Ca' Foscari University of Venice

Master's Degree

in International Management

Final Thesis

Business Models and Alexa Skills: to what extent is it possible to exploit them?

Supervisor

Prof. Andrea Pontiggia

Graduand

Nicolò Barozzi

857496

Academic Year

2019 / 2020

Acknowledgments

I would like to express my sincere gratitude to my supervisor, prof. Andrea Pontiggia for his guidance. Without his feedback and availability this final product would not be the same.

I additionally address my deepest thanks to Alberto Giusti and Marco Tibaldeschi, whose witnesses have been crucial to my study.

Table of Contents

Table of Figures

1. Introduction

Sometimes it is hard to draw a line, to judge where exactly to separate myths and facts. Knowledge is one of the best tools to identify the clear separation between the two. But perhaps people like myth, they like to think: "what if it is possible?". Voice technology and AI in general are surrounded by this veil of myth that makes it hard nowadays to understand exactly at which point we are and towards which direction we are going. It is the author's job, through this paper, to help the reader draw that line and trying to discover where exactly this groundbreaking technology is leading us.

1.1 Background

There probably isn't any other topic that has such a powerful combination of future potential and misunderstanding at the same time than AI and Machine learning. These concepts are not new, they have been around for decades, but it is still not yet clear to what extent we can exploit them. Smart Speakers or Voice Technology in general are some of their byproducts, and they are interesting because they share the same properties of the technologies they are made of: everybody knows them, but very few people understand its actual boundaries and potential. Later in this document we will provide an insight on all possible aspects to make the situation much clearer to the public, we will talk about what Smart Speakers are, as well as their present and future uses, linked with an up to date market analysis. Moreover we will deliver a clear picture to anyone willing to understand better the opportunities that companies can exploit to become one of the first movers in the Voice Technology segment, comprised of a step by step guide on how to adapt your current business model.

1.2 Target Audience

This study could be interesting for multiple parties. It could be interesting for individuals looking for a collection of information concentrated in the same place, because, as we described later in this document, there isn't a great availability of information and it is very much fragmented. The same goes for companies, but they could also be interested in the opportunities that Voice Technology offers nowadays, not only as a mean of internal efficiency, but also as another way to interact with customers on a different domain.

1.3 Purpose of the study

The main purpose of this study is to collect and connect all the small and unlinked pieces of information treating the subject, providing an unique and complete document that can help anyone in understanding the topic better. The parts describing the actual uses of the technology and how to adapt your business model are especially relevant to position Smart Speakers and Voice Technology in the minds of users.

1.4 Research questions

During this paper we will gradually move from general topics to more specific ones to favor an easier understanding process. Based on the the purpose of this study and the target audience, the following research questions have been formulated:

- **What is a Smart Speaker / Vocal Assistant?** An introducing chapter that is absolutely fundamental to understand fully the topics proposed in the next chapters. It will deal with topics such as the Smart Speakers definition, its uses, benefits and problems.

- **What is its Market Analysis?** All the most useful data to understand how the Smart Speakers market is evolving, concerning the major players and geographical areas.

- **What are Alexa Skills?** The central topic of this paper, Alexa Skills are the real deal when talking about Voice Technology, they change the rule of the game entirely. In this section we will talk about them extensively and provide many examples that will help us to set a basis for talking about Business Models opportunities.

- **Is it possible to create a Business Model with voice? If yes, how?** This controversial part guides the reader to the creation of a business model to enter the Voice domain by analyzing the three main parties involved: Amazon, the users and the company itself.

1.5 Procedures and Methodology

To answer the research questions, both qualitative and quantitative data have been gathered from various sources, with a very big chunk of material being the result of the author personal interpretation. We can therefore consider it to be a mixed methodology, comprised of quantitative data represented especially in the market analysis, and qualitative data that help the reader to understand better the main topics of this study.

2. What is a Smart Speaker / Vocal Assistant?

Smart Speakers are devices that offer services to the user through a vocal interaction. The user can ask questions or input direct commands to the device to obtain an answer to their need or to make an event happen (like adding items to the shopping list or set an alarm). Giving and receiving information through the use of your voice is the next step of integration with technology, and it makes it possible to shape this interaction in the most humanlike way as possible. Vocal Assistants are a thing since decades, but they were never intended to be used by the general public. Since 2011, when Siri for the iPhone was released, people started to interact with technology in a different way, not digital or analogical but vocal. Smart Speakers are relatively inexpensive devices with a built in Vocal Assistant that are becoming a common feature of every household thanks to their use as smart devices. Moreover, through common protocols like Wi-Fi and Bluetooth, they can act as home automation systems, thus multiplying their possible applications and uses.

If we were to summarize what they are we could say that Smart Speakers are devices created to make our life easier through a novel way of interacting with technology: after "waking them up" with the use of a "hot word" they assist us with basic tasks that can also be integrated with other external systems like cars, houses and phones to make them act in a "smart" way according to our instructions.

2.1 What is not a Smart Speaker?

It is a common misconception to compare Smart Speakers with Chatbots. They are both conversational interfaces but very different from each other. Smart Speakers work through vocal communication, they can listen, understand and reply with intelligent answers, while Chatbots are automated messaging systems that help people through the buyer's journey, thus acting mainly as customer care representatives most of the times. Even though both of these systems are byproducts of Artificial Intelligence (even if AI can still be considered to be in its infancy nowadays), Smart Speakers are much more complex and smarter (because of the

uncomparable technological advancement) than Chatbots, but it is fair to mention that both systems have an incredible rising popularity and usefulness. Let's think about stores: customers could interact with Smart Speakers in a store to find what they are looking for, but many times people are not comfortable talking about their private matters in crowded areas, while texting remains a viable way of communication. We can say that Smart Speakers will be more frequent inside customers' homes or cars while Chatbots will be used more in stores or other crowded places. Moreover, in these kinds of situations, Chatbots can provide images or videos that have a different impact on humans than a vocal description of an item. While a Smart Speaker interacts with one person at a time, a Chatbot can interact with many customers at the same time. In the end, since we already said that Smart Speakers technology is more advanced, we could expect them to outrun bots in the long run due to the release of new features and new advancements in their field.

2.2 What are the uses of a Smart Speaker?
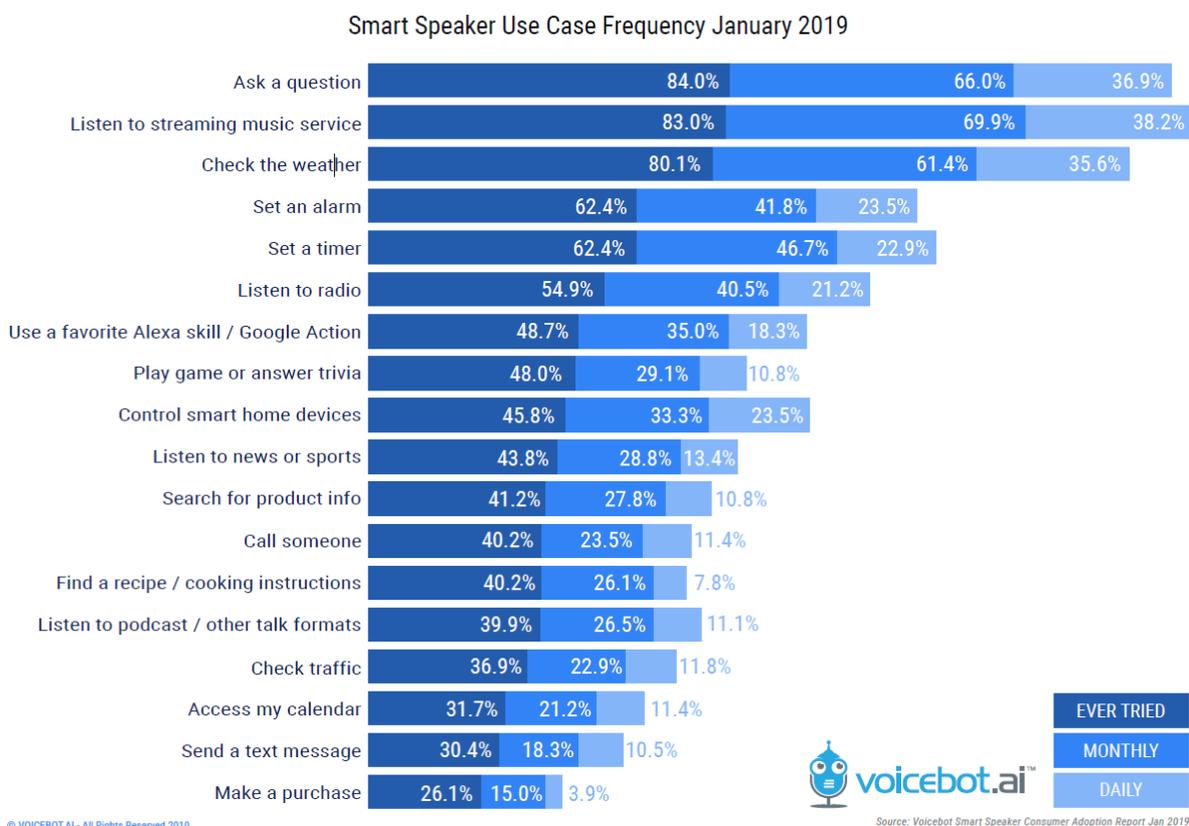
Figure 2.1: Smart Speakers use case Frequency

The uses of a Smart Speaker, even if quite limited nowadays, have a broad range of options, from the simplest to more advanced and "smart". Some of the basic functions could be answering queries (providing information about the weather in a specific location, reading the latest news, providing cooking recipes), they can play music, tell jokes, set alarms or reminders, but they can also perform more advanced actions such as send text messages, performing phone calls (or do anything that you can already perform with your phone), play games, open doors, turn lights on, control the thermostat or any other system connected with domotics. They can do many things and can be very useful, but why should we use them? They are "not as needed and useful as phones", right? This depends on other factors, such as:

- **Speed**: people look for the best and quickest (and possibly cheapest) solution to their problems. If my need is food, I can order food a lot faster with a vocal assistant than using an App, the same reasoning applies if I need a quick answer to a query or to turn lights off while I am comfortable on the sofa. If I cannot get what I want quickly, I will not use the device.

- **The extent to which they make life easier**: in an era with busy lifestyles like nowadays Vocal Assistants could be very useful to the common household as tools that can support daily life in a broad variety of ways. There are also some categories of people that could benefit much more from vocal assistants than normal households, let's think about people with disabilities for example, an innovation like this one could be life changing.

It is very important to point out that the main activity that these devices perform is that they constantly learn. They get to know your routines, your habits, what you look for, what you buy… They are always getting smarter and better at recognizing and anticipating your needs, providing solutions and increasing the number of activities they can perform. That's why if you have never used a Smart Speaker or a Vocal Assistant before, in the future you probably will.

The table above specifically provides examples of actions with the related frequency of use (ever tried, monthly, and daily). That list focuses mainly on what users have ever tried, with the first positions (apart from listening to music services), held by first-party services (those functions that are performed directly by the native speaker without the need of third party applications, like checking the weather or setting an alarm), and immediately after we find more traditional third-party services like music, Alexa skills (made by independent developers), games and more. Sometimes though frequency can tell us many more information than what it seems, certainly more information about how users use their Smart Speaker but also probably some indications on where it is located in their house and how likely they will buy another one (if many people set alarms maybe they will consider buying one to place in their bedrooms as well). What manufacturers and developers want is of course to add Smart Speakers interactions to people daily routines.

2.3 Which types of Smart Speakers are on the market?

At the time of the writing of this document there are many Smart Speakers on the market, but the most important ones (for the Western market at least) are:

- **Google Home**
- **Apple Siri**
- **Amazon Echo (Alexa)**

Figure 2.2: From the left, Google home, Amazon Alexa and Apple Siri vocal assistants.

Other important Smart Speakers on the market are:

- Samsung Bixby
- IBM Watson
- Microsoft Cortana
- Nuance Nina
- Alibaba AliGenie
- Baidu DuerOS
- Line Clova
- Tencent Xiaowei
- Xiaomi XiaoAI

While the first three Smart Speakers are the most famous on the American and European market, other lesser known speakers are basically as competent but more diffused in other markets like China (AliGenie, DuerOS, Xiaowei and XiaoAI), Japan and Korea (these countries have both American speakers and local ones like Clova and Bixby).

2.4 How do they work?

Without going too deep on technical details it could be useful to provide a simple explanation on how Smart Speakers work: generally these devices are continuously in a state of passive listening. This means they are not really recording because they are waiting for a specific command called "wake-word" to be activated. After activation users ask something to the device. This audio is converted firstly into text and secondly into a machine-understandable meaning that is processed on the cloud. After having analyzed the input from the user, an appropriate output starts being generated that could either be converted into text to be "read" by the device or it could be data needed for a specific action like playing a song with a specific app.

2.5 The history of Voice Assistants and Smart Speakers

Voice Assistants and Smart Speakers as we know them today are still very "young" systems, dating back to the last decade (2010s). In order to understand more about their development let's analyze the following timetable:
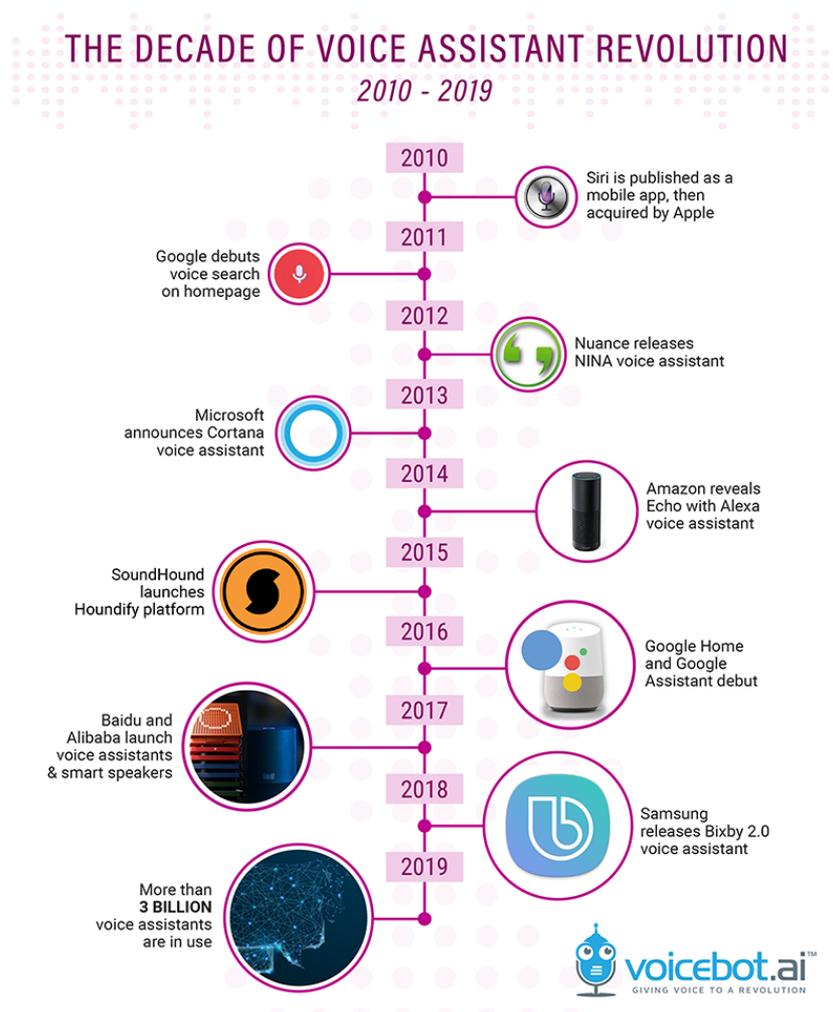
Figure 2.3: Voice Assistants timeline

- **2010**: Siri was an App for iPhone developed by an independent company that was soon acquired by Apple. After its introduction on the iPhone 4s, Siri became the first Voice Assistant on people's devices and you can find it today on any Apple voice-capable product.

- **2011**: Google has been running voice search technology tests on devices since years 2000s but it wasn't until 2011 that they added a voice search button on their homepage.

- **2013**: Microsoft announces Cortana, but it didn't get the hoped success on consumers. It became widespread in offices because of its business related efforts.

- **2014**: After years of "secret" testing, Amazon reveals the first Smart Speaker (Echo) with its own Voice Assistant named after the Library of Alexandria (Alexa). It is arguably considered the most influential Speaker on the market, taking the majority of market share, also thanks to "Skills", the central topic of this document.

- **2016**: Google reveals its own Smart Speaker with Google Assistant to directly challenge Alexa. They are similar systems but both have unique features that will determine their success in the next decade.

- **2017**: For western companies it wasn't too difficult to compete in the Asian market until other tech giants showed up. Alibaba and Baidu Smart Speakers and Voice Assistants flooded the Chinese market with new and different features specific for the Chinese and Asian markets.

- **2019**: As of the end of the decade Juniper Research affirmed that there were more than 3 billion devices with Voice Assistants in use, with expectations of reaching 8 billion by 2023. Today they are just fascinating tech devices, but in the future, as more features will be created and more integrations will be set in place (with cars, clothes, office equipment...), they will become a natural way of interacting with the world around us.

