



Research brief – August 2019

# Canned Intelligence

Voice assistants in Germany

Dr René Arnold  
Prof Dr Anna Schneider

# Imprint

## Authors of this study:



Dr René Arnold  
Head of Department Markets and Perspectives  
Contact:  
r.arnold@wik.org  
+49 (0)2224 92 25 25



Prof Dr Anna Schneider  
Professor of Business Psychology  
Contact:  
anna.schneider@hs-fresenius.de  
+49 (0)221 97 31 99 715

## Contact details of the scientific institutes:

WIK Wissenschaftliches Institut für  
Infrastruktur und Kommunikationsdienste GmbH  
Rhöndorfer Str. 68  
53604 Bad Honnef, Germany  
Tel.: +49 2224 9225-0  
Fax: +49 2224 9225-63  
eMail: info(at)wik.org  
www.wik.org

Hochschule Fresenius – Fachbereich Wirtschaft & Medien  
Business School · Media School · Psychology School  
Im Mediapark 4c  
50670 Köln  
<http://www.hs-fresenius.de>

General Manager and Director: Dr Iris Henseler-Unger  
Chairperson of the Supervisory Board: Dr Daniela Brönstrup  
Registered: Amtsgericht Siegburg, HRB 7225  
Tax No.: 222/5751/0722  
VAT No.: DE 123 383 795

General Manager: Prof. Dr. Tobias Engelsleben, Sascha Kappes,  
Kai Metzner  
Handelsregister: Amtsgericht Wiesbaden HRB 19044

## Pictures:

pawel-czerwinski-unsplash, scott-webb-unsplash, kevin-bhagat-unsplash, wim-van-t-einde-unsplash,  
boxed-water-is-better-unsplash, okwaeze-otusi-unsplash, revolt-unsplash, ben-kolde-unsplash; linus-  
rogge-JAN\_aeGk\_TM-unsplash; milad-sefidfard-SYmgYSC\_Bio-unsplash, kev-costello-w3jVXGkYZCw-  
unsplash, charles-unsplash, stefan-cosma-unsplash, kaboompics.

# Foreword



## Speechless no more!?

Whether it's Cortana, Google Assistant or Siri, voice assistants have found their way into our pockets and homes. Pre-installed on most current digital devices, they follow us everywhere we go. Ignoring them is easy, but switching them off completely can be difficult. No matter the operating system, voice assistants can hear our every command. One might think that this is good, because speech is humankind's most natural interaction mode – very much unlike keyboards. But is that really true? Will voice interfaces really become the next pervasive technology in human–computer interaction? How will we use the various services on the internet in the future?

Today, we are used to receiving long lists of results to any thinkable query, be it a product, restaurant or trivia search. The choice lies with us. We decide which source to trust, which product to purchase or which restaurant to visit. Despite long lists of results, which can be viewed, scrolled, filtered and sorted on ever larger screens, there is a heated debate about how Amazon, Apple, Google and other services rank their results. The Platform-to-Business Regulation and the New Deal for Consumers bear witness to this just as the current competition investigations into large tech firms do.

If we were to increasingly rely on voice interfaces as the most common form of human–computer interaction, lists of results would have to become much shorter due to the specific affordances of voice interfaces. Thus, the choices would need to be made beforehand by service providers. Society on the other hand would have to think carefully about if we are willing to accept pre-selection and to what degree.

The present research brief suggests that we should think about this sooner rather than later. Around 85% of consumers in Germany already have access to a device with a pre-installed voice assistant. Thus, we could face an adoption curve of unprecedented pace. So far, voice assistants still have a long way to go to become true conversational interfaces. The technology behind these systems however progresses quickly thanks to artificial intelligence. Competent authorities ought to monitor the developments closely. It's reassuring though that, for the moment at least, consumers use voice assistants mostly for simple tasks. But will it stay that way?

Dr Iris Henseler-Unger

85% of consumers in Germany have at least one device at their disposal that features a pre-installed voice assistant. At the moment, however, only 26% of consumers use them. Only a small minority of non-users intend to start conversing with Alexa, Siri and others over the next 12 months.

While data protection concerns constitute a reason for consumers to refrain from relying on Alexa etc., the largest barrier seems to be the lack of conversational quality.

