Reimagining Hearing Care

A detailed strategy for Cambridge Audio to enter and disrupt the British hearing care market.

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Reimagining Hearing Care with Cambridge Audio

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Master Thesis, Strategic Product Design
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ACKNOWLEDGMENTS

This graduation project is the final milestone of a great two year experience as a Masters student of Strategic Product Design at the Delft University of Technology. There have been so many moments in this milestone where mentors, colleagues, friends and family have supported me in different ways to make this possible.

I would like thank my coaches who supported me academically with relevant literature, research methodologies, constructive criticism of my design choices and also writing a convincing report. On a more specific note, Erik always helped with high level roadblocks, e.g. how to tackle validation during the corona period, where as Sander has been hands on in explaining design tools, asking me about my design choices and decisions, providing detailed inputs on my reports. My company mentor, James Johnson-Flint always helped with practical matters required for the project: like consumer research access, ODM engagement, previous marketing examples, budget tracking of their product line etc. I would especially mention the involvement of James, who always actively participated in the project even when his company was going through the corona virus crisis.

During the pandemic, my university team provided the much needed emotional support by increasing the meeting frequency to every week. Erik was instrumental in bringing me back to the Netherlands when EU countries were closing borders. Sander was especially supportive with social calls almost every week to discuss topics beyond just the project. James whole heartedly supported my decision to leave England abruptly and arranged everything for everything so that I could return safely.

It goes without saying, this project would not have been possible without the kind input of the nicest hearing impaired folks in various Facebook groups. They participated in my research and validated my solution with so much vigor and enthusiasm. Their stories and challenges really inspired me to deep dive and tackle a silent problem which affects millions of people every year.

Last but not least, I am indebted to my friends and family who have always been there during difficult moments with their genuine support and love. I would like to end with a quote by Helen Keller:

“Blindness cuts us off from things, but deafness cuts us off from people.”

July 7, 2020

EXECUTIVE SUMMARY

The executive summary provides a brief overview of the findings and the solution based on the problem statement. The initial brief from the client side was an interest in the hearing aid market and how Cambridge Audio can enter this industry. The project follows the double diamond approach, starting with an extensive research surrounding the initial brief. The context research revealed certain opportunities in the market and ways for Cambridge Audio to take advantage of these opportunities.

The time taken by an average consumer to start using hearing aid from the first moment of hearing loss is more than 4 years and there are a number of reasons behind this delay. The access to hearing aids is traditionally difficult in major markets - barriers being time, money and stigma. Consumer research revealed some major themes of friction in their interaction with the hearing care industry:

- Hearing aids were not up to the mark in noisy environments
- Consumers were not empowered with shared decision making and learning to control the aid.
- Hearing care is designed for the elderly population with outdated design & medical approach.

The research also revealed the true cost of hearing aids vs the inflated retail price charged by audiologists. These findings coupled with other trends redefined the problem statement to " Develop an easily accessible hearing care solution for the modern, technology oriented and price conscious netizens experiencing mild to moderately high hearing loss, which guarantees high consumer satisfaction at an affordable price and gives consumers the joy of enjoying their life to the full again."

The design is a reimagined hearing care service with an online presence at an affordable price point where accompanying hearing aids are designed to be 'consumer electronics' of the 21st century with modern features. This is one of the first ever internet based hearing care provider in the UK. In the US, the differentiating factor from other 'online' hearing aid companies is the focus on 'personalized care' instead of generic hearing aid along with cost advantage. It brings the quality of hearing aids in the consumer electronics segment and brings the feature set of true wireless earphones to the hearing care realm.

The brand is also designed with a focus on three main qualities: High Consumer Satisfaction, Low access barrier (time, information, cost) and positioning CA Assist closer to consumer electronics as a brand and product. A quick and early validation with consumers verify strong interest in this service and has helped iron out the rough edges of the service. The report also includes examples of marketing material and an early website / landing page manifestation.

GLOSSARY

HCP

Hearing Care Professional. They can also be termed as audiologists or hearing consultants in different countries or regions. They are generally referred to by the General Practitioner (GP) after determining a need.

PSAP / Hearables

Personal Sound Amplification Product. They are wearable electronic products that are intended to amplify sounds for people who are mildly Hard of Hearing. They can be purchased directly but are not intended to compensate for hearing loss as per FDA's definition.

OTC / DTC

Over the counter / Direct to Consumer. Products that can be purchased by consumers directly from the store / online without any medical prescription.

FDA

Food & Drug Administration. An American government organization certifying medicines and medical devices for sale to the consumer.

HA

Hearing Aid. In the current market and legal scenario, these are medical devices which can only be disbursed by licensed audiologists. This might change in the coming years when over the counter HAs can be purchased.

Behind the Ear (BTE) Hearing Aid

A kind of hearing aid where the earpiece or mould is located inside the ear while the remaining part of the hearing aid sits behind the ear. This kind of hearing aid is the most accessible, fits the widest kind of hearing ailments and are the most visible. The earmould design can make the ear canal of the patient feel stuffed where as the earpiece design generally feels airy / more comfortable.

Receiver in the Ear (RITE) Hearing Aid

A kind of hearing aid where the earpiece along with some other component sits inside the ear canal. The component sitting behind the ear is usually smaller and the connection between them is an invisible string making it somewhat discreet.

In the Canal / In the Ear (ITC / ITE) Hearing Aid

A kind of hearing aid where the device sits in the ear canal and is invisible from the front view and

partially visible from the side (when looking at the ear). These products need to be (generally) fitted to the specific ear shape and size.

ODM

Original Design Manufacturer. Companies which aid in the design and manufacturing of a product at scale based on client requirements. The products are then marketed and launched by the client.

OVP

Own Voice Processing. A feature in modern hearing aids where the amplification of the consumers' own voice is lowered to maintain the quality of sound.

Audiogram

A visual representation of a person's hearing loss. It is a graph plot between frequencies of sound vs the amplification decibel at which a person registers the sound. For normal hearing person, the amplification should be ideally zero for all frequencies.

REM

Real Ear Measurement is a technique used by audiologists to calibrate hearing aids to the hearing profile (Audiogram) and the ear canal shape of a patient. Using a probe microphone they measure the volume level of a particular sound inside the ear canal of the patient and calibrate the amplification accordingly.

Tinnitus

Perception of ringing in the ears, symptom of age related hearing loss. It is masked by some hearing aids using white noise generators.

Binaural Processing

Wireless communication between hearing aids for a better hearing experience. Some hearing aids synchronize features such as directional microphones to form a single hearing system, prioritizing speech and suppressing noise without any manual adjustment.

Hearing Aid Levels

Hearing Aids are classified as Level 1, 2, 3, 4, 5 and 7. The classification is driven by qualities and features provided by the aid. Better speech separation, Bluetooth connectivity, AI for environment sensing and other disruptive technologies are reserved for higher levels (5+). German national insurance covers Level 3 hearing aid where as NHS hearing aids are generally in the Level 3 or Level 4 category.

Netizen

A recently coined compounded word to describe 'citizens' using the net (internet). Net + Citizen

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Part 2: Define Problem Statement

Part 3: Develop Artifacts

Part 4: Deliver & Reflect

ABOUT THE CLIENT

Cambridge Audio is a British hifi audio equipment manufacturer with a rich history. Started in the 1960s in a garage by a couple of engineers from Cambridge University, the company has come a long way to seal its position as a high end iconic British brand of portable music players, speakers and other products. They pride themselves on three verticals (About us—Cambridge Audio, 2019) as illustrated in Figure 1. They have 5 decades of engineering expertise, and brand themselves as music enthusiasts who only manufacture products which music lovers would adore. As retrieved from their website, their tag-line is:

> Cambridge Audio. For people who listen.

The company started faltering during the 1990s and needed a fresh start. It was acquired by visionary entrepreneur, James Johnson-Flint in 1994. Under his guidance, they went back to profitability with a new line of amplifiers and speaker systems. They also won numerous awards during this time to be established as one of the best hifi brands in England. Over time, they have expanded their product line to provide diverse offerings like DAC systems and Bluetooth speakers.

Fig 1. Engineering, Value & Culture (Cambridge Audi, 2019)

Brief History

In the 1960s three things happened simultaneously - British bands began to enjoy unprecedented global success, British studios led the way in recording technology and British manufacturers started making the best hi-fi equipments in the world. Britain made a name for itself in all three areas but it was the studios and manufacturers that began to develop systems to capture and replay music as naturally as possible. Over time, this 'original' sound has become recognizably 'British'. Cambridge Audio comes from this rich period of history where a couple of graduates from the Cambridge University started this company with a goal to develop high fidelity audio equipment which could preserve the original quality of the music as recorded in a studio setting. It's been 50 years since their

founding, and they have come a long way achieving quite a lot in the five decades since.

Fig 2. Two Cambridge Audio engineers tinkering c. 1970 (Cambridge Audio, 2019)

They have expanded their product line from amplifier and transmission line speakers to network music players, mini speakers, headphones, streaming platforms and many others. They entered the mass market with Melomania 1 ear-buds (Melomania 1, 2019) with a goal to expand the product line.

Current & future

The market for high fidelity audio equipment has been shrinking over the years and are being replaced by smaller speakers and earphones / headphones. The emergence of air-pods in mid 2016 ushered a new era of true wireless music streaming. Cambridge Audio jumped the bandwagon in 2019 with the release of their first ear buds - the Melomania 1 (Melomania 1, 2019) which was highly praised by the consumer. Cambridge Audio was acquired by Audio Partnership PLC in 1994 and CEO James Johnson Flint has been at the helm of the company since then. James has always been known to find opportunities in the market and under his guidance, the company has been planning to diversify the business to other markets.

James started looking into the hearing aid market and saw a potential to disrupt the British hearing aid industry. A chance meeting between the CEO and Erik Jan Hultink (in October, 2019), a professor of new product marketing led to a discussion about this market and James asked for help through one of Erik's students. This is where the project initiated and I got on-boarded to the project a few months after that.

PRELIMINARY BRIEF

The hearing aid market has long been dominated by large medical device companies and accessible to 'patients' only through audiologists. The market is traditional with high supply chain and other overheads - with typical selling price for a pair of hearing aid of ~$3000 compared to a manufacturing cost of ~200 (Bose could disrupt hearing aid market, 2017). Figure 3 below illustrates the cost structure of hearing aids for the end consumer.