Smart Speakers are certainly an important technological revolution, but like all things they come with both benefits and problems. In the next sections we will discuss the

most common advancements as well as concerns and try to look at the future for possible solutions or improvements.

2.6 What qualities do customers value in Smart Speakers?

What do consumers want when interacting with smart speakers? Do they want detailed answers? Or perhaps a quick response? According to a research made by VoiceBot in the US we can say that nowadays people interacting with Smart Speakers want to be understood:
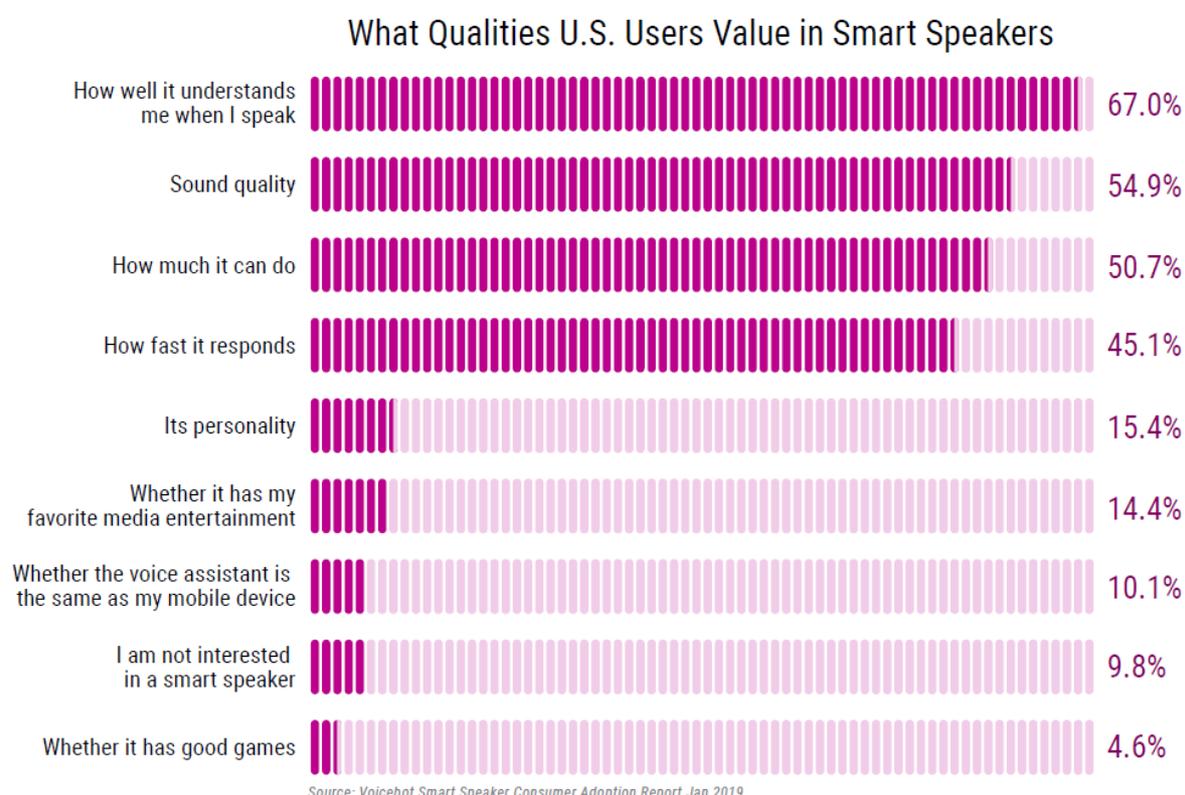
Figure 2.4: Smart Speakers qualities valued by consumers

More than two thirds of consumers is very concerned about how well the Smart Speaker understands when you speak. Other important qualities for consumers are sound quality at 54.9%, the range of actions it can perform at 50.7% and how quickly it responds at 45.1%. The next quality valued by consumers is personality at only

15.4%, thus creating a big gap between the first four options and the remaining ones. This tells us that nowadays consumers want to be understood and want to receive an answer as fast as possible, and it is strange to say but it is actually what the device was born for, thus reflecting how new and complex are these devices even if already widespread. One more important aspect to consider is that only one in ten consumers wants its Smart Speaker to be of the same brand of his smartphone, so it can be considered to not be an important characteristic for brand selection.

2.7 To what extent can we superimpose Smartphone Assistants and Smart Home Assistants?

As we already differentiated, brands like Apple or Google provide Voice Assistants on all their devices and have recently introduced to the market a Smart Speaker following Amazon that, compared to its counterparts, does not have any presence in the smartphone/tablet market, therefore the latter Voice Assistant Alexa is available only on Amazon Smart Speakers.

So both a Smartphone and a Smart Speaker share the same Voice Assistant most of the times, but are there any differences in the way they are used? The main factors influencing their uses are mainly the devices themselves: smartphones are always in our pockets, wherever we are, while Smart Speakers are generally at home or in an office, generally confined in a room where they serve their purpose. But all of these things influence the way they are used by consumers. Let's analyze some data:

% of users of these types of assistants who do the following through voice

Asking for directions

Finding information about something

Checking the weather

Listening to music

Setting an alarm/timer

Setting reminders/keep track of tasks

Checking the news

Finding products to buy

Cooking

Playing games

Adding item(s) to a shopping list

Controlling smart lights/thermostat

Listening to audiobooks

Smartphone Assistant Users		Smart Home Assistant Users
58%		35%
53%		57%
52%		59%
50%		67%
41%		52%
34%		46%
33%		50%
29%		34%
23%		31%
20%		28%
19%		29%
14%		32%
14%		23%

● Content/Entertainment   ● Productivity/Utility   ● Search/Commerce
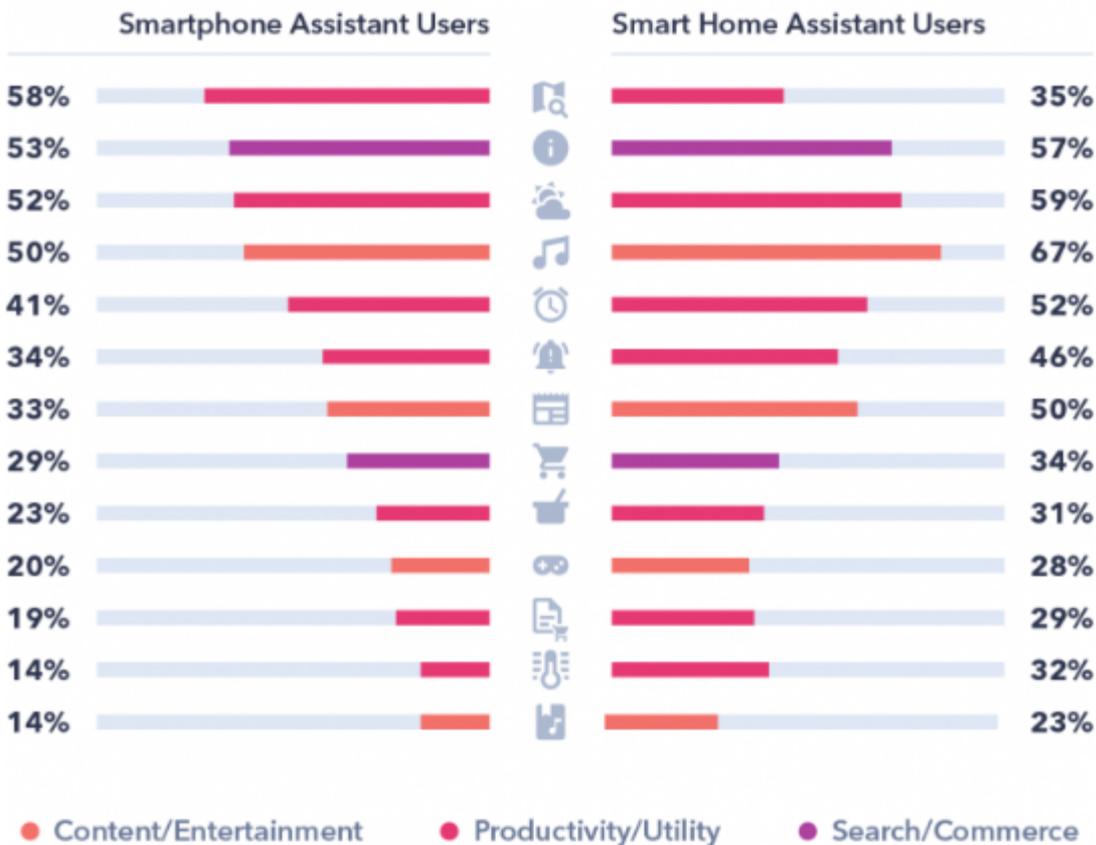
Question: Which of the following voice assistant features have you used on your smartphone in the past month? | Which of the following features have you used on this smart home device in the past month? **Source:** GlobalWebIndex August 2018 **Base:** 2,093 (UK) & 1,170 (U.S.A) internet users aged 16-64

Figure 2.5: Which activities users do through voice commands

Even at first glance it appears from the chart that Smartphone Assistant users engage more in activities related to productivity/utility, that goes together with the

functionality and preferability for the device in actions like asking for directions. Home Assistants instead provide a different kind of experience with a greater emphasis on content/entertainment like listening to music and checking for the news. Personally I was surprised to find out that many people used Home Assistants to play games, it is an important element that will help us with the introduction of Alexa Skills later in this document.

2.8 What do people prefer?

We have established the different ways users interact with Smartphones and Smart Speakers, but what do they prefer? Do they use more one device than the other? According to a research made by Forrester dating March 2020, people prefer to use the voice assistant from their smartphone, and so far they rely on such technology for very simple tasks. This is a very important discovery (even if it could be easily expected), because it tells us that both people and the technology are not yet ready to engage in more difficult tasks, at least not often. The four main categories of uses of Voice Assistants are communication, home control, media consumption/commerce, and transactions. If we speak about Smart Speakers only we can also rely to the frequency data in the table at the beginning of this document, where more complicated functions like making a purchase are found to be rarely exploited instead of more "widespread" activities like checking the weather that almost anyone engages in everyday.

2.9 Where do consumers place Smart Speakers?

Where consumers place their Smart Speaker could give us many useful information, especially about their behavior with the product itself and its degree of utility in a specific household. Let's see the numbers represented in the following table:

Where Consumers Have Smart Speakers

37.6% Bedroom	14.4% Home Office	2.3% // Garage
	44.4% Living Room	32.7% Kitchen
6.2% // Bathroom		6.5% // Dining Room — 2.0% Work Office
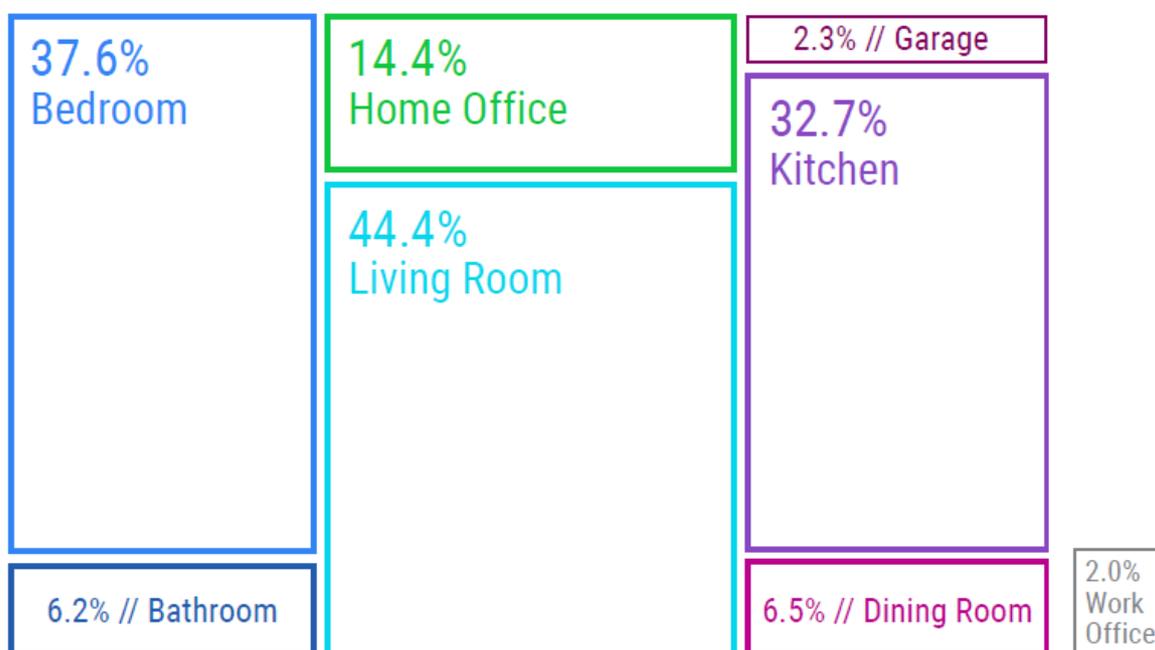
Note: Multiple responses accepted, numbers total more than 100%
Source: Voicebot Smart Speaker Consumer Adoption Report Jan 2019

Figure 2.6: Where consumers place their Smart Speaker

First of all, percentages add up to more than 100% because for this study, conducted by VoiceBot in the USA, multiple responses were accepted. As probably expected, the main places where customers place their Smart Speakers are the Living room (44.4%), Bedroom (37.6%) and Kitchen (32.7%), the places where people spend most of their time in and where some "help" would be needed more than in other parts of the house. Placing Smart Speakers in the Home office is an increasing trend nowadays, mainly as a place where people put their second Smart Speaker, while other places such as the Bathroom, Dining room, Garage and Work office are not preferred over the other alternatives.

2.10 Benefits

Some of the most beneficial aspects of this new technology have already been mentioned in the previous chapters to explain common uses and how they can be helpful to the generic consumer or household, so in this section we will try to go beyond that and provide uncommon or not yet implemented features that will greatly enhance the importance of these devices. The main reason why these devices are useful is because they are **easy to interact with**. Nowadays the least tech savvy people are probably elders, but at the same time this new technology could be much more beneficial for them than other categories of people due to the simplicity of communication, without buttons or complicated instructions. Some retirement facilities are already implementing Smart Speakers where users can set alarms, call their relatives or check the news and the weather.

Another field (probably the most important one) where the impact of Smart Speakers is not yet clear is business. Since we are in an early adoption phase we can only state obvious applications like **automation** and the possibility to convert some tasks to be performed vocally (or just started through a vocal command instead of pushing buttons, useful in warehouses or places that are not too safe to hang around like chemical labs). Other current uses could be to connect Smart Speakers with company databases so they can provide statistics and calculations directly or send them to your phone without the need of accessing a computer. In the business environment there are clearly many applications, both foreseeable and less obvious; the purpose of this document is to provide a clearer picture of business applications and the matter will be discussed thoroughly in the next chapters.

The other main pillar of this document consists of **Skills**, through which you can develop custom applications for your smart speaker (mainly available for Amazon Echo). You can do it for yourself but also share it on the App Store with other users. This matter has infinite potential and will be discussed thoroughly in the next chapters as well.

2.11 Problems

Like all new technologies, they are still surrounded by many concerns, and for Smart Speakers many of them are just driven by a lack of information while others are more serious and should not be taken lightly.

One of the most important topics, if not the main one when talking about these devices is **Privacy**: as we reported before, these devices wait in passive listening mode for a "wake word". There are many studies and researches done on this matter, with very different results with one another. It is often shown that the devices listen on several occasions during the day. It is fundamental though to distinguish listening with recording, the device has to listen to voices around it to look for the wake word. Once the wake word is recognized then it "wakes up" and starts recording. Many people are just concerned by the recording in general, you can always go in your account settings and delete them. To what degree are people concerned by privacy problems when using Smart Speakers?
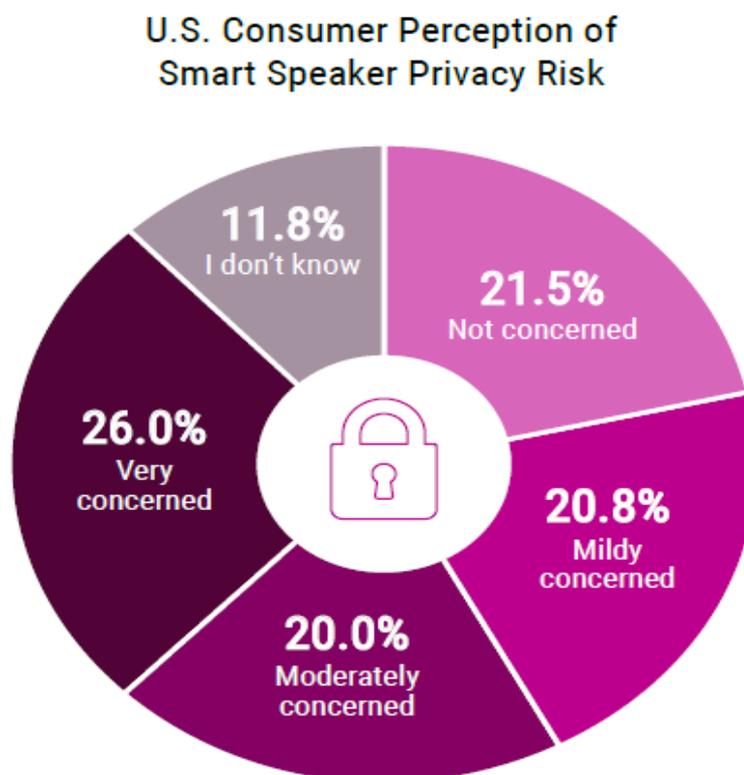
Figure 2.7: Users concerns about privacy related matters

According to VoiceBot's research in the US it is clear that many customers express some kind of concern while 26% is very concerned. These numbers don't translate in actual purchases problems because many people buy Smart Speakers even if they are concerned about privacy, but it is a useful representation of how fragmented opinions are on this topic. This doesn't change that the laws around this matter are unclear and there will certainly be more accurate investigations and researches in the future.