A catch 22: To improve on functionality, convenience and conversational quality, a voice assistant must have access to contextual data about the consumer such as their current whereabouts. Only when consumers are willing to share such information will voice assistants likely fulfil the expectations set for them.



H Y P E

or not?

# Introduction

Back in 2010, Siri, Apple's voice assistant, was the first of today's popular systems to be introduced. Amazon and Microsoft followed in 2014 with Alexa and Cortana respectively. In 2016, Google introduced Google Assistant. Samsung's Bixby is the most recent major voice assistant and was introduced in 2017. Due to short product cycles and regular software updates, the five companies can draw on an enormous number of consumer devices that feature the respective voice assistants.

The figures below refer to the number of devices available to consumers globally that enable them to use voice assistant software. But how many consumers in Germany have got a voice assistant at home? How many actually make use of it? And what are the prevalent usage patterns? All these questions are addressed in the present research brief. To this end, we conducted a survey of 3,184 consumers in Germany and 20 semi-structured interviews with individual consumers of whom 11 were using voice assistants.



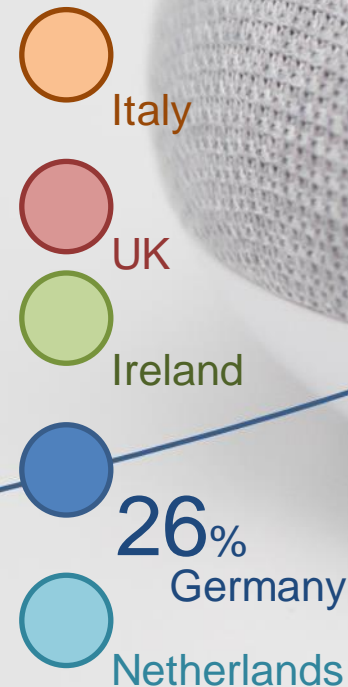
Pre-installed base in million devices globally

# Voice assistant adoption today

According to our survey, 26% of consumers in Germany currently use a voice assistant at least once a month. Around five years after the most prominent systems were introduced, their uptake is similar to the adoption of smartphones in Germany in 2012.

Within Europe, Germany is not among the countries with the highest uptake of voice assistants. In Italy, roughly twice as many consumers use voice assistants. In the UK and Ireland, a substantially larger share of consumers rely on voice assistants than in Germany. Consumers in the Netherlands on the other hand seem less inclined than Germans to use Alexa, Siri and similar systems.

Compared to Asia, voice assistant adoption in any European country is in its infancy. In China and India, the vast majority of internet users also utilise voice assistants.



Share of voice assistant users by country

Share of consumers who have a device with a pre-installed voice assistant at their disposal

85%

Unlike smartphones, consumers do not have to make any additional effort or incur expense to use a voice assistant. Around 85% of consumers in Germany already have a device at their disposal that features a pre-installed voice assistant. To become voice assistant users, all they have to do is start voicing their requests.

Consequently, we might see an unprecedented increase in the uptake as soon as consumers feel that voice assistants meet their needs. As the figure on the right illustrates, the share of users who have a voice-assistant-enabled device at their disposal varies substantially, depending on the specific system.

Alexa has the highest relative uptake as 69% of consumers who have a corresponding device at home are actually using the voice assistant. However, no other voice assistant is as closely linked to so-called voice-first devices (e.g. Amazon Echo). The voice assistants by Google and Apple are neck and neck in terms of their actual uptake shares. In terms of total users, Google benefits from its much larger penetration of devices. The voice assistants provided by Microsoft and Samsung lag behind with a mere relative uptake of 7%.

75%

Alexa

69%

50%

Google Assistant

28%

Siri

29%

25%

Cortana

7%

Bixby

7%

Pre-installed base and relative uptake of voice assistants in %



Pre-installed base share of population\*

# Will I need an umbrella today?

Despite the wealth of functions offered by voice assistants today, retrieving information from the internet about the latest weather reports, sport results or celebrity trivia remains the most popular function among the users of voice assistants. The majority of the remaining nine functions that Alexa, Bixby, Cortana, Google Assistant and Siri share are used by the users of the respective systems at roughly the same frequency. Around 40% of consumers use voice assistants for setting an alarm clock, music playback or calls. Only around one in five voice assistant users links external devices to the system in order to control them remotely. Only 8% of respondents have hailed a taxi via a voice assistant.

