

DEVELOPER ECONOMICS

STATE OF THE DEVELOPER NATION

14TH EDITION

The latest trends from our Q4 2017 survey
of 21,700+ developers

<http://vmob.me/DE4Q17>



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About SlashData™

SlashData™ is the leading analyst company in the developer economy, tracking global software developer trends based on more than 40,000 software developers annually in over 160 countries. Our surveys track the changing landscape of mobile, IoT, desktop, cloud, web, AR, VR, games, machine learning developers and data scientists.

Our mantra: We help the world understand developers – and developers understand the world.

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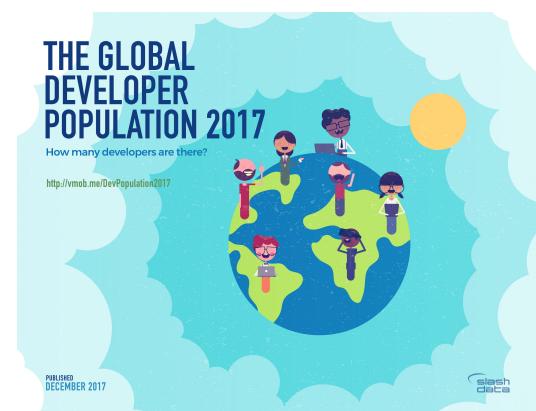
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ABOUT THIS REPORT

Developer Economics is the leading research programme on mobile, desktop, IoT, cloud, web, game, augmented and virtual reality, and Machine Learning developers as well as data scientists, tracking the developer experience across platforms, revenues, apps, languages, tools, APIs, segments and regions.

The 14th Developer Economics global survey wave ran from November to December 2017 and reached more than 21,700 developers in 169 countries. This research report delves into key developer trends for 2018.

The report focuses on four major themes – each with its own visualisation, showing how the data lends insight into the developer community.

1. In case you have not heard, the future is AI. Our first chapter looks at six emerging technologies, how each market is developing and which technology developers believe will make the biggest impact in the next five years. AI plays a central role in each of the technologies analysed.
2. Developers are increasingly adopting serverless platforms to reduce cost by paying for only what they use. This chapter looks at adoption trends, satisfaction level and which vendors are leading the way.
3. In our chapter on Augmented and Virtual Reality, we envisage Augmented Reality as an emerging battleground

for developer mindshare, with both Apple and Google releasing built-in AR on their smartphone platforms. Dedicated hardware for AR/VR is still of limited interest to developers other than professional games developers, and most are instead targeting the devices that consumers already use: smartphones and desktops.

4. Programming languages are often the kernels of strong communities and the subject of opinionated debate. Understanding how widely a programming language is used can be hard. For the first time, we present estimates for the number of active software developers using a dozen major programming languages, across the globe and across all kinds of programmers.

We hope you'll enjoy this report and find the insights useful! If you have any questions or comments, or are looking for additional data, you can get in touch with Miljana Mitic, Digital Marketing Executive for SlashData at miljana@slashdata.co. You can download this free report at www.DeveloperEconomics.com/go.

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Thank you

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IoT Korea Meetup, Beijing Python, Greece JS, The Web Meetup Australia, JSLovers, CocoaHeads Shanghai, Hackerspace Mumbai, the Hardware massive community, Software Craftmanship Turkey and Docker Athens. Also thank you to our affiliates who helped share the survey including Una Softic, Caven Cade Mitchel, Jesus Fernandez, Lorenzo Barbieri, Okeowo Aderemi and the team at Netstudio.

PARTNERS

SlashData is proud to be supported by a global network of partners, from global tech companies to local meetups and specialized developer communities. Our partners help us ensure that all developer segments are adequately represented in our sample, so that true value is delivered to the global community.

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KEY INSIGHTS

- Half of developers believe that advancements in self-driving cars will make the most impact in the next five years. Investment and promises are driving expectations high, but there is still a long way to go to get to full autonomy.
- Machine Learning and AI are underlying technologies that will fuel a new wave of innovation. From AR to chatbots and autonomous drones and brain computer interfaces, all are enabled in some way by Machine Learning and AI. This shift is requiring new and more diverse skillsets from developers that include mechanical engineering and biology, mathematics, probability and statistics. Our research shows that 30% of developers are involved in AI development projects.
- Adoption of serverless platforms is growing quickly. Nineteen percent of backend developers are using serverless platforms - up from 16% just 6 months ago. This level of penetration is almost on par with VMs with 20% of backend developers using virtual machines.
- Amazon is establishing a commanding lead in this emerging market with 44% of developers who use serverless platforms choosing Amazon Lambda, with the #2 vendor (Microsoft Azure Functions) only being used by 25% of developers. Amazon also lead in Net Promoter Scores (NPS) and satisfaction scores.
- Illustrating an ongoing level of interest, 25% of professional game developers say they are targeting AR and/or VR; the same percentage as reported by our previous survey. This figure falls slightly to 19% across the entire corpus of developers surveyed.
- Dedicated VR hardware, such as Oculus Rift, is attractive to games developers (61% report using it), but across all developers working on VR projects, we see a much lower uptake (33%), reflecting its early adopter status in fields other than games. Across all developers working on VR projects, 32% are targeting smartphone hardware using Google's Cardboard, and 19% are using Daydream View, built into Android Nougat and beyond, reflecting that developers, and consumers, are still experimenting with the technology on their existing hardware.
- A similar picture emerges for AR, with Android and iOS taking the lead in most popular AR platforms across all developers targeting AR. Google and Apple have each released SDKs with AR built-in, while third parties such as Unity and Unreal still show considerable appeal for cross-platform development. Of the dedicated AR hardware available, Microsoft HoloLens leads the pack, with Google Glass at Work and MagicLeap trailing behind.

