

The future is voice

Start building now

How the conversational economy and ambient intelligence will transform every business.



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Australia's Conversational Economy

Voice will be the key driver of a new conversational economy in which digital assistants connect people with home appliances, internet searches, online shopping, personal calendars, government interactions, messages and phones.

Smart homes will drive connection to the conversational economy



90% household penetration by 2030 of voice assistants



3/10 Australian adults already use home-based and mobile smart speakers



1/5 global consumers will be accessing the conversational economy by 2021

Consumers are at the heart of the conversational economy



A range of voice-activated AI solutions means businesses and individuals can have personalised conversations on a mass scale

Investment and participation in the conversational economy won't be optional



95% of large businesses will need to invest in voice-based customer engagement over the next ten years



Citizens will demand the same level of sophisticated and personalised interaction from government services as they receive from businesses

Widespread integration of conversational interfaces will enable consumer touch points



The **Internet of Things (IoT)** will integrate conversational interfaces into anything from your car to your fridge and beyond



42 billion IoT devices globally by 2025



Australian households forecast to have more than **37 connected devices** by 2023 will be accessing the conversational economy via smart speakers



Voice commerce will power the retail economy and consumer spending



Voice commerce expected to reach **US\$80 billion** a year by 2023



20% of all consumer purchases will be made through "v-commerce" by 2040

Foreword



Annie O'Rourke
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The Power of Conversations

Humans love to converse. We do it naturally. We tell stories, explain our lives, share our values and establish bonds using the simple power of voice. Sometimes we do it with humour, or anger, or empathy – but we largely do it with the purpose of giving life to our motives and aspirations.

The predominance of technology in modern life can conflict with these conversational instincts. Technology can reduce interactions to transactions, or personal needs to processes. Often, it is a function of how and why technology is deployed. When its singular purpose is efficiency, for example, governments risk being separated from their citizens and business from their customers.

That's why we need to flip the template. Technology that replicates the ease and naturalness of a human conversation can facilitate better customer engagement and government service delivery.

This paper has been prepared to help make a contribution to the ways in which the conversational economy can fulfil the brief, and insights on how to tailor it to your individual needs. It is timely because the conversational economy is not a futuristic concept; it is entrenching itself in our lives today.

Home-based and mobile smart speakers are the first step – and Australians are leading the world in their embrace. These products are merely a precursor to more sophisticated solutions. Advances in artificial intelligence (AI), cognitive science and data science are ushering in an age of 'ambient intelligence', in which technology is as invisible and pervasive as the air we breathe.

These systems, if properly and ethically implemented, could also enable faster, more seamless interactions with a wide range of service providers.

For governments, voice-first technology will be a game changer in service delivery. It will let them engage with citizens from all different backgrounds, skills and abilities on a 24/7 basis, on a platform people are more comfortable using. Voice-activated digital assistants can transform what citizens may perceive as a cold, bureaucratic agency into a support channel that delivers high-quality, tailored assistance.

Likewise for business. The rise of conversational AI and messaging will also mean that consumers expect deeper, more personalised interactions with their service providers. It can help cement brand loyalty and strengthen relationships with consumers.

That's not to say the transition is going to be easy. It will require a focus on the needs of customers, including recognition of strong privacy policies and practices business and governments should enact.

The dividend will be natural, conversational experiences that customers can embrace and trust, and in doing so, unlock the possibilities of technology for all.

Governments and businesses must start preparing now. This paper provides a roadmap for doing so and we hope it ignites a dialogue around the opportunity presented by the conversational economy.



"Hello..."

...How are you? Are you keen to hear what the conversational economy and ambient intelligence is all about?

This paper details the next big thing when it comes to digital disruption that will transform how customers, clients and consumers interact with business, government and in fact all institutions. I'm talking about the rise of the conversational economy.

I hope you enjoy this read. I look forward to hearing your feedback."

Introduction

Just as the world adjusts to the proliferation of screens, the emerging conversational economy is going to fundamentally transform our lives again.

Technological innovation is rapidly advancing conversational interfaces (like smart speakers, chatbots and voice assistants) to the point that we are now on the cusp of a new era: the conversational economy.

The conversational economy allows people to use their voice and the simplicity of a conversation. Technological solutions may act as the enabler or facilitator for their aspirations to become actions, but it is that raw human function - speech - that ties the conversational economy together.

Consumers are at the heart of the conversational economy, as technology facilitates meaningful business-to-individual personalised conversations at scale. By embracing voice and

the conversational economy as a communications channel, brands can empower consumers to talk in their own language, remove the barriers that buzzwords and industry syntax create, and limit confusion based on how you've organised content on your website. Put simply, you can stop trying to communicate and just start a conversation.

The mix of technology that underpins the conversational economy include the voice-activated devices becoming common in our homes and businesses today. Smart speakers are the most obvious example. Chatbots and other applications are also evident. However, as this paper shows, these devices will continue to morph into more sophisticated solutions that ease the ability of people to use voice-first, as well as amplify the benefit to government, business, and customers from doing so. They will increasingly have relevance across commerce, finance, health care, government service delivery and every facet of life.

Home-based and mobile 'smart speakers' already sold by Google, Amazon and Apple are the first-step: almost 3 in 10 Australian adults now use these devices to check the weather, purchase items online, and control smart home systems like

lights, music and temperature by voice.¹

Thousands of voice-activated devices are being produced each day, enabling people to interact with systems and applications more naturally. While today's smart speakers need to be activated by voice command, these are already evolving into always-listening systems that monitor and respond to users' needs based on their everyday conversations: a device that hears a couple talking about buying a house could chime in and provide expert advice on the latest home loan rates and even help with calculations and costs.

These systems provide a bridge to a wide range of service providers. AI robots with the ability to combine customer relationship management data, predictive technology and empathy will be able to provide a far more consistent and personalised service than either automated or staffed customer relationship channels. Devices that monitor their users' physical and mental health can activate and scale appropriate responses if they detect medical issues or emergencies.

¹ Voicebot.ai (2019), *Smart speaker consumer adoption report Australia*.



“The past 20 years have been about avoiding the conversation and the human experience because it was believed that conversations were unaffordable.”

The next 20 years is exactly the opposite. The conversational economy will explode across the globe in all sectors - from the enterprise through to the consumer.”

Marie Johnson.
CIO, October 2017

Voice-first technology is a channel changer for governments - helping them engage with the full diversity of society. Designed thoughtfully, voice-activated digital assistants can morph heavy-handed bureaucratic departments into high-quality support and service providers.

The conversational economy will enable Government to tailor information, services and support as never before. The frustration of trying to find relevant information on a

Government website, navigating online forms and waiting on hold to get through to a call centre for basic information can all be eliminated.

Transformation to the conversational economy won't be an 'optional extra' for governments as citizens quite rightly demand more sophisticated and personally tailored government services of the same quality

and functionality as they experience in their commercial interactions.

A successful transformation to the conversational economy has the ability to transform brands, reputations and relationships for the better: but there are also risks.

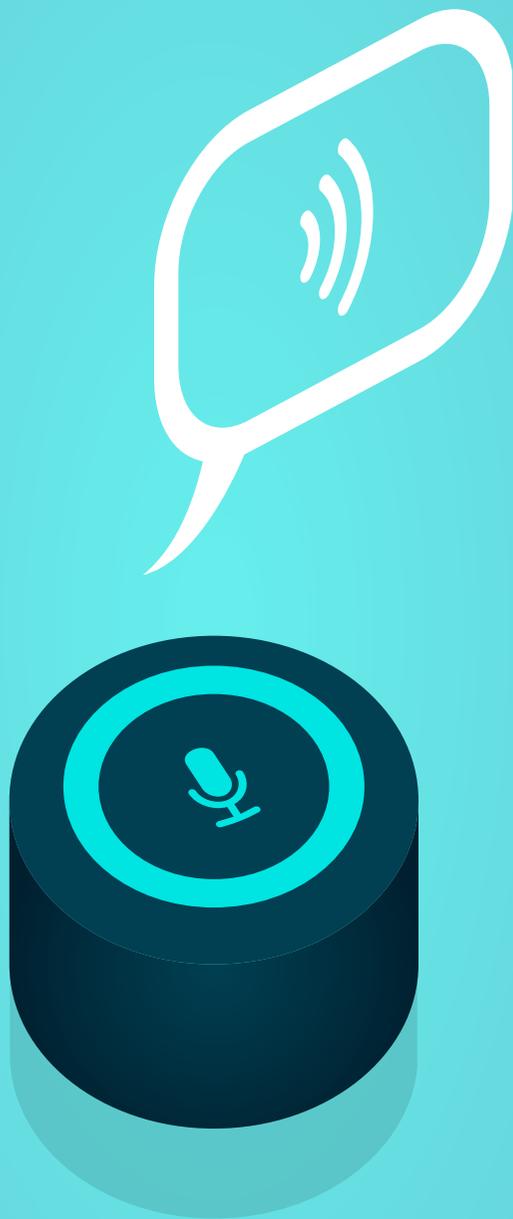
Two-thirds of Australians say they are at least mildly concerned about the privacy risks of smart speakers, including almost 18% who report being “very concerned”.² Without strong privacy policies and protections, the conversational economy will not succeed – nor should it. Organisations will need to earn the trust of their customers by creating apps that work as they should, without requiring unnecessary account details and free of unsolicited advertising.