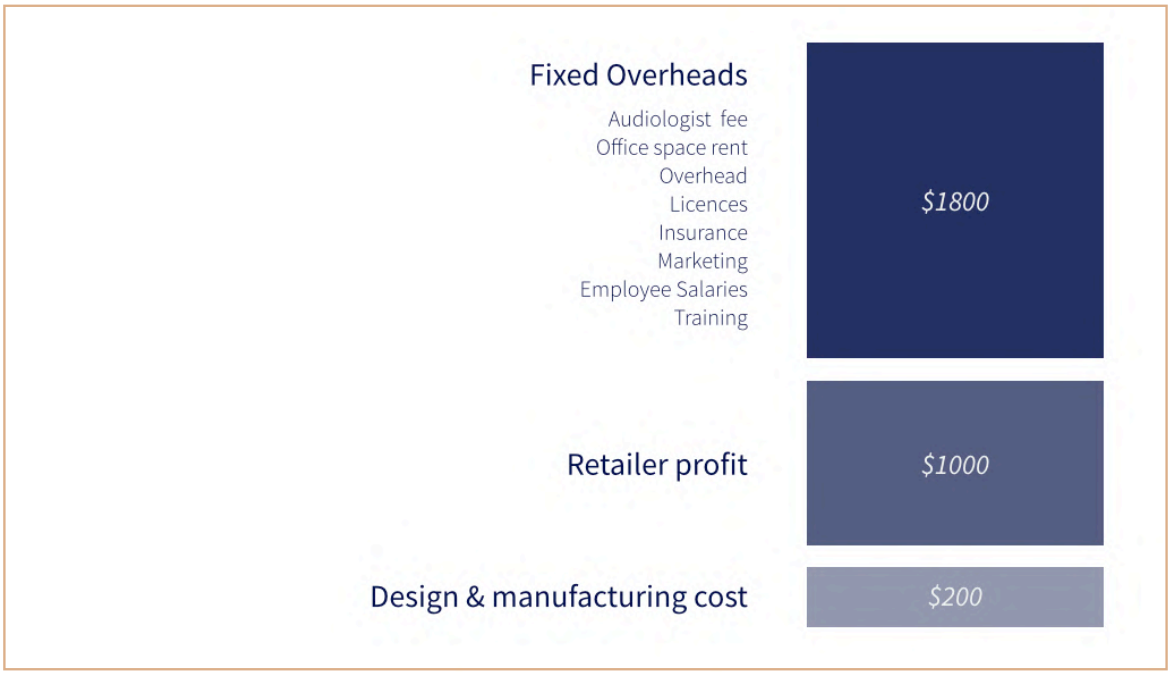


Fig 3. Cost break up of a typical $3000 hearing aid (theSeniorlist, 2019)

Initial Problem statement

Some recent trends and factors have primed the market for disruption. To start with, the intended user base of hearing aids is increasing fast due to longer lifespan in developed nations. The social stigma around wearing hearing aids is also diminishing thanks to technology acceptance - the ubiquitous presence of wireless earpods in recent years (Erler Susan F. & Garstecki Dean C., 2002). The US market size for hearing deficiency will touch 80 million consumers in 2020 ("Disruptors In Hearing Aid Market Shaking Things Up," 2012) and only less than 25% (Powers & Rogin, 2018) of the current target market is using hearing aids. Interestingly, the main reason for such low penetration is the high price barrier which can be attributed to business model, expensive medical certifications and other cost overheads of a traditional industry.

Recent legal changes are also easing the market - a ruling by FDA in 2018 removed certain kinds of hearing aids from controlled disbursement and they are currently working on a new law to ensure

over the counter sale by 2021. This has led to technology giants like Apple and Samsung to start working on related products and services. Another set of competitors - sound engineering companies like Bose and Harman are also getting involved in the hearing aid market ("How Bose and Other Tech Giants Are Disrupting the $10B Hearing Aid Market," 2018). The overarching goal of the project is to develop a strategy for Cambridge Audio to excel in the hearing aid market. This leads to the problem definition:

> How can Cambridge Audio enter and disrupt the British hearing aid market?

Project Scope

Currently, the project scope is undefined and Cambridge Audio is conducting a preliminary investigation of this market. The nascent stage of the project gives me ample opportunity and independence to define and scope it down in order to deliver within the allocated time frame. As I envision it, the deliverables will be a strategic roadmap complemented by the business model of the first horizon. It will be followed by the design of the sub-brand and the launch strategy of the first hearing aid. The deliverables will be combined together into a strategy report (currently the one being read) detailing the approach Cambridge Audio can take in order to enter and disrupt the British hearing aid market.

In order to develop a detailed roadmap, I would start by researching the problem context from a qualitative perspective. The outcomes of the research phase will be incorporated in the findings. Running in parallel with the product design phase (out of my scope) will be business model (product / service) and launch strategy for this product. I will explore a service based business model in this market and validate it with a pilot program. The business model will include a brief financial overview with cost structure and projected revenue.

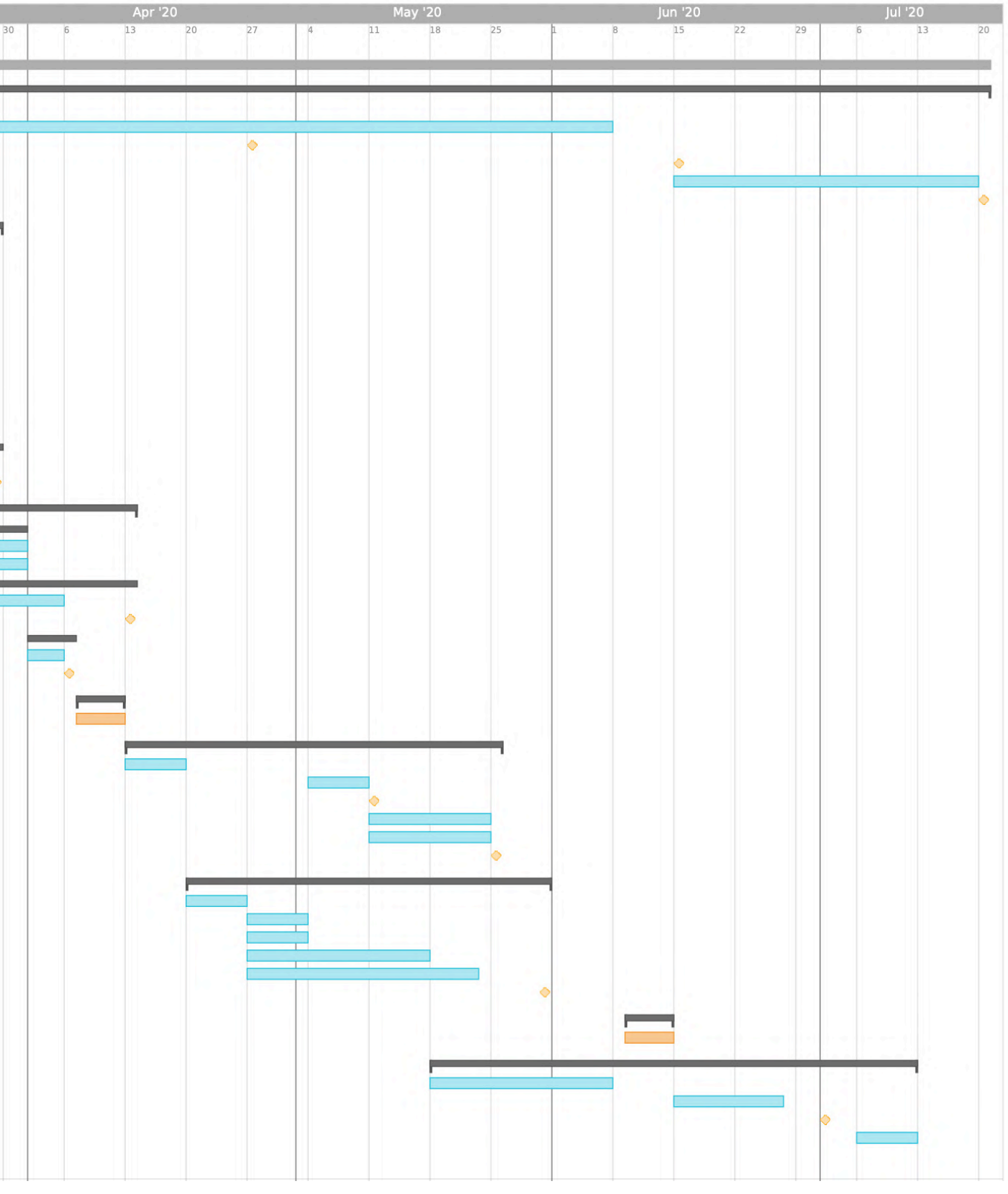
The last phase of the project will be developing a sub brand and launch strategy. Since the parent brand is already established with a lot of consumer associations, there would be some boundaries in terms the new brand's position. I will create a brand DNA, positioning statement, and example marketing material for the marketing team to use them as inspirations.

About this Report

Before diving straight into the project, it is important to clarify the purpose of this report and how it should be used. This document aims at providing clear directions in all aspects about starting the Cambridge Audio hearing care service. At the end of this project, a product manager can pick it up, read it and know exactly what he or she should do to realize this business. The report should help with identifying the target consumer, design of the product and service, the business model, pricing strategy, brand development, marketing flavor and launch strategy.

TIMELINE - GANTT CHART

Graduation Plan - Cambridge Audio	**0h**	**0%**
Over all progress	**0h**	**0%**
Kickoff meeting	0	0%
Overall strategy booklet creation	0	0%
Mid term meeeting	0	0%
share report and Greenlight	0	0%
incorporate feedback from mentor and chair	0	0%
Graduate	0	0%
Information gathering and Synthesis	**0h**	**0%**
Trend and Company Analysis	**0h**	**0%**
DEPEST	0	0%
SWOT Analysis	0	0%
Market Research (4C analysis)	**0h**	**0%**
4C analysis (JTBD)	0	0%
Stakeholder Mapping (value chain)	0	0%
User Research	**0h**	**0%**
Travel to England	0	0%
Qualitative Interview with potential consumers	0	0%
Transcription and analysis of interview	0	0%
Generative session with consumers	0	0%
Research Report - Input for product design	**0h**	**0%**
Synthesis of all information	0	0%
Create Report and share	0	0%
Product and Service Roadmap	**0h**	**0%**
Product and Service design brainstorming	**0h**	**0%**
Product and service Design (not detailed)	0	0%
Validation with consumers (story telling research)	0	0%
Tactical and Strategic Roadmap	**0h**	**0%**
Create Roadmaps	0	0%
Share it with stakeholders	0	0%
Engage with ODM (visit to USA - hearTECH Expo)	**0h**	**0%**
Interact with ODMs in hearTech expo	0	0%
Select ODM	0	0%
BREAK (Easter)	**0h**	**0%**
Take an easter break	0	0%
Business Model	**0h**	**0%**
Create business model based on previous info	0	0%
Pilot session (first product) with selected users	0	0%
Leave England	0	0%
Gather feedback and incorporate	0	0%
Updated business model and service design	0	0%
Share updated service design and business model	0	0%
Launch Strategy	**0h**	**0%**
Competition Axis	0	0%
Brand DNA	0	0%
Positioning Statement	0	0%
Poster and other example marketing material	0	0%
Create launch strategy report	0	0%
Share launch strategy report	0	0%
BREAK 2	**0h**	**0%**
Break 2 before finishing up	0	0%
Launch Strategy Booklet	**0h**	**0%**
Incorporate previous reports into the booklet	0	0%
finish up booklet for the client	0	0%
Share combined reports (into a booklet)	0	0%
Discuss results and future involvement with the client	0	0%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DESIGN METHODOLOGY

Design is an exploratory and iterative process where we generally define broad steps in order to guide the designer towards one or multiple solutions. There are different methods which can be followed in a design project and one of the most well-known methods is called the Double Diamond approach. The current project follows this framework (Design Council, 2019) and the strategy report is divided accordingly into 4 below mentioned chapters.