- JavaScript is the most popular programming language, used by close to ten million developers. That's 2.4M developers more than the next most-popular language. Furthermore, the JavaScript community is growing fast.
- Python has reached 6.3M active developers and is climbing up the ranks, recently surpassing C# in popularity. The rise of Machine Learning is a factor in its popularity. More niche languages like Swift, Ruby, or Lua don't seem to be adding many developers, however.

1 IN CASE YOU HAVE NOT HEARD, THE FUTURE IS AI

The explosion of data and our ability to collect and process it is creating a fundamentally new wave of innovation that reimagines how humans engage with computers. Breakthroughs in Machine Learning and AI are enabling machines to do more for themselves with fewer explicit instructions from the user and are supporting new ways for humans to engage with machines.

Historically, advancements in human machine interfaces have precipitated a new wave of innovation. The invention of the mouse and touch screen are two more recent examples. As part of our 14th Developers Economics survey, we asked developers what they believe will be the next big technology breakthrough(s) that will have a global impact in the next 5 years. Each one of these technologies has a AI and Machine Learning component to it and is focused on tackling difficult problems.

Half of developers think self-driving cars will have the most impact

The direction of innovation today is less about smaller more powerful machines and connecting and communicating. It's about redefining how computers and people work together. While early

breakthroughs are exciting, perfecting these technologies is still a long way off. With so much work to be done AI is becoming an increasing part of software development, providing new opportunities. The fact that thirty percent of developers in our survey are involved in AI development and projects is an indication of the impact AI is already making.

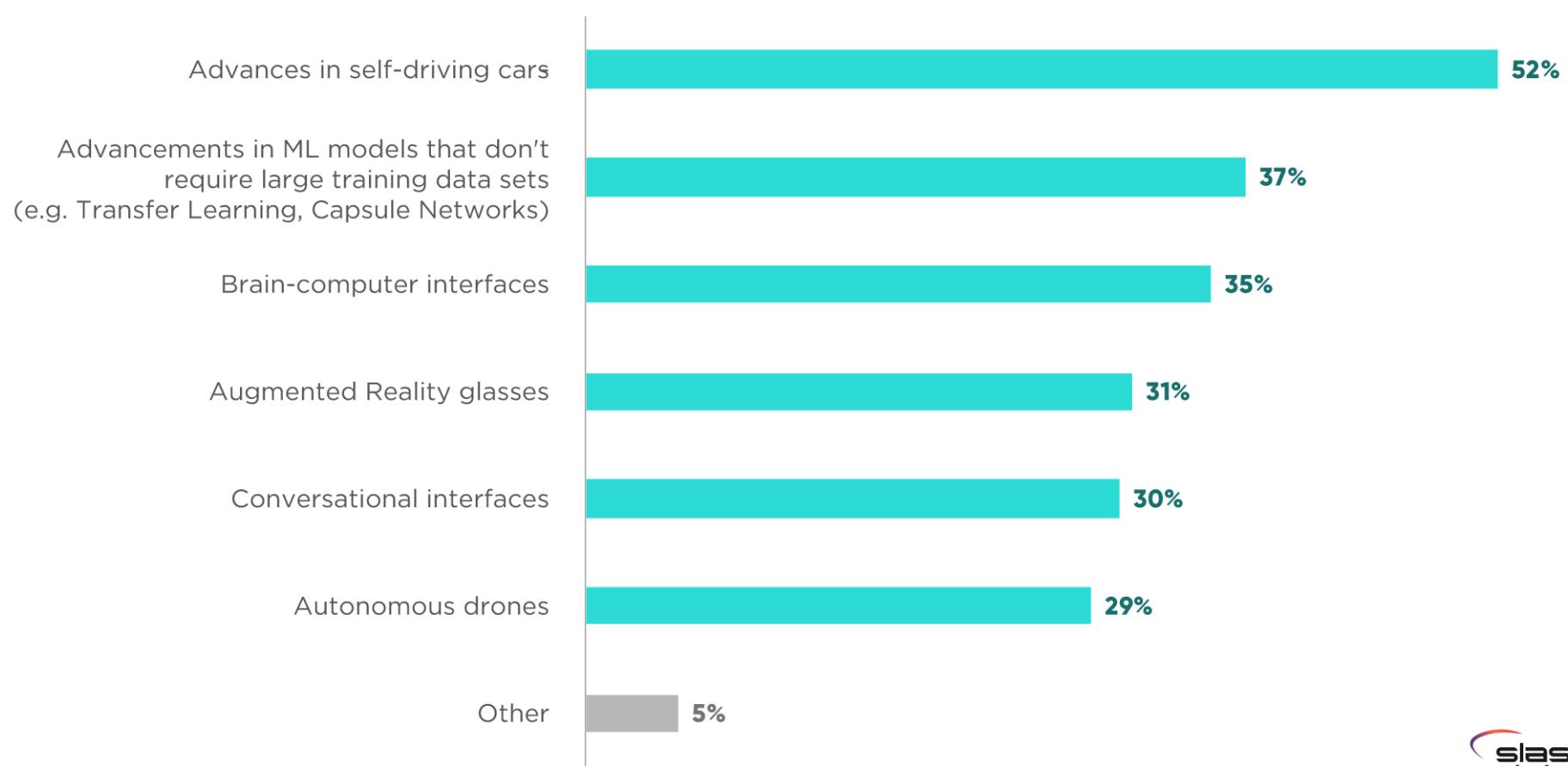
Detroit is setting high expectations for self-driving cars

Half of developers think advancements in self-driving cars will have the most impact in the next five years. This space is moving at a lightning pace and billions of dollars are being invested in it. For example, Ford has invested \$1 billion in ARGO AI, an artificial intelligence company, and both Ford and GM are investing hundreds of millions in Lidar Radar manufacturers.

