

REPORT

arm

# Developer attitudes to Windows on Arm: an Arm and Microsoft report



 Microsoft



## Executive Summary

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2018 was the year when brand new Windows laptops built on Arm-based SoC designs were launched in the PC market. Since then, the 'Windows on Arm' (WoA) devices and ecosystem have gone from strength-to-strength, with Microsoft having recently released Windows 11 for Arm and developing technologies to smooth the migration path for application developers.

WoA laptop devices with the core features of all-day battery life, instant on, always connected and a slim form factor are percolating to market, alongside a growing ecosystem of developers who are adding WoA support to their applications, so they run smoothly on these devices.

Building on this positive momentum, Arm and Microsoft wanted to gauge the views of developers via an in-depth survey of questions focused on gaining a better understanding of usage and perceptions of WoA and where developers feel the market is heading in the future.

The key findings of the survey include the following:

- **Developers believe WoA has enormous potential.**

A significant majority of survey respondents (81 percent) think that the WoA market will grow in the next five years. Interestingly, nearly 50 percent believe that WoA will constitute 24 percent or more of the PC market in the next five years, which would represent one of the largest shifts in PC architecture in decades.

- **Work-based applications have the biggest potential for WoA.**

66 percent of survey respondents feel that productivity applications have the greatest potential, with this category followed by utilities and tools (44 percent) and business (38 percent) applications – all applications for work-based activities.

- **Positive perception of WoA tools and features.**

All the current WoA tools and features noted in the survey have a neutral to positive developer perception, with each one scoring 80 percent or over in terms of neutral to positive. Developers provided their views on individual tools available to them now and popular development tools that they would expect to see available in native Arm64 Windows, like Git and Visual Studio.

- **However, challenges remain for developers targeting WoA.**

- » There is still more work needed to show developers that they should be adding native WoA support to their applications. Around 38 percent of survey respondents are thinking of adding WoA support; meanwhile, just 5 percent of survey respondents indicate that they are programming for Arm64.
- » A big drawback for developers is the absence of a WoA developer class system, with just over half of survey respondents noting that the availability of relevant hardware is a big challenge in supporting WoA and their applications.
- » Half of developers also note the lack of Arm64 versions of libraries, frameworks and tools as a significant challenge, with this closely followed by debugging tools.

# Chapter 1

## Introduction: Why we commissioned this survey

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Thinner. Faster. Lighter. All-day battery life. Instant on. Always connected. Fan-less designs. A vibrant screen. Blazing performance. The wish list for consumers when it comes to laptops has always been exceedingly high and remarkably consistent.

As a result, momentum and interest surrounding Windows laptops built on Arm-based designs have been steadily growing to meet the new performance and power demands of portable computing.

Microsoft laid the groundwork for a step-function advance in laptop capabilities in 2018 with an Arm-native version of Windows 10. This was followed by Microsoft Office and Microsoft Edge.

The company is now making another stride forward with Windows 11, the first Arm-native version of Windows capable of running emulated 64-bit applications. Additionally, Microsoft has released ARM64EC, which effectively allows software developers to port individual elements of their existing x86 applications rather than porting the entire application at once.

The result is a simplified migration process for developers and better performance and a wider variety of applications for consumers. Adobe Photoshop, Zoom, Netflix, Firefox along with Microsoft Office, Teams and Edge have all made, or are in the process of making, the move to Arm64. Tools are also continually being enhanced to bring more legacy and existing applications to a 64-bit WoA environment.

Building on this positive momentum, Microsoft and Arm surveyed just under 750 developers to gauge their views on the potential impact of WoA laptops, what they need to expand their development efforts on Arm, and what tools, features and other technologies are required. The insights from this survey can be used as a guide to help to shape the future direction of WoA and where investments are made to improve the overall development experience.

“There is now a smoother migration path for developers targeting WoA, alongside better performance and a wider variety of applications now available on WoA.”

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**Rich Turner, Senior Product Lead**  
Microsoft

## Chapter 2

# How we ran the survey (Methodology)

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The survey is the first (and biggest) of its kind to explore developer attitudes towards WoA. It was carried out between 30th March and 4th April 2022 by Microsoft, with 736 qualified respondents from the Windows ecosystem.