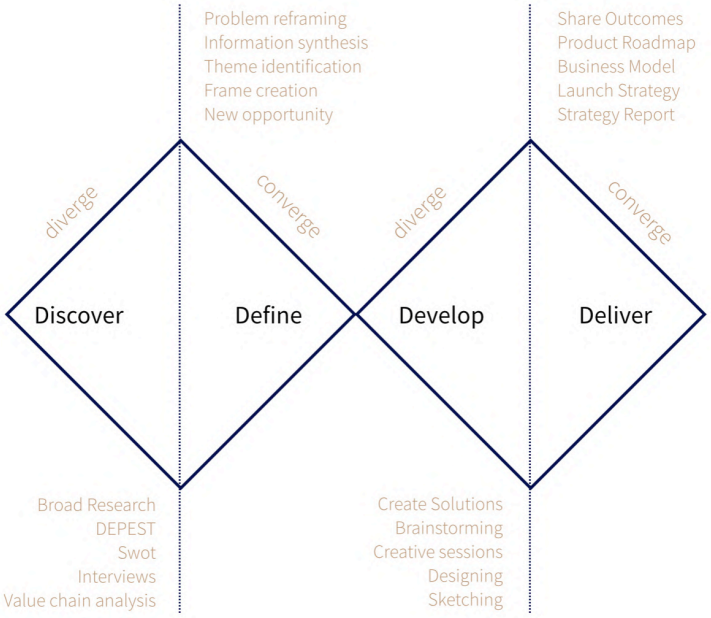


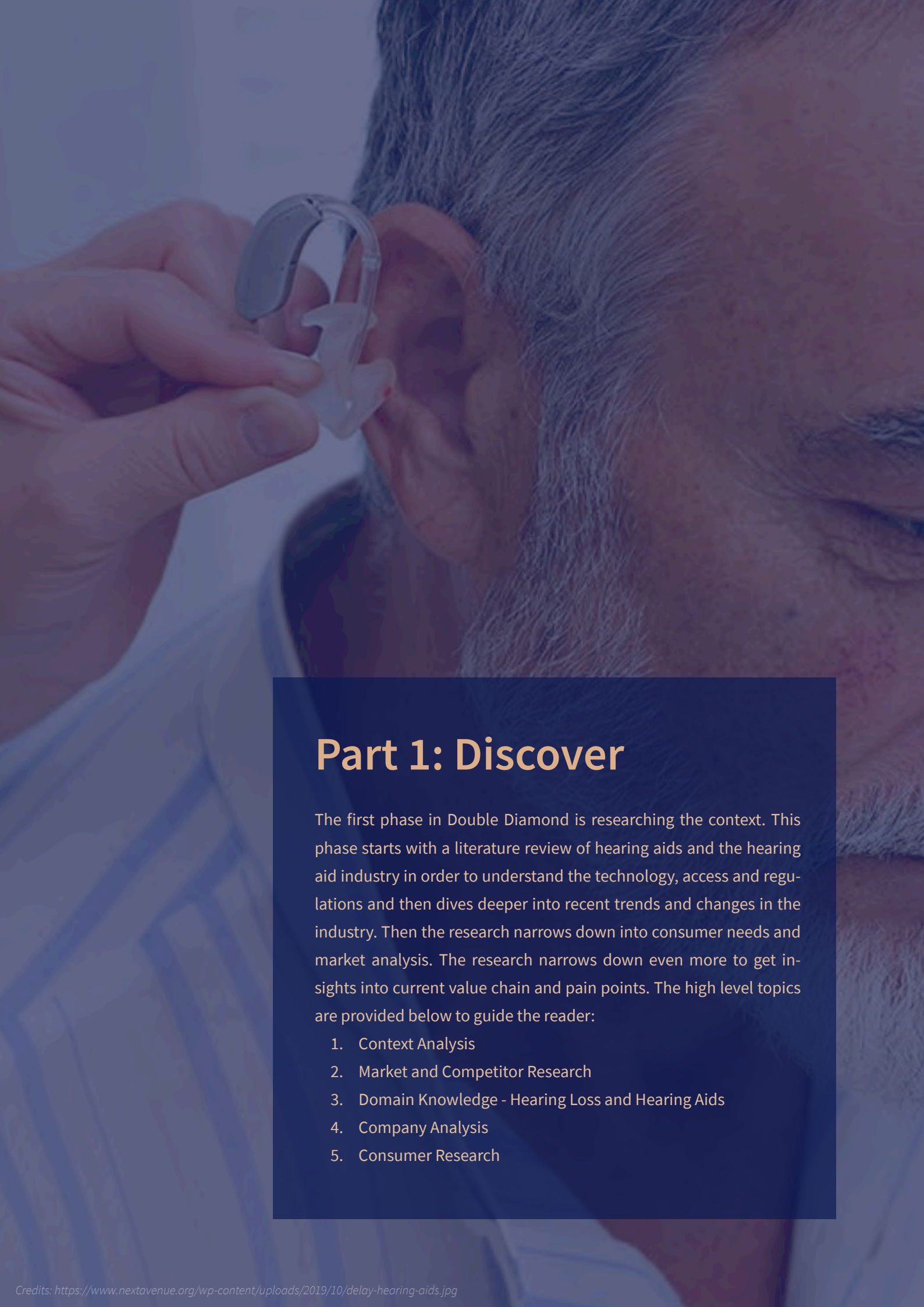
Fig 4. Double Diamond Process (UK Design Council, 2019)

Discover phase is characterized by wide divergence in order to collect as much information as possible to understand the context. It also includes a synthesis of the information for the next phase.

Define phase states the data synthesis outcomes of the previous phase and defines the problem statement. Define phase ensures that the right problem is tackled and solved.

Develop phase has 2 parallel tracks - the first track is the design of the product by a partner ODM. The other phase is the strategic roadmap along with the service surrounding the product. The business model will be developed after the roadmap. The 'develop' phase also includes testing with the user to validate the idea.

Deliver phase is used hand over all the outcomes of the develop phasewhich can help launch the business in the coming months, and reflect on the journey of the last 5 months.



Part 1: Discover

The first phase in Double Diamond is researching the context. This phase starts with a literature review of hearing aids and the hearing aid industry in order to understand the technology, access and regulations and then dives deeper into recent trends and changes in the industry. Then the research narrows down into consumer needs and market analysis. The research narrows down even more to get insights into current value chain and pain points. The high level topics are provided below to guide the reader:

1. Context Analysis
2. Market and Competitor Research
3. Domain Knowledge - Hearing Loss and Hearing Aids
4. Company Analysis
5. Consumer Research

Credits: https://www.nextavenue.org/wp-content/uploads/2019/10/delay-hearing-aids.jpg

TREND ANALYSIS

Trend analysis is a widely used methodology which provides interesting high level insights which can shake up the current value chain and create space for major changes in this industry. Also known as DEPEST analysis, it is categorized by different trend sectors namely: Demographic, Economic, Political, Ecological, Social, Technological. The figure below provides an overview of the major changes in trends and the subsequent description provides an in depth understanding of each of these trend changes.

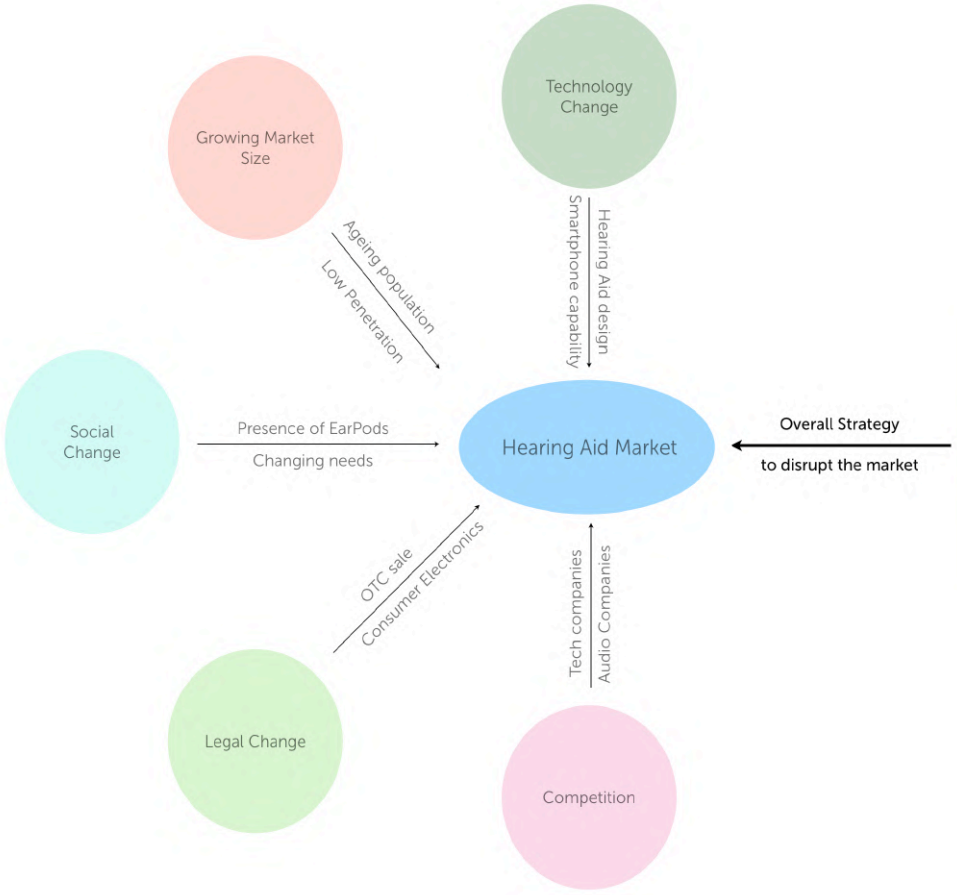


Fig 5. Overview of some defining changes in the HA industry

Demographic Changes

The developed world is aging fast and that leads to the potential number of hearing aid users to go up quickly. At the same time the average age of hearing loss is going down due to changes in lifestyle like listening to music at high volume for long hours (Herrera et al., 2016). This combined effect increases the number of potential target market for hearing aids. The shifting age range also dictates change in product design and features. The current UK market size is estimated at 11M customers according to BIHIMA ("UK and Europe still the dominant player in the global hearing industry," 2017), which is 17% of the total population. The penetration ratio in the current UK market is less than 20%. Graphs below show the growth rate of the hearing aid sales per year.

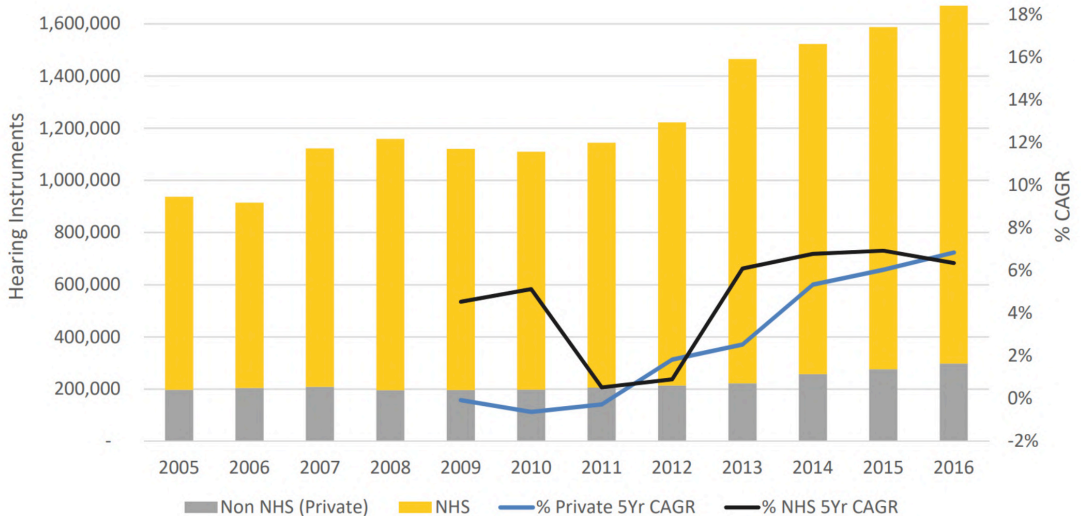


Fig 6. Growth of the British HA market ("BIHIMA results reveal a shift in hearing care towards the high street," 2017)

CAGR of private hearing aid market in the UK is currently 7.5%

The American market is equally positive in terms of the total consumer count. The projected number of potential consumers will touch 79 M by 2020 (Powers & Rogin, 2018). One of the main driver is the aging 'baby boomer' population who turn 65 with the turn of the decade. This demographic shift plays a positive role in driving the global HA market. A large opportunity also leads to the entry of new players disrupting the prevalent value chain with new products, services and systems.