HALF OF DEVELOPERS THINK SELF-DRIVING CARS WILL HAVE THE MOST IMPACT

% of developers (n= 14,904)

Half of developers think advances in self-driving cars will have the most impact



Along with large investments, the big auto manufacturers are making aggressive promises about when autonomous cars will come to market. Audi has already released the first level 3 autonomous car and GM is promising a fleet of level 4 cars in 2019. Getting to level 5 autonomous cars or ones that require no human interaction may take longer but Ford plans to release a level 5 car for fleet applications by 2021. Two years ago Elon Musk predicted Tesla would have a totally autonomous car in two years. This obviously has not happened and the company has admitted they need to redesign their approach to reach just level 4 autonomy. This is an indicator on how unpredictable and challenging it is to reach full autonomy, making the likelihood that today's forecasts will change very high.

One of the challenges is finding developers with the diversity of skills to program driverless cars. Developers need to know how to write code as well as understand auto engineering, statistics & probability, Machine Learning and mathematics. To create fully autonomous cars and perfect the experience will require more specialised skill sets. While the top jobs will go to the most skilled professionals, the adoption of the driverless car will create opportunities for developers to digitally engage with passengers and optimise the movement and flow of vehicles. Data collection and detailed mapping will also be required to incorporate road changes and ensure rural maps are accurate.

BCI and advanced Machine Learning models are in early stages but will have broad impact

Advances in brain computer interfaces (BCI) and Machine Learning models also captured the attention of developers. Thirty seven percent of developers feel that one of these technologies is the next big thing.

Last year was a coming out year for BCI technologies as innovators and capital focused on this cutting edge field. Elon Musk,

Facebook, Darpa and Bryan Johnson, the founder of Braintree, are making significant investments in BCI. These technologies are able to capture, read and translate brainwaves so computers can understand our thoughts. Participants are taking multiple approaches. At one end of the spectrum are painful high integration strategies that implant electrodes in people's brains to sense electrical signals created by synapses within the brain. At the other end of the spectrum innovators are taking less invasive approaches such as reading brain signals from the spinal column or thought EEG electrodes placed on the surface of the skull. Facebook is also developing non-invasive brain scanning technologies that use lasers to read the changing properties of neurons as they fire.

Today's applications are focused on the healthcare field helping disabled people regain control of their body for greater mobility or communication. The first round of consumer oriented interfaces will be more binary and continue to leverage language as a protocol. Think typing a quick text or controlling an AR experience with only your brain. The vision of the more distant future is to directly communicate thoughts circumventing the limitations of human language.

Machine Learning and Artificial Intelligence are all the rage spurred by advances in neural networks, supervised learning and easy access to data and processing resources to train AI models. The challenge with today's neural networks is they are unable to retain, pass on or apply knowledge gained in one process to another. Consequently context and relationships are lost. Emerging Machine Learning models, architectures and techniques are enabling gained knowledge to be retained and transferred from one process to another reducing the amount of training required, enabling better outcomes with less data. Transfer learning and capsule networks are in very early stages so while they may have an impact in the next five years, their full impact will presumably be felt further into the future as computers become able to retain more of what they learn. AI is also enabling a large majority of emerging technologies from AR to conversational interfaces to self driving cars. This underlying technology will no doubt have far reaching implications that we could not possibly imagine today.

AR glasses and chatbots are already making an impact

With both of these technologies around for a few years, mistakes have been made and lessons learned. Bulky headgear has relegated AR glasses to applications in engineering and logistics. This niche status has lead Intel to create more socially acceptable AR glasses, called Vaunt. Using projector technology and custom engineering, Intel has created smart glasses that are less intrusive and better looking. Microsoft has also announced a less bulky prototype using lasers and projectors. Big promises with little detail from Magic Leap are also elevating expectations.

Conversational interfaces are as old as the classic IVR systems but advances in Natural Language Processing (NLP) have enabled computers to perform much better in understanding language. These innovations have already had huge impacts in the customer service segment. As chatbots are integrated deeper into existing systems they are gaining more utility. They are accessing more and more data and are increasingly integrated into existing interfaces to augment humans and improve experiences.

Where there is much more opportunity to grow is in chatbots' ability to understand our intentions and self learn. Chatbots still get confused when users go off script. Improvement will be incremental as both algorithms and AI technology get better at learning and creating new scripts without direct human intervention.

With these technologies well established, there are many developers focused on them, helping to accelerate innovation and growth. Twenty percent of Machine Learning developers are working on NLP or chatbots and of all developers in our survey 15% are working on AR projects.

Regulations restrict mass adoption of autonomous drones

Twenty nine percent of developers thought that autonomous drones would have an important impact in the next five years. Amazon's drone delivery program is probably the best known application of these vehicles. While Amazon has demonstrated a successful drone delivery, scaling a complete logistics network will require a lot more work addressing infrastructure requirements, regulations and safety. A product that is closer to market is an autonomous drone that can follow a user to film them, a selfie GoPro drone. The impact of these innovations may be less dramatic as making drones autonomous is an incremental improvement to man-operated drones. Also, getting an Amazon package in 30 minutes is nice but it does not change the world. While autonomous drones may not have the same impact as self-driving cars, many niche applications will emerge as drone pilots are replaced by robots, creating new opportunities for developers.

Five percent of respondents had additional ideas about technologies that will have an impact and wrote in what they thought the next big technology would be. While there were many different responses, common technologies mentioned were quantum computing and blockchain/cryptocurrency.

Predicting how technology will evolve and how much of an impact it will make is always a challenging exercise. The only thing that is certain is that technology will drive change and innovation creates excitement and new opportunities.

2 A SERVERLESS REVOLUTION

The serverless movement has generated quite a lot of buzz, but is it really taking off? The name “serverless” seems to be sticking. It’s a reference to the fact that developers don’t need to care about the underlying servers running their code, the cloud platform provider handles all the maintenance and scaling issues.