Other concerns about this new technology are caused by **security** issues: there are many examples, many of which have in common the action of accessing your Smart Speaker from another person. Many Smart Speakers don't use voice recognition so anyone interacting with it could access your calendar, setup an early alarm to wake you up, or make a purchase with your credit card data (some devices ask you for a PIN confirmation). Some people could also try to access your device with much worse intentions like unlocking smart locks, disable security cameras or open windows or doors. It has been proved that a laser shot on the microphone from even more than 100 meters away can match a command by adjusting the intensity of the light.

One of the main critics to Smart Speakers is the **absence of a visual part** that greatly limits its possibilities. We could write pages and pages of debate about this matter, but the main reasonings are that a display helps you defining the boundaries of applications, you can understand at first glance what you can or can't do and how it works, allowing for maybe more complex interactions. You can access the list of skills you installed on your Smart Speaker through your computer or your smartphone, but this means using a second device that can probably already perform the same action you wanted to do in the first place. Alternatively you can add a screen to the Smart Speaker, maybe with touch screen in order to simplify interactions, but doing so the voice option is not the main feature anymore, exactly how it is on smartphones nowadays with Siri and Google Assistant. To conclude, some Smart Speakers will see the introduction of screens and others won't, but this choice is strictly connected to the real utility of the device, a type of utility that shines in helping people with quick and easy actions like booking a reservation or locking all the doors in the house, while it is unlikely that it will be used for complex or time consuming actions like shopping.

2.12 What did we learn?

Since mid 2010s Smart Speakers and Voice Assistants have been considered the next big thing, but according to numerous researches and studies done on the matter it may be an overstatement. They are definitely very useful and are considered to be the next step in the artificial intelligence field, they will surely become more widespread and integrated with many other systems thus becoming part of our everyday life, but there may be a veil of misunderstanding around them. Complexity around AI assistants is very very high and we are nowhere near the point of creating something that will help us in doing everything, they will not be omnipresent. The future of voice has clear limitations (even today on Amazon Alexa only a few people buy with the help of a Voice Assistant) and for now it will be centered around plenty of narrow settings instead of a general purpose like helping us with anything.

3. Market Analysis

In an article written by Bret Kinsella referring to the Consumer Electronic Show of Las Vegas (January 2019), he reports: "Amazon reveals that it has reached hundreds of millions of Alexa enabled devices and hundreds of millions of weekly Smart Home interactions".

Why is this statement so important and huge in the Smart Speakers market? By the end of January 2019 Google announced to have reached one billion devices with Google Voice Assistant enabled, and so did Apple not much time later, but there is a main difference between Amazon and its main competitors like Google and Apple:
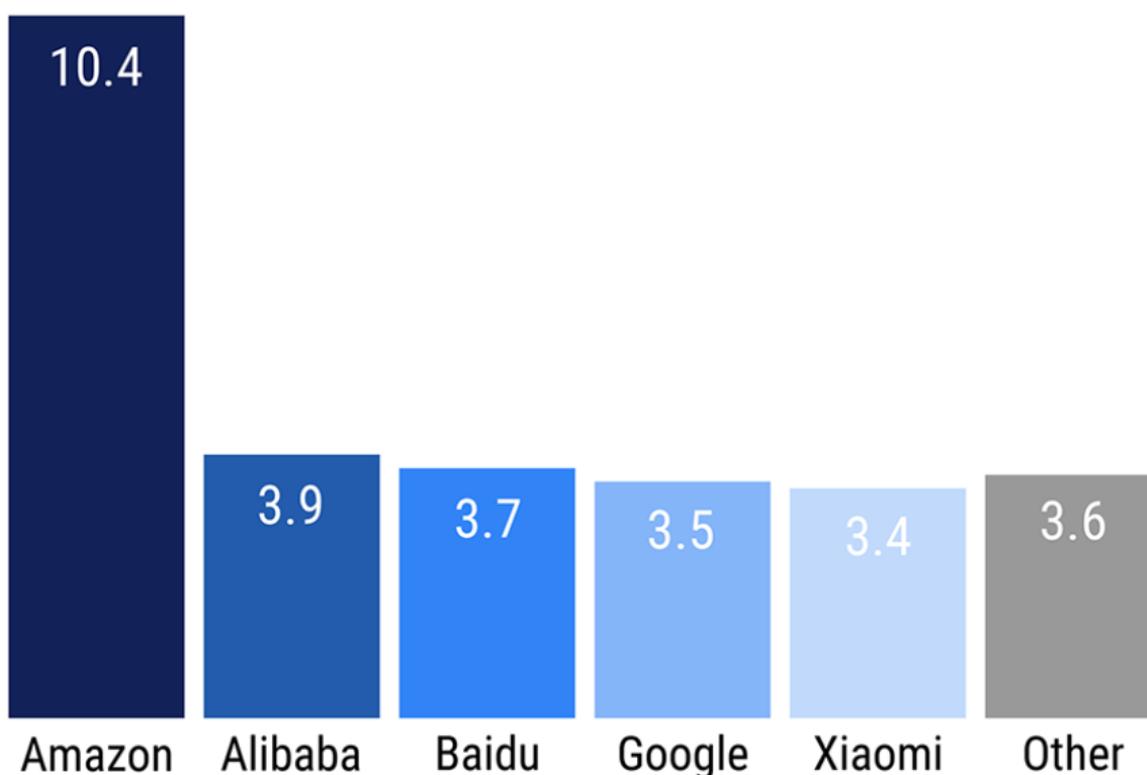
Figure 3.1: Smart Speakers global shipments in Q3 2019

Google and Apple's reach of one billion devices each with their own voice assistant enabled is outstandingly remarkable, but they take into account all the devices they

have sold, that is Android phones or iPhones, tablets and laptops. Amazon on the other hand reached 100 million devices considering only the Smart Speakers market, where it is dominating.

Let's now check the situation of the Smart Speakers market by analyzing market data from the Q4 of 2019 and the relative comparison with Q4 of 2018.

Global Smart Speaker Market by Vendor: Q4 2019 (Shipments in Millions of Units)					
Vendor	Q4 2019 Shipments	Q4 2019 Market Share	Q4 2018 Shipments	Q4 2018 Market Share	Growth Y/Y
Amazon	15.8	28.3%	13.7	35.5%	16%
Google	13.9	24.9%	11.5	30.0%	20%
Baidu	5.9	10.6%	2.2	5.7%	171%
Alibaba	5.5	9.8%	2.8	7.3%	94%
Xiaomi	4.7	8.4%	1.8	4.5%	167%
Apple	2.6	4.7%	1.6	4.1%	65%
Others	7.4	13.3%	5.0	13.0%	49%
Total	55.7	100.0%	38.5	100.0%	44.7%

Source: Strategy Analytics Smart Speaker and Screens service

Figure 3.2: Smart Speakers global shipments comparison by vendor 2018 - 2019

According to Strategy Analytics total Smart Speakers shipments in 2019 reached 146.9 units, that is a 70% increase from the total of 86 million units shipped in 2018. What are the reasons behind these staggering numbers? There isn't a single answer but a mix of events that are favoring the adoption of these devices. Consumers demand is still high, with new and better devices launched on the market many people still buy them and request for better and updated products. On the other hand there is a "penetration war" between Smart Speakers brands, specifically the ones with the most market share (Amazon, Google, Baidu, Alibaba and Xiaomi) where they sell their products underpriced or just give it away with a bundle of other services (Google gives away his product in a partnership with YouTube or Spotify).

Going back to the table, there are many interesting trend that are worth to point out and discuss:

- During Q4 of 2019 Amazon shipped 15.8 million products, thus obtaining a 28.3% market share and consolidating the top spot globally in the Smart Speakers market. Google follows with a 24.9% market share and Baidu gets

the third spot even if it is way far from the top two with a 10.6% market share. It is worth it to point out again that while many brands on this table already had Voice Assistants on their products (Smartphones, Laptops, Tablets), Amazon was able to conquer the top spot in the market due to the first mover advantages and product superiority, even if nowadays there isn't much difference anymore between Google and Amazon. The value added bonus from Amazon derives from skills that will be thoroughly analyzed in the next chapters.

- If we look at year on year growth we immediately notice an incredible growth from the Chinese brands, with Baidu at 171%, Xiaomi at 167% and Alibaba at 94%. Collectively they have shipped more units than Amazon. If we put them all together they registered a 134% year on year growth, posing a serious threat to the actual market leaders Amazon and Google since the latter's growth is only around 20%. These numbers are important but must be interpreted: the impacts on competition between Chinese and Western brands may be minimal since Amazon doesn't sell in China and Chinese brands don't sell in the countries where Amazon already has high penetration. Xiaomi is even partnering with Google, Apple and Amazon to offer their Voice Assistants on a Xiaomi Speaker solely for the Indian market.

- Apple often passes unnoticed in the shadow of Google and Amazon for simple reasons. It was nonetheless able to see growth but it is always employing the typical Apple's formula and it continues to prove successful even with a technologically inferior product. Apple's HomePod offers the best audio quality but not the best functions, it is still able though to get a piece of the pie thanks to its simplicity and positioning as a "design" object and not only a useful technological device. The price is around 350 US Dollars, and while its competitors offer products around the same price range they also offer well performing products for much much less.

3.1 Market Value

We have talked about how the pie is shared by many brands and their relative superiority and territoriality, but we have not yet defined how big the pie is. There are many regressions, more or less generous, but nonetheless the trend is extremely positive for the market, confirming the product to be in the early majority phase of the product cycle. Let's analyze the following table:
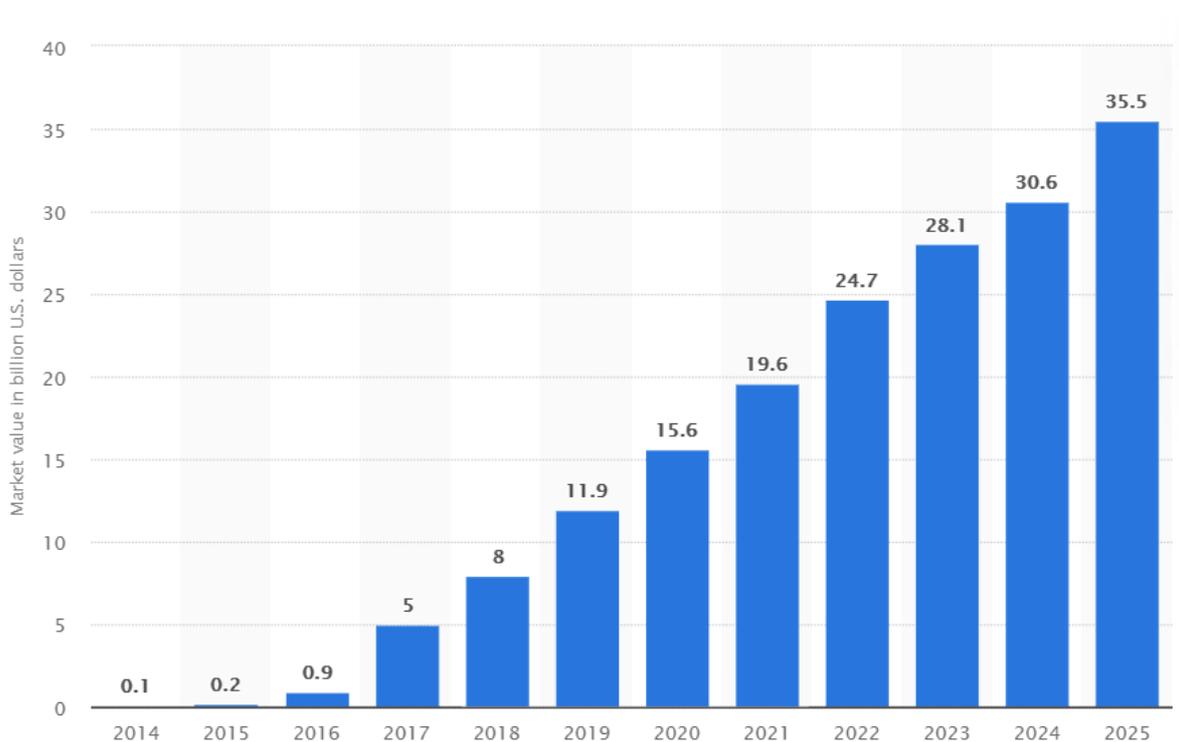
Figure 3.3: Smart Speakers market value projection

The market already reached a multibillion dollar value in 2016, only two years after the release of the first smart speaker on the market, and considering the complexity of the product and the difficulties of adoption by early consumers it is a very interesting result, sign that the early brands tried to push their own Smart Speaker as much as possible to gain market share. With time prices dropped and this favored even more the adoption by consumers that were now starting to be willing to try the new technology for such a reasonable price (around 50$ or even less proved to be affordable).

From 2019 to 2020 the market value for Smart Speakers increased from 15.6 billion $ to 19.6 billion $, a 25% annual increase in market value that will eventually determine a 35.5 billion $ value in 2025.

3.2 Market penetration

It's always good to talk about numbers but many times they are not representative enough of the full picture. We started by introducing brands, their market shares and the total value of the Smart Speakers market. To go on with the flow of this document we will now provide more data about the penetration of this kind of product in three main areas: USA, Europe and China.

Market penetration - USA
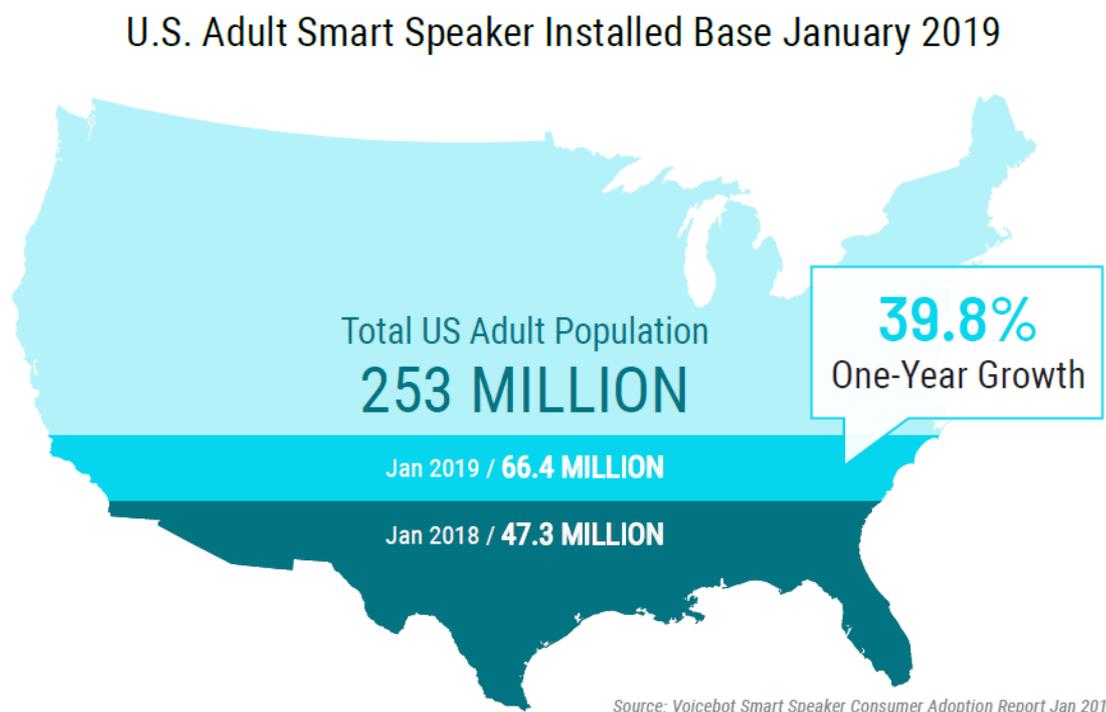
Figure 3.4: Market penetration in the USA as of January 2019

The USA, notorious nowadays to be the place from which new innovations come from thanks to the Silicon Valley cluster, is already registering very high adoption numbers:

from the data of January 2019, 66.4 million US adults have access to a Smart Speaker, this means more than one in four US adults. Smart Speakers are not considered a novelty anymore as they see their adoption increasing every year at high rates. It took only 4 years to reach 25% adoption from the day the first Smart Speaker was introduced on the market by Amazon.