Economic Drivers

The main reason behind low penetration ratio of hearing aids in the developed world is the financial burdens brought about by them. Being incredibly expensive, hearing aid uptake in the UK market is less than 20% and even lower in the US market. The NHS provides state covered hearing aids to consumers with severe hearing loss. At a time when the cost of all consumer electronics products have been dropping continuously, the cost of HA has not dropped considerably in the previous decades. A break up of the price of modern HA (p.12) showcases an immense overhead. The following graph showcases top 5 major reasons for such a low penetration within two groups of non-consumers. An interview with a sales person for Signia (one of the major hearing aid brands) in the German market echoes a similar overhead in the supply chain:

"HA manufacturers are selling the products to audiologists for approximately $95, and the audiologists are up-selling the most basic version for $700 ... the cost to consumer for a level 5 HA can be upwards of $2000 ..."

Top reasons for non consumption were insurance coverage and price of HA.

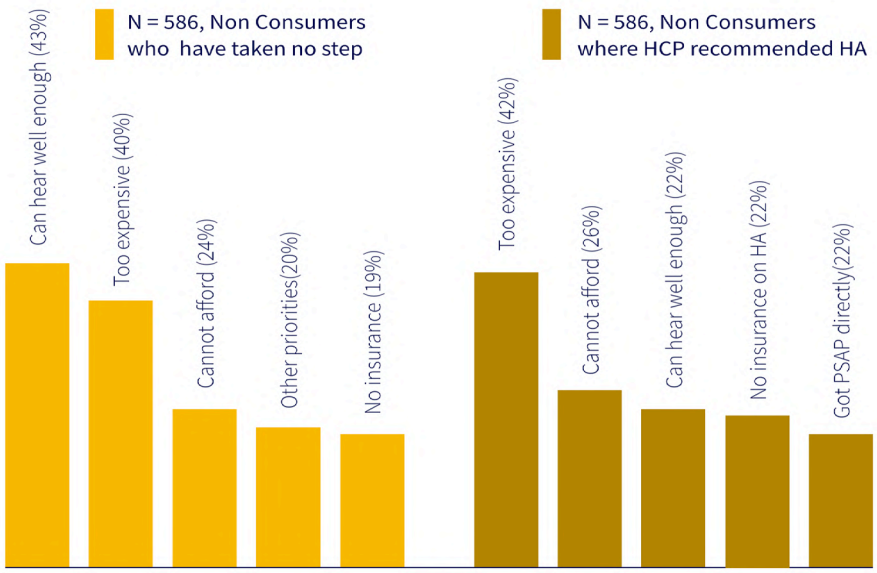


Fig 7. Top five reasons behind the slow uptake and low market penetration of Hearing Aids within two non-consumer samples (Powers & Rogin, 2018)

Political Shift

In some of the biggest markets, hearing aids have been historically labeled as medical devices and their access have been controlled through hospitals and licensed audiologists. Such countries include (among others) USA, UK and Germany (Yong et al., 2019). A recent legal change by FDA may change this scenario ("OTC Hearing Aids Are Coming—But They're Not for Everyone", 2018):

> FDA Reauthorization Act, 2019 aims to provide access to hearing aid directly to consumers (with moderate hearing loss) without medical prescription.

One may expect other countries to ease regulations over the next couple of years after the FDA ruling. This opens the market for tech companies to rebrand hearing aids as 'consumer electronics' and provide solutions directly to users. We are already seeing such a shift happening which is detailed more in the technological trend analysis.

Ecological Changes

One of the overarching trends in consumer electronics in the past decade is the use of rechargeable batteries. They have become ubiquitous in almost every gadget we use. However, a majority of hearing aids still use disposable batteries. Current consumer expectation and regulatory changes are introducing rechargeable batteries in HAs (Herbig & Heuermann, 2016). As Li-ion batteries become main stream in this sector, we expect the prices to come down.

Social Trends

Social trends include the widespread adoption of ear buds and consumers expecting more from hearing aids than just amplifying sound. One of the recent wave in consumer electronics is vital sign tracking which is driven by continuous accessible healthcare through data ("The Complete Guide to Hearable Technology in 2020," 2020)

We expect hearing aid adoption to go up as it slowly moves from a stigmatized elderly product to a lifestyle gadget for many. This is similar to what happened with the spectacle industry when it shifted from a old age necessity to a style statement.

Technological Transformation

The technological changes to consumer electronics in the past two decades has be exponential. This has also led to hearing aids getting modern features like Artificial Intelligence and Own Voice Processing. They are also rechargeable, have smaller profiles due to miniaturization of electronic components and have better overall performance.

The HA market has been dominated by 6 major players - Oticon, Widex, Starkey, Siemens (Signia), Phonak and ReSound for a long time ("The Big Six," 2018). However with the legal changes happening in the US right now, a new generation of companies are stepping into this market. On the one hand consumer electronics companies like Samsung and Bose ("How Bose and Other Tech Giants Are Disrupting the $10B Hearing Aid Market," 2018) and on the other hand, startups (MDHearing, NUHeara, Olive Union) are shaking up the hearing aid market. Bose has been testing self-fitting hearing aids for some time now (A First Look at the Bose Hearing Aid—Self-Fitting Bose, 2019).

A recent A/B testing experiment showcased that consumers were happier when they set up their own Bose hearing aid compared to when professional audiologists tuned the same hearing aid for them.

Recent news points that Samsung has trademarked the name 'Earacle' in South Korea and will probably come up with their own line of hearing aids in the near future. Cambridge Audio should invest in this market in order to take advantage of the changing environment. Based on current technology, Real Ear Measurements (REM) are used by audiologists to tune hearing aids to the needs of the user. REM calculates the pressure inside the ear canal with tubes. The hearing aid software calibrates based on the readings of the pressure inside the ear for different frequency channels. The hardware component of this test can make it difficult to emulate with an application.

Recent survey shows that 60% of audiologists use real ear measurement equipments while treating patients (Mueller & Picou, 2010)

MARKET LANDSCAPE

Once we have developed a good understanding of the relevant trends, market research looks at main competitions and their offerings. It also dives deeper into access to Hearing Aids and associated bottlenecks in the industry. The hearing aid market is currently dominated by 6 major players. One of the main bottlenecks to users taking up hearing aids is the cost component associated with it. Hearing Aids are categorized from TYPE 1 to TYPE 7 based on their feature set.

> A TYPE 5 hearing aid can cost somewhere between $1500 to $2000.

In most countries (barring the UK, where it is covered by the NHS) hearing aids are partially or not at all covered by insurance. This makes it difficult for users to buy it. There are several state funded program in the US which has been somewhat successful in increasing the penetration rate of HAs (Amlani Amyn M. & Silva Dakshina G. De, 2005). However penetration still stand at < 25%.

The most common kind of hearing aids are BTE (Behind the Ear), RITE / RIC (Receiver in the Ear) and CIC (Completely in Canal). These hearing aids have their own advantages in disadvantages, however sales data for the last years showcase a clear winner in the product categories. RIC sales have been increasing over the last few years. Table below provides illustrations and details of each kind.

Another kind of product category in the hearing loss market are hearables or PSAPs (Personal Sound Amplification Products). These products are not categorized as medical products and are accessible to consumers through mail order or online ordering. Hearables are often manufactured by the major hearing aid manufacturers and also startup consumer electronics companies (Nuheara, Bragi).

> A study has shown that there is no significant difference in the experience of hearables compared to hearing aids for patients with mild to moderate hearing loss (Cho et al., 2019).

The main differentiating factor in this category is the regulation or lack thereof. Following section expands on product and company analysis in this market.

Product Category

The market currently offers different kinds of hearing aids depending on the level of hearing loss, style, price and other requirements. The following table provides a brief overview of three main kinds of hearing aids along with their advantages and disadvantages:

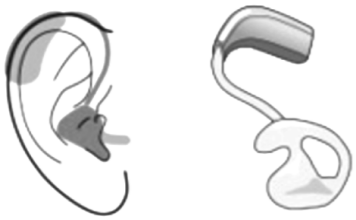
	**BTE (Behind the Ear)** Fits wide range of hearing loss, versatile and reliable hearing aid. Generally NHS provides this kind of hearing aid for advanced hearing loss. Cons include large size, visibility, outdated design, plugged up feeling in the ear and ear wax
	**RITE (Receiver in the Ear)** Small, soft ear piece (microphone) is placed inside the ear and a transparent thin cable connects it to the housing behind the ear. Generally more discreet but tend to need more maintenance as the tip & cable needs replacement.
	**ITE (In the Ear digital aids)** This kind is more discreet (invisible from the front) but also the most expensive versions. Cannot suffice for severe hearing loss and need high maintenance from time to time. The NHS does not generally provide this kind of hearing aid.

Table 1. Hearing Aid types and their pros and cons ("Hearing Aid Types", 2017)

The British Irish Hearing Instrument Manufacturers Association (BIHIMA) represents in Britain and Ireland the world's leading hearing instrument manufacturers and a study funded by them have found out that the RITE / RIC kind of hearing aids have been growing in sales number in the recent years. The following graph provides a comparison between sales number of the three kinds of hearing aids mentioned above. It should be noted here than the sales figures are only for the private sector in the British market.