The survey covers the following areas:

- The type of applications being developed;
- The target industries for these applications;
- The developer environment, such as types of devices and servers, that are being used;
- The Windows architecture currently being developed on and any plans to change;
- Usage and perceptions of Windows on Arm; and
- The benefits of and projections for Windows on Arm.



## Chapter 3

# A Window into Windows on Arm

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Before delving into the survey results, it is important to reflect on the current WoA landscape. Over the past four years, WoA laptop devices like the Samsung Galaxy Book S, Lenovo Yoga 5G, Microsoft Surface Pro X, Lenovo ThinkPad X13s and HP Elite Folio have all been positively received by consumers and the wider tech industry. Reviewers have spoken glowingly about the devices' core benefits of performance, all-day battery life and 'always on, always connected' capabilities, alongside the sleek and slim form factors.



The momentum is not only with the hardware. Behind the scenes, significant work and resources have gone into unblocking native application development and enabling new architectural tools and features for the growing WoA ecosystem.

This work is bearing fruit, helping an increasing number of applications target WoA, from mainstream productivity, creativity and entertainment applications, like Adobe Illustrator, Netflix, Kindle Reader, Amazon Music and Zoom to emerging applications, like Zinstall, StaffPad and Tweeten.



Furthermore, Microsoft has been supporting the advancement of the WoA application development process through joining Linaro – the open-source collaborative engineering organization that develops software for the Arm ecosystem. Microsoft joins a team consisting of Linaro, Arm and Qualcomm that have all been working together to build an ecosystem that supports native application development on WoA.

Then, last but by no means least, we have the new Windows 11 update, which is bringing big performance boosts across the entire system. Users can take advantage of many new Arm natively built applications and full x86\_64 emulation, meaning the end-consumer can run all their favorite applications on WoA devices.



All this work represents a win-win for everyone in the WoA value chain. It is helping the ecosystem take full advantage of the Arm architecture, which means better application experiences are available on the devices for the end-user.

# Chapter 4

## The survey results

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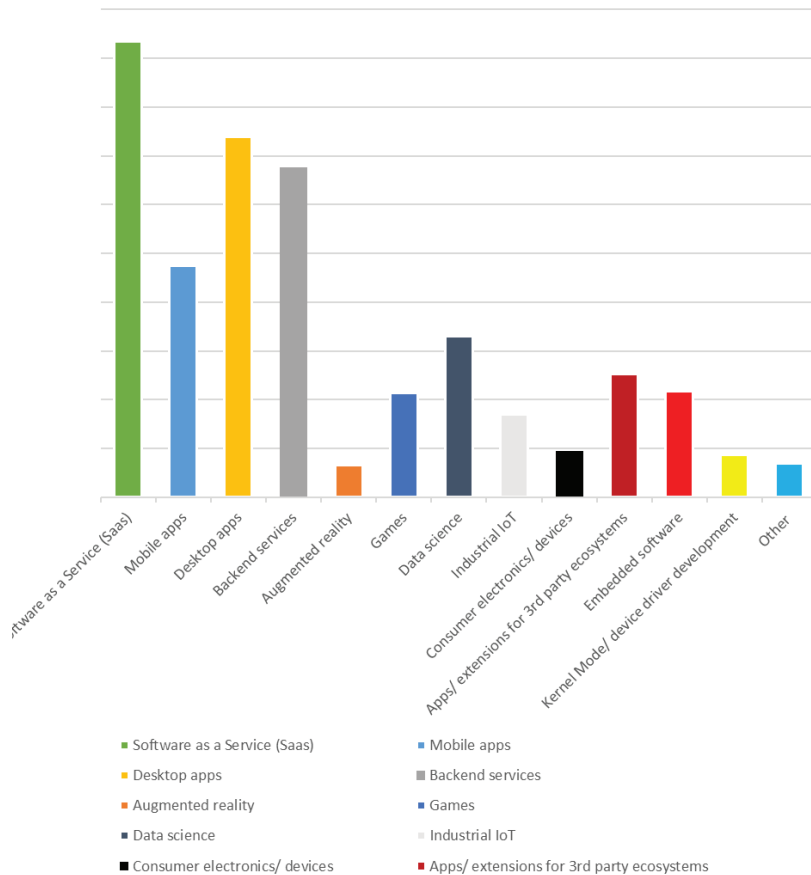
### 1. Who are the developers?