The main brands bought by consumers are Amazon and Google in the majority of cases, as we can see from the next chart:

Figure 3.5: Smart Speakers market share by brand in the USA as of January 2019

Amazon has a big lead on all the other companies despite the slow erosion of its market share, of which Google is one of the main factors since it accounts for half of Amazon's lost market share. Aside from that, it is certainly beneficial for consumers and for the market in general to have some degree of competition since it will lower the prices and boost the speed of innovation. In the "Other" category the leaders are

Apple and Sonos, and, even if the non Amazon and Google brands managed to gain some market share, it is unlikely that they will be a serious threat to the two leaders in the upcoming years.

Market penetration - Europe
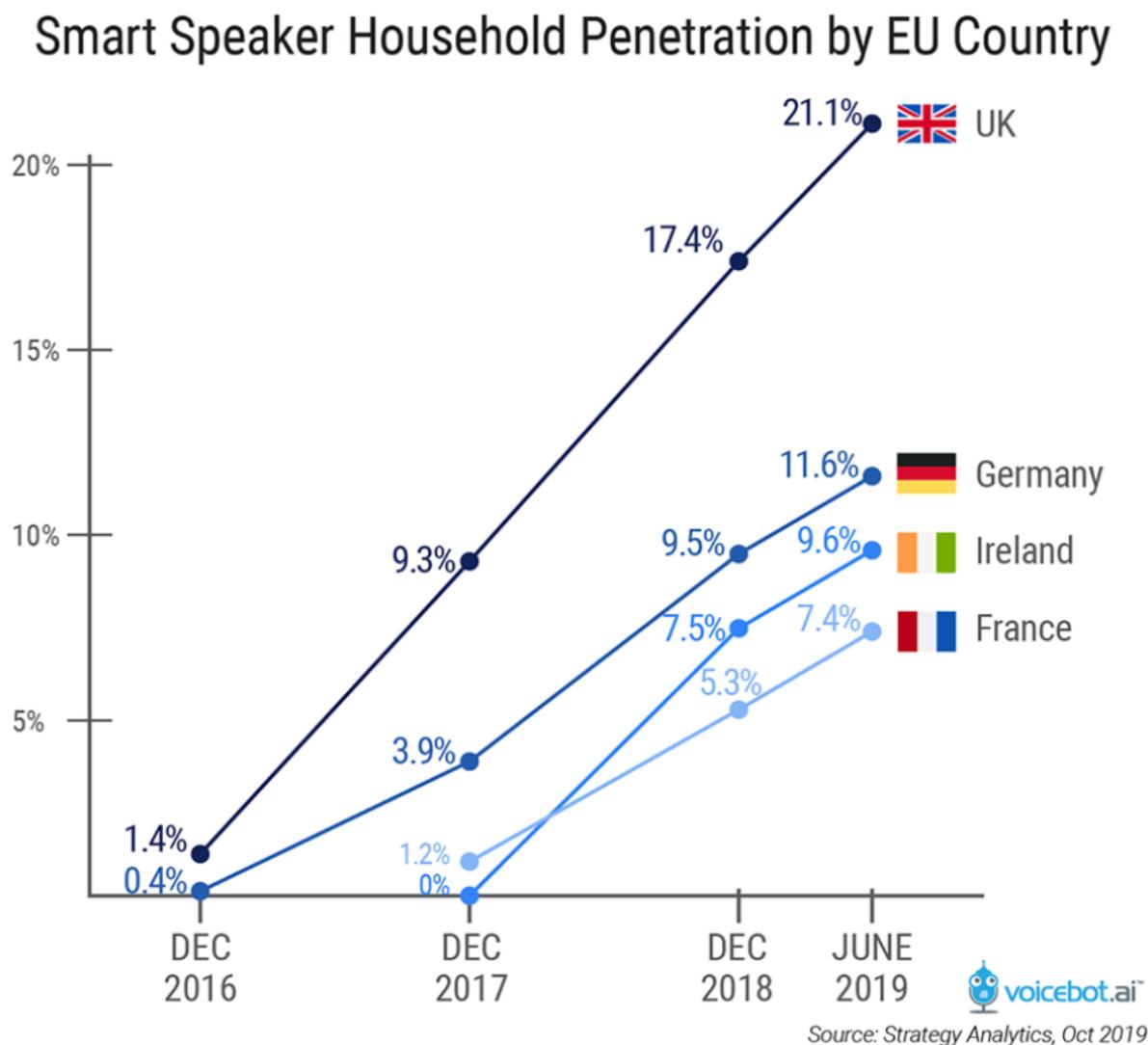
Figure 3.6: Market penetration in Europe as of October 2019

Before analyzing this graph it is convenient to mention the differences with the data taken into consideration for the USA chart. It is in fact hard to compare the two since the USA chart considers the adult population while the European graph concerns a

percentage of households. Moreover the European graph is chronologically closer to the present day because the date of the study refers to October 2019.

Even without looking at the numbers, the trend looks positive and on the rise, with the UK leading the pack of the studied countries followed by Germany. Ireland and France are not lagging behind, it's just that Smart Speakers have not been on the market for as much time as the UK, but they both show extraordinary growth. 20% household penetration reached by the UK in such a short amount of time (2 or 3 years) is an incredible number in the Smart Speakers market, given the complexity of the product. In this case it is to thank the aggressive moves of the companies involved in the market, trying in this early years to establish their brand and Voice Assistant as a standard and thus pushing their products with aggressive campaigns and low prices.

The main brands in Europe are the same as the US, Amazon leading with Google following, and together they control almost 90% of the market, with other brands like Apple that are trying to erode more and more market share year on year. As more people and households get accustomed to the use of smart speakers (like in the UK case) we can predict the rise of new opportunities for marketers to engage with potential customers, but of this matter we will talk in the next chapters.

Market penetration - China

We now move our attention to another very important market, not only by the numbers, but because there are many other tech giants other than the usual Amazon and Google that are dominating their domestic market. In the future those big Chinese companies may start to look at Europe and the US as potential markets for their own Smart Speakers. We have already identified some of the main Chinese brands before, so let's look at how their market shares look like in China:
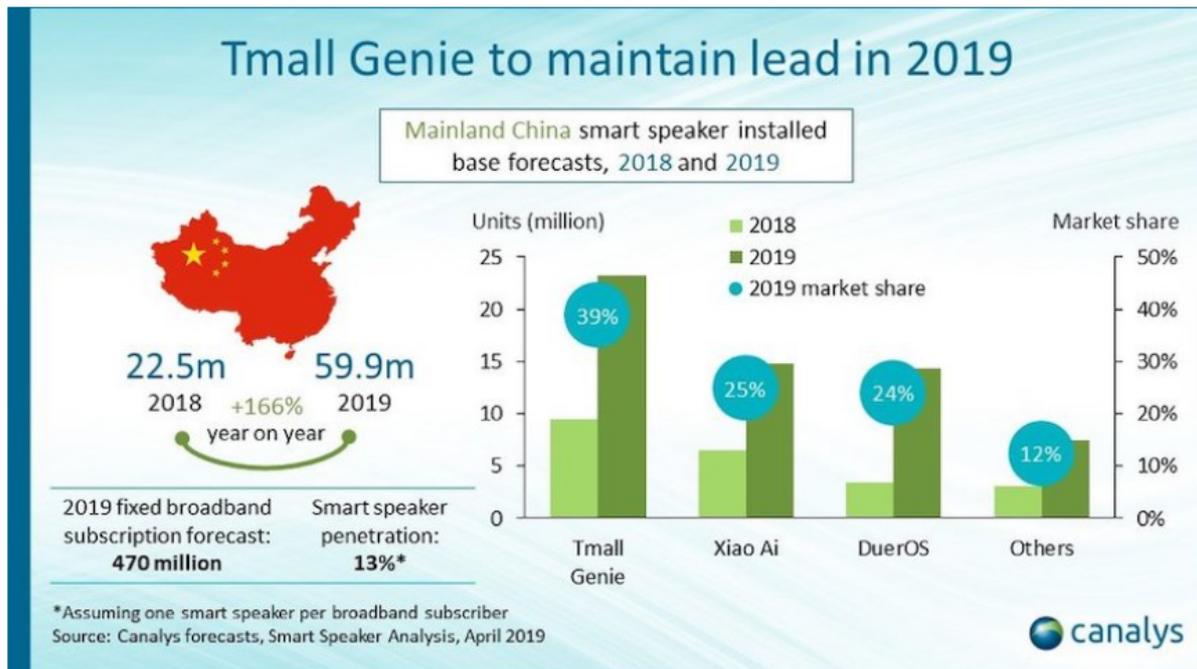
Figure 3.7: Market penetration in China as of April 2019

Let's go in order. The data refers to April 2019 and it is a forecast by Canalys of the Chinese Smart Speaker installed base between 2018 and 2019. According to the forecast Smart Speakers adoption has increased by 166%, thus becoming the fastest growing Smart Speaker market in the world, followed also by Japan and Corea that according to Canalys reached around a 130% increase. Aside from total numbers we also have a clear representation of the distribution of the market share. Alibaba with its Tmall Genie is leading with around 40% market share, followed by Xiaomi's Xiao Ai almost on par with Baidu's DuerOS at 25% market share. Those are the three main Chinese brands, exactly as we have introduced before, leaving 12% market share for other brands. In the end we have seen that in the US and Europe there is a sort of duopoly with Amazon and Google, while in China there are actually three brands competing with high market share. Other than that they can be considered very similar markets for Smart Speakers in terms of growth and development.

3.3 Could Smart Speakers be used for Marketing purposes?

As the number of Smart Speakers users increases, so do business opportunities, creating novel ways of interaction between businesses and consumers. Developing Skills and Apps for Smart Speakers is becoming increasingly important, especially for big corporations that want to establish a connection with the consumer and have the resources to invest in such actions early when the opportunities are not yet saturated. So, could Smart Speakers be used for marketing purposes? Yes! Definitely, and they will be used more and more in the future, even if there is another device that is a strong competitor: the smartphone. As a way to engage with customers, marketers are more concerned with smartphones as many businesses still don't have a sound strategy like apps or even advertising systems. In these cases Smart Speakers represent the next step. It also depends heavily on the industry: if you are a bank or a retailing company, there are huge opportunities in communicating with consumers directly at their homes, being there to offer solutions whenever they have a problem. For other industries it may not be a top priority.

3.4 The diffusion of the Smart Speakers Technology

We understood that nowadays Smart Speakers are not the most important device for marketers (the smartphone is), but they are quickly gaining ground as more and more companies are developing apps to engage with their customers in novel ways. In this case it is very useful to provide information about the technology adoption life cycle framework, composed by categories of people that represent the degree of diffusion of a given technology. The categories of consumers can be described as follows:

- **Innovators**: this category of customers generally has a high risk tolerance and is tech savvy, they want to try new technologies even if they could fail. They have the financial resources to cover for the possible failure.

- **Early adopters**: they can be considered as "opinion leaders", those who wait a little bit to have more information about the new technology and then make a more weighted decision to buy the actual product to achieve the status of communicators.

- **Early majority**: the customers that acquire the technology after much more time than the previous categories, they need more information to be convinced so they wait for the technology to reach a certain degree of development. They are influenced by opinion leaders.

- **Late majority**: they acquire the technology much later than the average consumer, they can be considered as skeptics so they are convinced only when the majority of society has already acquired the innovation.

- **Laggards**: the last top adopt a new technology, mainly because of an aversion to change and low financial liquidity.

The most important goal for any new technology provider is to "cross the chasm", that means going from early adopters to early majority. It is very hard because many innovations fail at this attempt, and being successful in doing so results in your innovation to become widespread. So at what point are Smart Speakers? According to the following graph provided by VoiceBotAI, they have already crossed the chasm for both categories of consumers and marketers in the US.
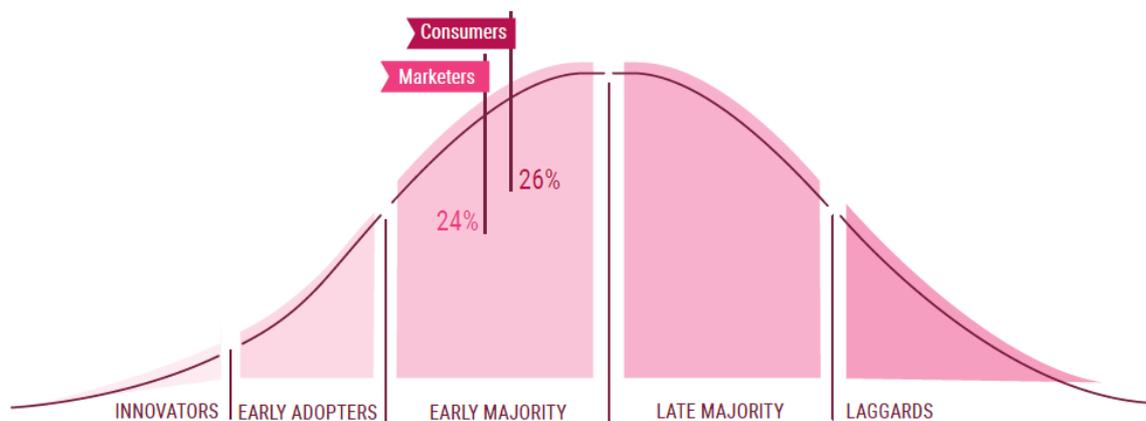
Figure 3.8: Smart Speakers diffusion represented as an innovation framework

In other countries adoption is lower than the US but definitely close to enter the early majority. Even if the innovation is in its infancy it is already showing optimistic results thanks to the leading companies investing a lot of money to become market leaders before their competitors. It is likely that as more and more new innovations are added to smart speakers they could be considered as a long lasting innovation.

4. What are Alexa Skills

We have largely talked about Smart Speakers, it is time we go deeper and start focusing solely on one specific device: Amazon Alexa. For the purpose of this thesis it is very important to describe what makes Amazon Alexa different from its competitors: that is mainly the "Alexa Skills".

With Alexa Skills we consider any action or capability that Alexa can perform, such as playing music or answering a question, nothing too fancy until now. The important part is that Amazon on its website provides tons of information on how to create custom skills. You can "teach" to your Alexa device anything you want it to perform, from simple tasks like playing a movie or reciting a prayer of the day every morning at 11.00, to more difficult tasks like programming entire games based on voice commands. Until now it sounds very fancy and home focused, but skills can be shared, downloaded or purchased, so yes, you could sell your own skill for everyone to use, so both people and companies are trying to exploit these new Skills to create something interesting. Now money and business join the formula: in the next chapters we will discuss and finally find out if it is possible to create business models based on the exploitation of alexa skills and how people are doing it.

4.1 Who are Alexa Skills developers?

Now we know what Alexa Skills are, but we don't know how difficult and expensive it is to develop one. These factors could greatly influence the "identity" of the general Alexa Skills developer: is it just one person, or more than one? Is it a company or a private doing it as a hobby? Is he looking for money or is it just for fun?
The quickest way to answer would be that there isn't a specific identity or recurrent type of people, we have instead to differentiate between independent developers and companies. Developing a Skill has been made as easy as possible by Amazon, so that even people without prior experience in programming can make one. Amazon also provides the access to all the resources needed to help you in the development,

without forgetting all the non-Amazon tutorials and communities that you can find on the internet. With such an extensive amount of information independent developers can develop their own skill at home without too much trouble, given that their Skill will not be complex or with many interactions: that would result in a much more time consuming and expensive operation. Generally the kinds of Skills that come from independent developers are quite similar: they either are something personal, (like Alexa reacting in a specific way after hearing a given word chosen by the developer), or something involved with domotics. The price for developing an Alexa Skill for a single developer is pretty much zero, or the cost of time he decides to put into it (if you already have an idea about what kind of Skill you want to create, it could just take from an hour to a couple of days if the Skill is simple, depending on how many information and interactions you want to create). For companies things are similar but, of course, more expensive. If you are a supermarket chain and want to develop a Skill you need to integrate far more things and offer much more depth than a normal independent Skill. You could allow your customers to play a game of guess the price on some articles you sell and offer discounts or gift cards on some instances. Moreover you need experienced engineers or developers to make everything work because you need to integrate the possibility to purchase on app, to look for specific articles, to play the game, etc.

We understood that developing an Alexa Skill is doable by anyone thanks to the amount of resources and support that you can find on the internet, however to make more complex skills we see the costs starting to increase and rarely there is a single developer behind it, but rather a company. In the next sections we will analyze many examples of successful skills in different fields as well as how many skills there are in the world.