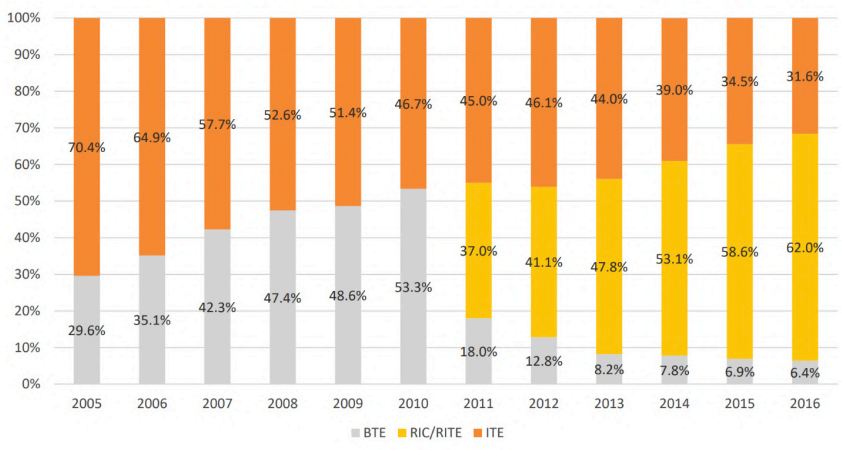


Fig 8. Sales figures of hearing aid types in the private market of UK ("BIHIMA results reveal a shift in hearing care towards the high street," 2017)

Barring the product types mentioned above, PSAPs and hearables comprise of the other competing product which do not need medical prescription in the UK or USA. They include modern functions like bluetooth functionality, microphone for calling, health parameter measuring etc. These products also do not conform to the typical form factor of a hearing aid. Figure below provides an example of hearable product from Bose:

Fig 9. Bose Hearphones | Conversation-enhancing headphones (Bose, 2020)

Competitor Analysis

The market for hearing aids is monopolized with 6 major players taking up more than 98% of the global market share ("The Best Hearing Aids of 2020 and Top Brands," 2020). The entry barrier to the market is high due to a number of reasons as mentioned below (Blustein & Weinstein, 2016). However that may change due to current changing trends.

> Access to hearing aids is the most important entry barrier for new entrants.

Audiologists being an integral part of the supply chain, they are often under the belt of the major hearing aid manufacturers. Independent audiologists are also tied down by lower price points of goods in exchange for loyalty. A recent FDA ruling for OTC hearing aid may change this situation with consumers getting to choose and program their own hearing aids.

Distribution channels is related to access, the biggest barrier to the hearing aid industry (Strategic Barriers in the Hearing Aid Industry, Part 3 – Holly Hosford-Dunn, 2016). Licensed distributors (au-

diologists) are locked in to the manufacturers' plan in return for lower cost of goods. Audiologists sometimes find it very difficult to exit such agreements due to lower cash flow or buying commitments. Switching cost to consumer is high because manufacturers tie in proprietary software and hardware making it difficult to switch to a product by a new entrant without ditching the current product altogether.

NOAH is proprietary software developed and marketed by a consortium of hearing aid manufacturers (Ingrao, 2006). The software ties down audiologists to a single platform which makes it difficult for new entrants to reach audiologists. It is currently being used by all major manufacturers, but incidentally not being used by disruptor companies like Bose and Sennheiser.

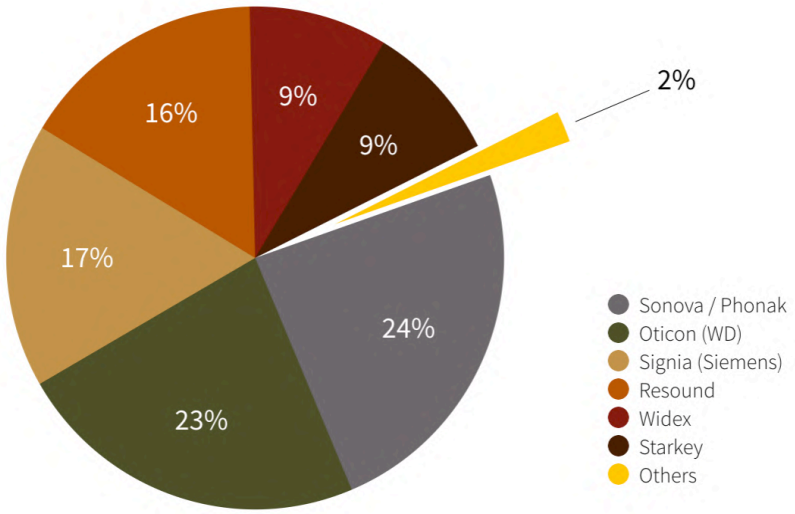
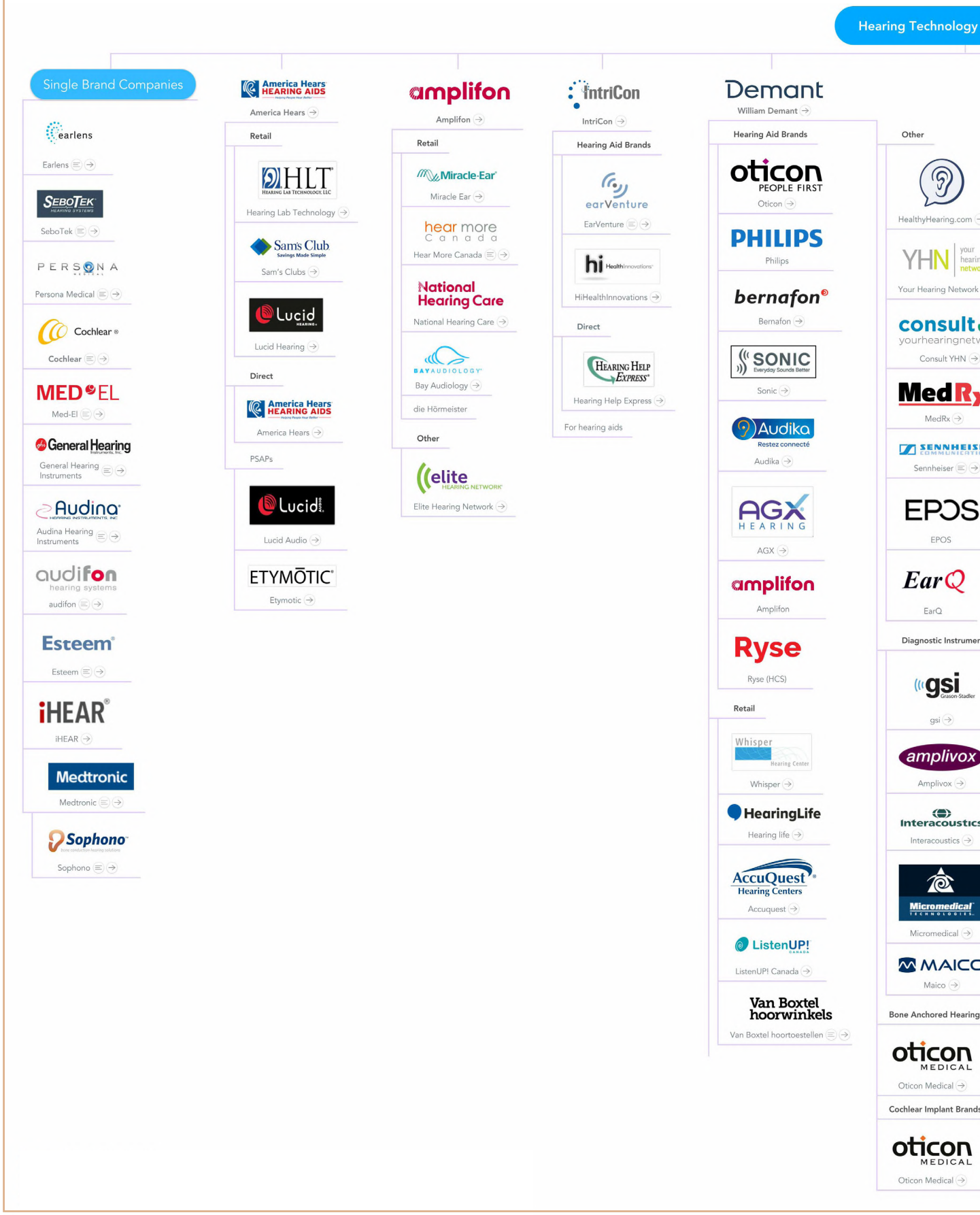


Fig 10. Combined market share 98% of top 6 hearing aid manufacturers (Hearing Aid Manufacturer's Market Share, Retail Activity, and Prospects, 2013)

Considering the strong monopolistic nature of the market, the average price point of the products from major players is comparable and fall between $2300 and $2800 with ReSound being on the lower end while Phonak occupies the higher end of the market. Fig 11 provides a comprehensive list of competitors. Looking at the fringe of the hearing aid industry are PSAPs and hearable devices. This market is flooded with many products at different price points, however the industry is going through a technological shift with features like Bluetooth Connectivity, rechargeable batteries, omni-directional microphone becoming commonplace. We are seeing the inclusion of artificial intelligence and active microphone as more modern features. Current competition include: Soundworld CS50+, Nuheara IQ boost and IQ buds, Bose Hearphones and Sennheiser A200.

PSAPS / Hearables are sometimes considered as intermediate steps for consumers to go to the audiologist recommend hearing aids.


Hearing Technology
Single Brand Companies
Earlens
SeboTek
Persona Medical
Cochlear
Med-El
General Hearing Instruments
Audina Hearing Instruments
audifon
Esteem
iHEAR
Medtronic
Sophono
America Hears
Retail
Hearing Lab Technology
Sam's Clubs
Lucid Hearing
Direct
America Hears
PSAPs
Lucid Audio
Etymotic
Amplifon
Retail
Miracle Ear
Hear More Canada
National Hearing Care
Bay Audiology
die Hörmeister
Other
Elite Hearing Network
IntriCon
Hearing Aid Brands
EarVenture
HiHealthInnovations
Direct
Hearing Help Express
For hearing aids
Demant
William Demant
Hearing Aid Brands
Oticon
Philips
Bernafon
Sonic
Audika
AGX
Amplifon
Ryse (HCS)
Retail
Whisper
Hearing life
Accuquest
ListenUP! Canada
Van Boxtel hoortoestellen
Other
HealthyHearing.com
Your Hearing Network
Consult YHN
MedRx
Sennheiser
EPOS
EarQ
Diagnostic Instrumer
gsi
Amplivox
Interacoustics
Micromedical
Maico
Bone Anchored Hearing
Oticon Medical
Cochlear Implant Brands
Oticon Medical