Other names for this technology perhaps describe it better - cloud functions, or functions-as-a-service. Although Microsoft launched Azure WebJobs in early 2014, Amazon has been driving this technology direction since the launch of AWS Lambda in late 2014. Microsoft and Google responded with their Azure Functions and Cloud Functions products respectively in 2016 and have been racing to catch up Amazon’s 2-year head start ever since.

We’re seeing significant adoption of the technology in general, with 19% of backend developers saying they use it, versus 20% that use virtual machine Infrastructure as a Service. While the latter almost certainly gets much heavier use currently, the breadth of adoption for serverless computing is significant and growing (it was 16% just 6 months ago). Its greatest advantage in gaining adoption is also its weakness. It can be adopted piecemeal, starting with just a single function to supplement an existing app. However, deeper adoption is likely to be restricted to new apps, since the serverless paradigm

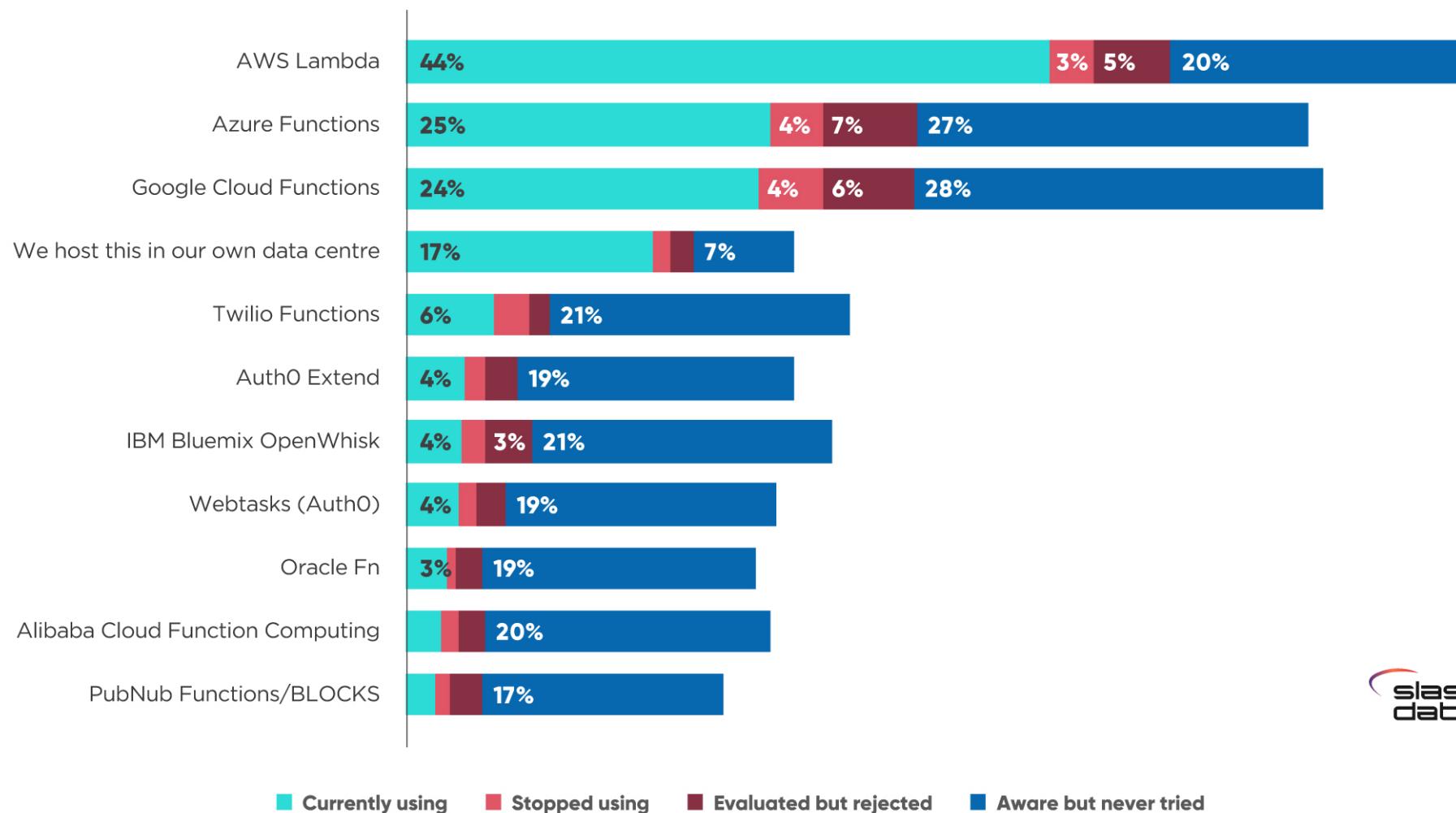
forces a microservices architecture and many developers won’t be willing or able to migrate.

For those that can make the shift there are potentially significant economic benefits. An application with constant load on the server would be significantly more expensive to run on serverless infrastructure, but constant load is unusual. The majority of applications out there are small and have light usage since most of the time they’re doing nothing. In those situations a serverless backend would usually be much cheaper to run for the developer, and also enable the cloud provider to realise massive cost savings through more efficient use of resources across multiple users. Larger, more heavily used applications can also benefit from very efficient scaling, only needing to pay for extra resources for the specific parts of the application under heavy load, and also more easily able to identify and optimise those. This advantage for larger applications is probably a major reason we see 17% of current

44% OF DEVELOPERS USING SERVERLESS COMPUTING PLATFORMS CHOOSE AWS LAMBDA

% of developers using serverless computing platforms (n=1,075)

Usage and awareness of serverless computing platforms



serverless computing adopters running a solution in their own data centre.