Respondents to the survey are all Windows developers. 70 percent are professional developers, with the remaining 30 percent hobbyists. Perhaps unsurprisingly, the majority of survey respondents develop on a Windows device. This is split between a Windows Desktop (54 percent of survey respondents) and a Windows Laptop or Tablet (41 percent).

### 2. What applications are they developing?

Software as a Service (SaaS) was the most popular type of application/ development project that survey respondents are working on (63 percent). This is followed by desktop apps (50 percent) and backend services (46 percent).

App types/ development projects that developers are involved in



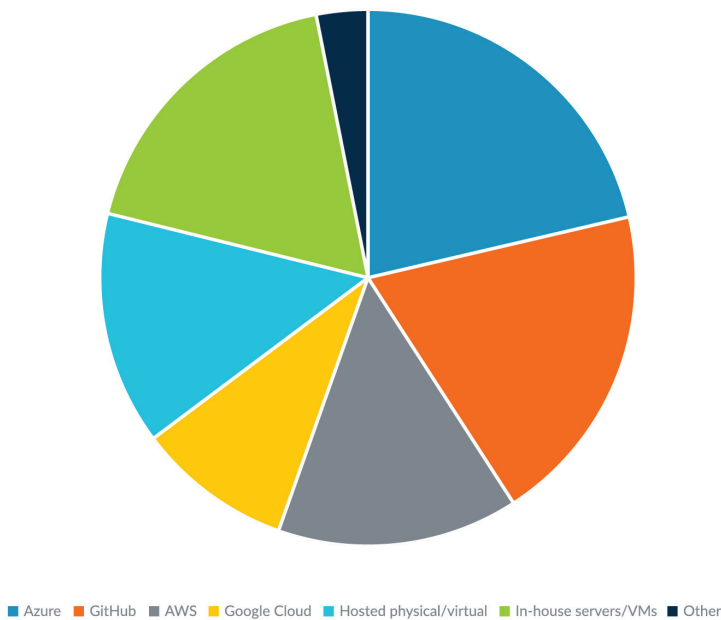
### 3. What industries are developers targeting?

The majority of survey respondents are targeting no specific industry with their applications (36 percent). In terms of a specific industry category, the most popular industry that developers are targeting with their applications is the technology sector (26 percent). The next most popular industries were finance and education (both around 19 percent).

### 4. What servers are developers using?

The majority of survey respondents (62 percent) said they use a server/cloud-based CI/ CD environment for their development projects. The most popular server/cloud-based CI/CD environment is Azure (45 percent of survey respondents use this), with this closely followed by GitHub (41 percent) and then in-house servers and VMs (38 percent).

The servers/cloud-based CIs/CD environments that are being used



“We want developers to be able to easily support WoA natively, so they take advantage of the benefits that the Arm architecture brings to the table.”

David Whaley, Director  
Strategic Partnerships, Arm

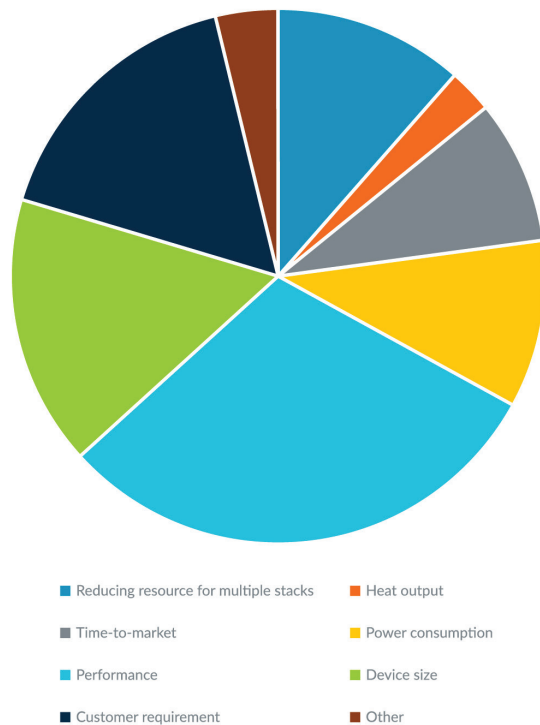
### 5. Are Windows developers adding native WoA support?