While preferred functions follow a general common pattern across voice assistants, some marked differences emerge. Alexa, for instance, is much more likely than the other voice assistants to be used for music playback. Notably, this happens on the integrated streaming service Amazon Music just as often as on third-party streaming services such as Spotify.

In general, Alexa users have the most versatile usage pattern. They use 4.2 functions on average. Across all voice assistants, only 3.5 functions are used. Cortana users utilise particularly few functions – only 2.4 on average. There is a notable correlation between the number of functions used and the age of the user.

Unlike other digital services, consumers in the age group 35 to 44 are the ones who use voice assistants in the most versatile manner. They use 4.1 functions on average. The youngest age group in our sample (18 to 24) only used 3.5 functions. That is only slightly more than users who are 55 and older, who use 3.2 functions of their voice assistants.

Functions used by [...] % of users



72

Seeking information online (weather, sports results, etc.)

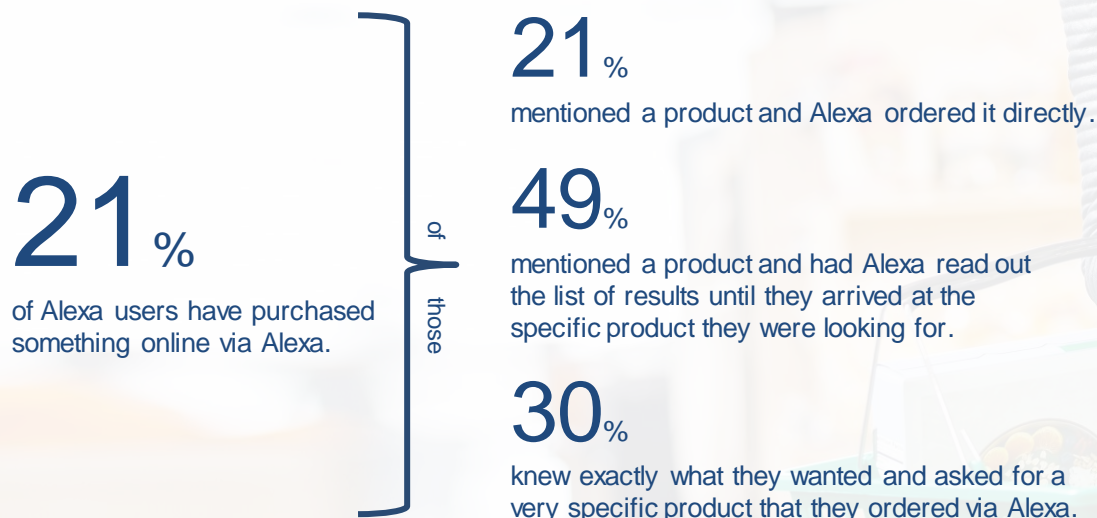
Source: Survey n=816.

\*Cortana: 59%; Bixby 8%; Google Assistant 43%; Siri 24%; Alexa 13%.

# Voice assistants and online shopping

Although online shopping features prominently both in marketing and policy contexts as a key function of voice assistants, only Alexa users can actually purchase online directly via their voice assistant. At least in Germany, the other systems do not offer this function. Even with Alexa, the specific user has to be a Prime subscriber and have OneClick activated in order to make purchases directly via Alexa.

Around half of the Alexa users in our sample meet these criteria. Among them only around 50% stated that they had purchased something online via Alexa in the past. When they did it, the dominant usage pattern was to request the product and have Alexa read out the list of specific product suggestions until one was mentioned that met the users' needs. Only a minority of Alexa shoppers fully trust the assistant to make the product choice. It is likely that this usage pattern is particularly prevalent for habitual purchases.



Source: Survey n=816.

\*Cortana: 59% ; Bixby 8% ; Google Assistant 43% ; Siri 24% ; Alexa 13% .