The serverless developers who use public cloud solutions are favouring AWS Lambda over its rivals; 44% are currently using AWS Lambda, versus 25% for Azure Functions and 24% for Google Cloud Functions. There are multiple smaller (e.g. PubNub Functions, Webtasks) and niche (e.g. Twilio Functions, Auth0 Extend) providers, but none of them have more than 6% mindshare. AWS Lambda also has fewer developers who have evaluated but rejected, or stopped using the platform (8% total) versus Microsoft and Google's alternatives (just over 10% each), a small difference but quite significant considering Amazon has so many more total users. That said, the level of failed evaluations and churn is very low across the category. This will partly be due to satisfaction levels with the services, but also extensive use of serverless to extend existing apps where consideration of an alternative cloud platform to the main application is relatively unlikely. This has helped Google catch up with Azure in the last year, as the integration of Cloud Functions with their popular Firebase Backend as a Service enabled more developers to adopt the service easily.

If developers start comparing serverless computing platforms more widely, then our data suggests that AWS Lambda is going to extend its lead. We measured satisfaction across 13 different attributes per vendor and calculated an attribute importance-weighted overall score. We also captured a more high-level Net Promoter Score

(NPS) for each of the platforms, showing how likely developers were to recommend their platform to their peers. AWS leads on both satisfaction (34) and NPS (32) versus Azure (satisfaction 27, NPS 28) and Google (satisfaction 25, NPS 24). Other vendors all scored significantly lower than the leading three, so this looks like a market that will continue to be dominated by the cloud giants. There are some interesting differences between platforms, with AWS currently being ahead on features, while Google currently lacks some quite critical ones, like support for HTTPS triggers. Meanwhile Google provides a better developer experience out of the box, whereas AWS has largely outsourced theirs to the open source community, with multiple frameworks available to make it easier to work with their API.

With developer adoption already quite high, rapidly maturing solutions from the top three cloud platforms, and relatively high levels of satisfaction with what already exists, we may well be witnessing the beginning of a serverless revolution. Awareness is relatively high. More than 60% of all serverless users are aware of at least the top three vendors. Awareness is high across all solutions including the very new ones, suggesting there are many developers who have a broad active interest in the serverless space, rather than just solving a specific problem with the technology. With all of the major vendors now uploading video tutorials on YouTube, and AWS increasingly experimenting with LiveStreaming coding demos on Twitch, this is a revolution that will be televised!

3 THE BATTLE FOR THE HEARTS & MINDS OF AR/VR DEVELOPERS

In the Q3 2017 State of the Developer Nation report, we highlighted the fact that as many professional game developers were targeting Virtual Reality (VR) and Augmented Reality (AR) technologies (25%) as were developing games for consoles (23%). VR and AR have continued to show the same level of appeal to the professional game developer community, with the figure steady at 25%. Across the entire corpus of developers surveyed, 19% said they were working with VR and/or AR.

Virtual Reality is still in the early adopter zone

VR is delivered through headsets that immerse the user entirely in the experience. The more powerful tethered systems comprise sophisticated headsets that are wired to a PC or console. These include Oculus Rift (targeted by 61% of game developers working on VR projects) and HTC Vive (running on Steam VR, targeted by 54% of the same group). At present, these products appeal mostly to early adopters. While they are clearly an attractive proposition for professional game developers, our survey found that across the entire group of developers working with VR (that is, beyond the games industry), Oculus Rift attracted a lower figure of 33%, and likewise Steam VR, which is down to 23%.

Mobile VR uses a relatively cheap headset and frees the user from the cable tether. This appeals to a broader range of users who can try it out using a smartphone they already own. From our survey, Google's Cardboard (launched in mid-2014) is targeted by 42% of game developers working with VR, and by 32% of all developers working with VR, coming a close second to Oculus Rift. Google's follow up to Cardboard, Daydream View, is also popular, attracting 33% of game developers working with VR, and 19% of all VR developers answering our survey. Daydream View is built into Android (version Nougat and later) and works on Google's Pixel phones and others such as the Samsung Galaxy S8. A standalone Daydream device from Lenovo is anticipated later in 2018.

Microsoft launched their Windows Mixed Reality (formerly Windows Holographic) platform in October 2017. Despite its name, it allows developers to build a fully immersive VR

experience, delivered at launch by headsets from third parties such as Acer, Dell, HP, and Lenovo. In our survey, 37% of developers identifying as game developers working with VR, are targeting the platform, and 22% of all developers working with VR are using it. This shows strong uptake from the last survey when just 18% of VR games developers reported to be using Windows Holographic, as a result of its launch and the broad selection of hardware already available.

The case for Mixed Reality and Augmented Reality

With the Windows Mixed Reality platform, Microsoft have identified a key factor for developer success. While mobile headsets introduce an accessible product for users to experience VR, they also introduce a problem: when on the move, a user must, for their own safety, be made aware of obstacles such as other people and the confines of their surroundings. Developers need to find a way to blend computer-generated imagery with the real world, which is less of a fully immersive VR experience and closer to the digital augmentation that is traditionally the realm of AR.

The Windows Mixed Reality platform leverages Microsoft's experience with Hololens, which is currently the most targeted dedicated wearable (17.4% of AR developers in our survey). Google Glass was discontinued as a consumer product in 2015, but was resurrected in an Enterprise Edition (Google Glass at Work) in mid-2017. It is targeted by 8.8% of AR developers (down from 11.7% in our last survey), making it the second most popular dedicated wearable. The much-hyped Magic Leap hardware, announced during the survey, attracts a low 4.5% of AR developers, which is to be expected while there is no public SDK available.

In much the same way as dedicated VR hardware, the dedicated AR headsets described appeal mostly to early adopters or specific target groups, and developers are clearly looking for a broader audience. Smartphones are capable of delivering a powerful AR experience, and it is there that we are seeing a battle for developer mindshare playing out between Apple and Google.