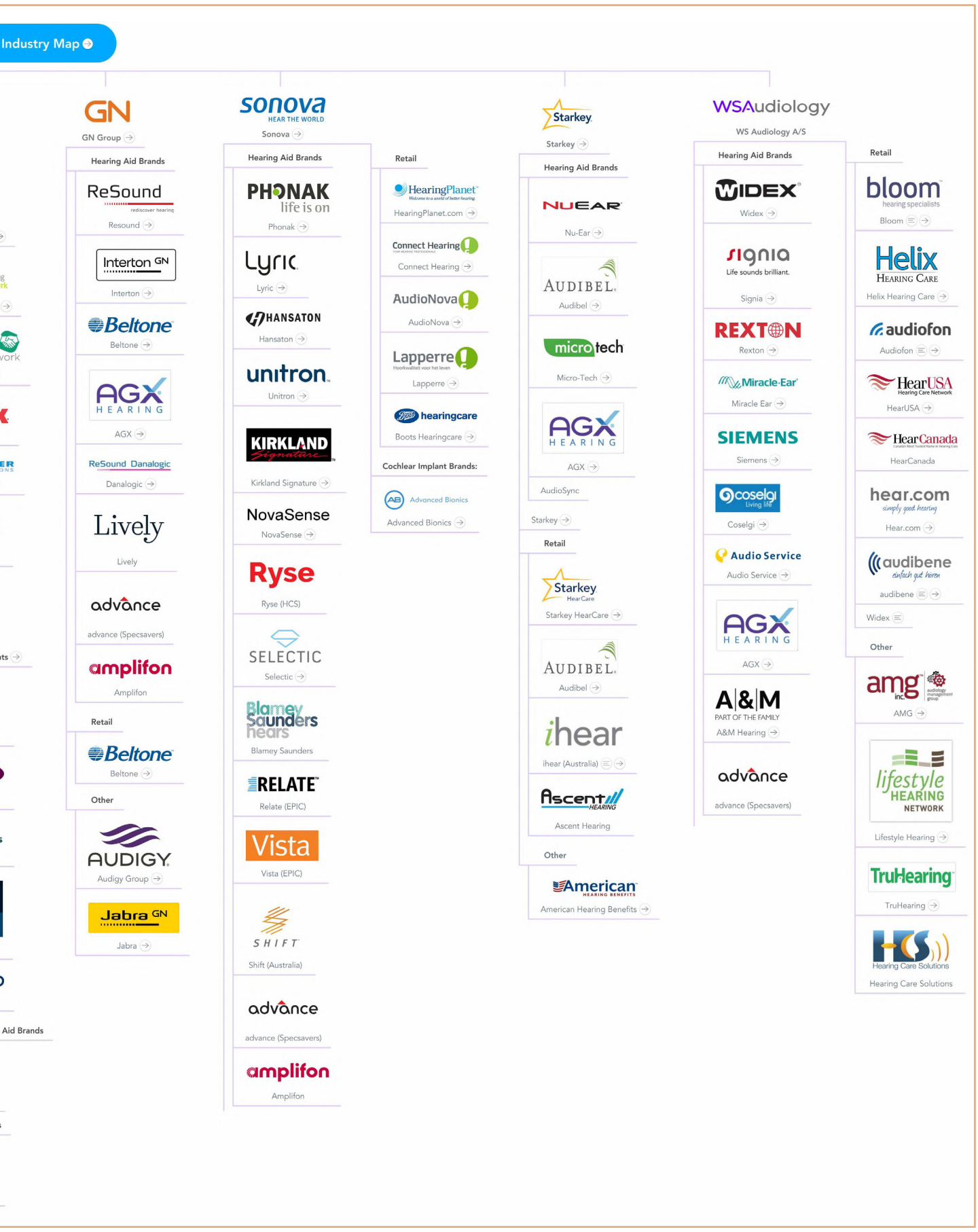


Fig 11. Major competitors along with their sister brands in the hearing aid industry (retrieved from Hearing technology industry map, 2020.)

British Hearing Aid Market

The British hearing aid market is driven by the NHS (National Health Service) of the UK. Patients with severe hearing loss access hearing aids through the NHS. Some of the problems with NHS provisions include longer wait times to access hearing aids, no choice of type, color, brand etc., availability when hearing is high to severe. This is leading to a growing number of consumers opting for private audiologists in spite of high price. An UK consumer spends an average of $3102 for a private hearing aid ("UK and Europe still the dominant player in the global hearing industry," 2017). An analysis of the British market positions different players in various locations of the competition axis and presents certain opportunities.

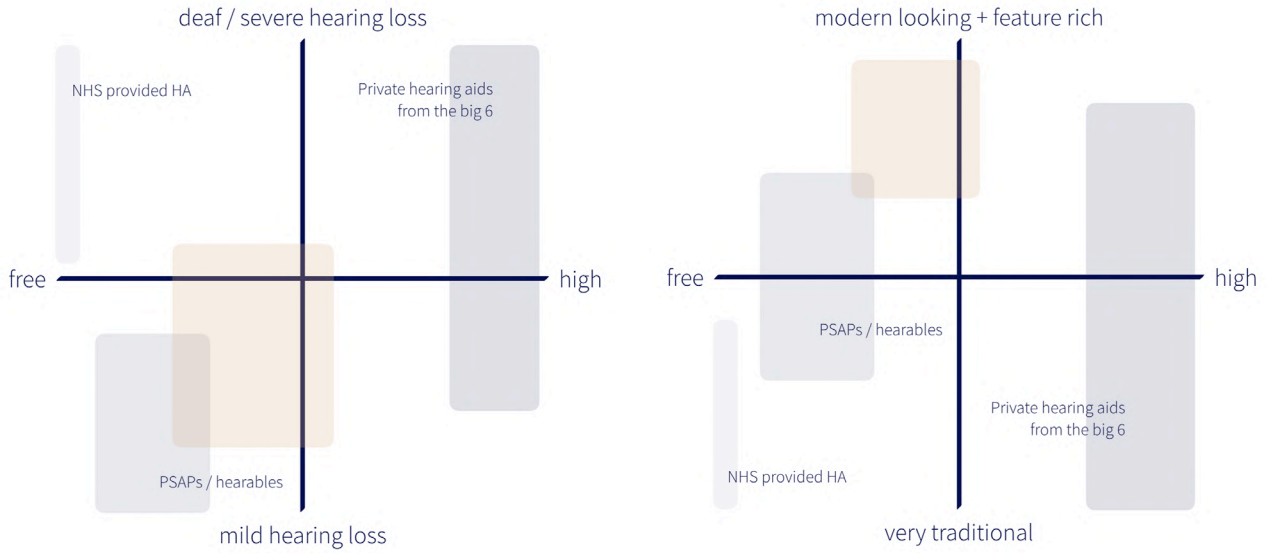


Fig 12. British Hearing Aid competitive landscape. (L): level of hearing loss vs product price, (R): product modernity (feature and make) vs product price to consumer

The graph on the left presents a gap in the medium price range for moderate hearing loss. The mixed consumer response of hearables and PSAPs enable this opportunity. An legal change allowing over the counter hearing aids can bridge this particular gap. The right graph shows a more stark market gap where features like discreet and modern design, BlueTooth function, rechargeable batteries are not available in NHS provided hearing aids, and only present in the private expensive options.

It should be noted here that the graphs above showcase product level differentiation in the current British hearing aid market. They should not be confused with brand positions of hearing care providers like Specsavers, Hearing Assist or NHS. The brand positioning of Cambridge Audio hearing aid business is tackled later in the report on page 76.

	**NHS provided Hearing Aids** Used by experienced users and power users. They are free, tried and tested, and have upgrades every five years by the NHS.	(very) visible, generally high wait times, often lacking modern features like BT, OVP, Li ion batteries.
	**Private Hearing Aid** Used by first times, experienced users and power users. More choices on hearing aid and modern features and design.	(very) expensive, and sometime not covered by insurance, maintenance required more often
	**DTC Hearables / PSAPs** Used by first timers and somewhat experienced users. Sleek with modern features. Inexpensive and has many choices	Has a negative perception from users, often fails to function as advertised, missing REM fit.

Table 2. British Hearing Aid competitive landscape: different product category offerings along with their user base and pros and cons

Looking at the competitive landscape figure and comparison table above, one can infer that right position for Cambridge Audio is a product with the following characteristics:

1. Modern looking product (opportunity to engage with consumers to understand their point of view on the form factor and features they value the most)
2. Catering to mild - moderately high hearing loss where consumers can access OTC products with low / online involvement of hearing care professionals.
3. Providing value for money product which differentiates from products of the price range >$3000
4. Preference towards RITE product type based on sales in recent years (consumer to be engaged for a more informed decision)

Once there is a good clarity on the product side, it is important to look at current problems in the service and how can we develop an accompanying experience which is substantially better than the competition in the market.

The consumer research in the upcoming sections sheds some light into inefficiencies and pain points of consumers. The correct product along with a disruptive service can unseat strong monopolistic incumbent positions in the market.

DOMAIN KNOWLEDGE

It is important to understand the basics of hearing loss and hearing aid technology in order to successfully navigate technical decisions required in the product development phase. The domain knowledge section is divided into 3 parts - hearing loss, hearing aids, and disruptive features. They provide an overall summary, touching upon common terminologies and their implications.

Hearing Loss

Hearing is an auditory perception to detect and process sound; it happens in the following manner. Sound waves enter the ear and hit the eardrum in the outer ear to vibrate it; the vibrations from the eardrum are amplified by ossicles (bones in the middle ear) to be picked by small hair-like cells in the cochlea (inner ear). The cells in the cochlea move as the vibrations hit them, and the movement data (sent through the auditory nerve) is interpreted by the brain as sound (Lin et al., 2011).

Types of hearing loss

Loss of hearing happens in two typical ways, firstly when enough sound does not reach the inner ear to vibrate the cells in the cochlea; secondly when the hair cells in cochlea are damaged and do not move enough when vibrations hit them. The first kind of hearing loss is called Conductive hearing loss which can happen due to buildup of ear wax, defective ear drum etc. The second kind of hearing loss which is more prevalent with aging is called Sensorineural hearing loss (Felman & Biggers, 2018) and generally affects both ears.

When hearing loss occurs, the ability to process sound diminishes differently at different frequencies. Some consumers miss sound in the lower end of the spectrum (like drum sound) where as others fail to hear sounds in the higher end (shrill voice of a baby). This loss in hearing is unique to each consumer and is represented graphically as an audiogram. The next part elaborates more on this topic and how a hearing aid enables a person to hear properly.

Hearing Loss Audiogram Profiles

An audiogram is a measure of how a person's hearing drum responds to vibrations of different frequencies. It is represented by a 2D graph where the sound decibel is measured against the wave frequency. Graph below provides a typical audiogram for a person with normal hearing with hearing at each frequency between 0 dB and 10 dB.

When we plot some hearing typical hearing loss profiles (HLP) on the same graph, we can compare different kinds of hearing loss as showcased below (Killion, 1993). As the profiles depict, consumers

face hearing loss at different frequencies and they are called flat / sloping / reverse sloping / complex losses.

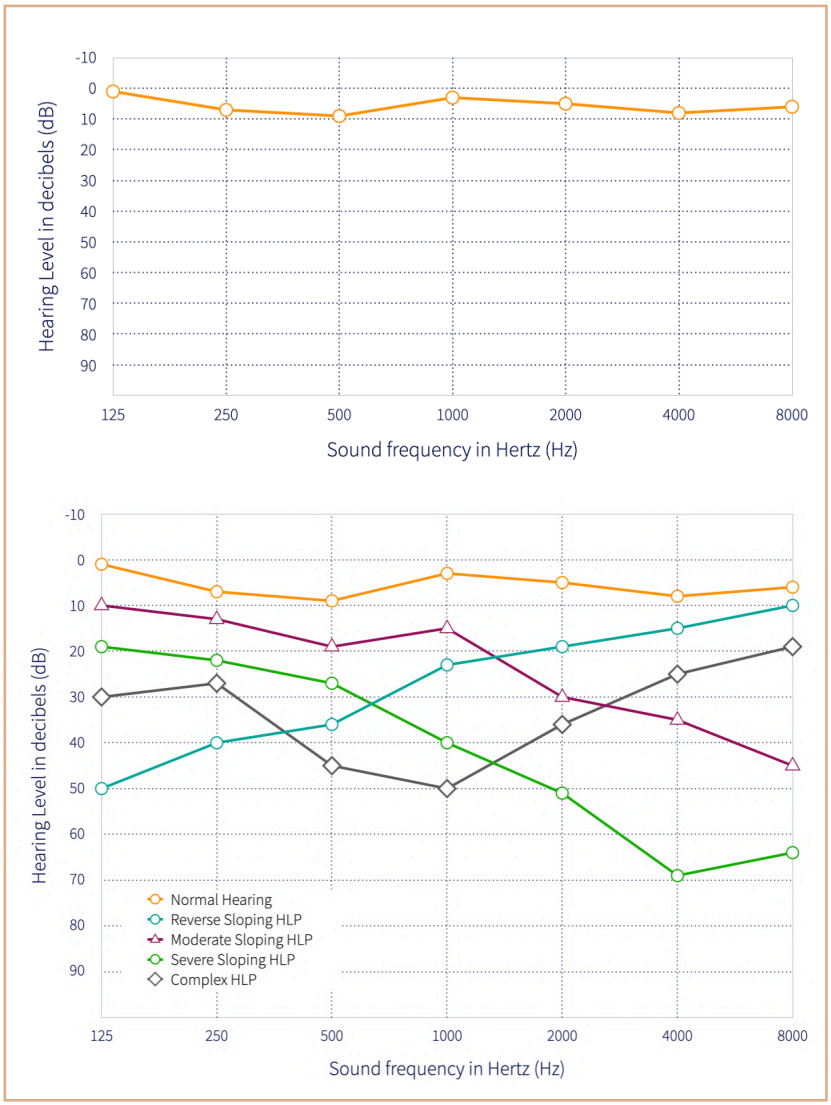


Fig. 13. Typical normal hearing audiograms vs Hearing loss audiograms. The top figure shows the typical hearing capability lying between 0 to 10 dB for all sound frequencies between 125 to 8000 hertz. The bottom figure shows different kinds of hearing loss profiles with normal hearing for comparison. Some consumers cannot hear at high frequencies (sloping hearing loss) where as others find difficulty hearing low frequency sounds (reverse sloping hearing loss)