Australia is among the world's fastest-growing smart speaker markets, with around 3 million Australian households expected to have a smart speaker by 2022 and up to 6 million Australians expected to use a smart speaker for online shopping in 2019.³ To be ready to meet user demands responsibly, governments and businesses must start preparing now: writing voice-ready web content; establishing unique conversational AI personas that have been co-designed and tested with their target audience so that they engage and delight customers; understanding voice assistant shortcuts; and building the right foundation of privacy and security that customers can rely on.

The challenge for change is already here. A successful response requires both knowledge and commitment. This paper outlines how decision-makers can harness both.

² Voicebot.ai (2019), *Smart speaker consumer adoption report Australia*.

³ Telsyte (2018), *'Smart speakers help send Australian IoT@Home market skyward'*; Versa (2018), *The Voice Report*.



1. What is Voice-First?

Voice-first devices are always-on, intelligent speaker systems capable of listening to, understanding and communicating with humans via natural speech.

These devices, enabled by decades of progress in speech recognition, cloud computing and artificial intelligence, are just the start. By enabling new consumer behaviours and service delivery mechanisms, voice-first devices have the potential to transform businesses, government and healthcare, unlocking a conversational economy worth more than US\$5 billion in the next five years.

1.1 The voice-first stack comprises devices, AI and third-party applications

The conversational economy is currently enabled by home and mobile devices by the likes of Google, Amazon, and Apple, that deploy voice-user interfaces (instead of the screen-based graphical user interface) to understand human speech and reply by voice. Those devices connect to the cloud to access conversational AI, a technology that also underpins text-based messaging apps and chatbots.

Conversational AI is what allows today's voice assistants like Apple's Siri to interact with consumers in an engaging, personalised way. It uses natural language understanding (NLU) to process spoken words along with contextual information, so a user can ask "What am I doing with Mum tomorrow?", instead of having to vocalise a series of commands to search their calendar for an appointment with "Jane Smith". Some voice assistants are also designed to have personality quirks, so conversations feel more natural and engaging.

The risk of detachment and disengagement is high from a bland personality that offers rote responses. Conversational interfaces like voice assistants and chatbots are set to become one of the most direct ways customers will interact with governments and business and so differentiating one voice assistant from another

will be essential. The user experience depends on a sense of personal service and appreciation of your customers' needs so creating a distinct personality is essential to the integrity of voice assistants. They both fulfil the immediate ask of a customer or a client but progressively build faith and trust and loyalty. Crafting the right personality for your government agency and business - and your bespoke clients - takes time, research and investment.

This technology has, in turn, enabled a growing range of voice-first applications that perform specific tasks, such as ordering coffee, checking bank balances, or moderating family games of trivia. By 2019, third-party developers had built more than 80,000 'Skills' for Amazon's voice assistant, Alexa, and more than 4,000 'Actions' for Google Assistant.⁴

As the conversational economy matures, businesses and application developers will be supported by an ecosystem of platforms, tools and services that will help applications reach wider audiences, thrive, and be financially sustainable. This ecosystem is still emerging, with Apple, Google and Amazon making

⁴ Amazon (2019), 'Amazon.com announces fourth quarter sales up 20% to \$72.4 billion'; Voicebot.ai (2019), 'Google Assistant Actions total 4,253 in January 2019, up 2.5x in past year but 7.5x the total number Alexa Skills in US'.

1. What is Voice-First

significant acquisitions and policy changes in recent years. Market researchers expect today's global voice assistant application market to grow four-fold to be worth US\$5.2 billion by 2024.⁵

Exhibit 1 provides an overview of the voice-first stack, from the devices that listen to and reply by voice to intelligent processing software and the sophisticated applications that are emerging:

1.2 Conversational technology developed slowly until the advent of cloud computing

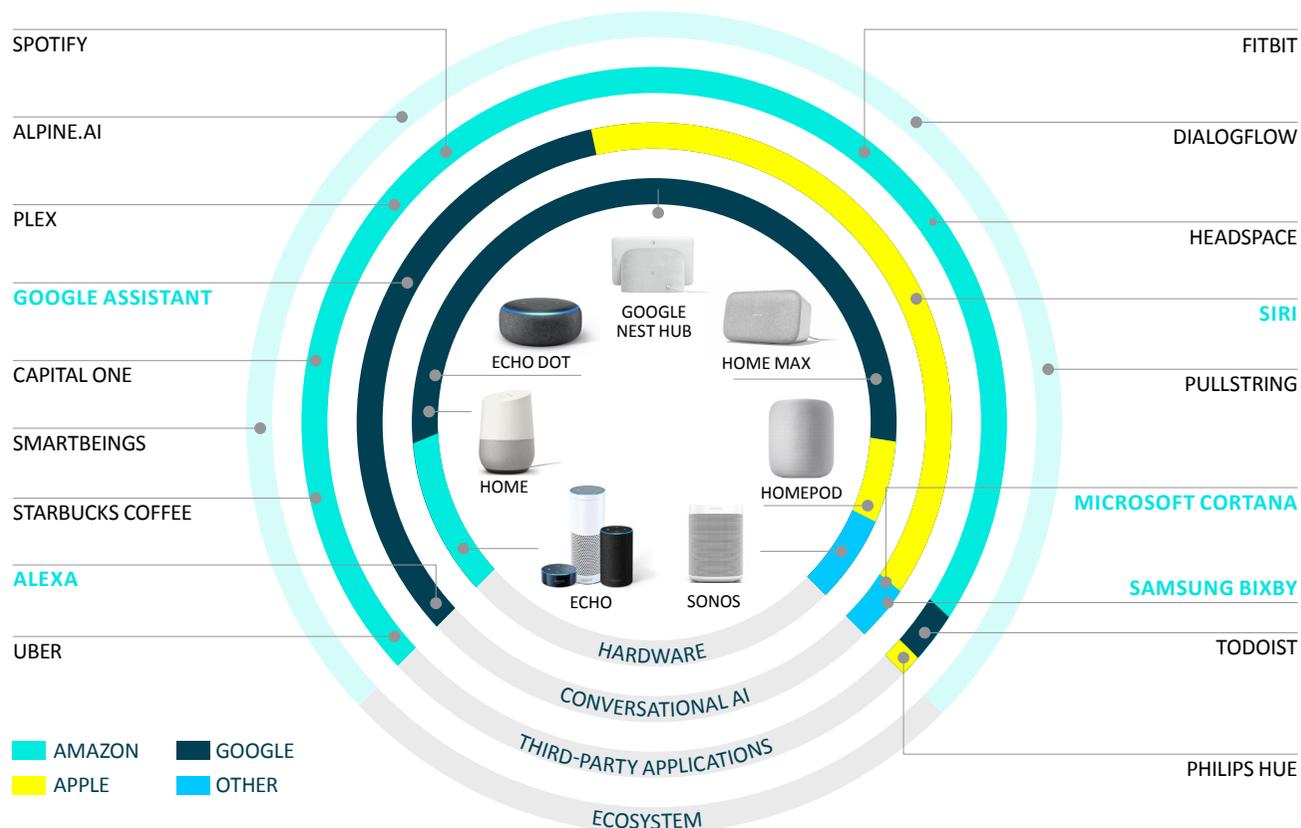
Systems by Bell Labs and IBM were capable of recognising spoken digits and a handful of words in the 1950s and 1960s.

Development subsequently plateaued for some time, with software accurately detecting only 8 out of 10 words during most of the 2000s.

Technologists soon realised that simply transcribing speech wasn't enough. Because humans rarely spoke perfectly, voice-recognition technology needed to understand accents, nuances, and context to derive true meaning from human words. It wasn't until Google's Voice Search app in 2008 that speech recognition became a viable consumer technology. Enabled by cloud computing and freely available to anyone with a smartphone, the app combined voice recognition with Google's vast stores of historical search data to better predict what its users were trying to communicate.

Today's voice assistants recognise more than 95% of human speech, and this is just the beginning. Exhibit 2 provides an overview of the history of voice-first technology.