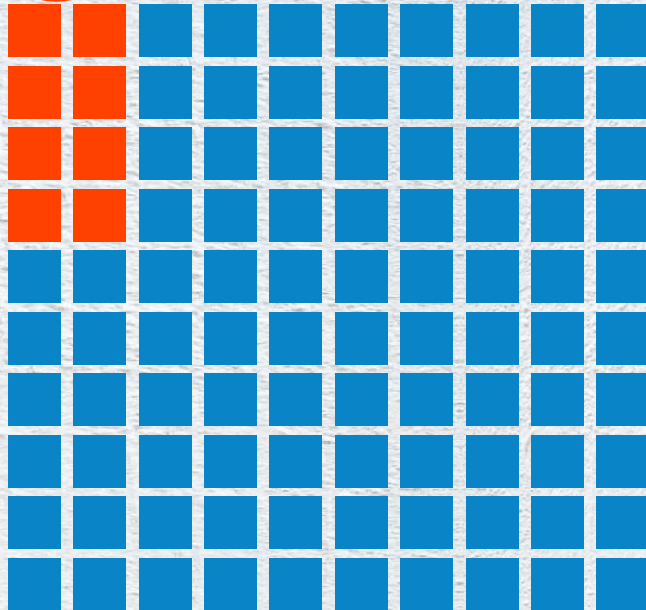
# Voicing gender concerns

A recently published study by the United Nations addresses in detail the potential challenges emerging from the obvious gender bias apparent in voice assistants. Users can choose a male voice with Bixby, Cortana, Google Assistant and Siri. However, a voice clearly recognisable as female remains the default. Alexa does not offer the option to switch to a male voice. Notably, there is a "skill" for that. According to its reviews, the skill does not quite meet users' expectations as it is very cumbersome to use. Thus, western, white and male role models are being multiplied and manifested by interactions with voice assistants when they ought to be broken up.

Unlike the EQUALS Coalition respondents who were cited in the United Nations study, in our survey just 5% of male respondents stated that they have switched their voice assistants to a male voice. Almost twice as many female respondents did the same (9%).

Researchers from Denmark point to a possible solution. In March 2019, they introduced "Q", the first completely gender-neutral artificial voice. If this catches on, voice assistants could not only prevent traditional gender roles from being multiplied, but also help to question binary gender stereotypes in daily life.

**8**% of voice assistant users have switched from a female to a male voice



<sup>1</sup> United Nations (2019): SSSS.

<sup>2</sup> <https://www.genderlessvoice.com/>.

Source: Survey n=816. Without consideration of those who indicated 'don't know/not specified'.

\*Alexa, Google Assistant, Siri, Cortana und Bixby.

# Talk to me

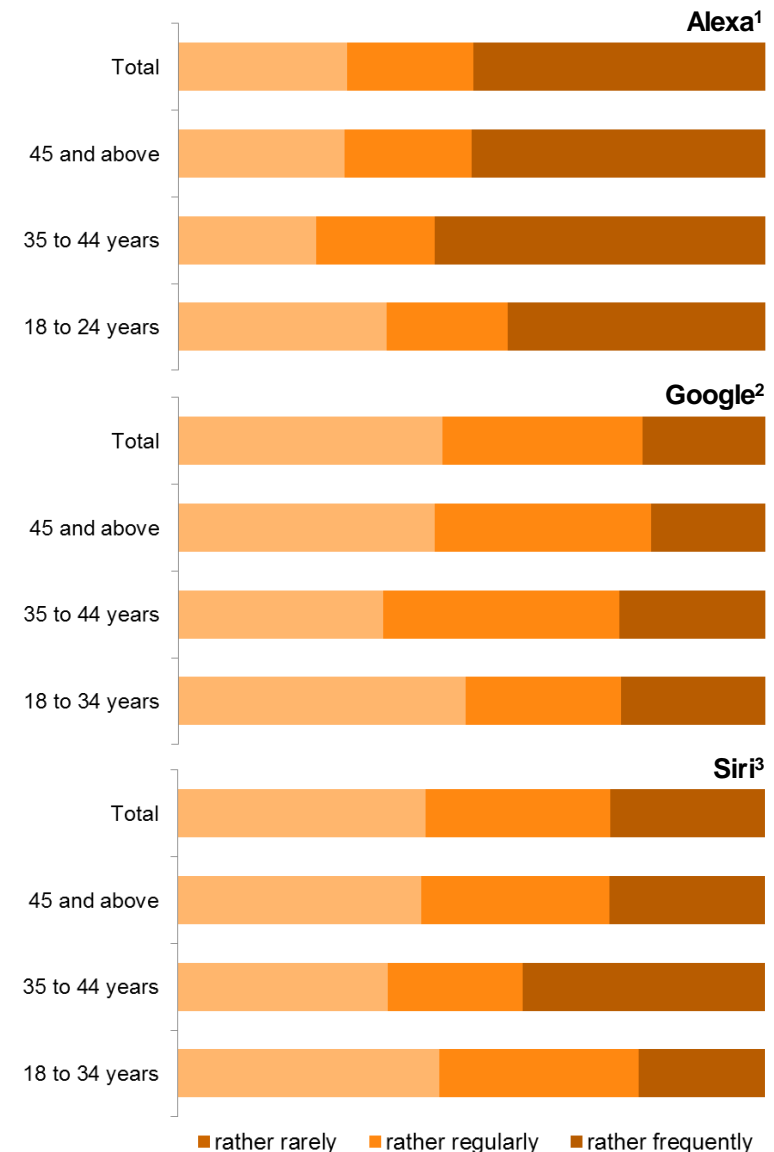
Alexa is the most frequently used voice assistant. Half of its users speak to it at least once a day. Siri and Google Assistant are used much less frequently in comparison. The majority of their users rarely use their functions. Approximately one in three consumers who own a voice assistant uses them twice or three times a week.