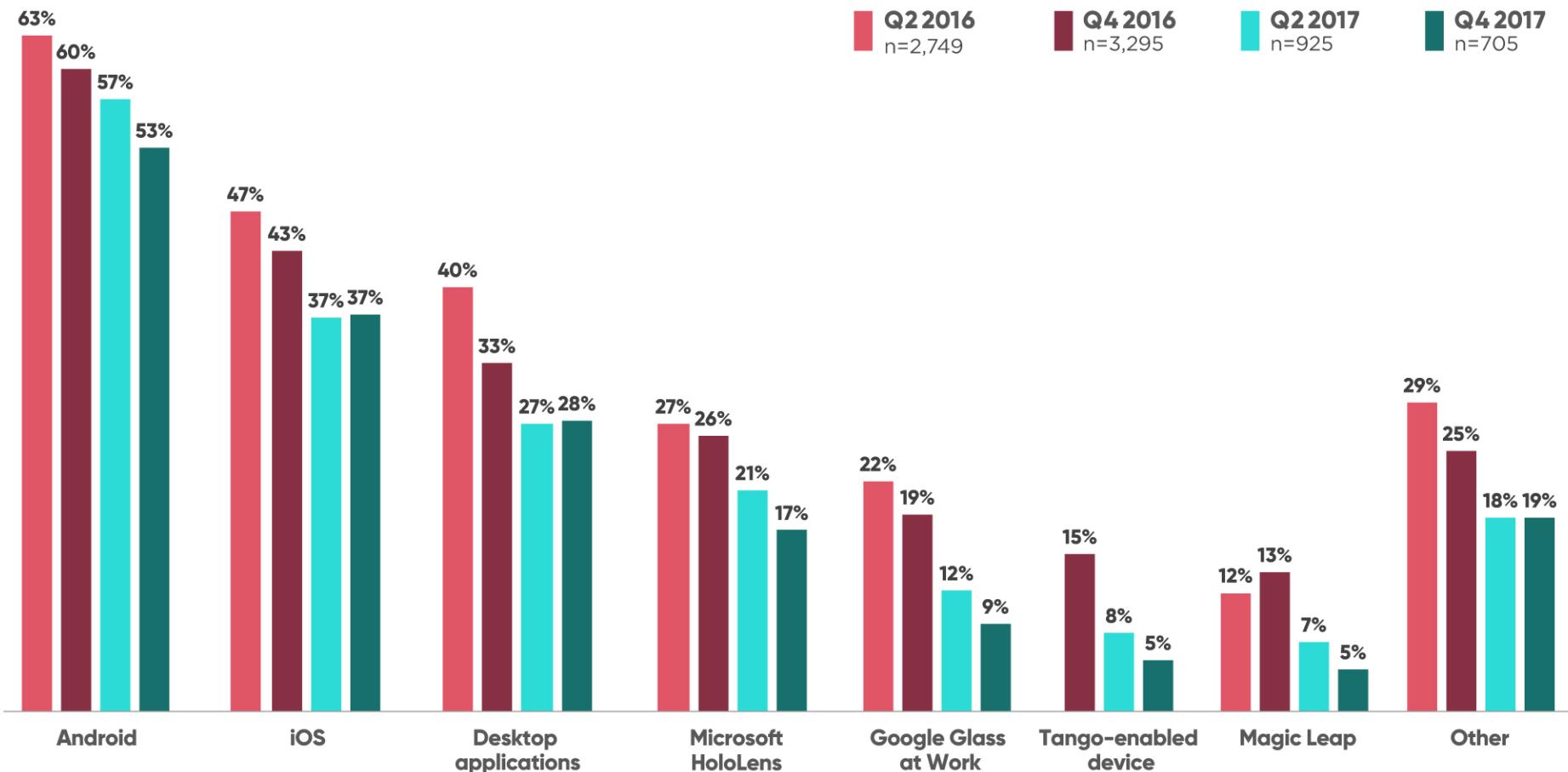
Smartphone AR platforms

Android is the most popular AR platform, targeted by 53% of all developers working on AR apps (down slightly from 57% in our last survey) and by 60% of professional AR developers. Comparatively, Apple's iOS is in second place with 37% mindshare among all AR developers, but a significant 54% of professional AR developers. This is consistent with patterns we have described previously for mobile app development, because the iOS user demographic and revenue potential is highly attractive to the professional developer community.

Both Apple and Google envisage third-party apps and services that use AR as valuable additions to their app stores. Successful apps add billions to the top line (Apple was expected to make \$3 billion revenue over 2 years from in-app purchases within the best known AR title to date, *Pokémon Go*) and high-profile AR apps also strengthen the ecosystems of both companies, boosting other revenue streams. To facilitate third-party AR development, Apple launched ARKit with iOS11 in Q3 2017, providing AR support to all updated iPhones from the 6S onwards and instantly offering developers a sizeable addressable market for AR apps and services. Our survey data reports that it is now the most well-known or well-used AR platform, with 36.5% of all AR developers being aware of, or using it (rising to 45.2% for professional AR developers).

AUGMENTED REALITY MINDSHARE SHOWS HIGHEST CONCENTRATION ON SMARTPHONE PLATFORMS

% of Augmented Reality developers developing for each AR device



In comparison, Google's Project Tango has a limited addressable market since it requires specialised hardware, and consequently, developer interest has waned, shown by our recent surveys (down from 15.1% of developers 12 months ago, to 5.3% in this survey). In December 2017, while our survey was open, Google announced that Tango will be deprecated from March 2018, in favour of its ARCore platform. ARCore v1.0 officially launched at Mobile World Congress in February 2018, and is available in approximately 100 million existing handsets such as Samsung's Galaxy S8 and Google's Pixel range of smartphones, with other manufacturers partnering to ensure ARCore support in handsets upcoming in 2018.