4.2 How many skills are there in the world now?

Alexa Skills have been available since 2016, starting from the US and slowly reaching other countries whenever Amazon was ready with the proper infrastructure. During this time many people started developing Skills, and this number grew almost exponentially year on year, even without counting Skill duplicates (Skills originally made for one country that have then been published also elsewhere). Let's analyze some data:
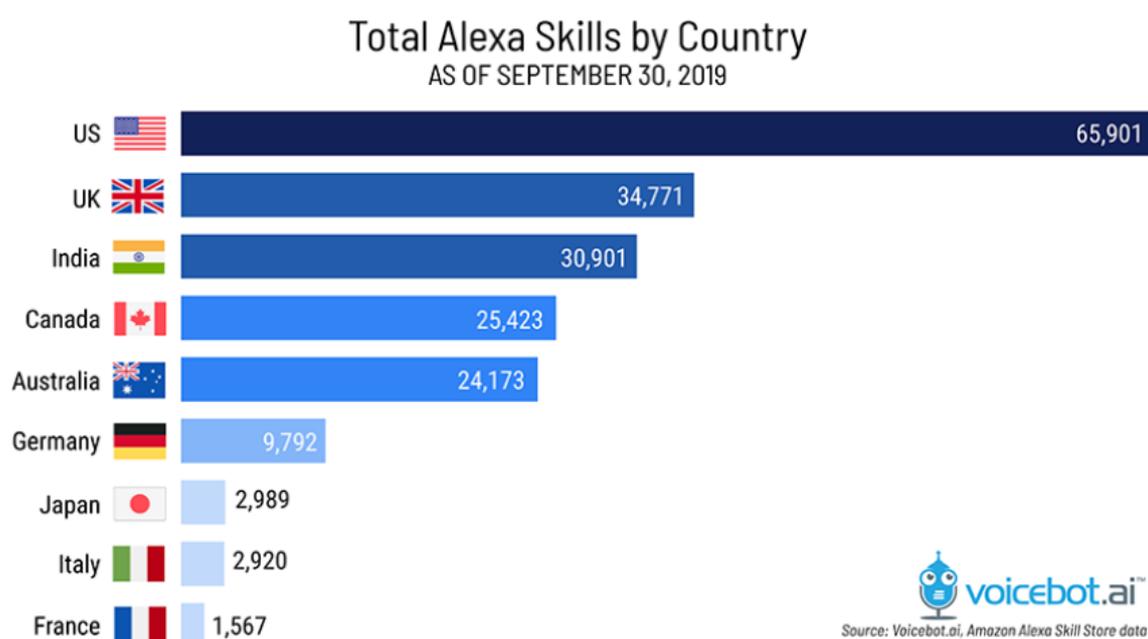
Figure 4.1: Total Alexa Skills downloadable per country as of September 2019

This pictures provides data as of september 30, 2019, roughly three years after Amazon release. It is around that period that Amazon reported more than one hundred thousand skills on their platform, that are though not evenly distributed between these countries. As we can see, the US and UK are leading the pack mainly because they were simply the first and also have the language advantage, thing that is benefitting also India, Canasa and Australia. Other countries though are catching up and have a discrete availability of skills in their own mother tongue. These countries generally have lower numbers also because there are less incentives for developers to

create Skills for a low number of potential users, while instead using english opens up to a much bigger public.

Let's now see more data about the growth rate:
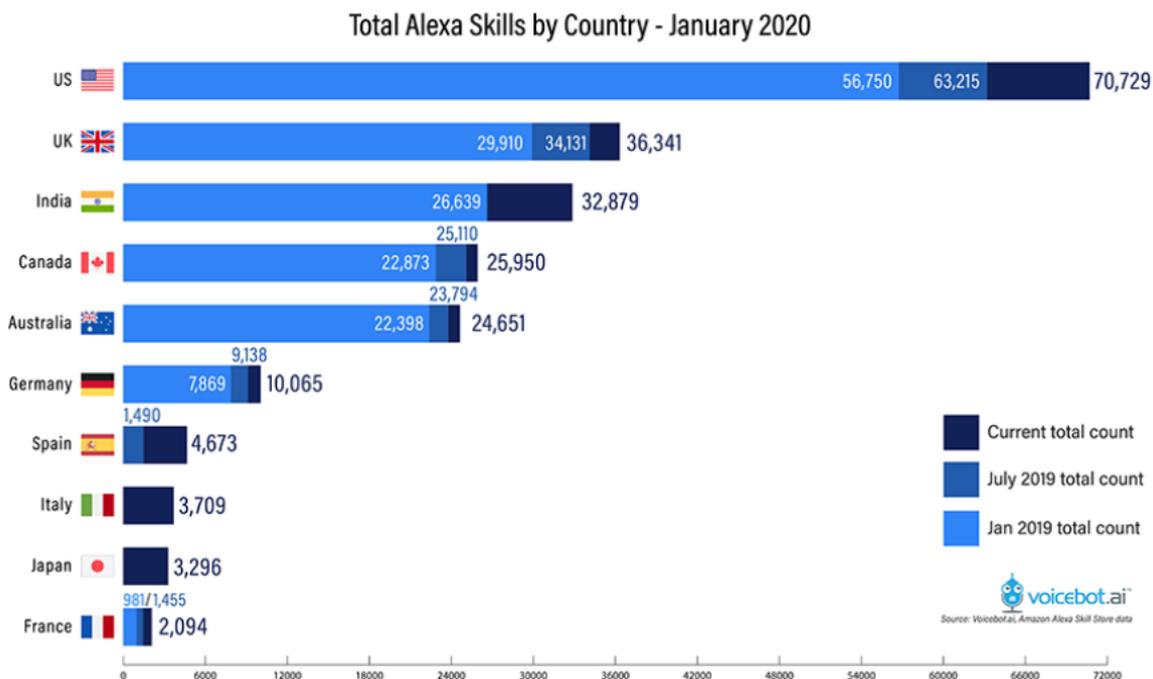
Figure 4.2: Total Alexa Skills downloadable per country and yearly growth rate

These data are more recent than the previous ones as they refer to january 2020. It is also similar to the previous chart in terms of numbers but it provides us with totally different information to be inferred. As we can see the growth rate of Alexa Skills development is slowing down. The leaders in growth are Italy, Spain and Japan, that are surely expanding their national offers, while the other countries see a strange decrease in growth.

New U.S. Alexa Skills Introduced
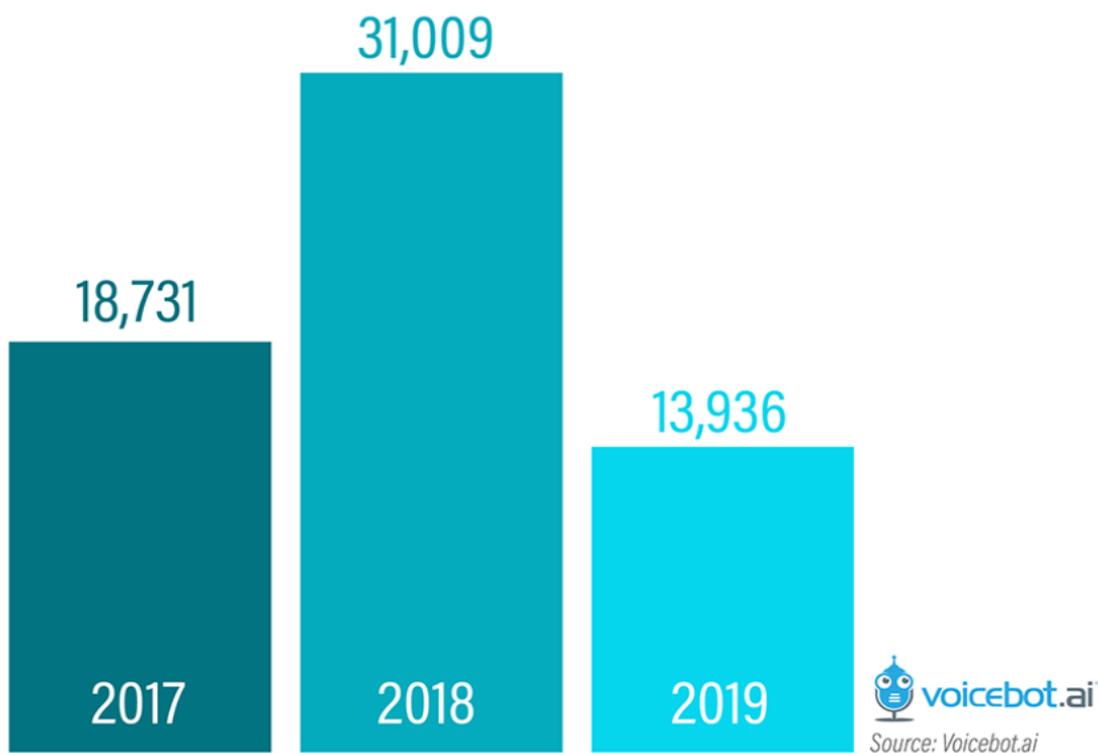
Figure 4.3: New Alexa Skills introduced in the USA every year

Looking at the exact numbers, growth before 2019 was almost exponential, but it slowed down significantly, especially in "mature" markets, as we have seen from the other charts as well. In 2017 new Alexa skill per day were 51.3, in 2018 the number increased to 85, while in 2019 it sharply fell to 38.2. Why is that? There are some explanations:

- We can easily conclude that the number of Skills developed is correlated with developers enthusiasm, as time passes their enthusiasm decreases and less Skills are created. Also, once a developer has published any Skill he will spend more time trying to update and polish them.

- Another explanation concerns the markets per se: currently there aren't endless possibilities with an Amazon Speaker, so growth of Skills cannot go on endlessly, it reaches a point where Skills start to be redundant in the activities

they perform. We can refer to countries where this happens as mature countries, also because of the high number of Skills that they already provide it is harder for   new developers to come up with ideas and actually reach the public with its new Skill, and this acts as a disincentive.

- Amazon offers rewards to developer that make a successful Skill, that means that it has to reach a certain degree of usage by the public (the rewards are pecuniary). In 2019 though this reward system has been reduced, this also acts as a disincentive for developers.

- It is also true that once the Skills option came out, there was a rush to their creation, with many people trying to implement their own ideas. Many of these people are just hobbyists that wanted to experiment with the tool and created very simple or borderline useless features. Now hobbyists are losing interest and we are approaching a more quality oriented phase instead of quantity oriented like Amazon tried to push until 2019.

In conclusion, despite the slower growth rate in 2019 there are no negative implications, mature markets are polishing their Skills and new ones are catching up on completeness. Also the possible features to be implemented in Skills are being continuously expanded and updated by Amazon to favor a more vary array of possibilities. In the next section we will talk about how is it possible to make money with Alexa Skills, covering in particular all the possible methods.

4.3 How to make money with Alexa Skills

As it generally works with new technologies, there are ways to exploit their early diffusion to make some money: this concerns both independent developers that decide to spend more time in creating Skills, as well as firms that invest in novel ways of connecting with customers. There are many ways of making money through Alexa Skills, we will try to cover them all and provide a detailed analysis of the different cases.

First of all, it is necessary to distinguish the different ways of obtaining revenue from Alexa Skills:

- **The Rewarding System**: Amazon created a rewarding system to boost developers' willingness to create Skills. The way it works is easy and straightforward, you just need to develop and publish any Skill that belongs to a given category (Education, Games, Food, Trivia, Productivity, Music…) and you will be rewarded with money every month according to the degree of "customer engagement". Customer engagement is a metric that Amazon uses to evaluate Skills, it is influenced by the number of users and of recurring users, as well as the amount of time spent using the Skill, the number of sessions and more. If the Skill qualifies, its developer will simply receive a sum of money every month corresponding, as we have already mentioned, to the degree of customer engagement. The exact numbers are not shared by Amazon, but it claims to have handed over millions of dollars in rewards. Generally the top Skills end up being rewarded between 1.000 $ and 10.000 $ each month, that is a big enough incentive for anyone to start working on a personal Skill project. Would we recommend it as a career path? Unfortunately no. Nowadays creating a top notch Skill is very hard, the bar has been set higher and higher. Even if you make it as an independent developer you probably cannot live off of one Skill, you will have to make more and keep constantly updating the other ones to not lose your source of revenues, all of this while there are many other people competing, it is simply not worth the

effort. I would personally recommend to try to work on a skill during a weekend to see how it is like and learn more about the process, but that is basically it, we can look at it as some nice benefits for people that invest time on their hobby.

Example: the story of David Markey makes up for a perfect example, he was a student when he purchased his first Amazon Echo, he liked to try as many functions as he could. His idea for a skill came up from his need of wanting to learn a new word each day, he didn't find anything like it on the Skills website so he decided to make one himself. He recorded a list of words and their meaning, and after some weeks of development he launched the Skill "Word of the Day" during early 2017. The Skill was a great success, it gained many recurrent users, but when Amazon launched the rewarding program in May 2017, David's skill didn't qualify. He then developed a second ("Word of the Day Quiz") and a third skill ("Price it Right"). Both of them became eligible for the rewarding program and helped David a lot in dealing with his expenses during his student years, at one point he was receiving around 10.000 $ a month. Of of course not everyone can make as much money as he did, in the end it becomes harder and harder to live off Skills rewards. He sold his Skills to a company and started working for them as a developer, an opportunity that he says wouldn't have happened if it wasn't for his experience with Alexa Skills programming.

Figure 4.4: Screenshot of the Skill "Price It Right"

- **In-Skill Purchases (ISP)**: it is easy to misunderstand the meaning of this title, it refers to buying/selling digital goods and services through Amazon Skills. To make it easy it is almost the same thing as in-app purchases, you can buy hints for a trivia game, or you can unlock special yoga lessons on a fitness Skill. The way they work and their structure is very similar to apps, as they have to deliver free content (you cannot put a Skill behind a paywall, that means that all the Skills have to be free, but they can be equipped with different monetization options), and they have to create ways for customers to spend money on the Skill without ruining the experience of the free part of the Skill. We can distinguish three main types of in-Skill purchasing: **one-time**

purchases (the customer pays once to unlock one type of premium content for the entire life of the skill), **subscriptions** (the customer unlocks all the premium content for a period of time), and **consumables** (the customer gains access to a piece of premium content and it is depleted after use). As already mentioned, if you are able to leverage on customers interest in the Skill this could prove an optimal way of gaining money with Skills. We can say that this is the most diffused way because of the complementarity with the services that many firms already sell, we will talk again about this topic in the next sections because it is one of the fundamental parts for the creation of a viable business model for Alexa Skills.

Examples: a good example of the one-time purchases category could be the Spanish skill "VeoVeo", a popular voice game that allows you to unlock more spaces to play with an in-skill purchase. For the subscription category there are many similar options, a simple one could be "Hypnotherapist Skill" which offers some therapy sessions for free and the possibility to access all of the available therapies by paying a monthly fee. For the consumables category instead we could talk about any trivia or quiz Skill that offers hints to grasp the solution easily. A good example could be "Yes Sire", a popular game also on smartphones where you have to make difficult choices that will impact the length of your reign; you can acquire extra lives with real money if you make the wrong choices and wish to keep playing the same round.
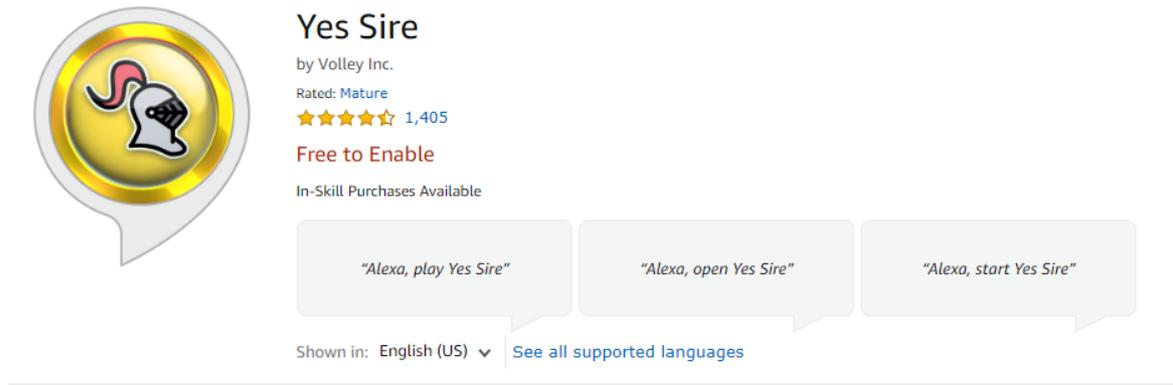
Yes Sire
by Volley Inc.
Rated: Mature
★★★★½ 1,405
Free to Enable
In-Skill Purchases Available

"Alexa, play Yes Sire" "Alexa, open Yes Sire" "Alexa, start Yes Sire"

Shown in: English (US) ∨ | See all supported languages

Description

Needy peasants. A backstabbing nobility. A king who is never satisfied. Nobody said that running a feudal fiefdom would be easy. But with this Alexa game, it is

Are you prepared to make some of the hardest decisions of your (soon to be short) life?

You sit as a medieval lord of the realm, presented with an ever-expanding array of difficulty choices. Make good choices and stay in power as long as you can!

FEEDBACK:
support@volleythat.com

Yes Sire is made by Volley - creators of the hit Alexa games:
* Song Quiz
* Popcorn Tycoon
* Voice Stories
...and more!