Surprisingly, consumers in the age group 35 to 44 are the ones who use voice assistants most frequently. Among them, Alexa users are also the most engaged voice assistant users. More than half of the users (56%) in this age group speak daily with Alexa. In the same age group, Siri is also used quite frequently with 41% of respondents reported to use this system regularly.

Google Assistant lags behind in terms of usage frequency. Only one in four users utilizes the system daily. In particular, 18- to 34-year-olds are the age group with the lowest usage frequency. Among them 49% use Google Assistant rather seldomly.



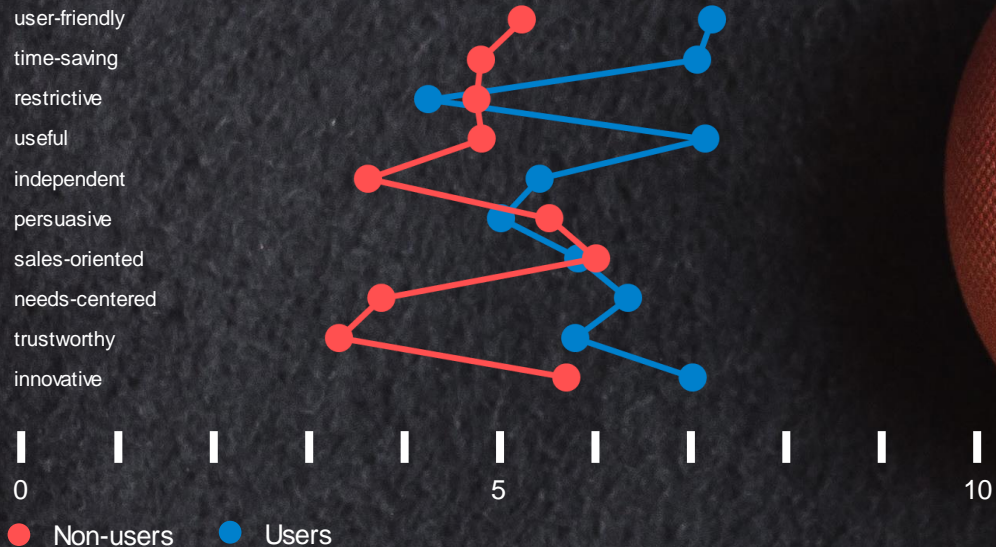
Frequency of voice assistant use



Without consideration of those who indicated 'don't know/not specified'. Rather rare: Once in the last month and once a week. Rather regularly: Twice or three times a week, More than three times a week. Rather frequently: Once a day, Several times a day. 1 Survey n=272; 2 Survey n=388; 3 Survey n=233.