Our survey indicates developer interest and awareness of ARCore at 18.8% for all AR developers, rising to 27% for professionals. The platform is currently in third place in AR platform rankings behind Vuforia. The latter stands at 15% for all AR developers but a high 39.4% for professional developers. The disparity in Vuforia's uptake between all AR developers and just professionals is to be expected because of the license fee it commands.

An additional point to note is that game engines like Unity and Unreal allow AR developers to hedge their bets and stick with a cross-platform solution while Google and Apple's smartphone platforms mature. This is reflected in the high percentages of AR developers reporting to be working with C# (47.4% on Android and 46.6% on iOS) and C++ (35.2% on Android, 30.6% on iOS) in our survey. However, we see the recent introduction of ARKit by Apple and upcoming arrival of Google's ARCore as their intent to extend the dominance of smartphone platforms in AR and Mixed Reality, and we will continue to track the metrics for developer uptake in future surveys. Meanwhile, alongside the battle for smartphone platform supremacy, a separate battle is playing out for mindshare between Microsoft, Google and Magic Leap for control of the dedicated wearable developer ecosystem, and we will continue to observe the fortunes of these headsets in coming surveys.

4 SIZING PROGRAM LANGUAGE COMMUNITIES

Who cares which programming language is the most popular? As it turns out, many people do! Developers care because they want to keep their skills up to date; and tool makers want to make sure they provide the most useful SDKs. We all know that programming languages are often the kernels of strong communities and the subject of opinionated debate.

Understanding how widely used a programming language is can be hard. The indices available from players like Tiobe, Redmonk, Stack Overflow's yearly survey, or Github's Octoverse are great, but mostly offer only relative comparisons between languages, providing no sense of the absolute size of each community. They may also be biased geographically, or skew towards certain fields of software development, or open source developers.

The estimates we present here look at active software developers using each programming language, across the globe and across all kinds of programmers. They are based on two pieces of data. First, our independent estimate of the global number of software developers, which we published for the first time in late 2017. Second, our large-scale, low-bias surveys which reach more than 20,000 developers every six months. In the survey, we consistently ask developers about their use of programming languages across nine areas of development¹, giving us rich and reliable information about who uses each language and in which context.

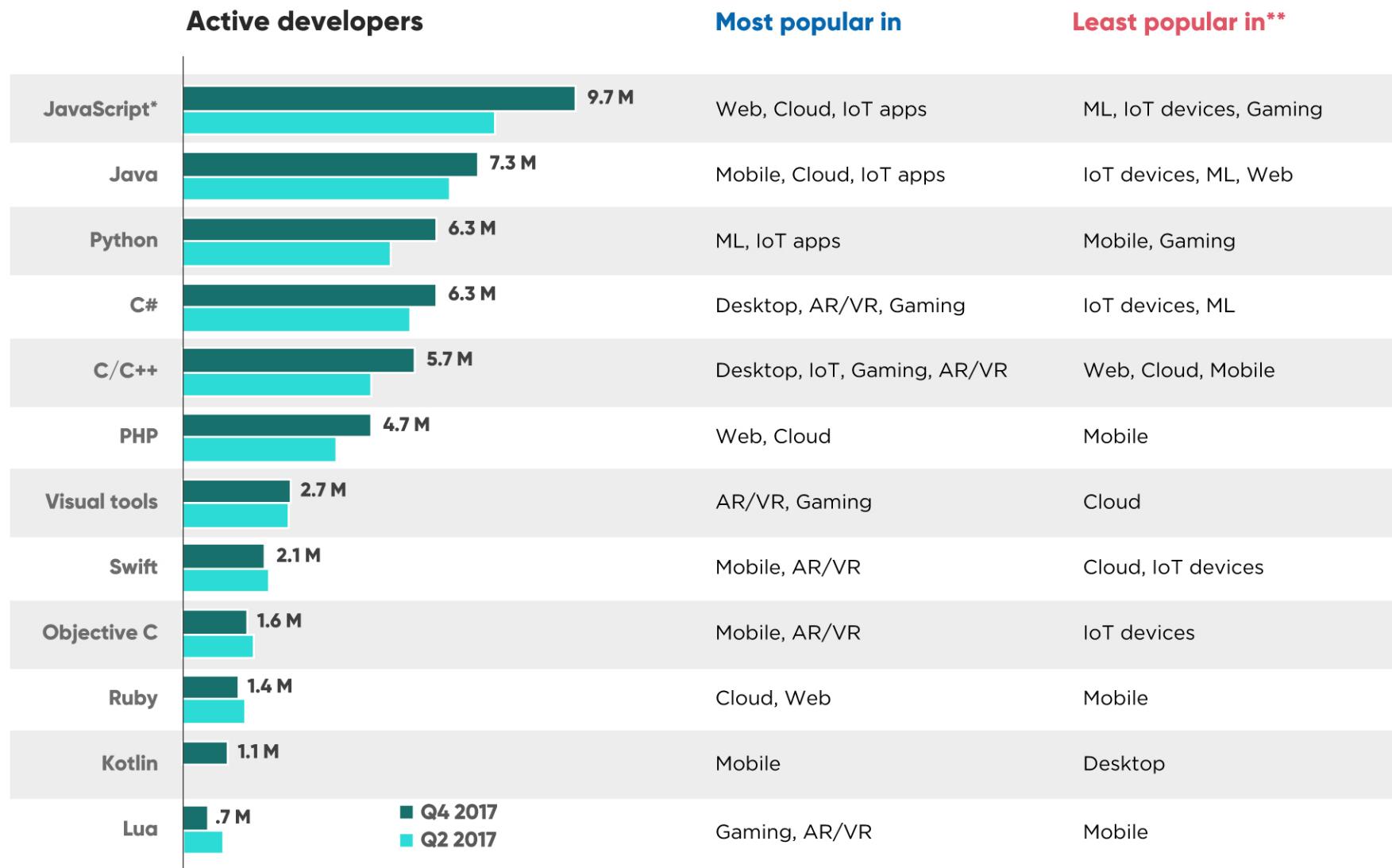
Without further ado, let's dig in to the data.