Figure 4.5: Screenshot of the Skill "Yes Sire"

- **Amazon Pay**: available since 2018, it is probably the most anticipated and "exploitable" option on this list, Amazon Pay allows companies to sell real products to customers through Skills, any item really, like flowers, food, concert tickets, clothes and more. There are many benefits for companies associated with this method, as they don't need to be a seller on Amazon, they can sell directly to the customer. Companies have to register as an Amazon Pay Merchant to enable Amazon Pay, it is very easy since the system will also be linked with the company's existing CRM and Sales Management in order to manage the process as thoroughly as possible. Of course Amazon applies a transaction fee, but it is generally very low, depending on the region. It is both flat and percentage based (30 cents as an authorisation fee and 2.9% of the total transaction value in the US).
Example: the Skill Atom Tickets allows its users to ask what movies are played nearby and offers the possibility to buy the tickets in advance without leaving

the Voice Skill. The customers will then receive their tickets on their email address.

Figure 4.6: Screenshot of the Skill "Atom Tickets"

4.4 Voice Commerce: a game changer?

In regard to the ways of making money through Alexa Skills, Amazon Pay offers the least used option nowadays, but also the one with the highest potential. From the data showed in the previous sections we know that only a small percentage of users chooses to make a purchase through Smart Speakers, but this trend is set to increase significantly in the future. Before explaining why, let's first explain what we mean with Voice Commerce and what are its strengths and weaknesses.

What is Voice Commerce? As you could have probably guessed, Voice Commerce is all about using Voice commands to buy products and services online through a Smart

Speaker. In other words it helps reducing the dependency on hardware like keyboards or screens to allow users to quickly buy what they need. This works with smartphones too, but in that case it is just a common web query that will display the results, with Smart Speakers instead we talk about instantly buying/reordering something that has presumably already have been bought before, allowing for much quicker interactions and opportunities in both the B2C and B2B sectors. Concerning Amazon we can say that its Voice Commerce option is represented by Amazon Pay.

How popular is Voice Commerce? While Smart Speakers are very popular and still rising thanks to the aggressive promotions of the companies involved, Voice Commerce doesn't seem to be that widespread yet. According to the use frequency table that we displayed at the beginning of this paper, the purchasing activity is actually ranked last. As a matter of fact, many people spend money through Smart Speakers, but generally real goods are not the most favourite items where users set their eyes onto. Is it because they are not used to it, or because it is not the most comfortable way to make a purchase? We will analyze better the benefits and challenges in the next sections.

Voice Commerce problems and limitations: aside general problems and limitations of Smart Speakers which we have already pointed out previously (like communication issues, privacy concerns…), there are some problems directly linked with Voice Commerce. **Knowledge gap** is the most common one, it happens when the owner of a Smart Speaker does not know what are the full capabilities of the device, consequently underestimating its potential and ending up underusing it. Another common issue revolves around **trust**, if we think about the beginning of ecommerce on the web as well, many people would advise not to buy anything online but instead going to the physical shop. E Commerce was quick, it removed some steps from the original buying experience (like the time needed to physically go to the store). Voice Commerce is the same thing, it is new and it is removing another step from the buying experience, that for itself is a huge benefit, but also a limitation since many people find it harder to trust the new process. Strictly correlated with what has just been said is the limitation on **what you can buy**: buying with voice is perfect for small items or

for reordering, but it's way harder for companies to sell a complicated product or just anything that is not already familiar for consumers.

Voice Commerce benefits: limitations are not all bad and are definitely not stopping the rise of Voice Commerce, some of its peculiar features will make it an important part for the business of many firms. The most straightforward benefits are **convenience** and **speed** for instance. The new technology is so easy to use that you can buy something while doing any unrelated activity, exactly when you feel the need to (you are cooking and you notice that you are using the last packet of pasta, ask Alexa to order some more). Moreover, you don't have to fill in any information or do any other task, everything gets done very quickly. A benefit for companies (and not the only one) concerns **data tracking**. Companies can collect data on consumer behavior to then use it to further polish their service and testing different strategies. As we have just talked about in the limitations section, there are two main areas where Voice Commerce has an incredible potential: the highest potential is represented by the category of **Low Involvement Products**, such as all the products where the consumer does not need to think much before buying it. For instance more complex products require a longer time for the consumer between when they see it and when they buy it (like a car, a smartphone...), while low involvement products are generally simpler and of everyday use (specific foods, toilet paper, soap...). Since these items are generally inexpensive, are used a lot and are habitually bought by the consumer, it could be much much quicker to order them through Voice Commerce and receiving them directly at your house the next day. Another incredibly high potential opportunity has the same background reasoning, but it is applied to a different category: B2B. Think about any production plant, they generally produce the same array of items. What if they could order the components they need with voice instead of making time consuming phone calls. There are already some established firms that are experimenting this way of communication with their habitual clients by setting up a Skill that will manage this kind of transactions.

4.5 Future trends

The "how to make money through Alexa" section is the base on which every strategy will then sustain itself. But are there any other actual functions or is this all about how to make money at this point in time? Actually it is. For the moment... As we mentioned many times in this document, Voice Technology is still in its infancy and the possibilities nowadays are very limited to what they could be in five years from now. Even if we said everything, nothing stops us from speculating about the future, as there are many "candidates" of what could be implemented. The most debated topic is definitely **advertising**: on Amazon Skills (that, to recall, are free), Amazon doesn't allow any advertising in order to safeguard customer experience. The fact is that advertising is the greatest source of revenue for digital companies (roughly 80% of Google's revenue comes from advertising on its search function) and it also is one of the greatest ways for companies to promote themselves and acquire new customers. For today's Alexa Skills it is hard for companies to gain new customers, it is much easier instead to nurture already interested profiles, to give them an easier and quicker way to conversion. Skills are not yet ready to be used for mass marketing even if they already are very diffused technology. In the future it is likely that advertising will appear on Amazon Skills, and if not direct advertising as we and firms intend, it will be more on the side of **behavioral data**. It is easy for Alexa to ask a question to a user, and their answers could prove decisive for a company that wants to invest in a particular field. Even if the future is uncertain, we can say something for sure: companies that already have a strong presence within voice technology will have a clear advantage whenever a new feature comes out, let it be ads or something else.

Amazon is pursuing an evident pattern, they follow the textbook way for creating a standard with a new disruptive technology: as of now they have focused their attention on expanding the customer base as much as possible, with aggressive promotion and rewards. As the customer base keeps growing, becomes mature, and voice technology grows, they will introduce more and more features to make their "product" (the Skills rather than the device) a true champion.

We are now ready to move onto the next section where we will see many examples of popular skills to then start analyzing what made them so successful.

4.6 Examples of successful skills

We have already introduced multiple examples of Skills in the previous sections to show the different ways that Amazon offers to developers to obtain revenue from their work. In order to find and evaluate a business model, we first need to go more in depth on Skills, we will see one example for every category to show how the most famous ones work and what made it possible for them to become successful.

News and Information

- There are so many Skills to pick in this category that work in the same or very similar fashion. We are talking about Skills that offer flash briefings to keep you up to date with the latest news. The most successful ones are **CNN** (American) or **BBC** (British), but there are many others that perform very similar tasks. Other examples of Skills that perform different tasks instead could be **Ted Talks**, that don't need any further explanation given how famous the Ted brand is, or **Big Sky**, that returns hyper local weather forecasts, following the same pattern as the smartphone App Dark Sky.

Figure 4.7: From the left, the Skills "CNN, BBC, Ted Talks, Big Sky"

Entertainment and Games

- It is definitely one of the most interesting categories because it explores a very hard field on which to create games, having to rely on voice only. In this category we can find so many different things, from simple games concepts like **Question of the Day**, where you get asked a question each day and you gain points when answering correctly, to App adaptations like **Akinator**, the famous genie that can always guess the person you are thinking about by asking you some questions. There are also popular TV shows adaptations like **Jeopardy**, a popular US Tv game show, but also real games based completely on the immersion in a different world, like **Void Warper**, a popular skill where you play as the captain of a spaceship and you have to rescue a princess. There are of course many many more options to choose from, but many are just so simple that don't make a true example of successful skills, while the ones reported above have definitely reached an interesting degree of success.

Figure 4.8: From the left, the Skills "Question of the Day, Akinator, Jeopardy, Void Warper"

Health

- Even without Skills, having a Smart Speaker at home could be life changing for some categories of people. As reported in the initial sections of this document, vulnerable people like elders or someone with disabilities could very much benefit of having a Smart Speaker in their room, thus being able to communicate with anyone in a very quick and easy way. Aside from that, also here there are many examples of successful Skills that shouldn't remain unknown. Many people probably already know **FitBit**, the smartwatch that

tracks your body and gives you real time data through a smartphone app. Now you can also ask Alexa how you are doing, what your heart beat rate is or how well you slept the night before. Another interesting Skill is **7-Minute Workout**, a skill that… helps you workout, it gives you all the instructions you need and tracks your progress. Aside from this one there are so many others offering meditation, and yoga. One more interesting Skill is **What to Expect**, completely designed to hand out tips to expectant parents given the due date provided by the user.

Figure 4.9: From the left, the Skills "FitBit, 7 Minute Workout, What to Expect"

Music and Sound

- This should be the top category in the list because the whole device idea is based on voice and sound. As a matter of fact we can find a vast array of simple yet popular skills that are able to make you feel like you have been teleported elsewhere. It is the case of **Sleep Sounds: Thunderstorm Sounds**, an incredibly popular skill that plays a relaxing natural tune in loop. There are many other Skills options for any relaxing sound you may desire, from a fireplace to a rainforest. In this category we certainly don't find ambient setting sounds only, but also many other useful and interesting Skills like **Audible**, an Amazon owned company that provides access to audiobooks. For the kids instead we have many other available Skills like **Short Bedtime Story**, a very popular Skill that can also tell personalized stories with the name of your child.

Figure 4.10: From the left, the Skills "Thunderstorm Sounds, Audible, Short Bedtime Story"

Automotive and Travel

- Many people believe that the Automotive sector will be one of the first most impacted by voice, for very valid reasons because at the moment people driving cannot afford to look at screens, so as integration options increase, voice commands will become fundamental. In the future probably drivers will not be needed anymore, but the oral way of communication with the device (the car) will remain as it is much quicker and easier for most tasks like setting maximum speed, asking how long it takes to reach the destination, or more importantly, obtaining information on the strange looking symbols that appear on the screen without looking at the manual. Even if we are still at the very beginning, some players are already taking advantage of this new way of connecting with customers, like **Uber** that thanks to its already big fan base became also a very popular Skill. It allows you to book any ride you need, as well as check the rates and prices from one place to another. If you are more of a car fanatic you can definitely use **Automatic**, it plugs in on your car and collects any possible data it can. You can then ask Alexa any information about your car, like where it is, how many kilometers left before refuelling, for how long it has been driven, etc. Another useful skill concerns airplanes instead, we are talking about **Kayak**, where you can set your closest airport as default and check any information on flights, rental cars and hotels.

Figure 4.11: From the left, the Skills "Uber, Automatic, Kayak"

Kitchen

- Another very interesting category, mainly because people engaged in this type of activities generally focus their attention on cooking, so having someone telling us what to do in real time while cooking speeds up the process. A good example is the Skill **Allrecipes**, developed after the website that offers more than 60.000 recipes, and will help you cooking or send all the useful information to your phone. For more targeted tips instead a good Skill example could be **MeatButler**, that will provide the exact temperature at which to cook your meat, provided that you enter the rarity and type you have. For the younger audience there are useful Skills like **Mixologist**, a Skill that gives the recipe of any drink, or it can help you by telling you which drink you can make for the drinks you already have at hand. Also this category has been victim of one big chain, in this case it is **Domino's**. Its Skill is very interesting while at the same time being quite simple: you can order pizzas to be delivered at your home in literally 10 seconds, track it down and save your favorite orders to order them again even faster.
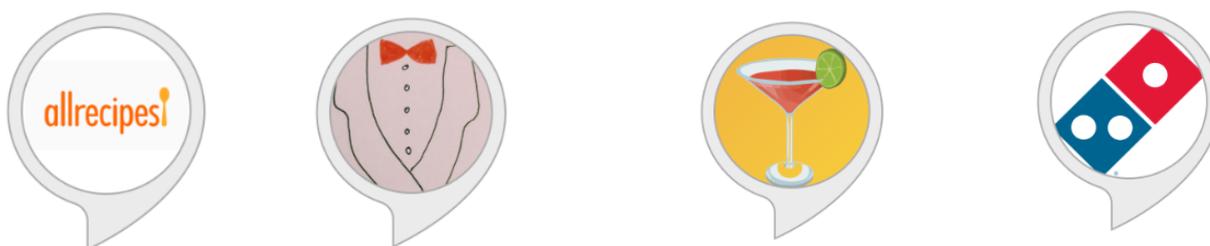
Figure 4.12: From the left, the Skills "Allrecipes, MeatButler, Mixologist, Domino's"

Smart Home

- When talking about Smart Speakers and domotics, people always think about a few things like controlling locks, lights and smart devices with voice. In reality... there isn't actually much more that this technology can do nowadays. This category is definitely interesting and one of the most stacked with big companies trying to get ahead of each other, because you cannot have a smart home with just an Alexa device, you need smart lights, locks, Tvs, fridges, or anything you want to automatize. That is why many home appliances companies like Samsung and Philips are trying to push it as much as possible, but even if they provide similar Skills, they are nonetheless very interesting and useful. To stick with the previous lines we present **Hue**, the Philips Skill that allows you to interact with special Philips light bulbs in novel ways: you can change colors or set the atmosphere through keyword like "relax, active or sleep". One of the most popular skills works with thermostats, **Ecobee**, where you can control your Ecobee thermostat with voice without losing your mind behind all the strange buttons and symbols. To provide another example the perfect candidate is **ADT**, a Skill that allows you to do pretty much everything with your security system, such as arming or disarming the alarm, capture video clips and so on. The most interesting part is that it can tell you if which door is locked and which is not, or if you left some lights on, among other things.

Figure 4.13: From the left, the Skills "Hue, Ecobee, ADT"

4.7 What do winners have in common?

After reaching this point, the reader gained a lot of knowledge about everything that surrounds Smart Speakers and Alexa Skills, what they are, how they works, how many people use them and the importance of Skills, so just one thing is left to explore and discuss: to what extent can businesses leverage Alexa Skills. The examples provided in the previous section can give us very useful information on the way to go, more specifically we found two main categories of Skills:

- **Skills as an extension of the Digital Strategy of a company**: this is the most common case, many of the most successful Skills derive from already known brands, we have seen CNN, BBC, Domino's, Philips, Uber, and many others, and there are many more available that haven't been discussed in this paper. Generally the businesses behind these Skills are big, because they can afford the early investment in a not completely foreseeable market, but medium sized businesses are already following, and small or local ones are starting to. Since many of the big companies already have a solid digital strategy and a community it is much easier for them to invest in Skills as an extension of their same strategy, it is just a matter of translating your competitive advantage in another format, like they have probably also done before with the Web and the Smartphone (Oxford teaches english, RiverHorse makes games, a cooking recipes website teaches you how to cook, and whoever already made a successful smartphone app tries to convert it to voice, like YesSire).

- **Skills as quality of life improvement**: this is how I like to call all the other skills that are not part of any company scheme or that are not born from the desire of the developer to sell a product, service or generally being in line with any pre existing strategy. These are the Skills that were born from developers wanting to test the new device, to learn how to code, or just as a hobby, maybe trying to gain some little money rewards through the rewarding program. The majority of these skills are very simple, like Word of the Day, History Trivia,

Funny sounds for your Cat or Rain sounds. They were born as a test, and the ones that became hugely popular ultimately incentivized the developers to create more Skills and to add ways to monetize them. Eventually they also ended up offering their service of Skill creation to businesses wanting to enter the market.

5. Business Model creation

After the clear separation introduced in the previous section, we would like to remember the fundamental question: is it possible to create a business with Alexa Skills? And how can we do that? Again, there are two different ways of doing business with Skills, as we can derive from the differentiation we have just finished: businesses where their source of revenue is composed by Skills only and businesses that develop Skills as an extension of their own digital strategy. Before explaining the business model steps that any of the two has to make in order to create and monetize an Amazon Skill, we should define how common these two cases are. This is a quite interesting and very important matter, because on one hand we have many many companies willing to invest in Skills to follow their consumers interests and be there on any device/technology they may use, while on the other hand instead the companies that make revenue through Skills only are very rare and can be counted with one hand.

5.1 Is it possible to create a Business model offering Skills only?

Instead of diving immediately on the business model information we would like to spend just a few more lines describing a couple of examples of companies that have Skills only and also offer Skill creation services to any other company willing to create one.

- The first case we will talk about is **Invoked Apps**: when you land on their website, you can understand everything with just a glimpse. Let's go in order, the main Skills they offer are almost all of the same kind, sleeping or relaxing sounds. You can find almost 50 different Skills that offer certain types of sounds, like rain, windy trees, fountain, cats, frogs, and more. They also offer a couple other Skills of a different format, like a Poker Game and Opening Bell

Stock Prices, but they are not their core idea. The way their relax Skills work is that you activate the Skill you like and it plays the requested sound for one hour, and then it stops, and if you want, you can activate it again. Since it is not at all difficult to make a Skill such as the ones they offer, it comes natural to think they were one of the first movers on the new platform, because their skills receive massive amounts of users everyday. In order to actually live off the Skills they developed, they had to find a way to monetize them, how did they do it? We have seen the three possible methods for monetizing an Alexa Skill in the previous sections, they decided to adopt the subscription plan: especially two different plans: the "Pro" plan, that for 0.99$ a month unlocks a better sound quality for one of the sounds they offer, as well as a four hours loop instead of one. The "Premium" plan instead costs 1.99$ a month and unlocks the same features of the Pro plan, but for all the available sounds. This is how Invoked Apps can survive by only creating Skills, they got the "monopoly" on a specific category of Skills that are very successful within the users and could exploit the monetization process correctly.