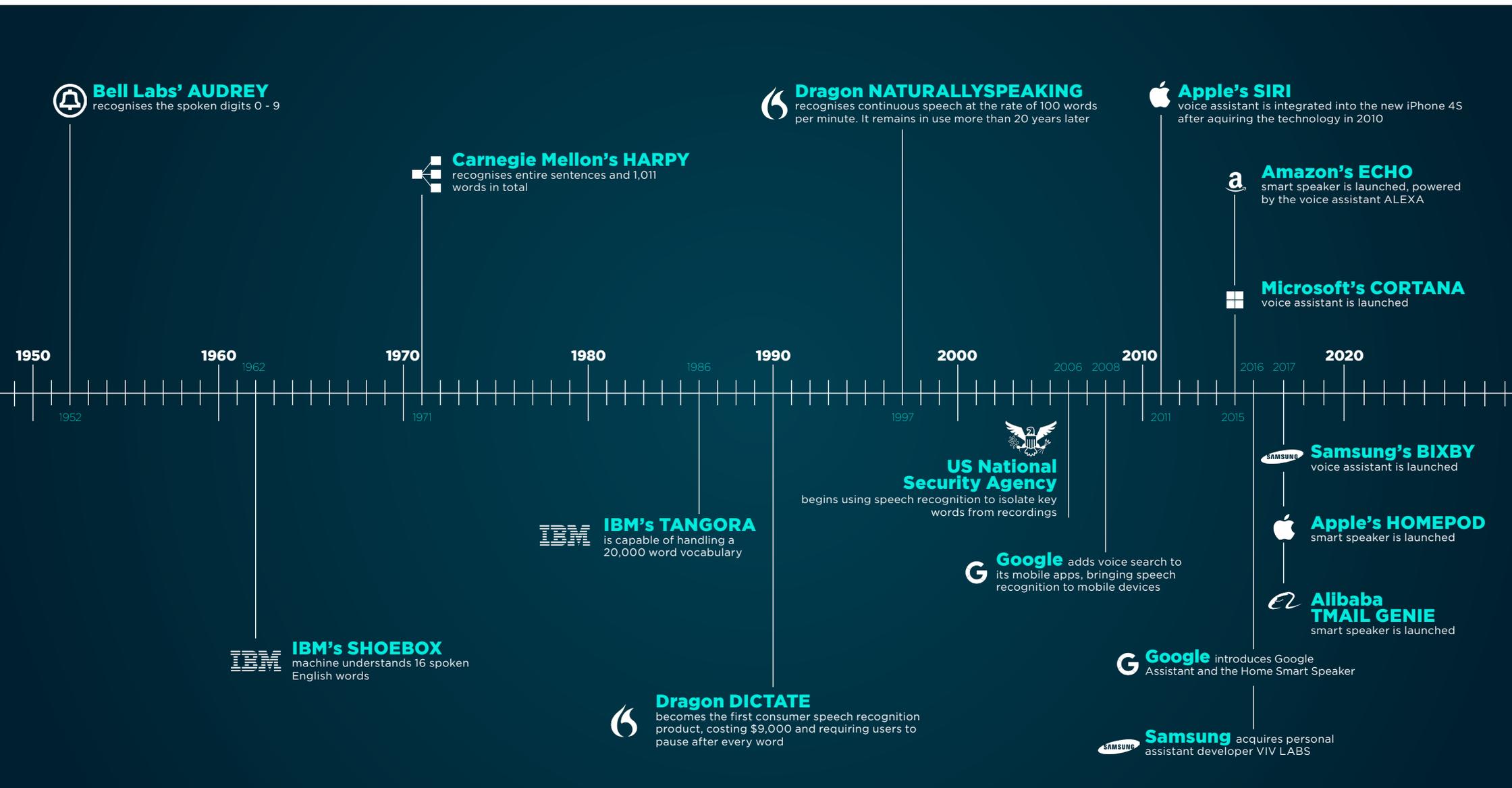
Exhibit 1: The Voice-First Stack



NOTE: Hardware and conversational AI categories describe Australian market share. The third-party app category describes voice apps built internationally for Apple, Google and Amazon. SOURCE: Telsyte (2019), *Australian IoT@Home market study*; Telsyte (2018), *Australian smartphone and wearable devices market study*; AlphaBeta analysis.

⁵ Markets and Markets (2019), *Voice assistant application market*

Exhibit 2: history of voice-first technology



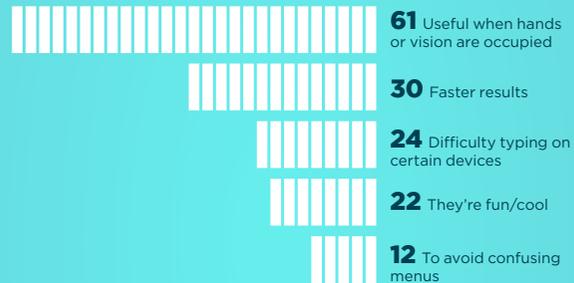
SOURCE: Voicebot (2017) 'A short history of the voice revolution'; ClickZ (2018), *The past, present and future of speech recognition technology*

2. Why are consumers adopting voice-first?

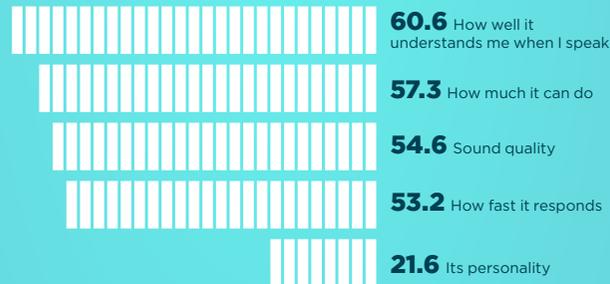
Consumers are adopting voice-first systems and services for three main reasons: speed, convenience, and better service quality. These advantages are becoming greater as the technology matures, with voice interfaces and conversational AI helping their users stay seamlessly connected at home, work and on the road.

Exhibit 3: Consumer motivations for using and purchasing voice-first technology

PRIMARY REASONS FOR USING VOICE, 2016



QUALITIES SOUGHT AFTER IN SMART SPEAKERS, 2019



SOURCE: Kleiner Perkins (2016), *2016 Internet trends report*; Voicebot.ai (2019), *Smart speaker consumer adoption report Australia*.

2.1. Speaking is faster than typing

Voice-first technology has the potential to be faster than traditional inputs for two reasons. Firstly, people speak more quickly than they type: averaging 150 words per minute in speech, compared to 40 words per minute on a computer keyboard and half that on a smartphone.⁶

Secondly, conversational AI will allow machines to more quickly interpret their users' needs, avoiding the need for cumbersome or confusing menus of options and commands. Using artificially intelligent voice-first devices, a user can simply say: "OK Google, which bank has the lowest fixed home loan interest rate now" in a fraction of the time they otherwise would have spent unlocking their device, navigating to a bank comparison website and locating the information they are after.

In phone calls to banks, telecommunications companies and other service providers, conversational AI technology will mean less time waiting on hold or navigating through automated, 'interactive voice response' (IVR) menus on the phone. Today's IVR systems typically present callers with a series of pre-programmed options and ask people to click buttons associated with the options that best fit their needs. That won't be necessary with emerging AI systems capable of routing or addressing spoken queries directly.

⁶ Kleiner Perkins (2016), *2016 Internet Trends Report*; TechCrunch (2017), 'Facebook is building brain-computer interfaces for typing and skin-hearing'.

Additionally, conversational AI will become more pervasive as it is integrated into the Internet of Things (IoT), allowing users to truly multitask by accessing the conversational economy while performing other activities. Users will hold conversations with their washing machine, such as asking them how to remove specific stains or ask their fridge for suggestions on what to cook for dinner based on what's inside.

Exhibit 3 outlines the primary reasons and criteria for consumers using voice technology, including the fact that almost one in three respondents in a 2016 survey said voice search commands produced faster results than typing.

2.2. Voice users are connected even when their hands or eyes are occupied

Voice assistants will be used in a wider range of settings than screens, which has become increasingly important in an always-connected world. At home, voice assistants will be used by people holding infants, or busy in the kitchen. At work they will benefit medical professionals or industrial workers whose hands are otherwise occupied. Voice assistants could also help make driving safer. BMW, Mercedes-Benz, Hyundai and Chevrolet have all built voice assistants into their vehicles in recent years, either by developing in-house systems like the Mercedes-Benz MBUX, or through partnerships with Apple, Google, Microsoft and Amazon. In a 2019 survey of US car

owners, more than half said they had used a voice assistant while driving. Of those, 68% used the technology at least once a month, and almost a quarter used it daily.⁷

2.3. Ambient computing and big data will improve service quality

Voice technology also has the potential to radically improve services. While today's contact centres rely on statistics such as call volumes, wait times and survey scores to measure customer satisfaction, emerging conversational AI systems could store much more conversational data. This would help businesses identify the language and recommendations that resonate with customers to, for example, improve communication and service quality.

AI voice assistants could also pull in a vast range of personal data from connected apps including users' calendars, email, weather, maps and history to provide better search results and recommendations. An always-on smart speaker that detects two business people discussing meeting plans could automatically suggest the top-rated cafe located in between the two offices, and a meeting time that suits both parties.

Clearly, there are privacy issues that need to be addressed before this technology becomes commonplace. However, given the appropriate policy settings and user acceptance, the benefits of ambient computing are likely to be a significant driver of growth in the conversational economy.

⁷ Voicebot.ai (2019), In-car voice assistant consumer adoption report.

2.4. Improving accessibility

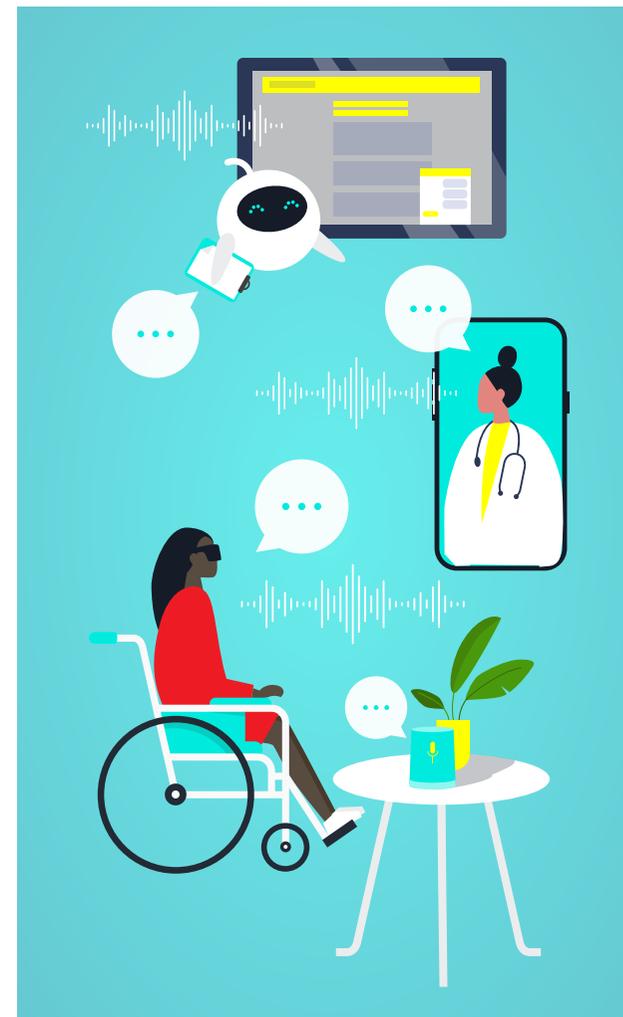
Voice technology has another clear upside - the potential to help a vast array of people who find it challenging to access services.