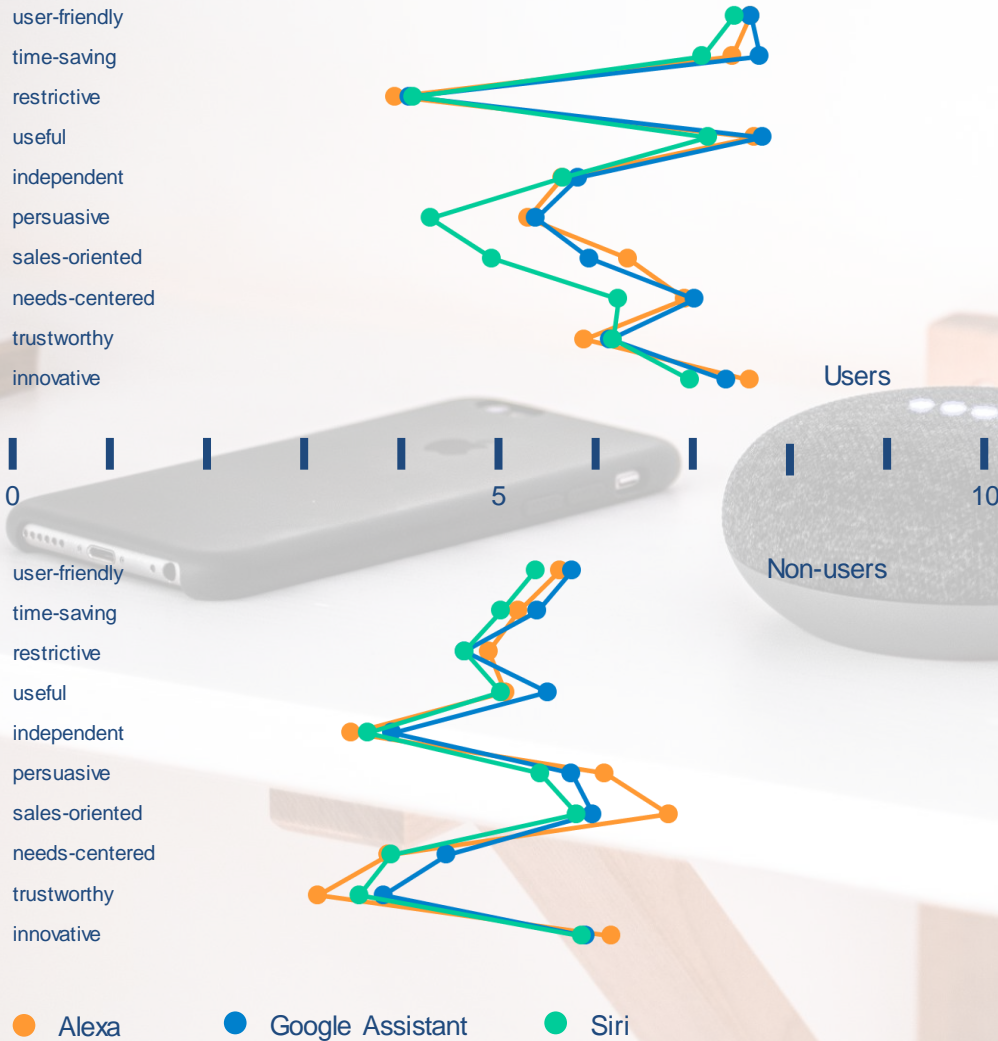
# Attitudes towards voice assistants

## Voice assistants are ...



In our survey, we asked both users as well as non-users of voice assistants about their attitudes towards these systems. Users appear to value in particular the time they think they can save by using a voice assistant. They perceive these systems as useful and user-friendly. Both groups do not feel restricted by the new technology. Non-users however perceive voice assistants as less independent and less trustworthy than their users.

It is particularly interesting that both groups concur in their perception of voice assistants being at least somewhat sales-oriented and persuasive. This shows that consumers do not approach this new technology naively.

