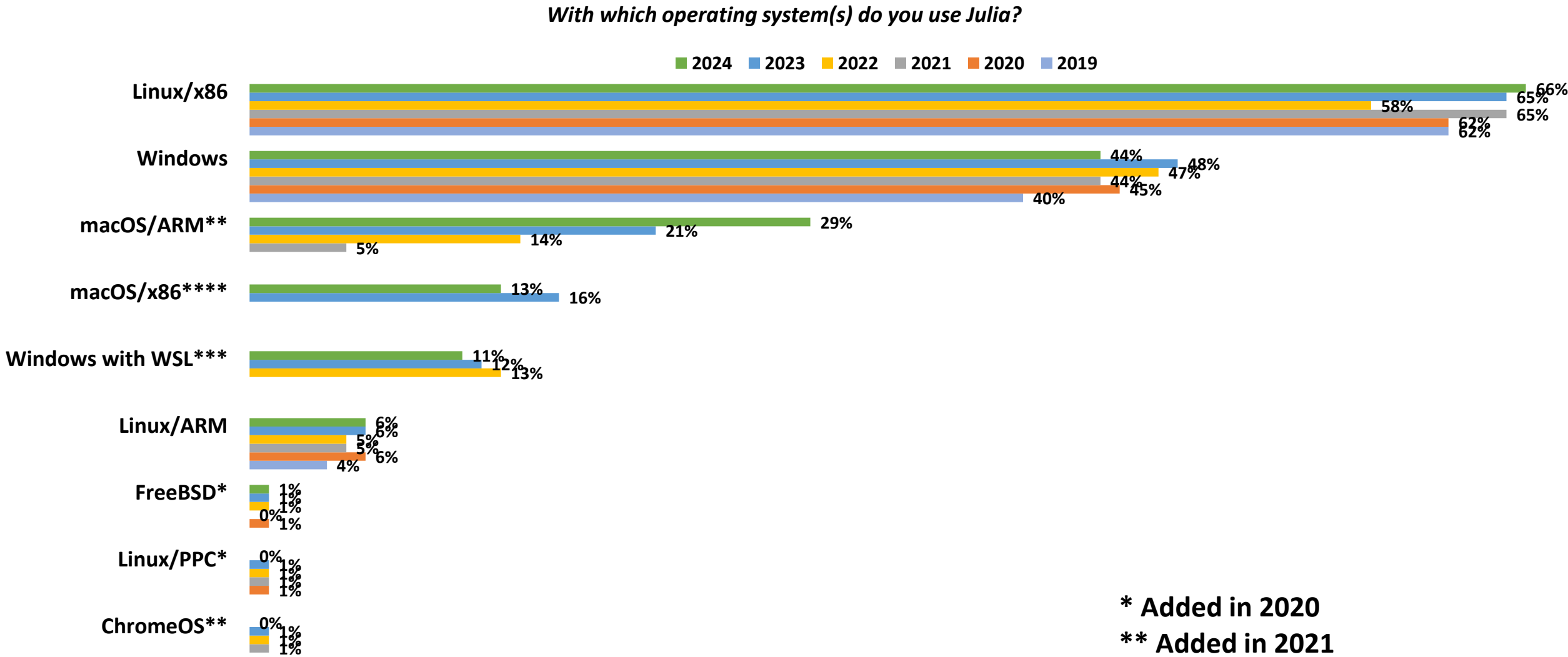*Have you attended or do you plan to attend JuliaCon? Please select all that apply.*

JuliaUp Has Overtaken JuliaLang.org Binaries As the #1 Place to Download and Install Julia

How did you download and install Julia?
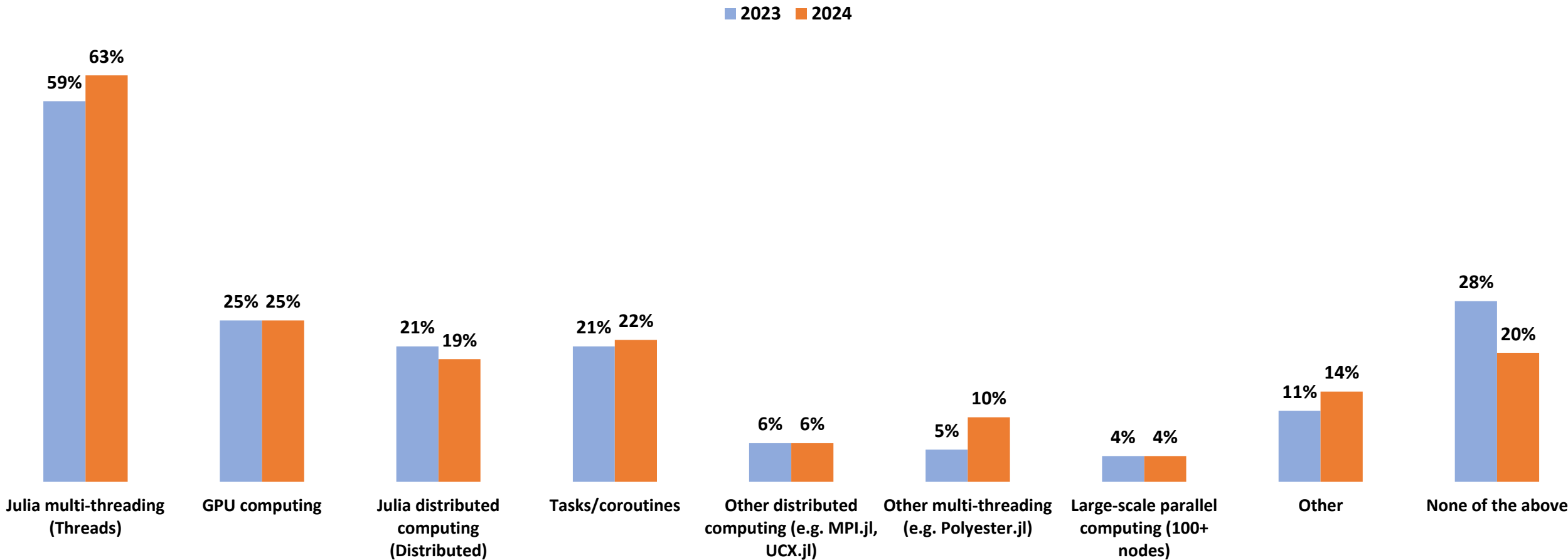*2019-2022: How did you download or install the Julia version you use most frequently?*

Legend: ■ 2024 ■ 2023 ■ 2022 ■ 2021 ■ 2020 ■ 2019

JuliaUp
- 2024: 66%
- 2023: 37%
- 2022: 11%

Binaries from JuliaLang.org
- 2024: 41%
- 2023: 67%
- 2022: 73%
- 2021: 78%
- 2020: 71%
- 2019: 70%

I compile Julia from source
- 2024: 10%
- 2023: 11%
- 2022: 10%
- 2021: 10%
- 2020: 12%
- 2019: 17%

From my Linux distribution
- 2024: 8%
- 2023: 13%
- 2022: 11%
- 2021: 12%
- 2020: 13%
- 2019: 12%

From Homebrew cask on Mac
- 2024: 5%
- 2023: 6%
- 2022: 8%
- 2021: 7%
- 2020: 6%
- 2019: 7%

Official Docker container
- 2024: 2%
- 2023: 3%
- 2022: 4%
- 2021: 3%
- 2020: 3%
- 2019: 2%

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Most Still Use Julia with Linux/x86 or Windows, but macOS Is Growing

With which operating system(s) do you use Julia?

■ 2024 ■ 2023 ■ 2022 ■ 2021 ■ 2020 ■ 2019

Linux/x86
- 66%
- 65%
- 58%
- 65%
- 62%
- 62%

Windows
- 44%
- 48%
- 47%
- 44%
- 45%
- 40%

macOS/ARM**
- 29%
- 21%
- 14%
- 5%

macOS/x86****
- 13%
- 16%

Windows with WSL***
- 11%
- 12%
- 13%

Linux/ARM
- 6%
- 6%
- 5%
- 5%
- 6%
- 4%

FreeBSD*
- 1%
- 1%
- 1%
- 0%
- 1%

Linux/PPC*
- 0%
- 1%
- 1%
- 1%
- 1%

ChromeOS**
- 0%
- 1%
- 1%
- 1%

* Added in 2020
** Added in 2021
*** Added in 2022
**** Added in 2023

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25

Most Use Julia Multi-Threading (Threads)

Which kind of parallelism, if any, do you use together with Julia?