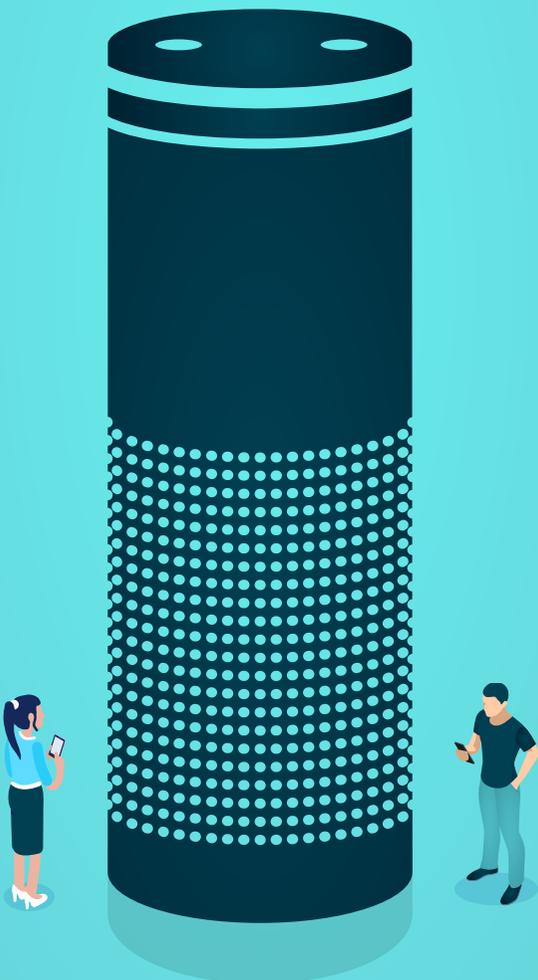
With an ageing population, voice is a much easier option than expecting consumers to find the right website and navigate themselves through the options available. Plus, the personalised nature of well-designed voice assistants will give them greater comfort in seeking and accepting the right assistance.

A more overt example is helping people who are vision-impaired, as it strips away the bulk of barriers they otherwise face.

The same principles of improved understanding of complex information and improved participation applies for people with intellectual disabilities, and people from culturally and linguistically diverse (CALD) communities. Indeed, voice-assistants can easily be made multi-lingual to aid communication with CALD communities.

Improved accessibility was a key driver in the development of **Nadia** - a digital assistant created for the National Disability Insurance Scheme. Nadia was purpose-built to provide people with disability a better way to access important information and communicate directly with the NDIS 24 hours/7 days a week on their preferred device. Through extensive codesign with people with disability, Nadia could optimise her speaking style to cater for individual disabilities.





3. How big is the conversational economy and how fast is it growing?

Australia is one of the world's fastest-growing smart speaker markets. About 3 in 10 Australian adults now use smart speakers despite their relatively recent introduction in mid-2017. The popularity of these devices, as well as improvements in conversational AI and applications, have also encouraged consumers to make better use of voice assistants on their smartphones. In the near term, analysts expect voice assistants to be performing more purchasing and reservations tasks, with voice commerce expected to reach US\$80 billion a year by 2023.

3.1 Australia is one of the world's fastest growing smart speaker markets

Google was first to bring smart speakers to Australia, launching the \$199 Google Home in mid-2017 to largely positive reviews. In February 2018, Apple followed with the HomePod and Amazon began shipping its Echo range of smart speakers locally, almost three years after the Echo's US release. A range of smart speakers from electronics makers including JBL, Sony, Sonos and Panasonic now come to Australian consumers with either Google Assistant, Amazon's Alexa, or Apple's Siri installed.

By the end of 2017, around half a million Australian households owned a smart speaker. By June 2018, after Apple and Amazon joined the fray, this number had more than doubled to 1.15 million households.⁸ Nearly 30% of Australian adults owned a smart speaker by December 2018.

In comparison, it took 3.5 years for smart speakers to reach 26.2% of US adults and over two years to reach 14.4% of people in the UK.⁹ Exhibit 4 shows how smart speaker adoption has grown in the years since their release in the US, UK and Australia.

⁸ Telsyte (2018), 'Smart speakers help send Australian IoT@Home market skyward'.
⁹ Voicebot (2019) US smart speaker consumer adoption report; eMarketer (2018), 'UK: Amazon Echo

3.2 Voice assistants will reach more than 1 in 5 global consumers by 2021

The rise of smart speakers has also encouraged consumers to make better use of the voice assistants on their smartphones. According to a January 2019 survey, Australian smart speaker owners are 1.5 times as likely as the general population to use voice assistants on their smartphones. Almost four in nine smart speaker owners reported using their smartphone voice assistants more frequently since buying a smart speaker.¹⁰

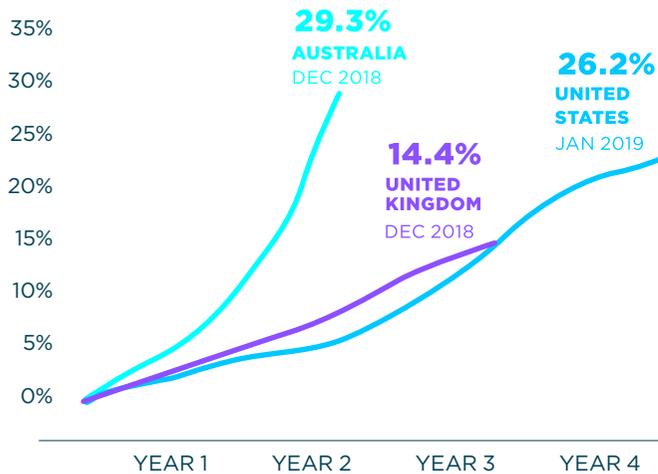
These evolving consumer behaviours and preferences have pushed voice-first technology to a tipping point. While only about 5.3% of the world population used voice assistants in 2015, almost 23% are expected to do so by the end of 2021.¹¹ This suggests that voice assistants will not only be a first-world convenience, but a primary means for people from all backgrounds, skill levels and abilities to interact with machines.

By 2021, there will be an estimated 7.5 billion voice-enabled devices in use around the world, more than double the 3.5 billion

¹⁰ Voicebot.ai (2019), Smart speaker consumer adoption report Australia.
¹¹ Tractica (2016), 'The virtual digital assistant market will reach \$15.8 billion worldwide by 2021

3. How big is the conversational economy and how fast is it growing?

Exhibit 4: Comparative rate of adopting smart speakers



SOURCE: Versa; Voicebot; Telsyte; CommScore; eMarketer; Forrester

that were active in 2016.¹² Much of this growth is expected to come from TVs, wearables, smart speakers and similar devices. Exhibit 5 provides a breakdown of the growth expected from each of the market-leading voice assistants.

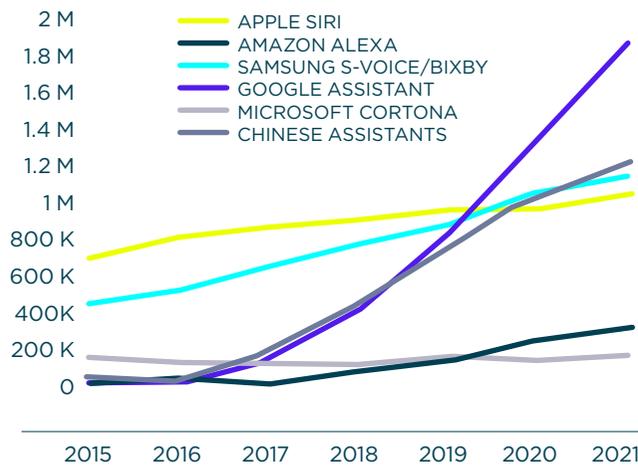
3.3 Voice assistants will facilitate more shopping and reservations in the near term

Today's consumers primarily use voice assistants to answer questions. For example, "How do you spell...?", "What sound does a whale make?", and "What's the name of this song?" were among the most common questions put to Google Assistant in 2018.¹³ Exhibit 6 shows how voice assistants have taken on more research-related tasks, including finding places to eat or looking up product reviews and prices, in the past four years.

A third of Australian smart speaker owners regularly use their devices for shopping, although many of these purchases are

¹² Ovum (2017), 'Virtual digital assistants to overtake world population by 2021'.
¹³ MakeUseOf (2018), 'The 15 most popular 'OK Google' questions you can ask'.