JavaScript is the most popular programming language, used by close to ten million developers. That's 2.4M developers more than the next most-popular language. Furthermore, the JavaScript community is growing fast. New developers see it as an attractive entry-level language, but also existing developers are adding it to their skillset. As you would expect, JavaScript is most used for frontend (web) apps and much less in performance-sensitive areas like gaming or IoT devices (despite efforts like Tessel or Espruino).

¹ We have programming language information for each of the following fields: web, cloud, mobile, desktop, IoT applications, IoT device-side code, game development, AR/VR, and Machine Learning & Data Science. In this report, we look at broadly used languages, present in 6 or more of these areas, counting developers who use each language in at least one of them.

JAVASCRIPT IS THE MOST POPULAR PROGRAMMING LANGUAGE

Number of active software developers globally, in millions, Q4 2017 (n=14,018)



(*) JavaScript includes CoffeeScript, TypeScript

(**) The 'least popular' column only includes sectors for which we have data on the language in question.



Java (7.3M active developers), C# (6.3M), and C/C++ (5.7M) are all in the top 5 and fairly close together in terms of community size. Java is very popular in the mobile ecosystem and its offshoots (Android), but not for IoT devices. C# is a core part of the Microsoft ecosystem. Throughout our research, we see consistent correlation between the use of C# and the use of Microsoft developer products. It's no surprise to see desktop and AR/VR (Hololens) as areas where C# is popular. C/C++ is a core language for game engines and in IoT, where performance and low-level access matter (AR/VR exists on the boundary between games and IoT). The rise of AR/VR and IoT boosts C/C++ usage.

Python has reached 6.3M active developers and is climbing up the ranks, recently surpassing C# in popularity. The rise of Machine Learning is a factor in its popularity.

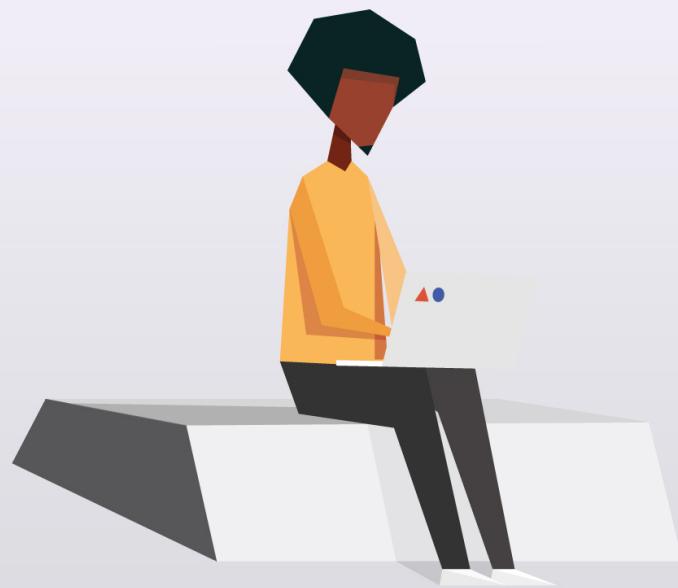
More niche languages don't seem to be adding many developers. Swift and Objective C are important languages to the Apple community, but are stable in terms of the number of developers that use them. Ruby and Lua are not growing their communities quickly either.

Older and popular programming languages have vocal critics, while new, exciting languages often have enthusiastic supporters. This data would suggest that it's not easy for new languages to grow beyond their niche and become the next big thing. What does this mean for the future of these languages and others like Go or Scala? We will certainly keep tracking this evolution and plan to keep you informed.

Join our panel today

Be the first to find out when our next survey launches and get access to all exclusive prizes!

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Get an invite to take part in our next survey



Collect points and get a chance to win awesome prizes



Get free access to our key research insights

METHODOLOGY

Developer Economics 14th edition reached an impressive 21,700+ respondents from 169 countries around the world. As such, the Developer Economics series continues to be the most global independent research on mobile, desktop, IoT, cloud, web, game, AR/VR and Machine Learning developers and data scientists combined ever conducted. The report is based on a large-scale online developer survey designed, produced and carried out by SlashData over a period of eight weeks between November and December 2017.

Respondents to the online survey came from 169 countries, including major app, Machine Learning and IoT development hotspots such as the US, China, India, Israel, UK and Russia and stretching all the way to Kenya, Brazil and Jordan. The geographic reach of this survey is truly reflective of the global scale of the developer economy. The online survey was translated into eight languages in addition to English (simplified Chinese, traditional Chinese, Spanish, Portuguese, Vietnamese, Russian, Japanese, Korean) and promoted by 57 leading community and media partners within the software development industry.

To eliminate the effect of regional sampling biases, we weighted the regional distribution across eight regions by a factor that was determined by the regional distribution and growth trends identified in our Developer Economy research. Each of the separate branches: mobile, desktop, IoT, cloud, web, games, augmented and virtual reality, and data science and Machine Learning were weighted independently and then combined.

To minimise other important sampling biases across our outreach channels, we weighted the responses to derive a representative distribution for platforms, segments and types of IoT project. Using ensemble modeling methods, we derived a weighted distribution based on data from independent, representative channels, excluding the channels of our research partners to eliminate sampling bias due to respondents recruited via these channels. Again, this was performed separately for each of mobile, IoT, desktop, cloud, web, games, augmented and virtual reality, and data science and Machine Learning.

For more information on our methodology please visit <https://www.slashdata.co/methodology>.

distilling market noise into market sense