■ 2023 ■ 2024

	2023	2024
Julia multi-threading (Threads)	59%	63%
GPU computing	25%	25%
Julia distributed computing (Distributed)	21%	19%
Tasks/coroutines	21%	22%
Other distributed computing (e.g. MPI.jl, UCX.jl)	6%	6%
Other multi-threading (e.g. Polyester.jl)	5%	10%
Large-scale parallel computing (100+ nodes)	4%	4%
Other	11%	14%
None of the above	28%	20%

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Nvidia GPUs Are the Most Common Accelerators

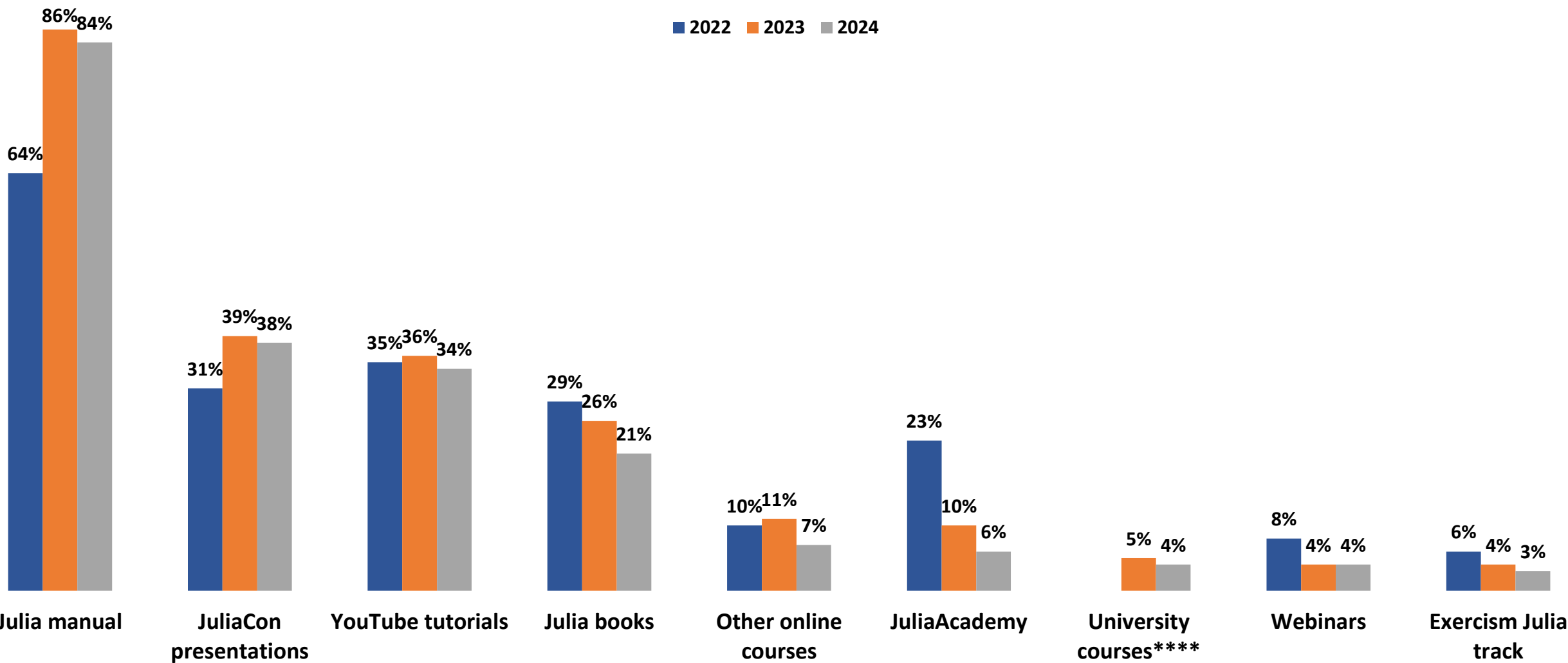**Which hardware accelerators, if any, do you use together with Julia?**

■ 2024 ■ 2023 ■ 2022 ■ 2021 ■ 2020 ■ 2019

None
- 46%
- 53%
- 42%
- 50%
- 51%
- 54%

Nvidia GPU - released 2+ years ago
- 22%
- 24%
- 23%
- 20%
- 16%
- 13%

Nvidia GPU - released in last 2 years
- 22%
- 23%
- 22%
- 20%
- 23%
- 20%

Apple M-Series GPU**
- 14%
- 9%

AMD GPU
- 6%
- 5%
- 7%
- 5%
- 3%
- 3%

Intel GPU**
- 4%
- 5%

Multiple Nvidia GPUs in one system
- 5%
- 4%
- 4%
- 4%
- 3%
- 4%

Distributed cluster of GPUs
- 3%
- 3%
- 3%
- 3%
- 3%
- 3%

Quantum computer**
- 1%
- 1%

Other**
- 0%
- 1%
- 2%
- 1%
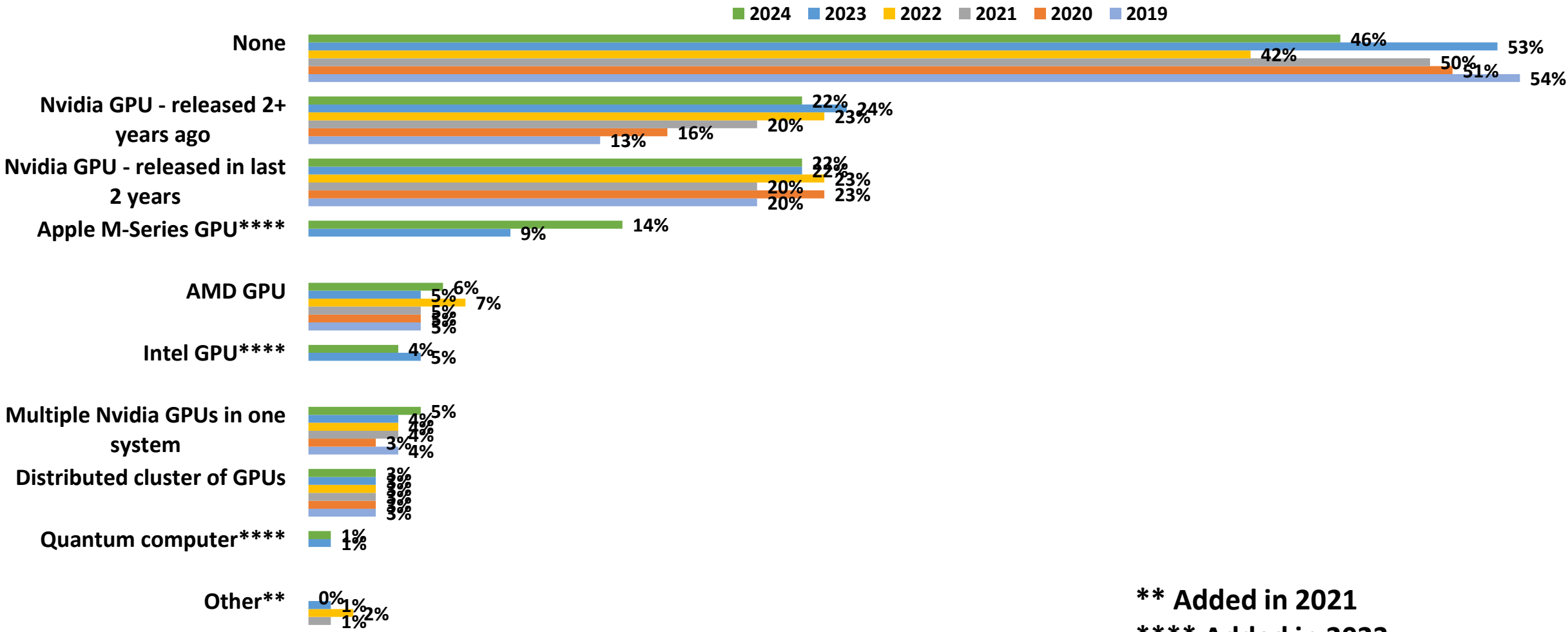
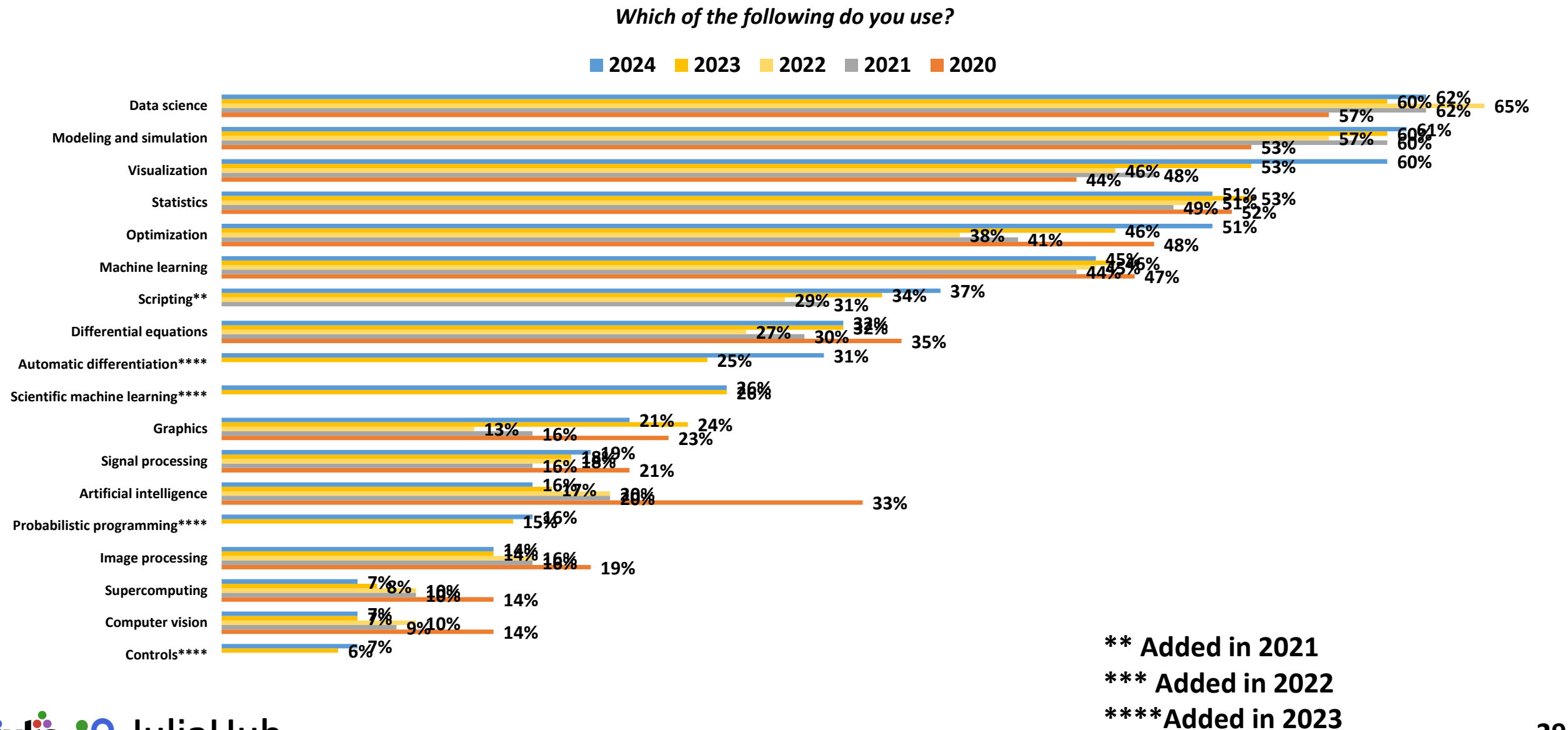**** Added in 2021**
****** Added in 2023**