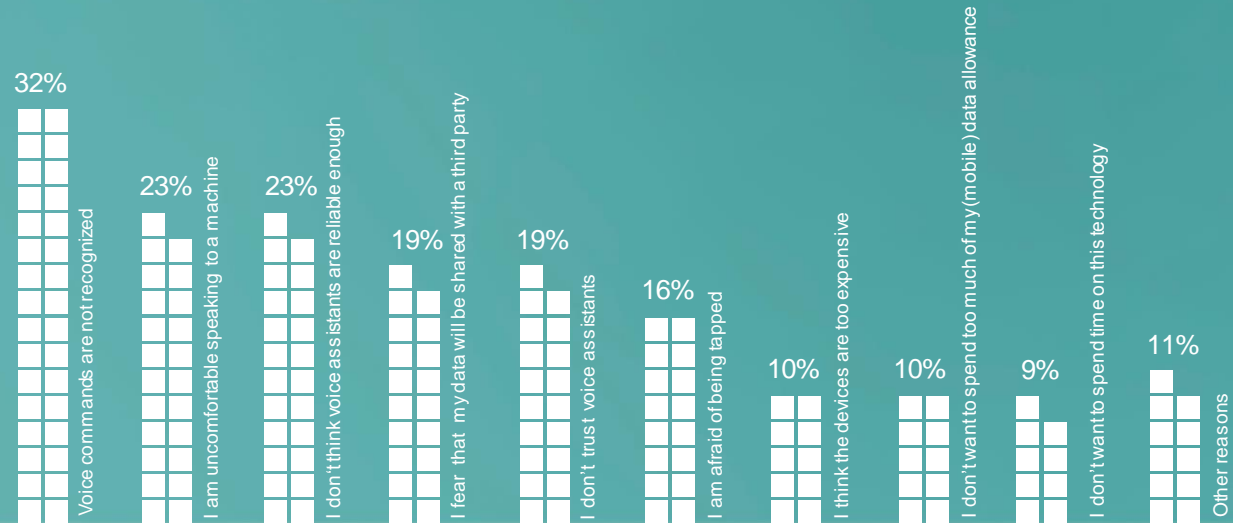


In a direct comparison to Alexa, Google Assistant and Siri show that their users' attitudes follow a similar pattern. Siri differs substantially from the other assistants as it is seen as less sales-oriented and less persuasive than the other two.

This is not surprising as consumers make the link between Google's Assistant und Amazon's Alexa and these companies focus on online marketing and online sales respectively. At the same time, Siri is perceived as less tailored to one's needs. The strategy of its competitors to provide individualized results appears to be paying off.

Non-users' attitudes towards voice assistants are on average less positive than users of voice assistants. Comparing the three main competing systems, we find that non-users – like users – perceive Alexa to be particularly sales-oriented. At the same time, Alexa is seen as somewhat less trustworthy than other voice assistants. Whether this has any effect on non-users' future choice of a voice assistant is however unclear. Currently, Amazon Echo devices are still seeing substantial growth of their sales.

# Time's up



## Why did you stop using voice assistants?

Around one in five consumers in Germany has tried engaging with a voice assistant at least once. However, they ceased using the technology eventually. The reasons for this revolve typically around the technology itself.

A total of 32% of respondents stated that they have stopped using voice assistants because their voice commands were not recognized properly or even not at all, while 23% felt the technology was not reliable enough.

Just as many consumers felt uncomfortable speaking to a machine, and this was followed by data protection concerns from former voice assistant users or consumers who have tried using them.

While 19% said they did not trust the technology or feared their data might be shared with a third party, 16% were explicitly afraid of being tapped if they had a voice assistant in their homes.

The price of devices or the additional data required when using them on mobile devices like smartphones and tablets played only a minor role in causing voice assistant usage to cease.

\* Referring to the voice assistant that is actually used.  
Source: Survey N=634.



The 20 qualitative interviews conducted for the present research brief echo the reasons elicited from respondents in the survey:

*“At first you think it [using a voice assistant] is totally cool and it’s perfect. You think it will all work, but in fact it’s rarely quicker. Often it is not precise enough and then you simply lose interest.”* (Patrick, 20)

*“You often have to use commands that are not flexible. It would have to be much more flexible, so that the voice assistant really understands me.”* (Bennett, 27)

*“Switching from German to English is a pain. Then she [the voice assistant] does not understand ‘Good Wife’ sometimes, because it is an English term. But the series is simply called that. You simply can’t get around English in German.”* (Ann-Kathrin, 24)

The interviews further illustrate that voice commands at least outside of the protected private space of one’s home and in particular in social situations can be perceived as negative:

*“It’s just frustrating because it simply kills the atmosphere, when everyone sits there and is talking to their phones.”* (Sabine, 68)

*“I think that using voice assistants is not yet fully accepted. Like walking in the city and speaking to your phone, giving voice commands.”* (Philip, 25)

*“I think it’s because I have never really seen anyone doing it [giving voice commands in public]. That would draw quite some attention.”* (Chalida, 20)

# Multi-homing is the exception

Will eventually just one voice assistant answer all our questions, suggest music and our life partners? If this were to become reality we would face a gatekeeper of a completely different scale. In fact, parallel usage of voice assistants is rare: 78% of voice assistant users rely on only one such system. However, as our analysis of usage patterns has already highlighted, preferences for specific voice assistants differ among consumers.