Exhibit 5: Market growth of leading voice-assistants



SOURCE: Ovum (2017), 'Virtual digital assistants to overtake world population by 2021'

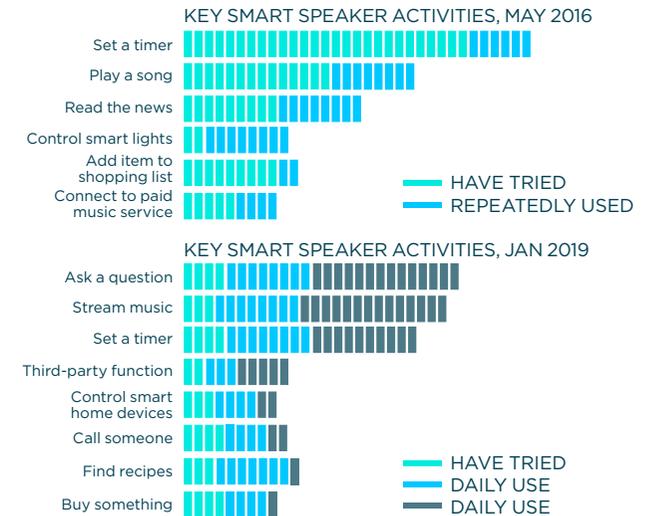
Alexa and Google Assistant have been open to third-party application developers for some time, giving rise to new, innovative voice-first functions that are now gaining traction. Domino's has introduced applications that allow users of either voice assistant to order pizza by voice, while Uber has developed applications that allow Alexa and Google Assistant users to request rides.



likely to be low-value transactions, donations, or purchases of digital like apps or music.¹⁴ As more voice-first applications emerge, voice-first purchases of clothing, books, food, groceries, homewares, technology and digital goods will grow to exceed an estimated US\$80 billion a year by 2023.¹⁵

¹⁴ Voicebot (2019), 'Smart speaker consumer adoption report Australia'
¹⁵ Juniper Research (2018), 'Digital voice assistants in use to triple to 8 billion by 2023, driven by smart home devices.'

Exhibit 6: Smart speaker activities



SOURCE: Experian (2016), 'Amazon Echo Study & Findings'; Voicebot (2019), 'Smart Speaker Adoption Report'. Categories were selected for ease of comparison.

Advances in conversational AI technology, such as Google's recently announced Duplex, will call and speak with other humans to perform tasks like making restaurant reservations, renting a car and booking movie tickets on their users' behalf. In the longer term, as AI technology matures to incorporate emotion, voice-first systems will be able to take on some healthcare functions, improve education and help identify fraud. Software can help doctors diagnose diseases like depression and dementia, or converse with older patients at home to monitor their wellbeing and remind them to take their medication. One in 10 personal devices are forecast to have emotion AI capabilities by 2022, up from less than 1% in 2018.¹⁶

The application of these new advances in voice technology has the potential to significantly impact the way in which both government and non-government organisations design their future service delivery - not only to enhance the experience for end users, but also their ability to provide an enhanced set of services at scale.

¹⁶ Gartner (2018), '13 surprising uses for emotion AI technology'.

4. How are organisations currently using voice-first technology?

Today's emerging voice applications tend to focus on two key areas: customer experience and productivity. Leading organisations in banking, government, healthcare and other industries have already introduced advanced conversational AI technology aimed at reaching a greater range of citizens, delighting their customers and reducing costs.

4.1 UBank's Mia is the world's first 'digital human' to assist with the home loan application process

Built in partnership with New Zealand start up, FaceMe, and launched in April 2019, Mia (My Interactive Assistant), is an AI-powered, virtual assistant that can answer customer questions about UBank's home loan application. For example, customers can ask Mia about UBank's rates or to explain terms such as, "what classifies as an expense?"

Mia was built from the success of UBank's first AI project, RoboChat – powered by IBM Watson – which saw home loan applications spike by 15% after interaction.

As a home loan is one of the biggest financial decisions in a person's life, people have many questions and are keen for honest, straight forward answers. Mia's personality is crafted with the customer in mind – smart, empathetic and as a jargon free zone.

Since arriving at UBank, Mia has had 2226 conversations with customers – 49 conversations each day. Mia's natural language understanding is at 81%, meaning it has been able to effectively understand and respond to customer questions. Lasting for an

average of four minutes, the conversations represent 148 hours and more than six days of queries diverted from UBank's call centre, allowing customer service team members to deal with more complex problems.

[Watch Mia in action](#)



4. How are organisations currently using voice-first technology?



4.2 Using virtual therapists to conquer PTSD

With the world's largest defence force, the US military has a constant cycle of troops returning home. One of the major tasks is to check every troop member for signs of Post-Traumatic Stress Disorder (PTSD).

Until now, the test has either been done via a written survey, or personal interviews. The risk has been people are guarded in these formats, as they can either feel judged or worry about confidentiality. But a new virtual interviewer – an AI avatar rendered in 3D on a television screen – is changing that.

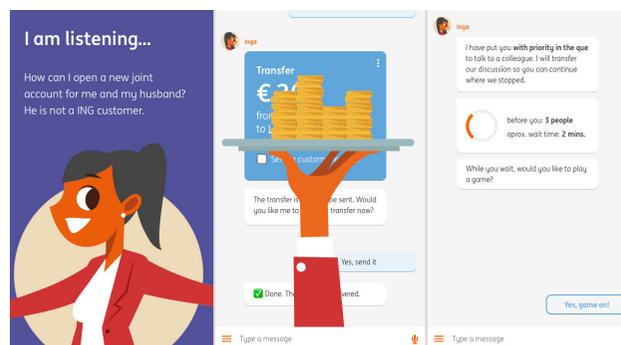
Firstly, the avatar, known as Ellie, uses machine vision to interpret the verbal and facial cues of subjects and respond supportively. In doing so, Ellie builds empathy and encourages the participant to open up.

Secondly, by removing fears around judgement or confidentiality being breached, Ellie is able to advance a conversation that is geared towards identifying symptoms of PTSD.

The result has been more subjects acknowledging and reporting PTSD symptoms when engaged with Ellie than a similar sample of traditional methods like surveys or 'personal' interviews.

Ellie's better performance has also been true over 'blind' interviews – where a therapist, like a priest, cannot see the participant. This is because they lack Ellie's capacity to see facial cues.

The result is returning military personnel are more likely to be channelled to the right assistance earlier than they would be otherwise. There is now also the prospect Ellie's functions will be extended to incorporate therapeutic supports.

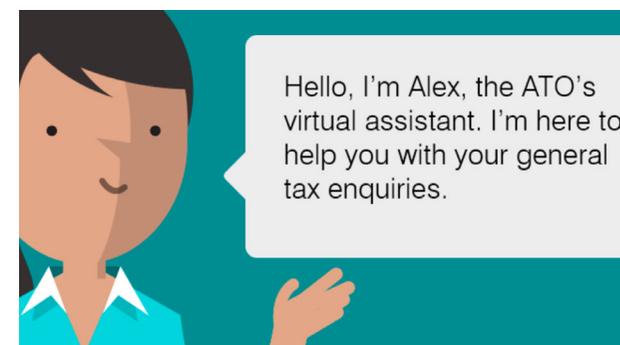


4.3 ING's conversational banking bots respond with empathy and emojis

Dutch bank ING has been building conversational AI to communicate with customers via telephone, Facebook, Twitter and smart speakers like Google Home for some time. It has several chatbots for its various business units, including 'Inge' for Dutch consumers, 'Lionel' in Australia, and global wholesale banking chatbot 'Bill'. ING also has technology that lets customers check their bank balances using Apple's voice assistant Siri.

Of ING's consumer-facing chatbots, Inge is the most advanced. Inge started life within ING's Mobile Banking app in 2014, allowing customers to make payments by reciting a recipient's 34-digit bank account number, instead of having to type it in. The chatbot has since developed better conversational capabilities, and now provides personalised financial advice and empathetic customer service via text-based chat, including emojis and images when appropriate.

ING sees its investment in AI and robotics as a means to gain a competitive advantage, to promote more efficient and effective processes, and to meet customer demand. In the near term, the bank expects more customers to demand predictive products and services that can be accessed via smart speakers like Google Home and Amazon's Alexa.



4.4 ATO's Alex saves \$9.3m per year

The Australian Taxation Office (ATO) introduced text-based chatbot Alex to its website in February 2016 as part of its 'Digital by Default' strategy. The chatbot answers clients' general tax questions on a 24/7 basis, linking them to web resources and calculators where relevant. It uses natural language understanding so clients can phrase their questions conversationally, without the specific terminology required by traditional search engines.

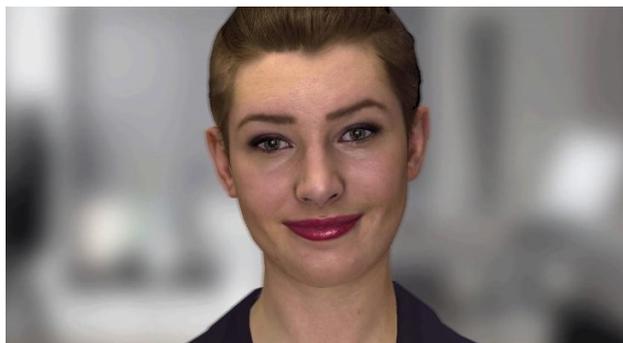
Within 18 months, Alex had 2 million conversations, handling 88% of those queries without the need for further intervention from the ATO staff. Alex reduced ATO call centre volumes by an estimated 8-10% during that period, saving a total of \$9.7 million worth of staff time a year.¹⁷

Alex was built by Nuance Communications and learns over time. The ATO is now considering applying Alex to its call centre, where it will handle voice enquiries. If deployed, the technology could make it significantly faster for customers to access both general tax information and personal advice on the phone. The ATO already stores the voiceprints of one in seven Australians, and has reduced its average call time by 48 seconds by authenticating these callers more quickly and seamlessly than with its traditional security questions.¹⁸

¹⁷ Nuance Communications (2018), 'Australian Tax Office deploys new virtual assistant'.