Julia Manual Is Most Useful for Learning Julia, Followed by JuliaCon Presentations, YouTube and Julia Books

What resources have you found most useful when learning Julia for the first time or when learning how to do something in Julia? Please select all that apply.

Legend: ■ 2022 ■ 2023 ■ 2024

- Julia manual: 64%, 86%, 84%
- JuliaCon presentations: 31%, 39%, 38%
- YouTube tutorials: 35%, 36%, 34%
- Julia books: 29%, 26%, 21%
- Other online courses: 10%, 11%, 7%
- JuliaAcademy: 23%, 10%, 6%
- University courses****: 5%, 4%
- Webinars: 8%, 4%, 4%
- Exercism Julia track: 6%, 4%, 3%

**** Online and in-person university courses combined in 2023

Most Respondents Use Data Science, Modeling and Simulation, Visualization, Statistics and Optimization

Which of the following do you use?

■ 2024   ■ 2023   ■ 2022   ■ 2021   ■ 2020

	2024	2023	2022	2021	2020
Data science	60%	62%	65%	62%	57%
Modeling and simulation	61%	60%	61%	60%	53% 57%
Visualization	60%	53%	48%	46%	44%
Statistics	51%	53%	51%	52%	49%
Optimization	51%	46%	48%	41%	38%
Machine learning	45%	46%	47%	44%	
Scripting**	37%	34%	31%	29%	
Differential equations	31%	32%	30%	27%	35%
Automatic differentiation****	31%	25%			
Scientific machine learning****	26%				
Graphics	21%	24%	13%	16%	23%
Signal processing	19%	18%	16%	18%	21%
Artificial intelligence	16%	17%	20%	20%	33%
Probabilistic programming****	16%	15%			
Image processing	14%	16%	16%	16%	19%
Supercomputing	7%	8%	10%	10%	14%
Computer vision	7%	9%	10%	10%	14%
Controls****	6%	7%			

** Added in 2021
*** Added in 2022
****Added in 2023

Professionals Are Nearly Half of Survey Respondents

Which of the following best describes you? Please select all that apply.
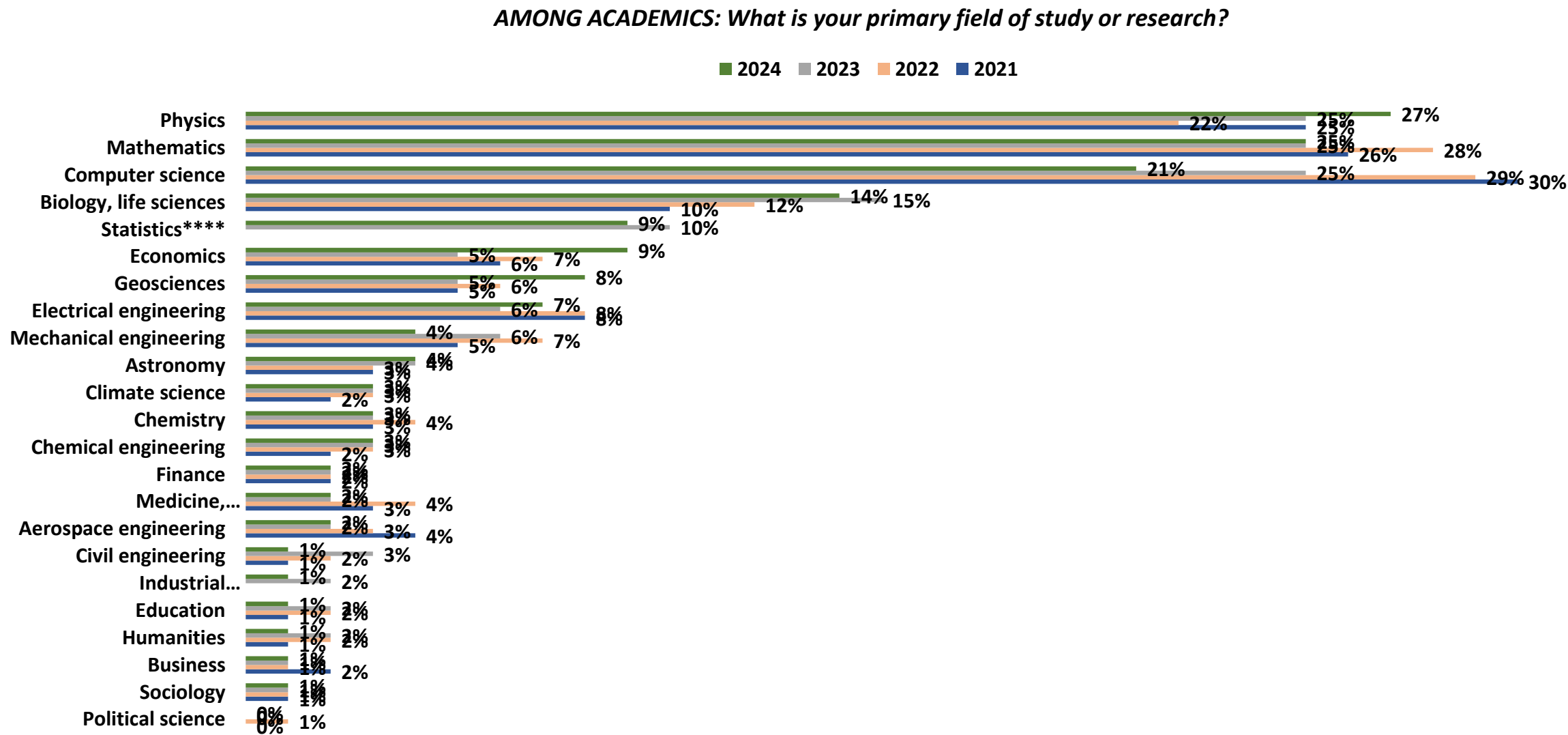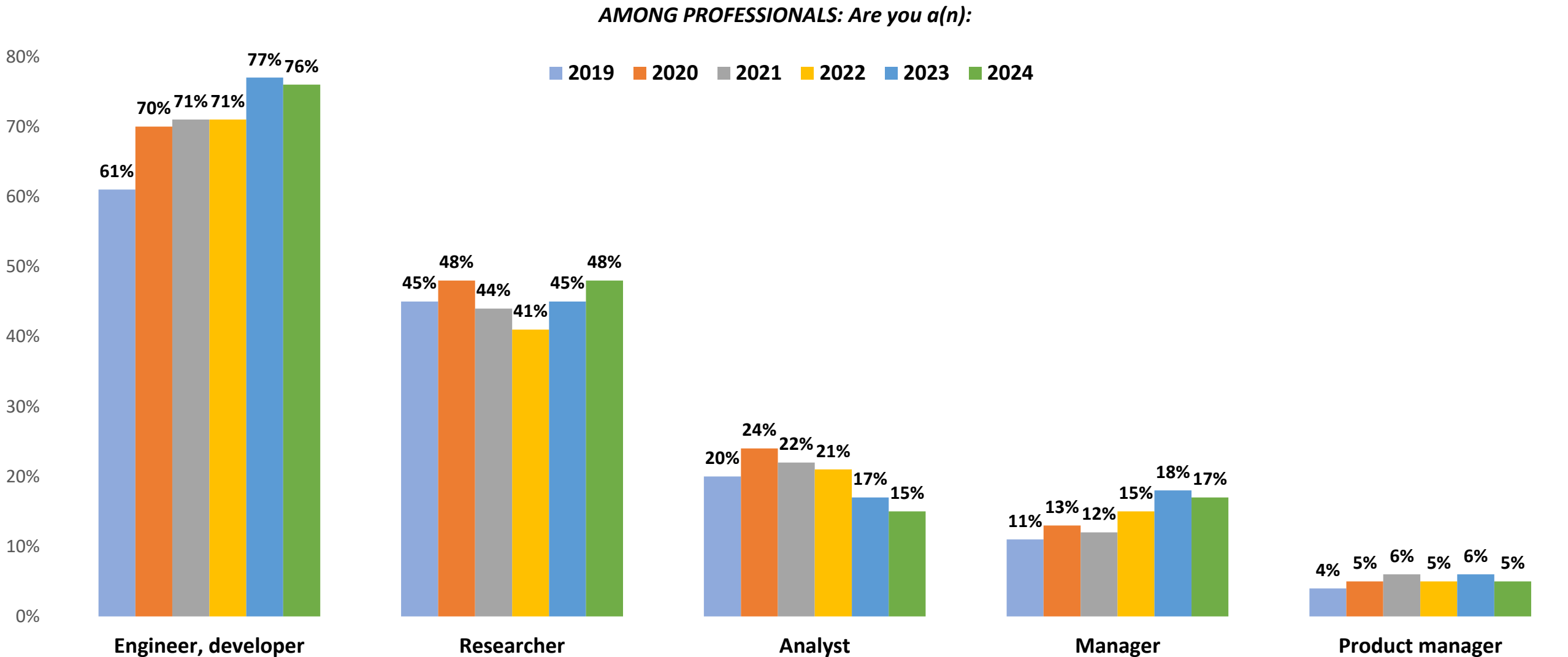
■ 2019 ■ 2020 ■ 2021 ■ 2022 ■ 2023 ■ 2024