From the survey responses, there is still work to do to show developers that they should be adding WoA support to their applications. Around 38 percent of survey respondents are thinking of adding WoA support; then, from this percentage, 65 percent are investigating or considering porting their applications for WoA but with no immediate plans. The remaining 35 percent are currently planning to add support now or planning on adding WoA support after this year (2022). The survey also reveals that just 5 percent of respondents currently run their applications on Arm64, showing that there is still potential to get more developers on board with WoA.

## 6. Why do developers want their applications to support WoA?

The performance of WoA devices is the most popular reason among survey respondents for developing for WoA (71 percent). The second most popular reason was the device size (38 percent) (e.g., the smaller form factor of WoA laptops compared to other laptop devices). Another popular reason noted by survey respondents is the influence of their customers and the requirements they have, which means applications need to target WoA.

Motivations for developing on Windows on Arm





## 7. What are the challenges to supporting WoA?

For survey respondents, the biggest challenges in supporting WoA with their applications is the availability of developer-class WoA hardware (51 percent note this as a reason) and the availability of Arm64 versions of libraries/frameworks/runtimes/tools (50 percent). These challenges are followed by the debugging tools and experience for WoA (46 percent cited this as a challenge). Interestingly, only 33 percent cite time, lack of resources and project priority as a major challenge to developing for WoA. This is one of the lowest noted challenges by the survey respondents.

“We will be working hard to address the challenges noted by developers, while also ensuring they can capitalize on the enormous potential of WoA.”

Rich Turner, Senior Product Lead  
Microsoft

Biggest challenges in supporting Windows on Arm



- Time/resource/project priority
- Availability of Arm hardware
- Availability of Arm64 versions of libraries/frameworks/runtimes/tools
- Unexpected issues in the code
- Availability of documentation and guidance
- Debugging tools and experience for Windows on Arm
- Other

## 8. What is the perception of WoA tools and features?

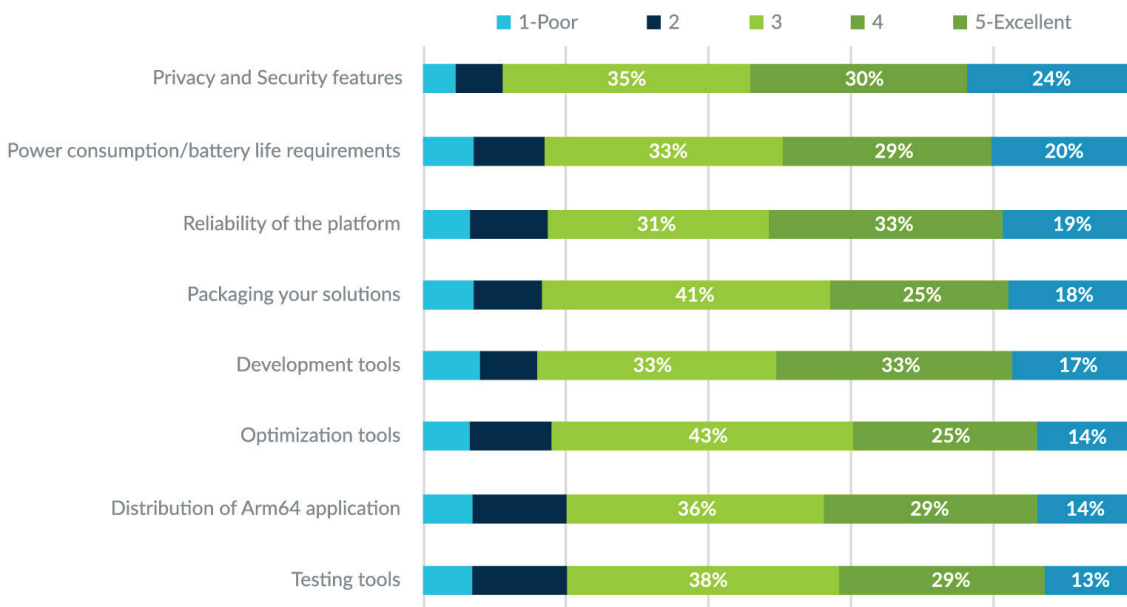
Overall, survey respondents had neutral to positive opinions on the WoA tools and features, with an average of 83 percent neutral to positive across the choices. These are:

- Development tools;
- Optimization tools;
- Testing tools;
- The reliability of the platform;
- Privacy and security;
- Power consumption and battery life;
- Packaging of solutions; and
- The distribution of Arm64 applications.

Each one of these tools and features are viewed more positively than negatively by survey respondents. Out of all the WoA tools and features, privacy and security features are rated most positively by survey respondents (89 percent viewed them as neutral to positive). Tools and features – which are the testing tools and distribution of Arm64 applications – are also viewed neutral to positive overall (80 percent for both).

“Tools are vital for developers looking to provide WoA support for their applications, helping to make the whole development process as simple and pain-free as possible.”

David Whaley, Director  
Strategic Partnerships, Arm



### 9. What development tools need to be available for WoA?

In terms of development tools that survey respondents would expect to see available in native Arm64 Windows form, the most “in-demand” was Git, with 71 percent saying that this should be available. This is closely followed by Visual Studio at 66 percent. Other development tools in demand are .NET (Core) (52 percent) and .NET Framework (50 percent of survey respondents).

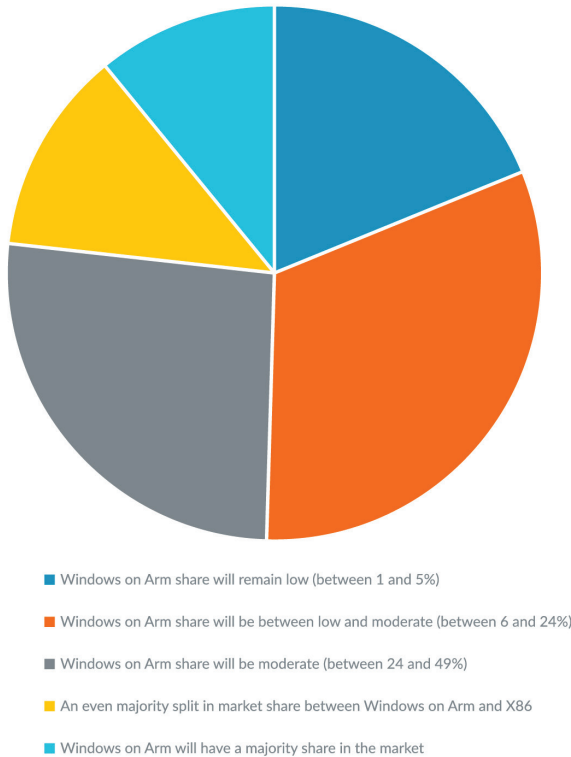
### 10. What is the potential of WoA?

Nearly 50 percent (49.4 percent) of survey respondents believe that WoA will constitute 24 percent or more of the PC market in the next five years. If this is borne out in reality, it would be one of the largest shifts in PC architecture in decades. Furthermore, a significant majority of survey respondents (81 percent) believe that the WoA market will grow more in the next five years.

“We are excited about the seismic growth that developers are predicting for WoA in the next five years.”