¹⁸ Computerworld (2018), 'The Australian Tax Office now holds the voiceprints of one in seven Australians'.

4. How are organisations currently using voice-first technology?

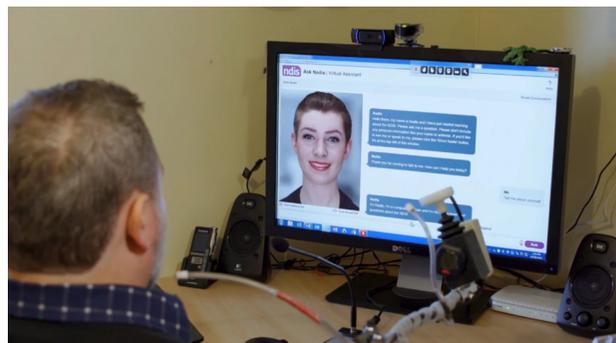


4.5 The NDIA's 'Nadia' helps make information accessible to all

Although currently on hold, the National Disability Insurance Agency (NDIA) has developed a digital assistant to help people with disability navigate the National Disability Insurance Scheme. 'Nadia' has a realistic, computer-generated face and the voice of actress Cate Blanchett. Once operational, Nadia will transform the lives of tens of thousands of people with disabilities by allowing them to communicate directly with the NDIA 24/7 on their preferred device.

Communicating with Government can be difficult for people trying to navigate a brand new program and way of transacting. These challenges are even greater for a range of people with disability for whom many existing communications channels - in person, on the phone, or via a traditional website - simply don't work or create additional barriers.

By helping to make information more accessible to all, conversational AI technology like Nadia (and the ATO's Alex) can be a gamechanger for government agencies seeking to raise



awareness of policy changes, and keeping citizens engaged to achieve better policy outcomes.

People with disabilities, community groups, carers, academics, and the Department of Human Services all contributed to Nadia's development. People with disability had a key role in codesigning and directing her approach, tone, language and voice, so that she would be seen as a friendly and helpful 'face' of the NDIA that could build trust and human-like connections. More than 400 people with disability also signed up to be part of a 'Nadia training crew' so Nadia could interact and learn as a virtual trainee for a year.

Nadia has been developed to augment, not replace, channels like the NDIA's call centre. By handling simpler enquiries, Nadia will free up call centre staff to handle more complex tasks, enabling the NDIA to support the massive increase in call volumes which is expected when the National Disability Insurance Scheme is fully rolled out by 2020.

[Watch Nadia in action](#)



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4. How are organisations currently using voice-first technology?



4.6 Smart speakers at the Prince of Wales Hospital help reassure patients and prioritise requests

The Prince of Wales hospital in Sydney's east has piloted the use of smart speakers as an alternative to the bedside call button. Conventional call buttons alert staff at a central nurses' station without providing information about a patients' specific needs. Instead, the Prince of Wales' voice-activated system, called Lucy, asks for information, prioritises requests and allocates tasks to hospital staff via their mobile devices. Patients are then reassured, via the speaker, that someone is on the way.

Lucy collects data about patient requests throughout the day, so hospital management can analyse requirements and organise staffing of wards accordingly. Patients may also give voice commands to their bedside smart speakers for simple tasks such as turning on the television, lowering the blinds, or turning down the lights, freeing up valuable staff time for other duties.

[Watch the PoW smart speakers in action](#)

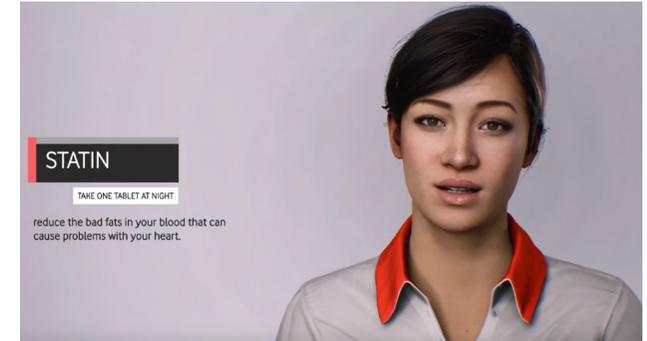


4.7 H&M's smart mirror provides fashion advice

In 2018 Swedish retailer H&M installed a full-length interactive mirror in its flagship store in Times Square, New York. The mirror, developed by Microsoft and Swedish digital agencies Visual Art and Ombori, combines facial and voice recognition to take selfies on request, provide outfit recommendations, and facilitate online shopping.

The mirror invites customers to download selfies and purchase recommended products via Augmented Reality (AR) codes. Some 86% of visitors download their selfies via the AR codes, of whom one in 10 also agrees to subscribe to H&M's online newsletter.

[Watch Smart Mirror in action](#)



4.8 12080.ai's Digital Human Cardiac Coach

12080.ai is developing the AI-powered Digital Human Cardiac Coach – which are digital humans to help people with cardiovascular disease (CVD) and health illiteracy. They are already working in the health sector in the United States where telehealth is an integral part of the ecosystem of health service delivery.

The numbers in the name reflect the gold standard for blood pressure and are blended with the AI reference to link to the technology solutions that underpin the Coach. Cardiovascular disease is regarded as a pandemic by the World Health Organisation - nearly 18 million people die from CVD each year. 4.2 million Australians have CVD and the disease is the number one cause of death among women. Improving outcomes would not only create savings for health budgets, but also save lives.

[Watch Cardiac Coach in action](#)

5. 10 things organisations can do right now to join the conversational economy

As the technology develops so will the use cases of voice assistants. Innovative conversational interfaces will solve complex customer and business challenges not yet even encountered. Here are 10 activities voice assistants can do right now to help solve your organisational challenges:

1. Act as 'front-of-house' concierge across all digital and voice channels

An AI concierge can greet clients in a personalised manner, help customers arrange appointments, and use each interaction to build a thorough understanding of the clients' needs and background information. AI concierges can help provide a consistent experience to customers such as shift workers for whom normal call centre hours aren't accessible, getting the right customised information to them as they need it.

2. Coach clients to success

AI coaches are being used to provide to train and mentor consumers across many complicated areas. From health, medical, finance and education, AI coaches provide person-centric rather than information-centric advice by bringing together complex and disparate information in a synthesised way to match patient and consumer language.

3. Avoid repetitive and time-consuming queries

Some 40% of call centre queries deal with the same repetitive questions adding burden to call-centre support staff. Integrating a voice assistant into as the first point of contact in your customer service journey can eliminate these repetitive enquiries freeing up capacity of your call team to manage more complex cases.

4. Assist customers to complete complex forms

Compared to long and complicated forms, **conversational forms** provide superior user experience, building better trust with end-users through meaningful interaction. Dynamic in nature, smart forms can respond intuitively, removing irrelevant questions reducing user error and frustration with forms. The result is a better user experience for your customers, fewer errors and higher quality data.

5. Provide better customer service and advice

Virtual assistants assistants are able to provide high-quality customer service, tailored to the personal needs and situation of the client. Customer service voice assistants can be deployed to help users derive increased value from products and subscription services, maximising their engagement and propensity to re-spend.

6. Drive consumer spending

AI sales assistants will take an increasingly important role in helping consumers discover the product they are after. By listening to the shopper's unique set of requirements AI shop assistants will provide a filtered and personalised selection, coaching shoppers through to the point of sale. Expect to see AI sales assistants across retail websites, in-store and even connected to your next shopping trolley.

7. Be your No. 1 Brand Ambassador

When built to embody your organisation's brand and values, your voice assistant will be your No. 1 Brand Ambassador, providing consumers with a consistent, high-quality (and infinitely scalable) point of interaction.

8. Improve comprehension for culturally and linguistically diverse communities

Voice assistants can endlessly repeat, rephrase, adjust language and speaking preferences to ensure CALD communities have the opportunity to fully comprehend complex information and engage with your services or products.

9. Make procedural assessments

Voice assistants can apply machine learning to make procedural assessments such as assigning incoming work requests based on priority and need through to pre-screening recruitment applications.

10. Mentor staff to achieve better outcomes

Not all voice assistants need to be consumer facing. Deploying voice assistants internally to coach and provide recommendations to frontline staff can improve their results and uptake of internal training and other systems.



6. What should we do to prepare for the conversational economy?

Not only are consumers getting used to interacting with business and government services via machines, but they are also expecting intelligent, personalised responses on a 24/7 basis. Organisations that don't want to risk being left behind must start building these systems now. Design and development must be led by user needs - not technology - and underpinned by strong, trusted privacy and security practices. These systems may leverage voice assistant capabilities, voice-searchable online content, and carefully crafted conversational AI chatbots capable of keeping customers engaged.

Building strong AI foundations

First steps

The transformational power of the conversational economy to governments and business needs to be carefully harnessed. Rushed, unsophisticated or generic solutions won't secure the dividend on offer and present a real risk of turning away clients and customers.

An essential first step is assessing your organisation's capacity to leverage opportunities presented by the conversational economy. Think creatively about how the conversational economy can help improve your organisation and what is needed to properly prepare for the transition.