Academic: 60% (2019), 60% (2020), 61% (2021), 56% (2022), 58% (2023), 56% (2024)

Professional: 43% (2019), 43% (2020), 43% (2021), 47% (2022), 47% (2023), 47% (2024)

Hobbyist****: 21% (2023), 17% (2024)

****Added in 2023

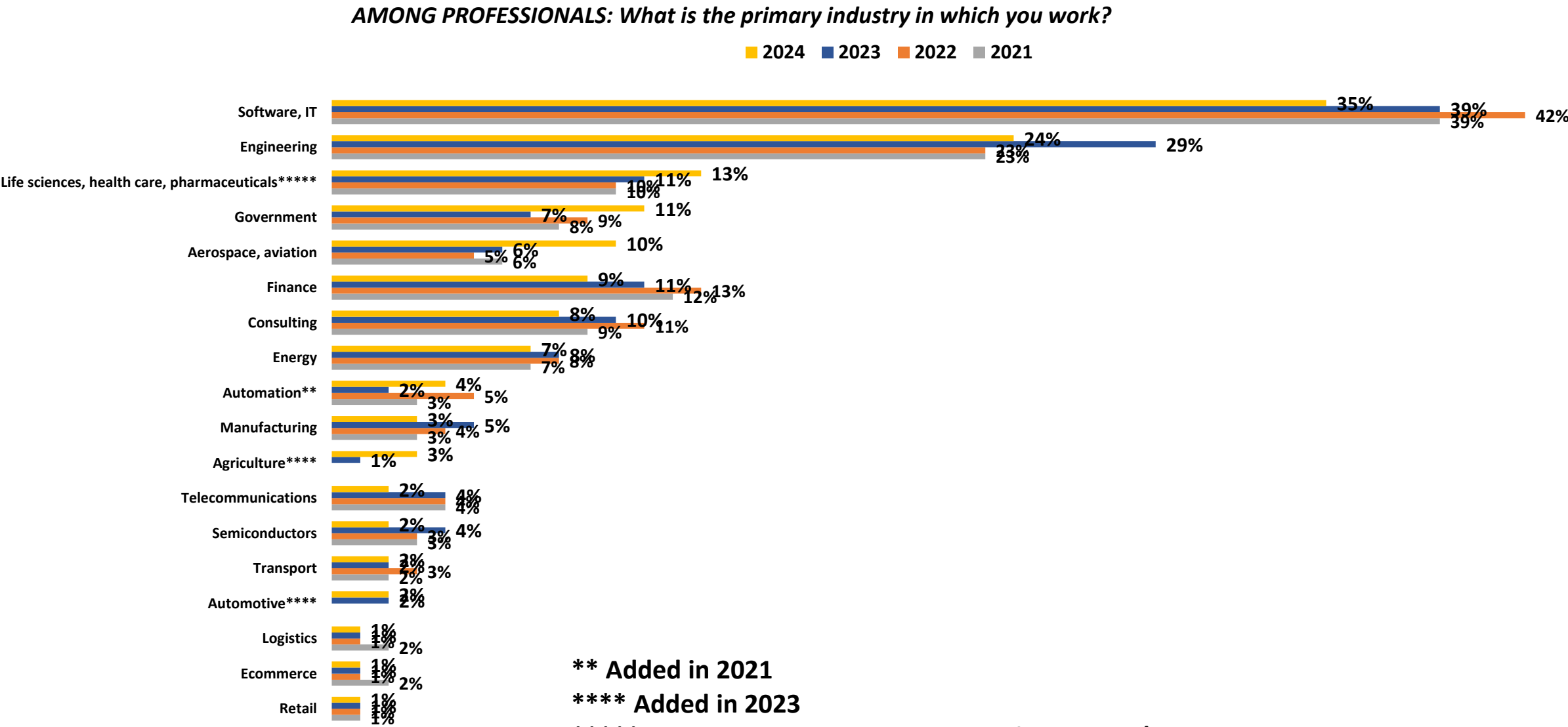# Among Academics, Most Respondents Are Researchers, Graduate or Postgraduate Students or Researchers

AMONG ACADEMICS: Are you a(n):

■ **2019** ■ **2020** ■ **2021** ■ **2022** ■ **2023** ■ **2024**

** Added in 2021
*** Added in 2022
**** Added in 2023

Researcher**** — 43% 44%

Graduate or postgraduate student or researcher — 56% 69% 52% 49% 43% 40%

Faculty** — 19% 23% 23% 23% 22%

Postdoctoral researcher or fellow**** — 16% 17%

Research software engineer — 10% 7% 8% 7% 10%

Undergraduate student — 11% 12% 13% 10% 8% 4%

Instructor — 34% 20% 6% 8% 7% 4%

System administrator** — 2% 2% 2% 1%

High school student or researcher*** — 2% 1% 1%

Among Academics, the Most Common Fields Are Physics, Mathematics and Computer Science

AMONG ACADEMICS: What is your primary field of study or research?

■ 2024   ■ 2023   ■ 2022   ■ 2021

Field	
Physics	27% / 25% / 25% / 22%
Mathematics	25% / 25% / 28% / 26%
Computer science	21% / 25% / 29% / 30%
Biology, life sciences	14% / 15% / 12% / 10%
Statistics****	9% / 10%
Economics	9% / 5% / 6% / 7%
Geosciences	8% / 5% / 6% / 5%
Electrical engineering	6% / 7% / 8% / 8%
Mechanical engineering	4% / 5% / 6% / 7%
Astronomy	3% / 4% / 4%
Climate science	2% / 3% / 3%
Chemistry	3% / 3% / 4%
Chemical engineering	2% / 3% / 3%
Finance	1% / 2%
Medicine,…	2% / 3% / 4%
Aerospace engineering	2% / 3% / 4%
Civil engineering	1% / 2% / 3%
Industrial…	1% / 2%
Education	1% / 2%
Humanities	1% / 2%
Business	1% / 2%
Sociology	1%
Political science	0% / 1%

Among Professionals, Most Respondents Are Engineers or Developers

AMONG PROFESSIONALS: Are you a(n):

Legend: 2019, 2020, 2021, 2022, 2023, 2024

Engineer, developer: 61%, 70%, 71%, 71%, 77%, 76%

Researcher: 45%, 48%, 44%, 41%, 45%, 48%

Analyst: 20%, 24%, 22%, 21%, 17%, 15%

Manager: 11%, 13%, 12%, 15%, 18%, 17%

Product manager: 4%, 5%, 6%, 5%, 6%, 5%

Among Professionals, the Most Common Industries Include Software, IT and Engineering

AMONG PROFESSIONALS: What is the primary industry in which you work?

■ 2024 ■ 2023 ■ 2022 ■ 2021

Industry	2024	2023	2022	2021
Software, IT	35%	39%	42%	39%
Engineering	24%	29%	23%	23%
Life sciences, health care, pharmaceuticals*****	13%	11%	10%	10%
Government	11%	7%	9%	8%
Aerospace, aviation	10%	6%	5%	6%
Finance	9%	11%	13%	12%
Consulting	8%	10%	11%	9%
Energy	7%	8%	8%	7%
Automation**	4%	2%	5%	3%
Manufacturing	3%	5%	3%	4%
Agriculture****	3%	1%		
Telecommunications	2%	4%	4%	4%
Semiconductors	2%	4%	3%	
Transport	2%	2%	2%	3%
Automotive****	2%	2%		
Logistics	1%	1%	1%	2%
Ecommerce	1%	1%	1%	2%
Retail	1%	1%	1%	1%

**   Added in 2021
**** Added in 2023
***** Pharmaceuticals merged with life sciences/health care in 2023

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Julia Users Would Be More Likely to Recommend Julia if Startup Time Is Reduced

What type of improvements to Julia would make you more likely to recommend Julia to other people?