The advent of one single voice assistant that is used ubiquitously will likely depend on many factors. One such factor could be how well the competition between digital ecosystems will function in the future. Furthermore, another deciding factor may be whether third-party devices will tack on existing voice assistants or create their own systems.

To assess future developments it should be kept in mind that the functions currently used with voice assistants are quite limited. Moreover, Pocheron et al. (2018) find that today's voice assistants still have a long way to go to become true "conversational interfaces". Today, they are still limited to relatively simple input/output interactions. Mimicking human interaction is however an essential key to success for voice assistants. The next wave of innovation in voice assistants may thus completely overturn the current market environment depending on which firm masters conversations first. As switching between voice assistants is easy, very little would hold consumers back if one system emerges as being qualitatively superior.

Finally, it is important to note that the relevance of multihoming across voice assistants will strongly depend on the role these systems will take on in the future of human-computer interaction. Using them as an effective substitute for entering commands manually and finding essentially the same output on a screen of some kind will not change much. If, however, future generations of voice assistants will actually integrate various functions and services from today's internet ecosystem, we have to address potential lock-in effects and in particular the neutrality of these systems.

78%  
of users rely on only one  
voice assistant



# Future intentions to use voice assistants

only  
2  
%

of consumers who are aware  
of voice assistants are inclined to  
start using one in the next 12 months

So far, consumers use their voice assistant for menial tasks and actions. Various studies show that they have to make an effort for their voice assistants to actually understand their commands. Consumers have to pronounce everything correctly and find the right key words, otherwise there will not be any reaction. That is annoying. Around one in five respondents have tried voice assistants at least once but ceased their use. That happened mainly because the systems, despite many technological advances in recent years, still do not function as well as many consumers want them to do.

Recent increased attention to data leaks as well as underlying fears of insufficient data protection with voice assistants do nothing to improve the situation. German consumers in particular may be put off by such news. Against this backdrop, future acceptance of the new technology and adoption of voice assistants may not necessarily happen quickly (or at all) in spite of the large pre-installed base.

However, should voice assistants manage to achieve a level of comfort and functionality that truly mimics human interaction, adoption rates could reach an unprecedented pace. As 85% of consumers in Germany already have a device at their disposal that has a pre-installed voice assistant, they can simply start talking to it. This could lead to an adoption rate close to what is usually considered market saturation overnight.





### ***About this study:***

The online survey for this study was conducted with 3.184 consumers in November 2018 by the international market research institute YouGov. The results were weighted to draw representative conclusions for the German population (age 18+). Additionally, 20 qualitative interviews were conducted in the autumn of 2018. The complete survey results are published in WIK discussion paper No. 441 which can be ordered online at [www.wik.org](http://www.wik.org).

### ***About WIK:***

Founded in 1982, WIK (Wissenschaftliches Institut für Infrastruktur und Kommunikationsdienste) in Bad Honnef, Germany offers consultancy for public and private clients around the world. Its focus is on the telecommunication, Internet, post and energy sectors giving advice on policy, regulatory and strategic issues. More information is available at: [www.wik.org](http://www.wik.org).

### ***About Fresenius University of Applied Sciences:***

With more than 11,000 students, as well as numerous national and international locations, Fresenius University of Applied Sciences is one of the largest and most renowned private universities in Germany. Practical, innovative study and training content, focusing on the requirements of the labour market, with small study groups and well-known cooperation partners are just some of the many advantages of the Hochschule Fresenius. With its headquarters in Idstein near Wiesbaden, the Hochschule Fresenius can look back on almost 170 years of tradition. More information is available at [www.hs-fresenius.de](http://www.hs-fresenius.de).