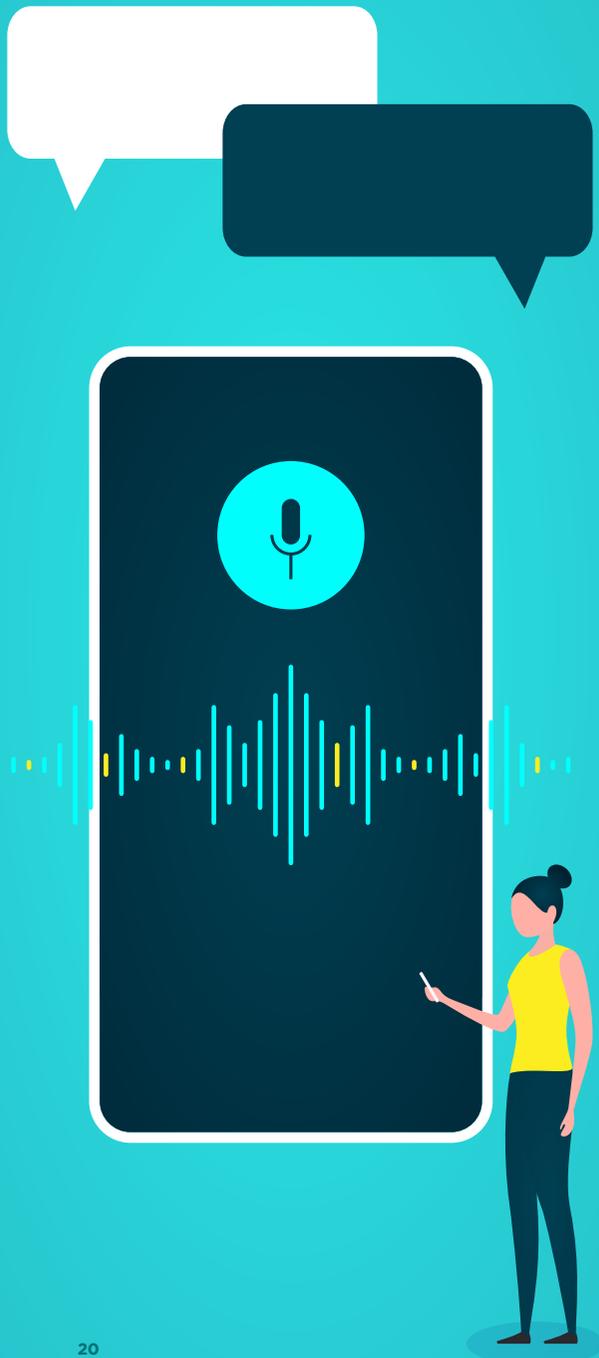
Research by the UK Government Digital Service found that voice assistants rely on a mix of search engines and knowledge bases to provide users with answers. These databases - including Wolfram Alpha, KnowledgeGraph, Wikidata and others - use known facts to answer queries. The UK Government has taken steps to create more highly structured data for this purpose.

RECOMMENDATION 1: Audit conversational economy readiness including organisational capacity, identifying business opportunities, benefits and risks, and resources required.

Create an organisational roadmap for the Conversational Economy

There will be numerous approaches for your organisation to engage in the conversational economy. Investing in the wrong path, or taking a siloed approach across different business units could lead to costly development investments that ultimately do not meet consumer or business needs. Developing an organisational vision articulated through a Conversational Economy Roadmap will lay out a strategic plan to deliver voice assistant solutions that meet your overall goals. Research reveals that the biggest benefits are derived when AI investments are integrated across the business rather than through siloed initiatives.¹⁹

¹⁹ Building the AI Powered Organisation' Harvard Business Review, July-Aug 2019



5. What should we do to prepare for the conversational economy?

Interdisciplinary and diverse teams are critical to successful developments according to research from Harvard Business Review on building AI-powered organisations.²⁰ Multidisciplinary teams are more likely to identify business processes impacted by your AI systems and devise a better rollout.

RECOMMENDATION 2: Develop a Conversational Economy Roadmap undertaking whole-of-business concept ideation and scoping exercises.

These are all fundamental steps required well before any voice-assisted tools are deployed, and should be backed in by substantial investment in research into the customer experience and data privacy policies that will give them the necessary level comfort.

Understand your consumer and build a conversational brand that resonates

Design conversational systems around a deep understanding of customer needs

Developing your response to the conversational economy and the development of your own digital assistant takes time and needs to start with a deep understanding of the customer, their needs and journey. This process is not tech-led but customer-led. End products and personas must be developed with user needs – not technological platforms or solutions – at the centre.

Critically, if digital assistants do not make end users feel comfortable and understood, the consequences will likely be harsh (through digital disengagement) and re-engagement will be hard to achieve. The brand or persona, content or offerings must hit the mark on first contact, provide a positive experience

and engender a sense of trust in order to ensure ongoing reliance and connection.

RECOMMENDATION 3: Undertake quality market research and customer mapping work first. Have the process lead by strategic communications teams with support from tech teams. This will ensure that the process stays customer-focussed and leads to better outcomes.

Organisations looking to deploy conversational AI systems can also use these as a new source of information. These systems have the potential to generate quality data about customer behaviours and preferences, to inform and refine organisations' communication strategies and service quality. Organisations will need the right systems and framework in place to be able to capture and use this new data.

As with the rise of all new opportunities and applications, there will be many 'off the shelf products' for sale. However, these products are not suitable for those businesses, governments, and organisations that need to develop a trusted relationship with their customers, clients, or citizens. Just like one organisation wouldn't use another's physical branding, they shouldn't use a generic, automated off-the-shelf product for engaging with their end users. Failing to invest in a conversational economy product specifically tailored for your brand could be a very costly and more likely unsuccessful exercise.

RECOMMENDATION 4: Invest in developing and extending your brand through tailored conversational economy products to gain the greatest return on investment.

Expand your brand footprint to integrate voice and sonic elements

The user experience of voice assistants and conversational systems won't simply be guided by the aesthetics of the interface, but the phraseology, tone, language and voice actor will all influence how your brand is presented to consumers. As voice assistants become more ubiquitous ensuring your brand permeates through the assistant to create a unique and meaningful interaction will be key to building trust, and engagement with consumers. A critical question is 'how will your voice assistant reflect your brand?'

At a simple level, does your voice assistant say "hi", "hey" or "hello"? Perhaps it says "Good morning" or "What's up?" Is it relaxed and jovial, does it serve up a side of sass, or take a more formal and serious tone? Does it comfort, reassure or champion? Answering these questions, and many more are fundamental to creating an identity for your voice assistant that consumers feel readily reflects your organisation. Get it wrong, and you'll create a trust deficit - or brand confusion - with these consumers.

Audio can be used to trigger powerful emotional and memory response from consumers. With the rise of channels dependent on audio, including voice assistants, IoT, podcasts and even video, large corporations are investing in developing their 'sonic brand' to give consumers an integrated audio experience.

Both Mastercard and VISA have released sonic brand marks that will live across not only their video and radio campaigns, but consumers will start to hear the sound when payments are processed at point-of-sale devices, and as transactions are completed on smart speakers. It will be a familiar ping that over time will remind you that you're shopping with either MasterCard or VISA, even if you haven't used a physical card to

²⁰ Building the AI Powered Organisation' Harvard Business Review, July-Aug 2019

5. What should we do to prepare for the conversational economy?

do so. Ensuring your voice assistant integrates with other audio channels will be a powerful brand trigger for organisations.

RECOMMENDATION 5: Invest in developing your unique conversational and sonic brand that will reinforce to consumers the key attributes of your brand.

The rise of conversational AI and messaging will also mean that consumers expect deeper, more personalised interactions with their service providers. With the right persona, abilities, and data, chatbots can help cement brand loyalty and strengthen relationships with consumers.

To create natural, conversational experiences, Amazon recommends voice scripts that present only the most relevant information needed in a concise and simple way. Alexa may collect further information through follow up questions, or tell jokes in the appropriate context. Amazon also recommends Alexa vary her responses, for example, between “yes”, “okay” and “no problem”, to avoid sounding robotic and monotonous.²¹

User experience testing for ING’s Inge chatbot found that customers responded well to 'moments of delight' – for example when Inge says “Done. You deserve a break” after performing tasks. However, those conversations or responses should stay on point as much as possible to keep users engaged. That meant losing some of the memes used in early test conversations, as well as recognising when a human agent was needed, and being able to transfer the customer to a human seamlessly.²²

²¹ Amazon.com (link), Alexa Design Guide.

²² <https://uxdesign.cc/how-we-designed-inga-a-delightful-banking-chatbot-for-ing-941d18c4646f>

RECOMMENDATION 6: Develop natural language protocols with situationally appropriate personality cues, ensuring your voice assistant can integrate into your broader ecosystem and seamlessly transfer customers to human agents when needed.

Early wins

RIP websites? Optimise new content for voice search and personalisation

The rise of the conversational economy will dramatically change websites. Web developers once favoured flashy, keyword-laden websites to attract the attention of consumers and search engines. Voice search, predicted to account for half of all online queries by 2020, calls for something radically different.²³

Because voice search results are spoken aloud, not read, they need to be simpler, more concise, and grammatically correct. Amazon recommends that statements scripted for Alexa be speakable in a single breath, while a 2018 study found the average Google voice search result to be only 29 words long and written at a ninth-grade level.²⁴ Web content also needs to load quickly, with voice search results typically loading up to four times as quickly as the average web search result.²⁵

RECOMMENDATION 7: Optimise your online content for voice search by including voice-friendly snippets and ensuring that pages load quickly.