■ 2023 ■ 2024

Note: Question changed to multiple response in 2024

- Reduced startup time (time to first X): 38% (2023), 41% (2024)
- More machine learning functionality: 20% (2023), 32% (2024)
- More statistical functionality: 15% (2023), 24% (2024)
- More web development functionality: 9% (2023), 16% (2024)
- No improvements are necessary: 5% (2023), 5% (2024)
- There is nothing that would make me likely to recommend Julia to other people: 1% (2023), 2% (2024)

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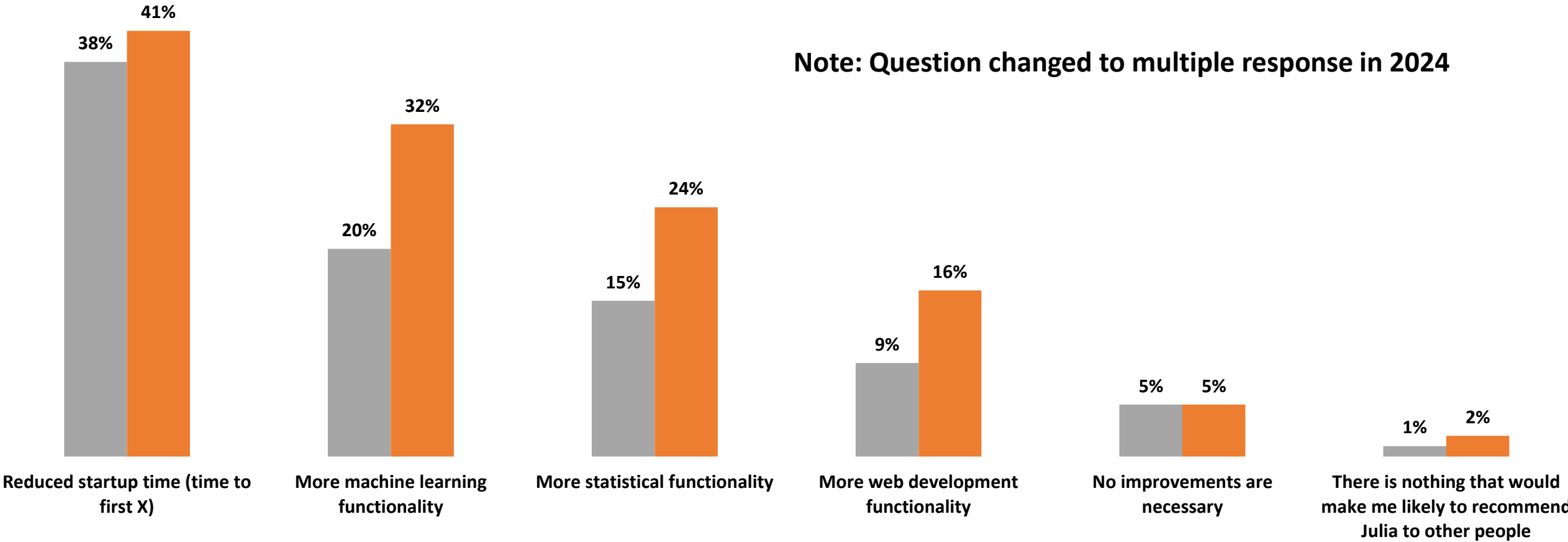
More Julia Users & Developers Have 11-20 Years Coding Experience; Fewer Have Less than 10 Years Experience

How many years of coding experience do you have?

Legend: 2021 | 2022 | 2023 | 2024

Experience	2021	2022	2023	2024
0-5	23%	20%	17%	14%
6-10	27%	27%	25%	24%
11-15	15%	17%	18%	20%
16-20	9%	9%	9%	13%
21-25	7%	7%	8%	8%
26-30	5%	3%	5%	5%
30+	12%	14%	17%	14%
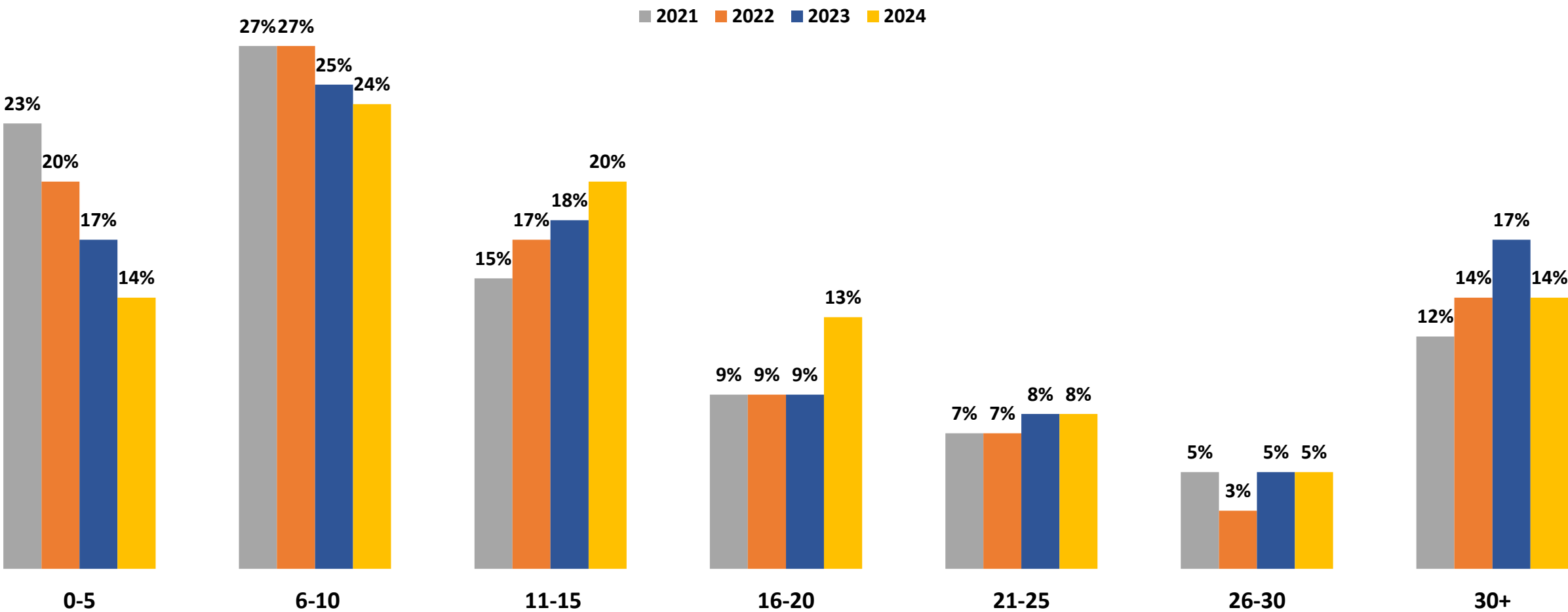
More Julia Users & Developers Are Age 23-35

What is your age?

■ 2021   ■ 2022   ■ 2023   ■ 2024

Age	2021	2022	2023	2024
15-22	8%	7%	4%	2%
23-29	28%	25%	25%	26%
30-35	20%	20%	20%	24%
36-40	11%	12%	13%	13%
41-45	7%	9%	9%	9%
46-50	6%	7%	7%	6%
51-55	5%	7%	7%	6%
56-60	3%	4%	5%	3%
61-65	3%	3%	4%	3%
66-70	1%	2%	2%	3%
70+	2%	1%	1%	1%
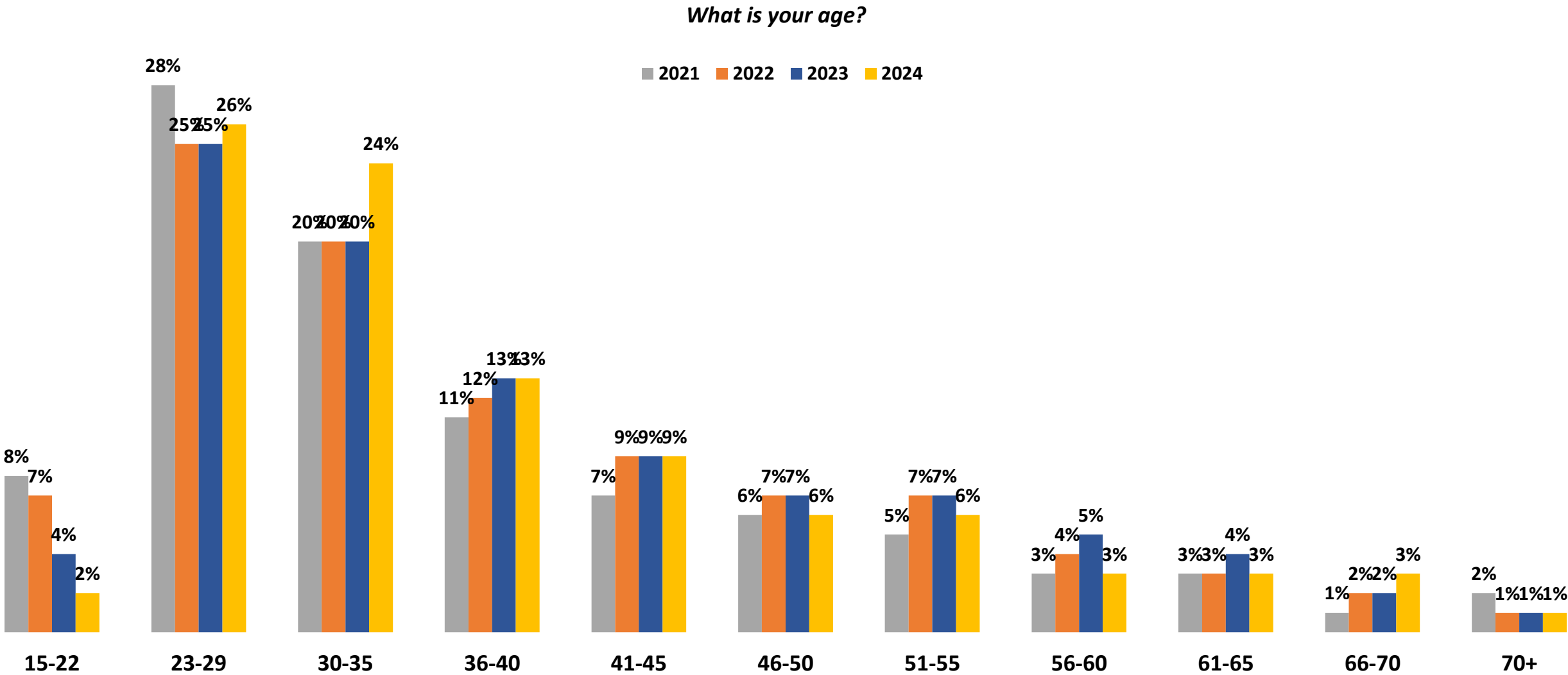
Respondents Live or Work in Nearly 60 Countries and Regions Germany Shows Most Growth

What is the country or region where you currently live or work?