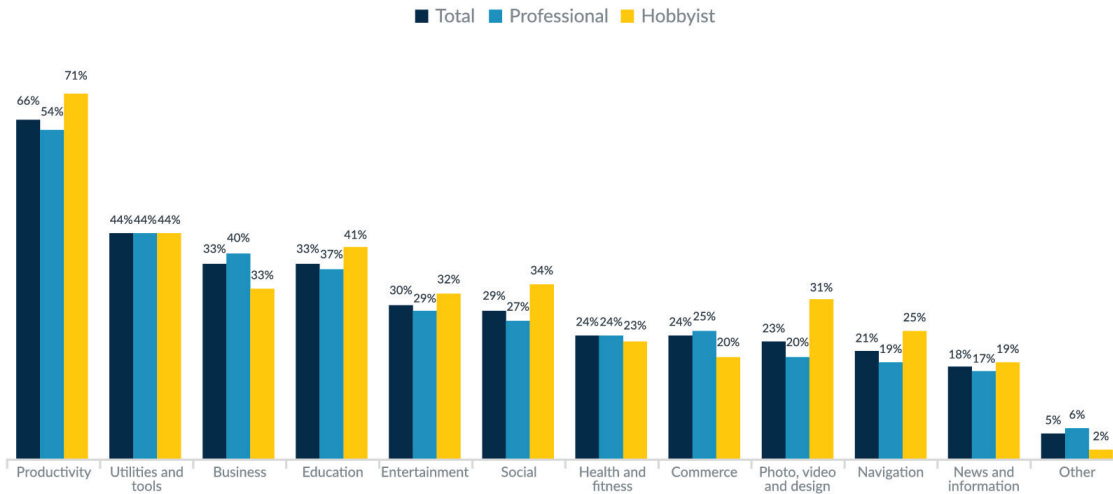
Rich Turner, Senior Product Lead  
Microsoft

The landscape of Windows on Arm in the next five years



## 11. What applications have the most potential for WoA?

In terms of the applications, 66 percent of survey respondents believe that productivity applications, like the Microsoft Office suite, have the greatest potential for WoA. Utilities and tools (44 percent), education (38 percent) and business (38 percent) applications all followed behind productivity as applications that respondents think have the most overall potential.



## 12. What devices will have the biggest impact for WoA?

Finally, in terms of devices, unsurprisingly laptops are seen as the devices having the biggest impact for WoA – 62 percent of survey respondents believe this will be the case. This was followed by desktop PC devices (52 percent). Perhaps surprisingly, mobile and tablet devices both have largely the same percentage for biggest impact for WoA, at 48 percent.

# Chapter 5

## Conclusion

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The responses from developers to this survey reflect the growing momentum of WoA since 2018.

Overall, developers feel positively about WoA and its potential, with half predicting a potentially seismic shift in the PC market due to the growth of WoA. The responses indicate that WoA could be set for a significant growth trajectory in the next five years.

This positivity is reflected in developers' experiences with WoA tools and features, with the majority viewing them as neutral to positive. Windows developers are clearly finding the tools and features useful and helpful as part of the development process.

However, there is still more work to do, with developers looking for further tool and feature support for WoA. The majority of developers indicated that they would expect to see both Git and Visual Studio available in native Arm64 Windows form.

Despite the positive responses, the survey did reveal areas for improvement. There are challenges with the WoA

development process, particularly around the availability of the relevant hardware and Arm64 versions of libraries, frameworks, runtimes and tools. Further work is also needed to encourage developers to add native WoA support to their applications, with current developer support not as high as we would like it to be.

However, we believe that these challenges are not insurmountable. Developers clearly have a very positive view of WoA and its future potential. Developers are keen to add WoA support to their applications, but need the relevant equipment and resources to make this a reality. In some cases, this is already being addressed. For example, Lenovo's WoA ThinkPad X13s provides developer-class WoA hardware to address the availability of hardware challenge noted by Windows developers in this survey.

Arm and Microsoft will be working together to ensure that WoA continues to grow and develop. We are encouraged by the positive experiences so far that are revealed in the survey. We will be continuing to work with the ecosystem to add more support, tools, features and hardware to ensure WoA reaches its enormous potential.

Currently, Arm has a selection of Windows on Arm tools and guides for developers that are free to access on [developer.arm.com](https://developer.arm.com). Additionally, working alongside Arm and Microsoft, Linaro have a list of current projects being worked on to get Arm working on Windows natively. These projects are listed [here](#).

If developers are at the start or middle of the Windows on Arm developer journey, then we recommend looking at these tools, resources and projects for useful insights and guidance.