- Another good example is from the Italian firm **Aloud Tech**, which is similar to Invoked Apps, but it offers a wider range of Skills, as well as development and consulting services to any firm deciding to invest in the voice market. Some of their most famous Skills are designed for the Italian market only, like Impara i Verbi, Capitali del Mondo, il Raccontastorie, and more. Others instead are tailored for a wider public, like Void Warper, the Skill we already analyzed in the previous section. It is worth mentioning that they are also very early movers in the same environment as Invoked Apps, and it is worth to mention them as well given the very much divers way of monetizing. Here we don't find a wide array of similar Skills that are monetized in the same way, but we find much more differentiation, with Skills that perform different tasks for different audiences, and on top of that there are the consulting and development services.

To answer the question in the title of this section, we can say that it is indeed possible to create a business model based on Skills only, and firms undertaking this path can have different revenues streams as well like direct Skill monetization, as well as development and consulting services for other firms. It is indeed a very very hard way to go, only a handful of very early players could make it and as of today it doesn't provide a great scaling option for the future.

5.2 The three actors that impact the Business Model

We are ready to dive deeper in the business model discussion. We have already defined that in the majority of cases Skill development is a direct continuation of the digital strategy of a company. Hence we are talking about companies that want to be present in a different channel to meet their consumer, as it was for Apps on smartphones or Ads on Google, firms want to engage with potential and usual customers on the new Voice technology too. We can easily find three main actors that influence all the business model related decisions:

- **Alexa**: the system itself offers both opportunities and limitations, it is indeed vital to understand well all of its aspects to create a valid business model.

- **Users**: it is the same case as Alexa, it is vital to know why, how and when they use Voice technology in order to create an efficient strategy to create a connection.

- **Company / Product Team**: basically the group of people or the department that will create the Skill itself. They not only need the practical knowledge of Skill development, but also the ability to gather the inputs from the other two categories (Alexa and Users) to then produce strategically successful outputs.

5.3 How to design a successful Voice strategy

Part 1: What to buy and sell

The first thing the interested firm should look at is **what Amazon allows you to sell**. We have talked about this extensively in the previous sections, so I will just recall the main points. Amazon poses a lot of limits on the actual contents of the Skills, and they also have to be free for anyone to use. In order to sell something you can opt for digital goods (in the forms of one-time purchases, subscriptions and consumables), or real goods through Amazon Pay.

After having a good knowledge about the opportunities and boundaries that Amazon poses on its Skills it is time for the next step. This time the subject is the company or the product team that will develop the Skill: **what are you willing to sell**?
It is a fundamental question, you should evaluate all the options stated in the previous point and decide which one makes the best case for you. Normally there are two different scenarios: the product already exists outside of the Alexa environment or it has been created for the device. In the first case the product already exists, then it is a matter of adapting the existing business model to the Voice environment (remember Oxford and English courses, they already had a lot of materials recorded, it was just a matter of reorganizing them and create patterns for learning). The other case is generally rarer, and also more complicated. The business model doesn't exist yet so you have to start from zero, learning for which kind of experience users are willing to pay. An example of this is the already mentioned game Void Warper where you can pay to unlock more parts of the game.

We are left with the users side of the equation, and it is very straightforward: **what are users willing to buy**?
Recognizing that you are making the Skill for the customers is an essential part of any campaign, listening to them and what they need is the first step for success. We are still in a situation where it is hard to define clearly consumers needs and wants in the

Voice Technology environment, so the developers should rely more on hypothesis and experimentation, while also keeping an eye on what other players have done to ensure their success in similar categories.

Part 2: When to make upsell messages

With voice technology the selling proposition is much more explicit, since most of the times you are interrupting the enjoyment of the users with your selling message. This is why it is very important to offer upsell massages at the right time and in the most appropriate matter.

According to Alexa guidelines, when should you offer upsell messages?

As a general rule of thumb they suggest to offer upsell messages both early (to showcase your value proposition as soon as possible to the users) and often (to remind users that they can unlock a better experience, it is not like smartphone apps where the upsell offer is always visible) . It is also important to remember to leave room for experimentation, as 100% working procedures are not a thing yet. Maybe in the future with more data on hand a helping system can be created for these matters. The main recommendation from Amazon is to always give the free part first and then try for an upsell message (E.g. Alexa, what does "hombre" mean in english? It means man. Would you like to unlock a special lesson on English nouns for half the normal price?).

When to make an Upsell message?

By understanding what Amazon allows you to do and what consumers are looking for you are already halfway there. Test different formats, try different ways and choose the one that works better for you or for the product you are selling. Make sure that your message is visible and the least annoying as possible, treat your users with respect without bothering them and make them feel pampered.

When are users open to buy?

Aligning with users need can be considered even more important than the other indications. Understanding that there are differences between different products, and communities is the key for a successful strategy. The probability of success is highly dependant on the context, if you want to find the perfect one for your case you have to test some options. An example of strategy adaptation can be made for each category Amazon proposes: in the **Consumables** category we generally find games that are of an increasing level of difficulty or they track your scores, so many players are willing to spend for consumables such as hints or lives that make them go on with the game instead of having to start all over again. In **One-time purchases** Skills the users needs could be that they love the Skill and use it a lot, so they want more content and are willing to pay for the premium version of the Skill (like audiobooks, fitness lessons...). The **Subscription** category is similar to One-time purchases, you have to be smart about the contents you offer for free and the one behind the subscription. Adapting to the different kinds of Skills and determining the users needs is not completely hard, as there are already dozens of examples online where to take inspiration from. Instead it is a bit harder to not be annoying to potential customers. Some good recommendations are to often advocate your **product novelty**, such as implementing a welcome message that states how you improved the Skill and what has changed (of course it has to be updated frequently to avoid too much repetitiveness). **Avoid too much recurrency**, make sure that your main Skill experience is not covered in upsell messages, actually it should be clean of them. **Keep track of users responses**, if a user already declined to buy a specific offer, you should consider stopping it for that user, or waiting a considerable amount of time before telling them the same upsell message.

Part 3: How to make an upsell message

In this section, the Alexa guidelines are fundamental, they offer many resources to guide you to success. It is also very important to not underestimate the roles of users and the developing team as well. Let's see in more detail.

How to make an upsell message according to Amazon Alexa?

Amazon is the first of the parties involved that doesn't want the users to have bad experiences, so it created a set of guidelines on how to design a good customer experience, comprehensed with best practices to follow in any of the previously discussed categories, in order to help the developing team in every part of the buyer's journey. There are basically two main parts in the buying experience: the **buying feature** and the **upsell message**. The first one is completely controlled by Amazon, developers can only modify some parts of it like setting the prices or the adequate message to introduce the purchasing option. The upsell message instead, which is controlled by the developing team, is subjected to a series of guidelines and best practices that Amazon created, as we just stated. Some interesting examples of these guidelines are something we already introduced, like the fact that you should always give the free part to the user first, but also something novel, like that you can't include details about the price of what you want to sell, it will be revealed once they show their interest for the upsell message. Its purpose is merely for informing the users that there are options that they can unlock by paying and stimulating their interest so that they would want to know more.

What to focus on to sell a Voice Product?

Pros and Cons are one of the oldest methods of understanding the strengths and weaknesses of your product, but in this case you should find what is the one thing that users will value above all the rest and build up from there. The famous USP (Unique Selling Proposition) will be your main focus, but I assure it is no easy task to try to exploit it while taking into account for voice technology limitations as well. We already provided many examples of this, but to be even more clear, the USP can range from making the skill more useful (Like Oxford English), extending the fun (YesSire), or helping users in difficult situations (Trivia games). Aside from the USP, which is a vital point to work on, the developing team really hasn't much else to do in this last phase, as they are quite limited from the technology itself and Amazon guidelines.

How to convince users to make a purchase in an ethical way?

We understood that it is important to find the right moment, but also the capability to create a perfect message that resonates with potential customers, avoiding being annoying or giving away the feel of forcefully trying to sell something. You should be conscious that the users accessing the Skill, do so for entertainment, certainly not for unwanted messages or features they didn't ask for. It is assured that we have to focus on the USP, but at the same time we should try to blend the message in a way that keeps the user immersed in the experience. A good example comes from Yes Sire, when you lose it says: "Sire, your wealth has dropped to 0, the emperor will be outraged. Mr. Jack, the head of the powerful Jack banking, says he can secretly restore your wealth to fifty for a small fee. Would you like to talk to the banker Jack?".

When talking about ethics instead we must pay attention to two main points: first you should **make sure that your upsell message gives away clearly that a purchase option is involved**, it should be completely transparent without the possibility of a misunderstanding. Secondly, **the message should provide complete and clear information about what is about to be purchased**. There isn't something worse than charging users for something they didn't want to buy, even if it is their fault, your message couldn't be clear enough, they become upset and leave very bad reviews on your Skill that will influence other potential customers decisions. A simple way to make your upsell message clearer is to enforce it with some words like "premium", "free and paid version", "paid bonus"...

5.4 Giveaway

In the end we determined that the success of a Skill is strictly related on how the three involved parties interact with each other: the Alexa technology, the users and the developing team. Make sure to study what Alexa offers and its limitations, especially because it is a system that keeps evolving over time (keep in mind that companies with an already established Skill nowadays are in a very good position for retaining more games in the future when more innovation reaches the Voice market). Learn from users needs and competitors in order to make a tailored Skill that works

smoothly, with the right messages at the right times. As the developing team, you should make sure to combine all these elements together and transform the already existing digital strategy of the company into Voice adaptation. In case you want to develop your Skill, feel free to use the following canvas to help you decide what is the best strategy:

	Alexa	Product Team	User
What	What does Alexa allow to sell?	What resources are available?	What is the user willing to buy?
When	When does Alexa recommend to sell?	When is the Product Team willing to sell?	When is the user more open to purchase?
How	How does Alexa recommend to offer your products?	What's the unique selling proposition?	How can we convince users?

Figure 5.1: Alexa Skills Business Model Development Plan. Credits to jesusmartin.eu

6. Conclusion

6.1 Smart Speakers towards a Business Ecosystem

With all the information we have gathered we can analyze to what extent Smart Speakers' companies are trying to create the foundations of an ecosystem. In 1993 Mr. James Moore defined a business ecosystem as "an economic community supported by a foundation of interacting organizations and individuals". The main actors here are the organization (in our case, the supplier, let it be Amazon, Google, Apple...) and the community of people that are using/experimenting the new technology. The producing companies are not limited to the action of selling a product to the customer, instead the whole value creation lies in the relationship between the seller and the community itself: they grow together through a process of movement towards shared visions, a sort of mutually supportive role. As we defined in the previous section, in the Alexa case the technology can be considered as a sort of open source environment: the producing company poses many limits and boundaries but essentially anyone can operate inside them creating what best suits their needs. What ends up being created by the community will be fundamental to attract more peole inside the ecosystem, a sort of Network Effect that will strengthen all the parties involved. The establishment of a successful ecosystem not only makes the producer role much easier by having a lot of feedback and information on consumers' preferences, but it also creates powerful barriers to entry. This is one of the main reasons why every major company involved in the production of voice technology is more concerned to sell as many devices as possible even if the real utility of the technology nowadays is not as developed as it should be. It is a new technology with an incredible potential, and nowadays we are in a race that will determine who gets the biggest market share, or, in other words, who gets to create the biggest ecosystem.

6.2 The information problem

Before looking at possible future trends it is worth mentioning a problem encountered during the writing of this document: information have been very hard to find and most of the times they are very generalistic. There are a few exceptions, some of the producing companies create guidelines and content to inform and help consumers about such a new technology, or there are some websites that were born just to satisfy the people's need of information in regards to the smart speakers market (like voicebot.ai). Some topics are also more covered than others, if you look for "privacy and Smart Speakers" you find so much information that it becomes a job of analyzing what is actually true and what is just a myth, while other crucial information have been very hard to find. The purpose of this section is certainly not to complain, but to analyze what this limitedness of information means. Smart Speakers are very much diffused, almost anyone knows what they are, but almost no one knows what they can do, and here is the problem that is worth to discuss. They have come out since 2016 and voice is a much older technology, but the information are scarce and redundant, and mostly come from the producing companies or people that have a great knowledge of the market with many experiments and experiences under their belt. So why is that? The main reason is that we are still in the testing phase. Everyone praises all the new features but they also hardly know where all of this is going. Predicting the future with this kind of technology is very hard, it is kind of given that voice will be part of our everyday lives, but no one knows which part, if at home, at the office, on the car or something else completely unexpected. This is especially true for the producers, they are doing a good job in updating and improving their software over time, but if you think about it, things are not much different than some years ago, and when we are talking about a new and potentially disrupting technology where companies worldwide are investing billions of dollars on, it feels like it could have grown much quicker than that. Definitely it is not as simple as saying that the future is uncertain, there are so many factors at play here. One other example is the ecosystem we were talking about previously: companies

still have priorities on the web and smartphone, voice is and will be an important channel to connect with your customers, and eventually any company (some more, some less, depending on their industry) will be present on the voice domain as well. Producers are aggressive and cautious at the same time, their step one has been to place their flag around as much as possible by "underselling" their Smart Speakers, now they wait for feedback to make their second step. At the end of it all, are they sure that people will accept another technological revolution? Maybe, but definitely they have nothing to say about how much time it will take, eventually customers will become accustomed to it. If you think about it, barely more than ten years ago almost no one had much knowledge or even plans about creating a mobile strategy, nowadays everybody does, so it will be interesting to see what will happen in ten more years and a new disruptive technology.

6.3 Possible Scenarios

During the course of this paper we have reported many information on Smart Speakers, comprised of market and strategic analysis, going then deeper in the understanding of the reasons behind the choices that the big producing companies made. We have also recalled many times that the future is very uncertain, the technology and its applications are promising, but its development and actual adoption are somewhat slower than expected. To make this document complete, in this section we will provide some possible future scenarios that will be more or less likely to happen, backed by the author's knowledge collected after the research that has been done to write this document. In order to make the scenarios as comparable as possible, a list of critical drivers of the Voice and Smart Speakers technologies has been carefully crafted, hence the future scenarios will be based on analyzing the list's elements as the backbone of its thinking. The critical drivers are:

- **AI Development**: AI and Machine Learning are at the base of Voice Technology, the producing companies are investing a lot in technological

advancements so its degree of development of course influences greatly the possible scenarios.

- **Consumer Demand**: Demand carries adoption, the fact that consumers could be interested or uninterested in a new technology determines its success or failure.

- **Regulations**: As with all new technology, Voice comes with many unsolved problems (yet), like privacy. If it will become popular, regulations will also have a strong impact on its use and diffusion.

- **Integrations**: The very heart of Voice Technology. People have fun in playing with it, but the real deal comes with integrations with other technologies as well as other producers, we provided many examples like domotics, cars, office... The number of possible integrations and their utility will be crucial.

- **Benefits**: with this element we mean to what extent Voice will be a useful technology. For instance the Web brought access to an incredible amount of information and services; the Smartphone brought access to an incredible amount of information and services that can be consulted wherever you are; Voice technology is set to offer access to an incredible amount of information and services wherever you are that can be consulted quicker, and without losing focus on the tasks you are already performing, plus other applications and integrations that will be possible.

- **Limitations**: Voice technology is not the remedy to all problems, it is also limited in some situations. We talked much about this previously, but we can remember that it is not suitable for a long search of information or to buy complex products.

- **The number of players**: In this paper we provided more information on the "western" kinds of players, especially Amazon, but all the most important

global players have been recognized and mentioned. This element will be important to determine how competition will play on the global scale, will every major company create its own voice assistant or there will be a dominant one emerging?

All these elements have a strong impact on future outcomes, some are easier to predict while others are almost completely unpredictable. Other than that, they surely help us in identifying what are the forces that move the strings of the Voice Technology's future, so without further ado, let's dive in the possible future scenarios.

Scenario 1 | World Disruption: the basic idea behind this scenario is that Voice Technology will be disruptive in a wide range of industries, at the very least it will be as disruptive as the web and the smartphone were. This means that an incredible number of users will interact with Voice Technology daily, therefore creating opportunities for the whole ecosystem, favoring investments and integrations. This scenario is plausible in both the cases of producers oligopoly (a bit like nowadays), and monopoly, as long as the demand for the new technology is high and integrations with multiple systems are possible. A further development in AI will allow to overcome most of its limitations making it suitable for a wider range of uses and improving its benefits. Companies will understand that Voice has become a critical domain where to engage with potential and existing customers in both B2B and B2C situations, creating entirely new buying experiences that will make things easier and quicker for the most recurrent purchases and information gathering. In this scenario much of the benefits end up on the customers side, they will be the ones to enjoy the most out of this situation than in any other scenario, but it could turn out to be a double edged sword: a sort of "privacy and choice trade off" will come to existence, because in order to use this new technology you have to give up some of your data, that will then be used to filter your available options beforehand, a kind of limitation of decision power.