■ 2024 ■ 2023 ■ 2022 ■ 2021

United States: 26%, 26%, 23%, 27%
Germany: 13%, 11%, 7%, 9%
France: 6%, 8%, 4%, 5%
United Kingdom: 5%, 4%, 6%, 5%
Australia: 3%, 3%, 3%, 2%
Canada: 3%, 3%, 3%, 3%
Japan: 3%, 3%, 8%, 2%
China: 2%, 1%, 2%, 8%
Netherlands: 3%, 2%, 3%, 2%
India: 2%, 4%, 7%, 4%
Switzerland: 2%, 2%, 1%, 1%
Sweden: 2%, 2%, 2%, 2%
Spain: 2%, 2%, 1%, 2%
Norway: 1%, 1%, 1%, 2%
Austria: 1%, 1%, 1%, 2%
Denmark: 1%, 1%, 1%, 2%, 2%
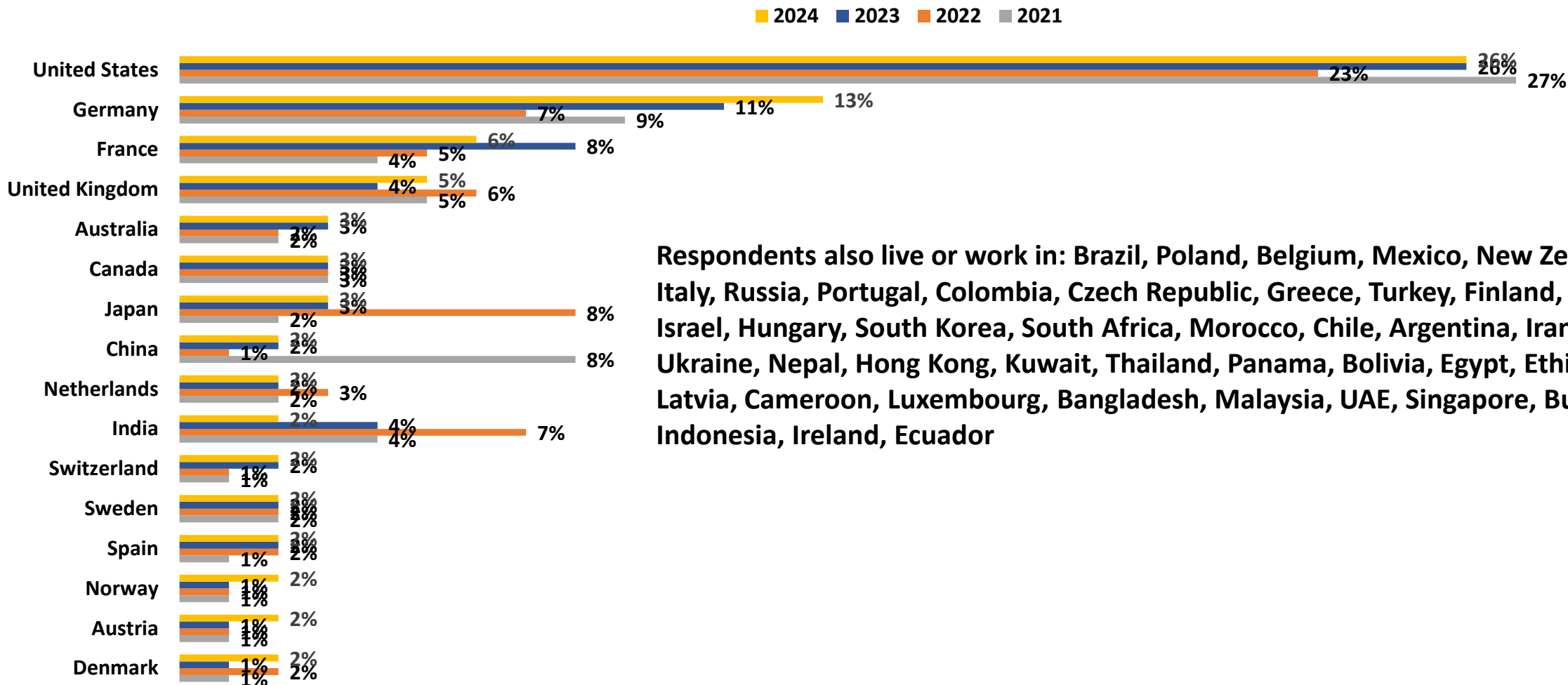
Respondents also live or work in: Brazil, Poland, Belgium, Mexico, New Zealand, Italy, Russia, Portugal, Colombia, Czech Republic, Greece, Turkey, Finland, Romania, Israel, Hungary, South Korea, South Africa, Morocco, Chile, Argentina, Iran, Nigeria, Ukraine, Nepal, Hong Kong, Kuwait, Thailand, Panama, Bolivia, Egypt, Ethiopia, Latvia, Cameroon, Luxembourg, Bangladesh, Malaysia, UAE, Singapore, Bulgaria, Indonesia, Ireland, Ecuador

Respondents Come from More than 70 Countries and Regions

What is the country or region where you are originally from?

■ 2024 ■ 2023 ■ 2022 ■ 2021

United States 21% / 22% / 17% / 21%
Germany 11% / 11% / 6% / 9%
France 6% / 8% / 6% / 5%
China 5% / 3% / 3% / 8%
India 4% / 6% / 9% / 6%
United Kingdom 4% / 3% / 4% / 3%
Australia 2% / 2% / 2% / 3%
Sweden 2% / 2% / 1% / 2%
Italy 2% / 3% / 3% / 3%
Japan 2% / 3% / 8% / 2%
Poland 2% / 1% / 2% / 1%
Spain 2% / 2% / 2% / 2%
Mexico 2% / 2% / 2% / 2%
Brazil 2% / 3% / 3% / 4%
Canada 2% / 3% / 2% / 2%
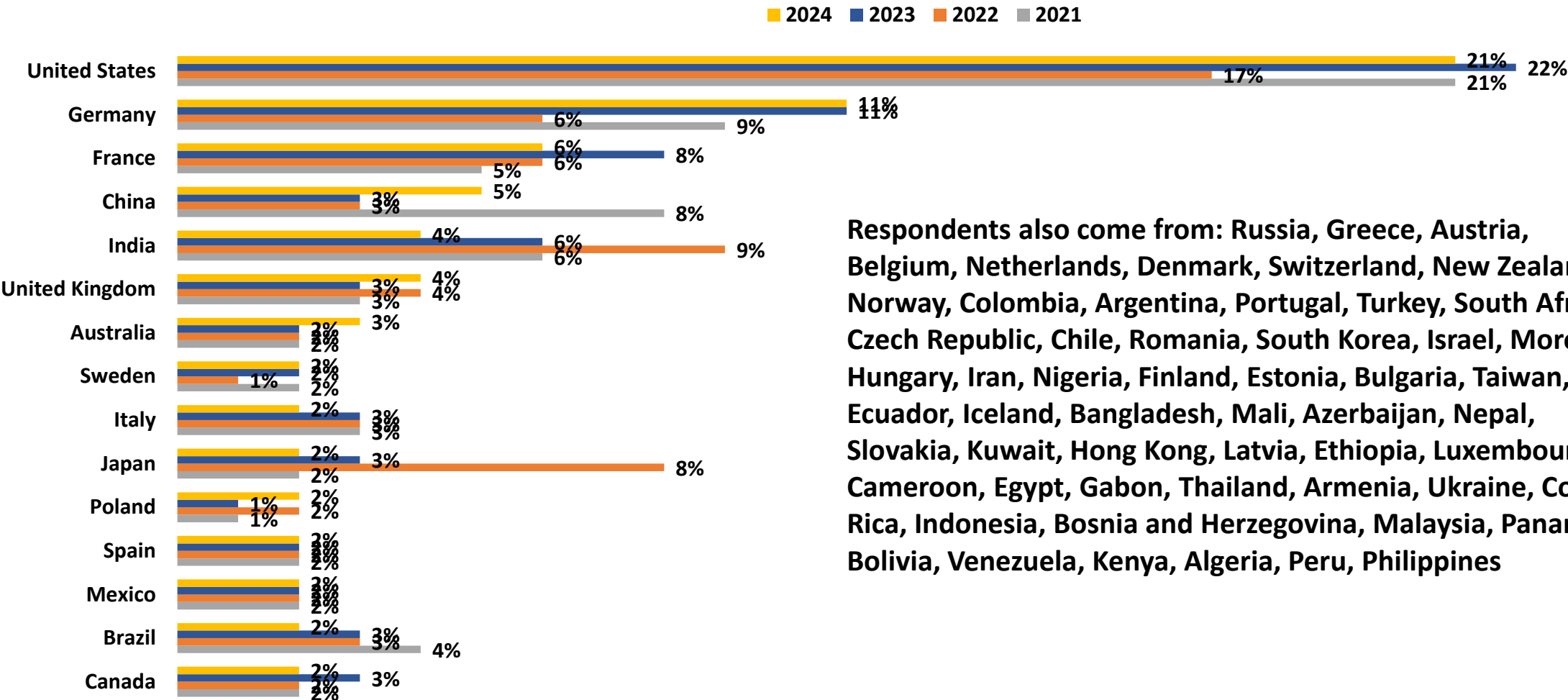
Respondents also come from: Russia, Greece, Austria, Belgium, Netherlands, Denmark, Switzerland, New Zealand, Norway, Colombia, Argentina, Portugal, Turkey, South Africa, Czech Republic, Chile, Romania, South Korea, Israel, Morocco, Hungary, Iran, Nigeria, Finland, Estonia, Bulgaria, Taiwan, Ecuador, Iceland, Bangladesh, Mali, Azerbaijan, Nepal, Slovakia, Kuwait, Hong Kong, Latvia, Ethiopia, Luxembourg, Cameroon, Egypt, Gabon, Thailand, Armenia, Ukraine, Costa Rica, Indonesia, Bosnia and Herzegovina, Malaysia, Panama, Bolivia, Venezuela, Kenya, Algeria, Peru, Philippines