Audiology Practice and REM

An audiogram test is the first activity in the hearing care journey. The hearing care professional may also recommend extra tests like CT scan of the ear. Once the audiogram test is done, the hearing care professional suggests hearing technology which would fit the need of the client. The professional can also recommend other kinds of treatment like operations or cochlear implants; however in most cases with age related sensorineural hearing loss, hearing aids are recommended. Once the right form of hearing aid is selected, the next step is to tune aid to the hearing loss profile of the client.

In best audiology practices, hearing aids are tuned to the client's hearing need using a technique called Real Ear Measurement (REM).

A probe microphone is inserted inside the ear canal along with the hearing aid. A speaker in front of the user emits sound of different frequencies which is picked up by the hearing aid, amplified and sent to the ear canal. The probe microphone inside the canal measures the volume of the amplified sound and sends it to the audiologists computer screen. The audiologist adjusts the hearing aid settings based on the gain (amplification) and the HLP. Detailed description on adjustment of channels is provided in the next section of the report. Once the hearing aid is curated, the user starts wearing it and gets adjusted to the new found feeling of hearing more again. They often visit the audiologist for settings updates over time as their hearing profile change.

Fig 14. A client wearing a probe microphone in an audiologist's chamber during REM and hearing aid fitting process (Thompson, 2018)

Digital Hearing Aids

The development of digital signal processing (DSP) in the 1990s and the miniaturization of electronic components has led to the development of digital hearing aids. The hearing aid market at present is dominated by digital hearing aids and analogue counterparts are becoming obsolete. This section of the research provides a brief domain knowledge of how a digital hearing aid works and the main components / features of a digital HA. Figure next presents the basic components of a BTE hearing aid.

The fundamental difference between an analogue and a digital hearing aid is the approach to sound amplification. In case of analogue aids, the sound is received by the sound input module and amplified without any change or processing of the original input signal. However digital hearing aids convert the sound signal to digital format and then process and digitally amplify it . This allows digital HAs to selectively amplify sound and remove noise as per the requirement of the patient. However one of the side effects of digital amplification is the delay in sound travel as a result processing time

which increases with more complicated processing and noise reduction algorithms. The following paragraphs briefly explain essential features of a modern digital HA and how these components / features contribute to a clear hearing experience.

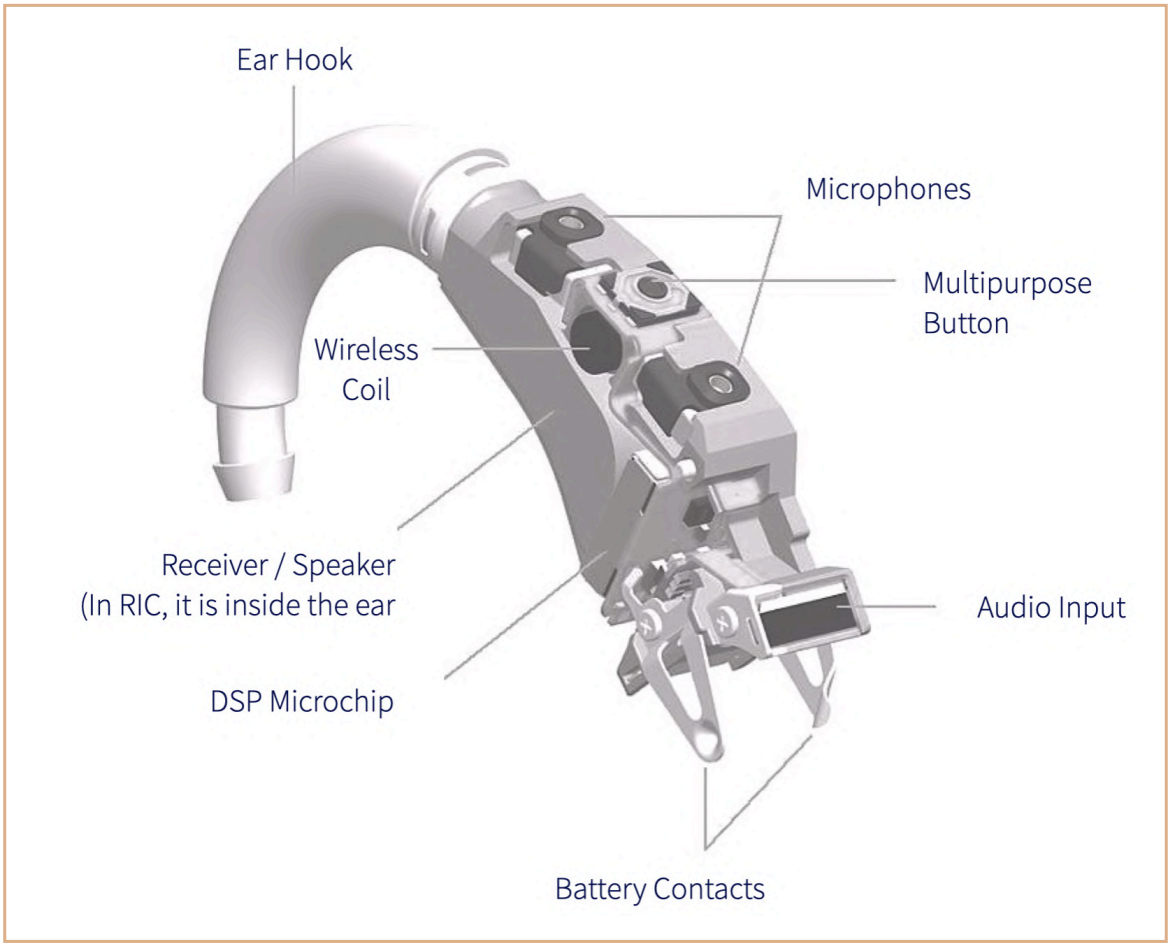


Fig 15. Main parts of a digital BTE Hearing aid (battery is fit in the lower compartment touching the contacts.

Channels

The number of channels is one of the most prominent features in a hearing aid. Some people have more hearing loss in the low end of the spectrum (deep bass sounds) and some have loss at the high frequency end (shrill sounds like bird chirps); others have a mix of the two.

Hearing aid channels slice the frequency input (incoming sound) into many pieces (bands), so that each band can be amplified individually according to the hearing loss profile.

Channels provide a way to “turn up” the volume in required parts of the spectrum without turning up everything. For people with complex hearing profiles, a high number of channels helps to adjust several sections of the frequency spectrum to create a more even and natural hearing experience (Levitt et al., 1988).

Microphones (Omni and Directional)

A challenge for people with hearing loss is mitigating noisy environments like restaurants and pubs. Hearing aids may boost all sounds, which makes it difficult to focus on the right source. To combat such situations, modern hearing aids are equipped with multiple microphones which measure the length of time taken for the same sound to reach each microphone. The hearing aid uses that information to focus on sounds that are directly in front of the listener while turning down the amplification on sounds that are coming from other directions. Certain advanced hearing aids have omni directional microphones to 'scan' the environment and intelligently analyze the incoming sound in order to select the most important sound for the user while lowering 'other' sounds. Some modern hearing aids (like Bose Hear-phones) also provide the user an option to control microphone directionality based on the environment.

Noise Reduction (Impulse / transient)

While directionality focuses on the right spatial position of the sound source, noise reduction and speech enhancement further shape the sound in order to block out background noise (static) and amplify dynamic signals, like speech or music. The algorithm within the microchip analyzes the incoming sound input and identifies "static" sound signatures, like tap water or a running washing machine and separates them from "dynamic" sounds, like speech or television. The hearing aid then boosts the dynamic sounds while minimizing the static ones. Algorithms are becoming better every year at identifying and separating noise from sound (Cornelisse, 2002).

Feedback Suppression

Feedback occurs when the amplified sound partially escapes from the ear canal and is 'picked up' again by the hearing aid microphone, creating a feedback loop of high-pitched whistling noise.

> To minimize the annoyance, hearing aid manufacturers created systems to identify and stop feedback before it starts. ("Top 5 Hearing Aid Features and Why You Want Them," 2016)

A feedback cancellation algorithm built in the hearing aid microchip monitors incoming sounds for feedback signals. If a signal is detected, the hearing aid produces an equal and opposite signal to cancel out the feedback within milliseconds.

Wireless Connectivity

Most modern hearing aids have BlueTooth inbuilt which allow them to be connected to smart phones or other BT enabled devices. Wireless Connectivity provides hearing improvements in a number of use cases like listening to music, audio and video call, watching television etc. The sound is directly transmitted to the hearing aid as digital signals which is sent to the consumers' ear. The main benefit is low noise to signal ratio in digital signals.

Disruptive features coming to Hearing Aids

Recent innovations in hardware and software technology has led to the inclusion of many cutting edge features in top of the line hearing aids. Some of these features and how they contribute to better hearing experience is explained below:

Automatic acclimatisation adaptation

Hearing loss patients starting with hearing aids often complain HAs being 'too loud' because they have not had normal hearing for a long time. Some modern hearing aids auto adjust the amplification over time (rather than the audiologist doing it) as one get used to wearing it, a type of self-learning / gamification.

Automatic Compression / Sound Softener

Provides more amplification of low sound levels where as compressing high sound levels from being intrusively loud. It is done after the sound is converted to a digital signal and the amplitude of the signal is normalized: e.g. the noise from an industrial equipment is lowered to comfortable levels.

Choice of listening program and User defined modes

Many modern hearing aids provides different listening modes like restaurant, office, nature etc. Some hearing aids allows users to create new modes or edit available modes to suit the hearing loss pattern. The user can lower the gain of certain noises like 'traffic' while amplify pleasant sounds like bird chirp.

Binaural Processing

Wireless communication between hearing aids for a better hearing experience is called Binaural Processing. Cutting edge hearing aids synchronize features such as directional microphones to form a single hearing system, prioritizing speech and suppressing noise without any manual adjustment.