Scenario 2 | Great Alliances: In this hypothetical future the Voice technology will become widespread as well, but much of its "disruption power" gets stopped because

integration between the different Voice technologies as well as other industries will not always be possible. The situation will also be the result of regulations that increase the amount of limitations to avoid too much exploitation of the market by the more and more consolidated leading companies. These new barriers will stop the companies to achieve monopolistic situations and possible oligopoly cartels, but they also regulate the Technology communication between them, thus favoring integration for the benefit of customers. We will find ourselves in a scenario where complete integration is impossible to achieve, but many different ecosystems are able to speak with one another with a few more exceptions and limitations. Aggregates of information will be created with a system of shared rules and practices, but each one of these gigantic aggregates is not able to communicate with other aggregates (let's say that Google and Amazon provide an interconnected service together with many other industry leading brands that sell cars or home appliances, they can be considered an integrated system because your data are recognized by all the devices you use, you can control everything quite easily and comfortably. The difference with the previous scenario lies that if you use some other popular Voice brand from China you don't have the same data and integration that you already have on your other systems, because they are not integrated). Consumers will receive a big portion of benefits in this scenario as well, with just a bit more regulations they could also be more protected while still retaining all the benefits of the technology.

Scenario 3 | Kingdoms: you have probably guessed where we are heading to already, to a scenario where, as a result of intense regulation to avoid the creation of monopolies, a lot of new limitations have come into existence. Communication between the producers and integration of applications are hard to achieve and not worth the effort. Many companies are developing their own system that works around their portfolios of products (a bit like it is also happening nowadays with big companies like Samsung or Philips), trying to leverage their own ecosystem without a common bigger picture. In this case also AI advancements will be slower due to a higher market fragmentation that doesn't favor the creation of clusters, but more independent research centres. In this scenario Voice technology will not be as diffused as in the previous ones, with less consumers traction, and less innovation

and collaboration, things will work out slowly and in the majority of industries it will just be considered as a plus for a brand to apply Voice digital strategies, but not really fundamental, while some others retain their strategic importance (automotive and home appliances mainly, but also anyone who has recurrent customers can set up their own hub or small ecosystem). Consumers will be far from benefitting of this situation, it could be instead rewarding for some companies that are able to move in advance and develop a successful ecosystem, because battles for Voice dominance will be held in every industry in a harsher way, but with also lower possible returns than other scenarios.

Scenario 4 | Failure: all the above scenarios treat Voice technology as successful, even if sometimes things don't go completely well. It is definitely possible and not that hard to see that Voice Technology could actually fail or remain in a very small niche for a long, long time. If we take into account that the US Government still doesn't understand how Facebook works and what are its sources of revenue, how can we think that any government can understand, favor and regulate correctly a complex (and not yet defined) technology like Voice. Moreover, AI development is slow, it could completely be that by the time Voice technology develops, another innovation will prove much more efficient, or smartphones will be improved in such a way that Voice benefits will be much lower than now. Or simply: people will not get accustomed to it. It is useful for some categories of people more than others, ore in some situations and not in others, so maybe it will just be stuck in these small niches and never achieve a greater use. Honestly this scenario is probably the less likely, but there are certainly some valid arguments and it could really happen.

6.4 Final Appendix: the author's personal experience

Writing this paper has definitely widened the author's perspective on Voice Technology and Smart Speakers on many areas, from the basic understanding of what they are to their market data and their future applications. The author had little previous experience with this new technology, having first gotten a Smart Speaker

during mid 2018 and having used it casually out of curiosity ever since. Voice technology today gives the feeling of still being limited, it creates that vibe of incredible potential, but nowadays it is a bit too early. In order to understand better the Alexa Skills aspect, the author has also developed his own Skill to effectively check if what is reported in the Alexa Skills sections of this paper is true or not. In fact, it is: creating a simple Skill is complex but achievable by anyone thanks to all the materials and tutorials available online, both from Amazon or other developers, while for a more complex skill, the game becomes much more difficult and people that actually know what they do are required. The "test" Skill created is called "Interesting History Facts", it is very simple, after you ask for a History Fact it answers with one of the 100 loaded facts (did you know that Napoleon was not short but average height? It was just a voice diffused by his enemies to hurt his image). Everything is free and there are no premium options available to purchase. It was released in the US Skills market to reach a higher number of users due to the fact that currently it is the bigger one and English is much more diffused than other languages. There were no expectations for this skills, but it actually paid off, in one month it had more than one hundred uses, it is not much but it was nice to see that the time spent developing it (around one week), proved to be useful for some people around the world. In these final lines, the Author would like to thank anyone that has reached this point with the sincere hope that this work may have been useful for others research.

Bibliography

Snehil Chouhan. "The ultimate guide on how to build Alexa Skills". Hackernoon, 8 October 2018,
https://hackernoon.com/how-to-build-an-alexa-skill-an-ultimate-guide-on-alexa-skill-ee191823cb6b

"Smart Speaker". Wikipedia, https://en.wikipedia.org/wiki/Smart_speaker

"What is a Smart Speaker: how do smart speakers work". ElectronicsNotes,
https://www.electronics-notes.com/articles/equipment-items-gadgets/smart-home/what-is-smart-speaker.php

Robert Silva. "What is a Smart Speaker". Lifewire, 4 December 2019,
https://www.lifewire.com/smart-speaker-4145037

Marc Saltzman. "What is a Smart Speaker". AARP, 11 October 2019,
https://www.aarp.org/home-family/personal-technology/info-2019/smart-speaker-uses.html

Sarah Perez. "Nearly 70% of US smart speaker owners use Amazon Echo devices". TechCrunch, 10 February 2020,
https://techcrunch.com/2020/02/10/nearly-70-of-u-s-smart-speaker-owners-use-amazon-echo-devices/?guccounter=1

Chris Ciligot. "7 Key Predictions for the Future Of Voice Assistants and AI". ClearBridge, 18 July 2019,
https://clearbridgemobile.com/7-key-predictions-for-the-future-of-voice-assistants-and-ai/

Sarah Perez. "Report: Voice assistants in use to triple to 8 billion by 2023".
TechCrunch, 12 February 2019,
https://techcrunch.com/2019/02/12/report-voice-assistants-in-use-to-triple-to-8-b
illion-by-2023/

Eric Hal Schwartz. "The Decade of Voice Assistant Revolution". Voicebot.ai, 31
December 2019,
https://voicebot.ai/2019/12/31/the-decade-of-voice-assistant-revolution/

Centre for Data Ethics and Innovation. "Smart Speakers and Voice Assistants". CDEI
Snapshot Series, September 2019,
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/atta
chment_data/file/831180/Snapshot_Paper_-_Smart_Speakers_and_Voice_Assistants.p
df

Molly Mclaughlin. "What a Virtual Assistant is and How it Works". Lifewire, 29
January 2020, https://www.lifewire.com/virtual-assistants-4138533

"Voice Assistants: How Artificial Intelligence Assistants Are Changing Our Lives Every
Day". Smartsheet,
https://www.smartsheet.com/voice-assistants-artificial-intelligence#voice-assistant
s-in-the-home-the-rise-of-the-smart-speaker

Jason Wu. "Challenges of smart speakers in real-life applications". Technical Direct, 16
October 2019, http://www.technical-direct.com/en/smart-speaker-issues/

David Murphy. "Your Smart Speaker's Skills Might Be a Huge Privacy Problem".
LifeHacker, 22 October 2019,
https://lifehacker.com/your-smart-speakers-skills-might-be-a-huge-privacy-prob-18
39257208

Allison Ingersoll. "Users Worry About Smart Speaker Privacy, But Keep on Buying Them". Bloomberg, 5 September 2019,
https://www.bloomberg.com/news/articles/2019-09-05/users-worry-about-smart-speaker-privacy-keep-on-buying-them

Greg Sterling. "Privacy issues may be hurting smart speaker market growth". Marketing Land, 1 July 2019,
https://marketingland.com/privacy-issues-may-be-hurting-smart-speaker-market-growth-263199

Olivia Valentine. "What's the Next Big Thing for Voice Assistants in 2019?". Global Web Index, 24 October 2018,
https://blog.globalwebindex.com/chart-of-the-week/voice-assistants-2019/

Kane Simms. "How Voice Assistants Could Change the Way We Shop". Harvard Business Review, 15 May 2019,
https://hbr.org/2019/05/how-voice-assistants-could-change-the-way-we-shop

Swapratim Roy. "Chatbot vs. Smart Speakers — Who Has the Better Future?". Medium, 3 February 2018,
https://chatbotsmagazine.com/chatbot-vs-smart-speakers-who-has-the-better-future-436fccc5ba68

Bret Kinsella. "Amazon Now Claims Hundreds of Millions of Alexa-Enabled Devices and Hundreds of Millions of Weekly Smart Home Interactions". Voicebot.ai, 6 January 2020,
https://voicebot.ai/2020/01/06/amazon-now-claims-hundreds-of-millions-of-alexa-enabled-devices-and-hundreds-of-millions-of-weekly-smart-home-interactions/

Bret Kinsella. "Over 20% of UK Households Have Smart Speakers while Germany Passes 10% and Ireland Approaches That Milestone". Voicebot.ai, 11 October 2019,

https://voicebot.ai/2019/10/11/over-20-of-uk-households-have-smart-speakers-while-germany-passes-10-and-ireland-approaches-that-milestone/

Bret Kinsella. "Amazon Again Topped Q4 Global Smart Speaker Sales Followed by Google and Baidu According to Strategy Analytics. Smart Speaker Shipments Set New Record". Voicebot.ai, 17 February 2020, https://voicebot.ai/2020/02/17/amazon-again-topped-q4-global-smart-speaker-sales-followed-by-google-and-baidu-according-to-strategy-analytics-smart-speaker-shipments-set-new-record/

Prableen Bajpai. "An overview of the Smart Speaker market". Nasdaq, 20 December 2019, https://www.nasdaq.com/articles/an-overview-of-the-smart-speaker-market-2019-12-20

Frank Gillet. "Getting Consumers Beyond Simple Tasks On Smart Speakers Is Challenging". Forrester, 2 March 2020, https://go.forrester.com/blogs/getting-consumers-beyond-simple-tasks-on-smart-speakers-is-challenging/

Kayla Matthews. "The state of the Smart Speaker market in 2020". Tech Talks, 27 March 2020, https://bdtechtalks.com/2020/03/27/the-state-of-the-smart-speaker-market-in-2020/

Ryan Whitwan. "Researchers Hack Smart Speakers with Lasers". Extreme Tech, 5 November 2019, https://www.extremetech.com/extreme/301504-researchers-hack-smart-speakers-with-lasers

Ben Dickson. "The fundamental problem with smart speakers and voice-based AI assistants". Tech Talks, 3 September 2018, https://bdtechtalks.com/2018/09/03/challenges-of-smart-speakers-ai-assistants/

Nilay Patel. "Apple Home Pod review". The Verge, 6 February 2018, https://www.theverge.com/2018/2/6/16976906/apple-homepod-review-smart-speaker

Bret Kinsella. "China Smart Speaker Adoption to Grow 166% in 2019, Alibaba to Maintain Market Share Lead". Voicebot.ai, 17 April 2019, https://voicebot.ai/2019/04/17/china-smart-speaker-adoption-to-grow-166-in-2019-alibaba-to-maintain-market-share-lead/

Bret Kinsella. "IDC Says European Smart Speaker Sales will Exceed 23 Million Devices in 2019 and Google Home Just Outsold Amazon Echo in Q1". Voicebot.ai, 2 July 2019, https://voicebot.ai/2019/07/02/idc-says-european-smart-speaker-sales-will-exceed-23-million-devices-in-2019-and-google-home-just-outsold-amazon-echo-in-q1/

"Diffusion of Innovations". Wikipedia, https://en.wikipedia.org/wiki/Diffusion_of_innovations

Kate Kozuch. "The 30 best Alexa Skills in 2020". Tom Guide, 1 June 2020, https://www.tomsguide.com/round-up/best-alexa-skills

"Build Skills with the Alexa Skills Kit". Amazon. https://developer.amazon.com/it-IT/docs/alexa/ask-overviews/build-skills-with-the-alexa-skills-kit.html

"Alexa Developers Whitepapers". Amazon, https://developer.amazon.com/en-US/alexa/alexa-skills-kit/get-deeper/whitepapers

"Grow your business with voice". Amazon,

https://developer.amazon.com/en-US/alexa/alexa-skills-kit/grow-your-business

Void Warper Skill, Amazon,

https://www.amazon.co.uk/dp/B081756QN1/ref=mp_s_a_1_1

Bret Kinsella. "New Alexa Skill Data Show New U.S. Skills Launched in 2019 Fall to Lowest Level Since 2016". Voicebot.ai, 17 January 2020,

https://voicebot.ai/2020/01/17/new-alexa-skill-data-show-new-u-s-skills-launched -in-2019-fall-to-lowest-level-since-2016/

"Exploring Business uses for Smart Speakers". The VOGO Voice Blog, 5 November 2019, https://www.vogovoice.com/blog/business-uses-for-smart-speakers/

Kaya Ismail, "4 Challenges Holding Back Smart Speaker Adoption". CMS Wire, 27 February 2020,

https://www.cmswire.com/customer-experience/4-challenges-holding-back-smart-s peaker-adoption/

Nick Chasinov. "How to make money with Alexa Skills". Tekniks, 31 May 2018,

https://blog.teknicks.com/how-to-make-money-with-alexa-skills#.XwbnGigzaUl

"Earn money with Alexa Developer Rewards". Amazon,

https://developer.amazon.com/en-US/alexa/alexa-skills-kit/grow-your-business/re wards

"How You Can Make Money with Amazon Alexa Skills". Onix Systems, 7 February 2019,

https://medium.com/@onix_systems/how-you-can-make-money-with-amazon-alex a-skills-2da9b4955243

Neeru Jain. "How to make money with Alexa Skills". Whizlabs, 13 February 2020, https://www.whizlabs.com/blog/make-money-with-alexa-skills/

Ali Montag. "Student makes $10.000 a month inventing Skills for Amazon Alexa". Makeit, 12 April 2018, https://www.cnbc.com/2018/04/12/student-makes-10000-a-month-inventing-skills-for-amazon-alexa.html

"What is Voice Commerce". Sana, https://www.sana-commerce.com/e-commerce-terms/what-is-voice-commerce/

Rakesh Soni. "Voice Commerce: Could It Be a Game-Changer for Brands?". Boss Magazine, https://thebossmagazine.com/voice-commerce/

"Is Voice Commerce the future of Online Shopping?". Emerchantpay, https://www.emerchantpay.com/insights/voice-commerce/

Jesus Martin. "What, when and how to sell with Alexa Skills with in-skill purchase (ISP)". UX Collective, 16 March 2020, https://uxdesign.cc/what-when-and-how-to-sell-with-alexa-skills-with-in-skill-purchase-isp-9a34c3133dc5

Taylor Martin. "The 50 most useful Alexa Skills". Cnet, 9 February 2019, https://www.cnet.com/how-to/amazon-echo-most-useful-alexa-skills/

"Yes Sire". Amazon, https://www.amazon.com/Volley-Inc-Yes-Sire/dp/B071ZR5HKR/

"Atom Tickets". Amazon, https://www.amazon.com/Atom-Tickets/dp/B07BMD7M3Z

"Price it Right". Amazon, https://www.amazon.com/Volley-Inc-Price-It-Right/dp/B07871TGCT

Brandon Vigliarolo. "10 Amazon Alexa Skills to add to your Echo today". TechRepublic, 13 January 2017, https://www.techrepublic.com/article/10-amazon-alexa-skills-to-add-to-your-echo-today/

"Aloud Tech home page". https://aloud.tech/en/home-en/

Eric Griffith & Rob Marvin. "The best Amazon Alexa Skills". PC Mag, 12 June 2018, https://www.pcmag.com/news/the-best-amazon-alexa-skills

"Invoked Apps home page". https://invokedapps.com/

Metty Fisseha. "How to Optimize Your Upsell Strategy for Your Monetized Alexa Skills". Amazon, 4 January 2019, https://developer.amazon.com/es/blogs/alexa/post/4506e350-1e7a-4ba3-b54c-8a bf000d7236/how-to-optimize-your-upsell-strategy-for-your-monetized-alexa-skills

"Design a Good Customer Experience for In-Skill Purchasing". Amazon, https://developer.amazon.com/es-ES/docs/alexa/in-skill-purchase/customer-experi ence.html

Adam Hayes. "Business Ecosystems". Investopedia, 13 June 2019, https://www.investopedia.com/terms/b/business-ecosystem.asp#:~:text=Moore% 20defined%20the%20business%20ecosystem,organisms%20of%20the%20busines s%20world.&text=The%20member%20organisms%20also%20include,%2C%20co mpetitors%2C%20and%20other%20stakeholders.