Respondents Are Fluent in More than 50 Languages

In what language(s) are you fluent?

■ 2024 ■ 2023 ■ 2022 ■ 2021 ■ 2020 ■ 2019
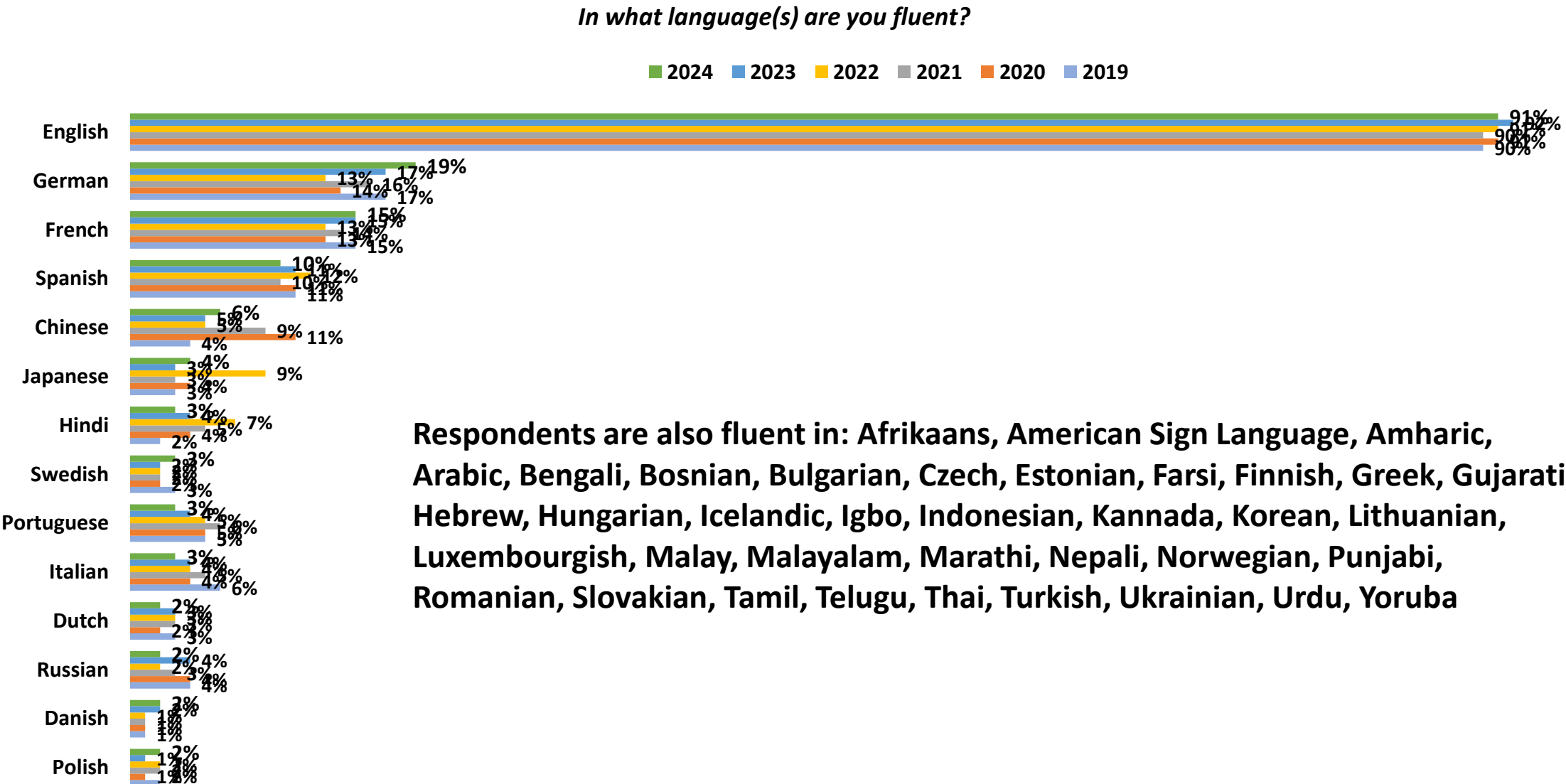
Respondents are also fluent in: Afrikaans, American Sign Language, Amharic, Arabic, Bengali, Bosnian, Bulgarian, Czech, Estonian, Farsi, Finnish, Greek, Gujarati, Hebrew, Hungarian, Icelandic, Igbo, Indonesian, Kannada, Korean, Lithuanian, Luxembourgish, Malay, Malayalam, Marathi, Nepali, Norwegian, Punjabi, Romanian, Slovakian, Tamil, Telugu, Thai, Turkish, Ukrainian, Urdu, Yoruba

Most Respondents Are White or Asian

Which of the following best describes your race or ethnicity?

■ 2019 ■ 2020 ■ 2021 ■ 2022 ■ 2023 ■ 2024

Other responses selected in 2023 include American Indian, Maori and Native Hawaiian or Pacific Islander

	White	Asian	Hispanic	Middle Eastern	Black	Decline to answer
2019	66%	13%	7%	2%	1%	13%
2020	57%	23%	8%	2%	1%	8%
2021	60%	19%	8%	2%	1%	12%
2022	57%	23%	8%	2%	2%	7%
2023	66%	15%	8%	2%	2%	11%
2024	65%	14%	7%	3%	1%	11%

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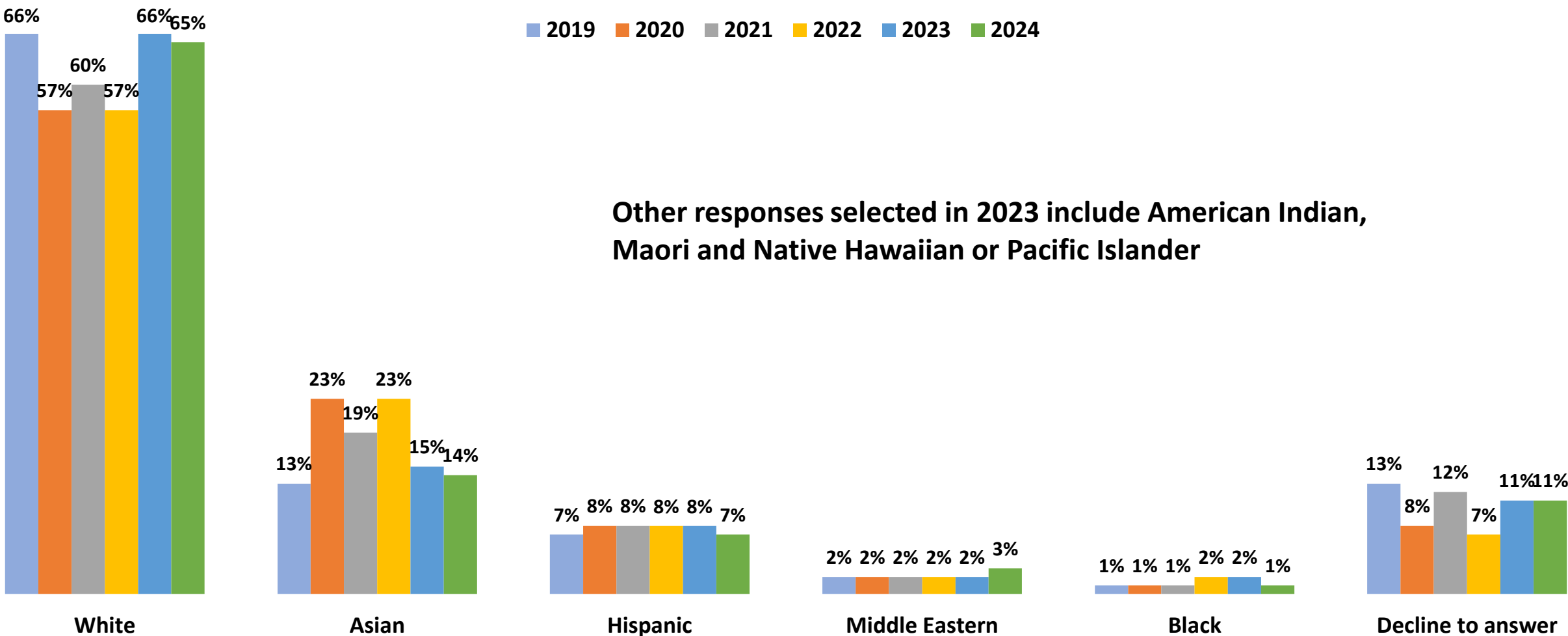
85% Identify as Men, 3% Identify as Women, 2% as Non-Binary and 10% Decline to Answer