²³ Kleiner Perkins (2016), 2016 Internet Trends Report.

²⁴ Amazon.com (link), Alexa Design Guide.

²⁵ Backlinko (2018), Voice Search Ranking Factors Study.

Learn to sell through voice assistant shortcuts

Up to 6 million Australians are expected to use a smart speaker for shopping this year. While today’s voice commerce apps are relatively simple, allowing customers to reorder previous purchases like pizza and electronics, smart home devices including smart speakers and fridges are forecast to be used for \$100 billion, or around 20% of consumer retail purchases, by 2040.²⁶

Voice shoppers can currently buy products sold through Amazon, or through third-party Alexa Skills, Google Assistant Actions or Siri Shortcuts. Walmart, Starbucks and Domino’s are among the global brands to have introduced apps that allow smart speaker users to order items by voice, for example by saying: “Hey Google, talk to Walmart ... Add milk to my cart.” Other brands such as H&M, marry voice and visual, sending links for relevant products to customers’ phones.

However, you also need to listen to your customers about what they want to purchase this way. In a 2018 survey, around half of Australian consumers said they would consider buying movies, TV, books and food using their smart speakers; 35% said they would consider booking accommodation or flights; only 24% said they would consider buying used cars.²⁷

RECOMMENDATION 8: Learn how to use Alexa Skills, Google Functions and Siri Shortcuts to sell by voice, or to link shoppers to online product listings - and use market research to focus your efforts.

²⁶ Telsyte (2019), Australian IoT@Home Market Study

²⁷ Versa (2018), The Voice Report.

Ensure a smooth rollout

Understand where consumers will interact with your conversational system

Consumers are used to having a choice about where they engage with organisations, including through their website or app but also across distributed channels like social media. Similarly, consumers will want a choice in how to interact with voice assistants and conversational systems.

Already popular messenger services such as SnapChat, WhatsApp and Facebook Messenger allow organisations to leverage chatbots to engage with consumers. They are likely to rapidly expand to allow for voice assistants and other conversational interfaces in order to keep consumers engaged on their platforms.

IoT enabled devices and smart speakers will present further distribution opportunities for conversational interfaces, and consideration must be given to how consumers will be able to talk with your organisation through these platforms.

RECOMMENDATION 9: Understand where your consumer will expect and value interaction through conversational interfaces.

Drive adoption with strong consumer and internal communications

Ensuring both consumers and staff know about your new conversational assistant, its benefits and where to access it, will drive its adoption. Without a robust communications strategy to promote your assistant, your investment risks under-utilisation. Research by Harvard Business Review identified that companies who had successfully scaled AI initiatives had invested heavily on adoption initiatives, assigning more than half the initiative's budget to ensure success.²⁸

²⁸ Building the AI Powered Organisation' Harvard Business Review, July-Aug 2019

RECOMMENDATION 10: Develop a robust strategic communications plan for the launch and embedding of your conversational interface or voice assistant.

Getting it right - things to remember

Steer clear of 'trust busters' and design systems with privacy at their core

Organisations will be able to capture huge amounts of customer information from voice devices and AI-powered conversations with their customers. How they use this data could make or break trust in the conversational economy entirely.

Two-thirds of Australians say they are at least mildly concerned about the privacy risks of smart speakers, including almost 18% who report being "very concerned".²⁹ These fears are not unfounded. In 2018, an Amazon Echo device mistakenly recorded and sent a private home conversation to its user's work colleague. And in 2019, a Bloomberg investigation revealed that Amazon employed thousands of people around the world to listen to and transcribe smart speaker recordings – including some private audio – to improve its understanding of human speech patterns. Observers have warned that voice devices are feeding companies with volumes of behavioural data that allow consumers to be unknowingly surveilled and exploited.

Businesses and governments must establish strong privacy policies and practices, collecting only information that is needed and de-identifying or deleting data that is not. The Office of the Australian Information Commissioner recommends 'privacy by design' – that is, embedding privacy protection into systems and business processes.³⁰ One example is informing users of the information that is collected, and asking them to opt-in to share their data, instead of presuming consent until they opt out.

²⁹ Voicebot.ai (2019), Smart speaker consumer adoption report Australia.

³⁰ Office of the Australian Information Commissioner (2018), Guide to securing personal information.

Privacy policies should be written in clear, plain English, and any security breaches should be addressed and reported in a timely fashion.

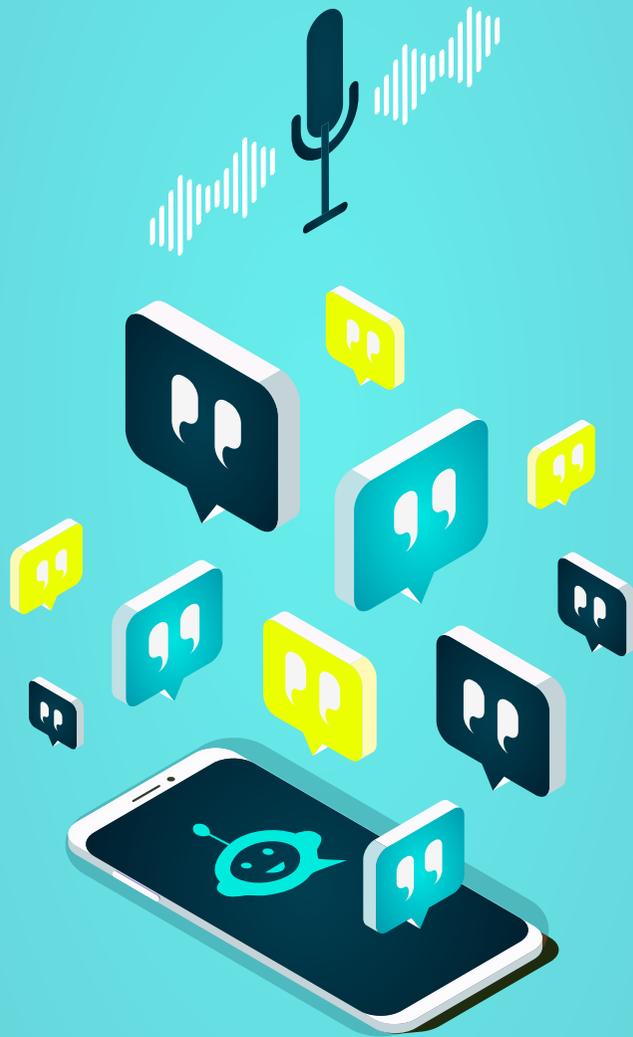
RECOMMENDATION 11: Design business processes and systems with customer privacy at their core. Ask customers to opt into – rather than opt out of – sharing data, keep them informed of how their data is used, and advise them of any security breaches in clear, plain English.

Customers also need to know that they can trust a voice app to perform as it should, especially for functions like banking. User experience also goes some way towards building trust. Amazon recommends Alexa developers avoid unnecessary account linking, unsolicited advertisements, and provide clear information about any errors. High-risk situations, like bank transfers, should require customers' verbal confirmation to avoid errors. Developers should also avoid having voice assistants announce or display private or sensitive content, including passwords or bank information, without the customer's consent.³¹

RECOMMENDATION 12: Avoid unnecessary or unsolicited voice prompts, and always ask for customers' verbal confirmation before performing high-risk voice transactions or revealing sensitive content.

³¹ Amazon.com (link), Alexa Design Guide.

7. Breakthrough the buzzwords



Algorithm

The set of instructions a computer program follows to perform a task or solve a problem

Ambient computing

When devices within our environment combine to sense and respond to our presence and needs, without being actively 'used'.

Ambient intelligence

When a mix of devices work in concert to help people carry out everyday tasks

Artificial Intelligence (AI)

The simulation of human intelligence by computers and machines.

Bias (in AI)

When the bias of humans infects the data or algorithms that underpin AI, and as a consequence AI repeats and confirms the bias.

Big data

The concept and challenge of extracting valued analysis from mass, complex and raw data sets.

Chatbots

AI software that simulates a conversation with a user through websites, apps or the telephone.

Conversational economy

The constellation of voice-activated AI solutions that bridge people and technology.

Conversational interfaces

Platforms such as voice assistants and chatbots that replicate the experience of a conversation with a human being.

Data analytics

The science of extracting and forming conclusions from raw data sets.

Data mining

Finding patterns within large and complex data sets to predict outcomes.

Data modelling

Mapping the way data needs to flow to support its effective use.

Data science

Using a matrix of scientific methods, systems and technology to solve complex problems via data.

Deep learning

Using algorithms to convert raw data into refined outcomes by progressively learning from and layering information

Internet of Things (IoT)

The connection forged between devices and objects all connected to the internet.

Machine learning

An application of AI that lets systems and computers automatically learn and improve without active human instruction.

Natural Language Understanding (NLU)

A form of AI that helps computers understand and process human language.

Neuro Linguistic Programming (NLP)

How the brain, language and behavioural patterns combine to define how humans communicate and relate to each other.

Predictive analysis

Using historical data to try to forecast or predict future outcomes.

Smart speakers

A wireless device that can perform functions as well as respond to commands and queries.

Voice first devices

Devices that primarily receive and transmit information via voice.

Voice search

Speech recognition technology that lets people perform a search via vocal instruction rather than typing into a search field.