Which of the following best describes how you identify?
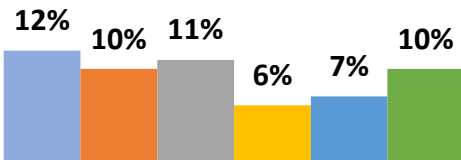
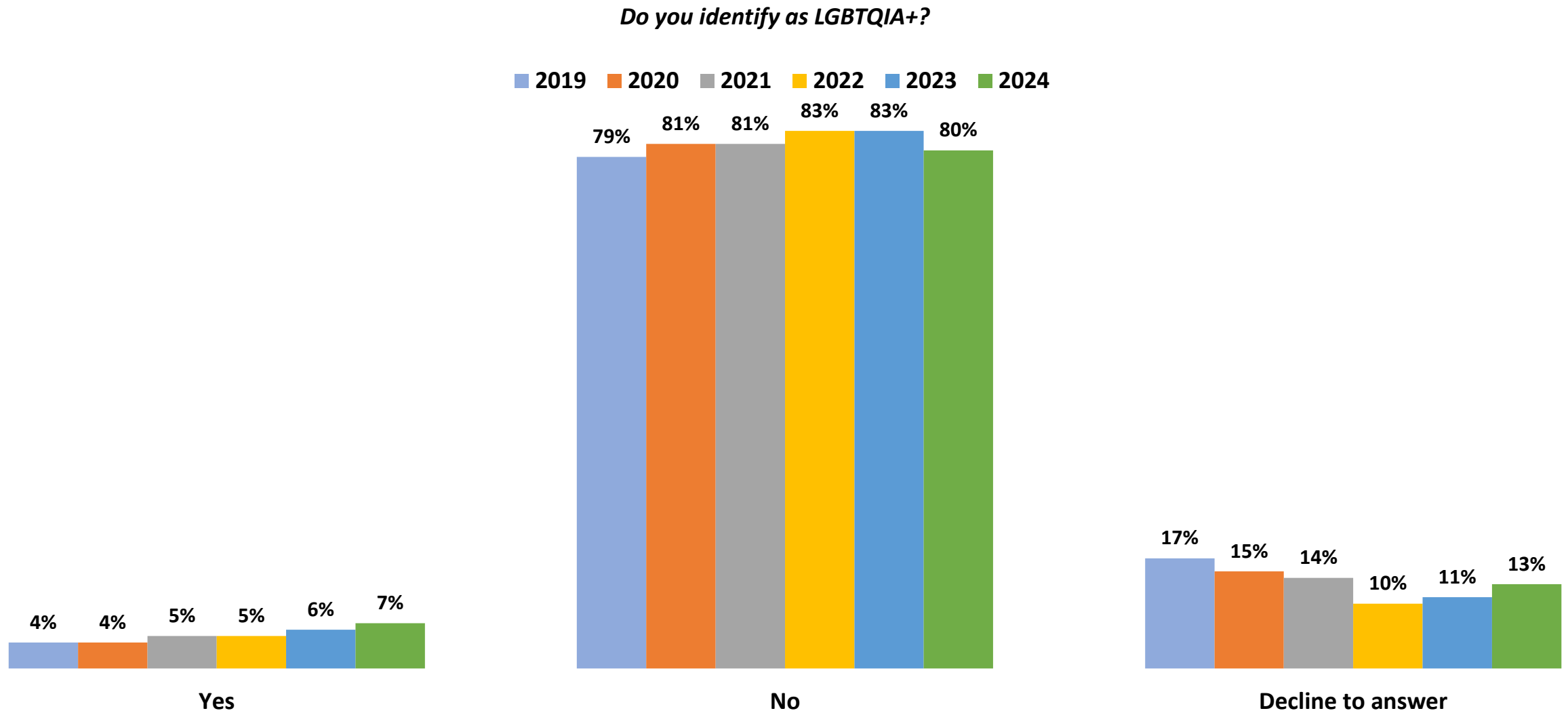■ 2019   ■ 2020   ■ 2021   ■ 2022   ■ 2023   ■ 2024

Man: 85%, 87%, 84%, 87%, 90%, 85%

Woman: 3%, 3%, 4%, 3%, 2%, 3%

Non-binary**: 1%, 1%, 1%, 2%

Decline to answer: 12%, 10%, 11%, 6%, 7%, 10%
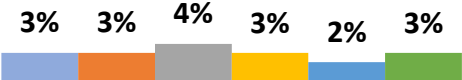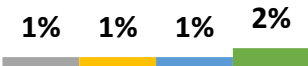
**** Added in 2021**

7% Identify as LGBTQIA+, Up From 4% in 2020

Do you identify as LGBTQIA+?

■ 2019 ■ 2020 ■ 2021 ■ 2022 ■ 2023 ■ 2024

Yes
4% 4% 5% 5% 6% 7%

No
79% 81% 81% 83% 83% 80%

Decline to answer
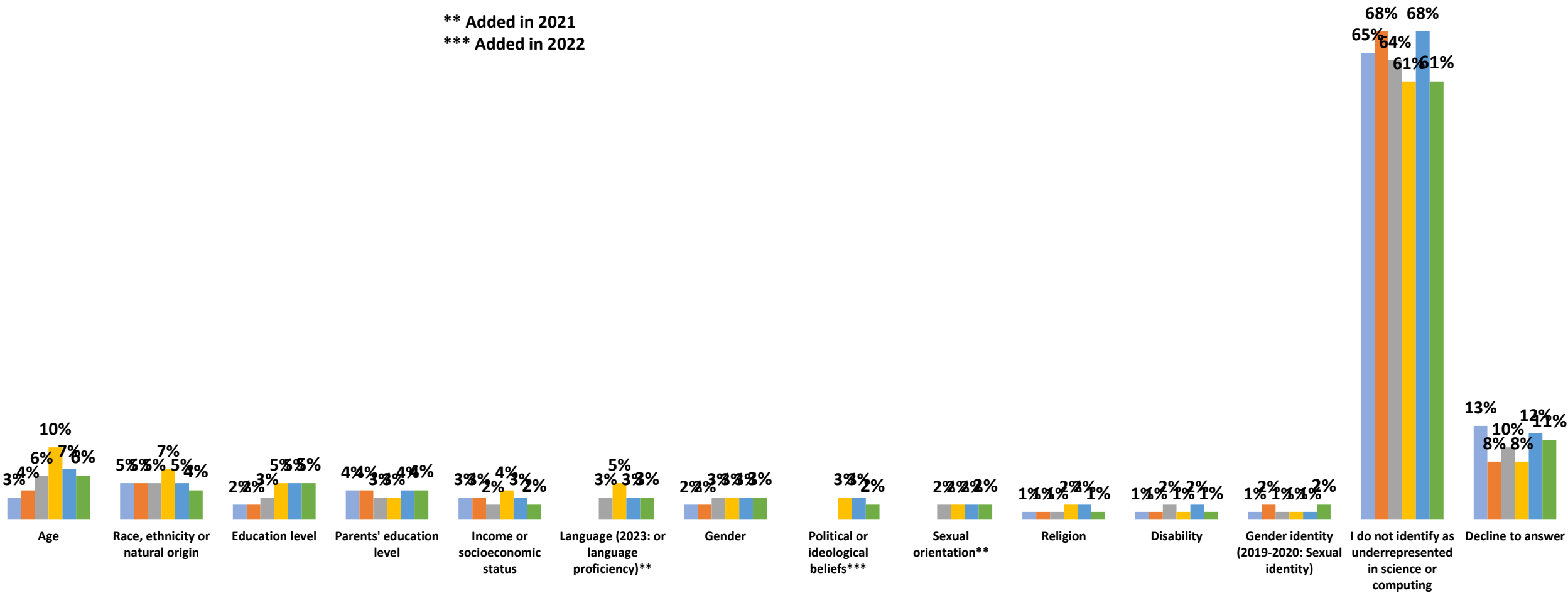17% 15% 14% 10% 11% 13%

19% Identify as Underrepresented in Science or Computing

Do you identify as underrepresented in science or computing because of your:

■ 2019 ■ 2020 ■ 2021 ■ 2022 ■ 2023 ■ 2024

** Added in 2021
*** Added in 2022

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Contact

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