Low-battery indicator

A nifty feature now becoming commonplace is an alert sound to change battery. In case of rechargeable hearing aids, a battery case is provided to charge them.

Music Equalizer

Modern hearing aids can optimize the sound of music by using a different algorithm to curate to user's preferred choice.

Tinnitus Masking / White Noise Generator

Patients with severe hearing loss often face a constant uncomfortable sensation of ringing noise

called tinnitus. A tinnitus masker is low level noise generator which comes inbuilt with some high end hearing aids and helps in alleviating the issue.

Wind noise Manager

Dedicated algorithm to identify wind noise in the converted digital signals and automatically suppress it. Wind noise manager works well with binaural processing and omni directional microphone to amplify speech from a specific microphone while suppressing noise from the other microphones. This kind of hearing tech can help consumers who spend a lot of time outdoors.

Artificial Intelligence

Hearing Aids are getting equipped with cutting edge technology and a recent addition to that is artificial intelligence (AI). Livio by Starkey was one of the first mainstream hearing aids which featured AI in 2019. AI can enable self learning and automatic adjustments based on the environment. It also tracks other health parameters like movement and fall detection, temperature, heart rate etc.

Fig. 16. First AI Hearing Aid with health tracking (Activity Tracking Hearing Aids | Starkey Livio AI, 2019)

COMPANY PROFILE

The trend analysis suggests a number of changes happening in the hearing aid industry which will affect the industry and open opportunity for new entrants in this market. A careful competition analysis has showcased new products and services are being tested and piloted by companies for the near future. There are three new categories of entrants:

1. Consumer electronics / technology giants like Samsung and Apple who have created a mass market hearable consumer base over the last few years; and
2. Sound engineering companies like Bose and Sennheiser who have marketed PSAP products with different form factor and modern features at an affordable cost. They are expected to jump into the hearing aid industry with the recent FDA ruling.
3. Technology startups like Audicus and Bragi with a goal to disrupt the hearing aid industry with new products, services and business models.

Cambridge Audio falls into the second category of entrants (audio companies with a strong brand) who have perfected sound engineering over the years.

They are not expected to become leaders in the hearing aid industry but rather consolidate a small chunk of the market which is expected to grow year over year. Even a quarter of a percentage market share of the total can provide millions in revenue and that should be the initial goal of the company. However in order to develop a solution which fits the target consumer, one needs to understand the patient as well as the company. It is important to find out the core competencies of the company because it help in prioritizing certain in house developments vs external talents. I have used to SWOT analysis tool to perform a quick analysis of Cambridge Audio.

Swot Analysis

The Strength, Weakness, Opportunity, Threat (SWOT) tool is used to understand a company's position in a specific market. Developed in the early 1950s, this tool is widely used in all major corporations as an initial benchmark to understand the position of a company in the competitive market.
It lists the strengths and vulnerabilities of the company from the internal and external perspective. The following table lists down the most important findings from the SWOT analysis. The table has been developed with sources from Cambridge Audio internal company presentations, their brand outlook and the market scenario. A goal of the matrix is to move the weaknesses into the opportunity space to enter new markets or target new consumers. E.g. Cambridge Audio does not have medical certification vs service model for HA is not tested in the British market. How can these two be combined in order to create a new opportunity in the Hearing aid market.

Strength	Weakness
• Brand recognition in the hifi audio market of UK: Cambridge Audio is highly valued for its signature sound and quality products • Strong relation with the manufacturing partner(s) in Asia: more than 20 years of OEM and ODM engagement from Shenzhen region • Public Endorsements: Can get the endorsement musicians with hearing loss • Current market: Consumer persona matches with the beach head market being targeted	• Low or No technical knowledge / capability in HA industry: they have not ventured into this market before • No hold over the value chain within the industry (GP, audiologist, retailer) • The brand image and brand recognition of CA right now does not associate with the new market of hearing aid. • CA does not have medical certification of any previous products and hence this is uncharted territory.
Opportunity	**Threat**
• Legal changes in the USA make it a perfect time for disrupting the OTC HA market • NHS provided HAs have mixed reviews and CAGR of privately provided HAs growing at 8%. A lot of consumers in the UK have been unhappy with NHS products • The market is dominated by big players w are slow to react to change • Service model in the British HA market has not been introduced yet and early to market opportunity can help	• International players with a strong presence in the UK market are ahead of the game (Bose, Samsung, other major players) • NHS can expand their product offering and compete with the private market. • Current incumbents can come up with products which can directly compete with CA offerings and they have a clear advantage of being in this market for a long time. • New medical procedure can make hearing aids useless.

Table 3. SWOT Analysis of Cambridge Audio for the Hearing Care Business

CONSUMER RESEARCH

Consumer research is one of the pillars of any good design process. Developing products and services with the user at its center is the core of Human Centered Design. Consumer research becomes particularly important when the product and accompanying service needs to fit into the user's daily routine perfectly. It is a very intimate B2C necessity product which has to function very well according to user needs. The outcomes of this section coupled with the other sections of the research phase helps in shaping the design goal thereby ensuring that the right problem is being addressed.

Process

It starts with online consumer research from literature, news articles, consumer reports, first hand stories posted on websites and social channels like Facebook. The qualitative research includes the interviews approximately one hour in duration, conducted over telephone. An online tool is used to transcribe the interview audio (recorded with consent) ; the transcript is then manually screened for overlapping themes; which then form boundaries for quantitative survey in the 3rd stage. It should mentioned here that qualitative analysis was not only restricted to patient interviews but also took into account the point of view of other stake holders in the value chain: audiologists and sales personnel. The funneled linear approach as shown below best describes the process.

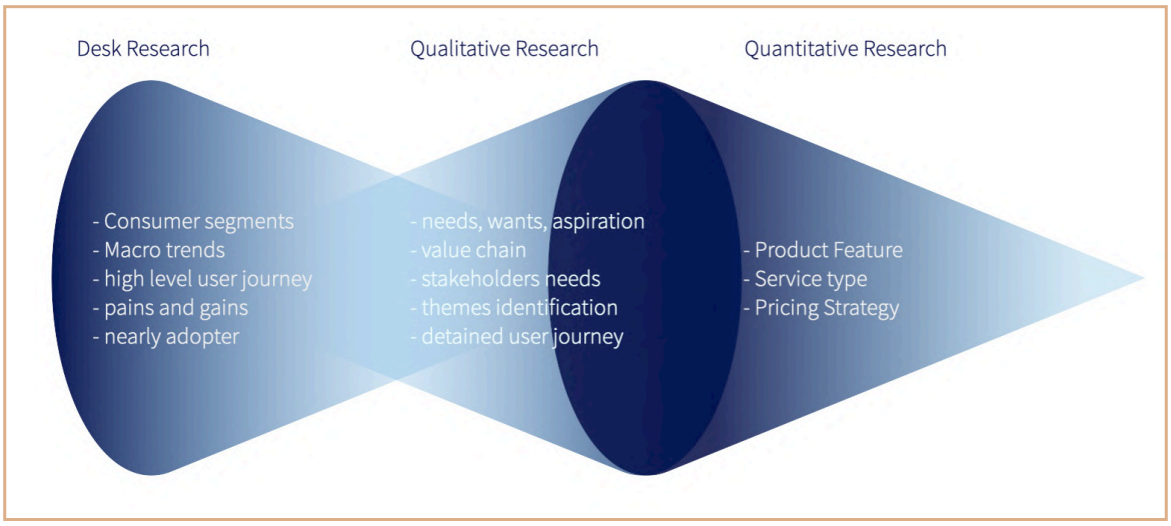
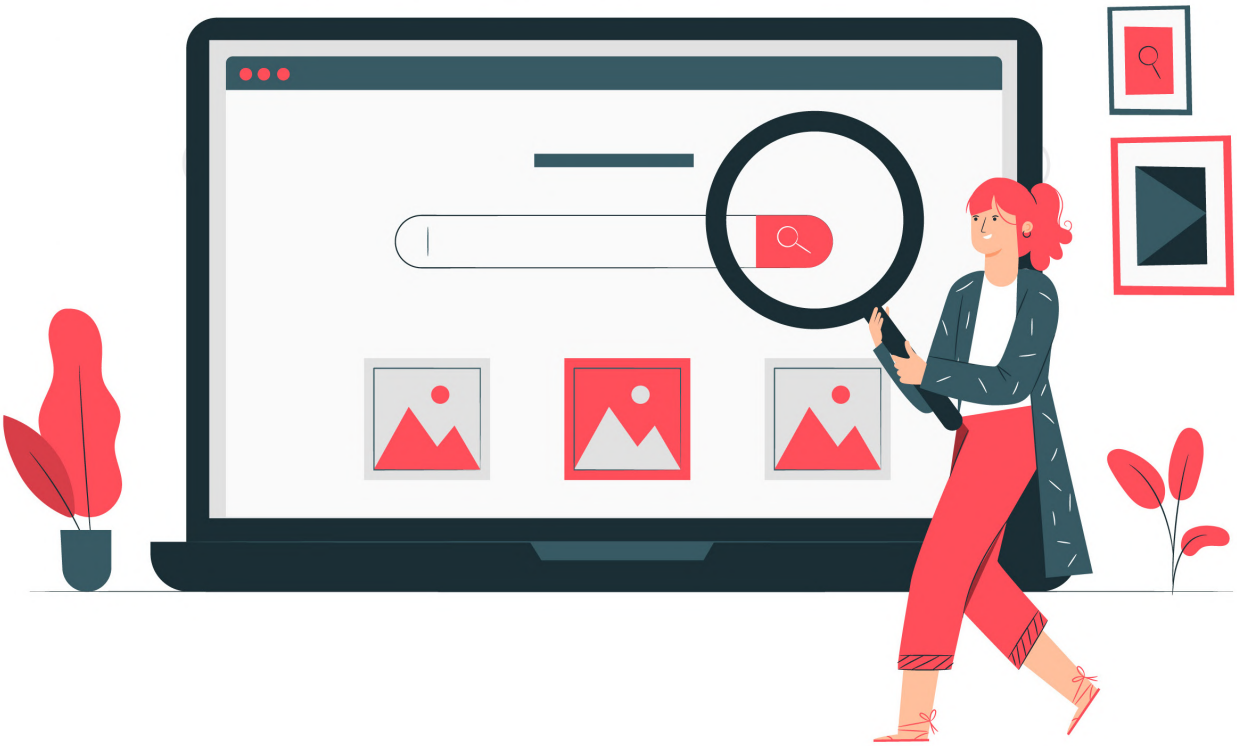


Fig 17. An alternating converge-diverge model of consumer research enables the right insights translated into the problem statement during the converge phase of the double diamond.

Such an approach ensured that the right insights were transformed into the design goal and also at the same time helped in handling large amount of qualitative data without getting overwhelmed. The verbatim interview transcripts and quantitative survey raw data are included in the appendix of the report for reference.

Step 1 - Desk Research

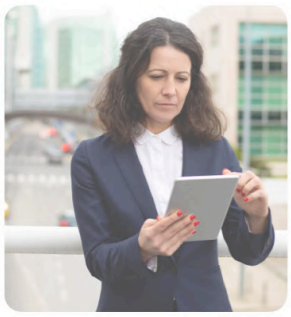


The first step to consumer research is to develop a good overall understanding of different consumer types. In this case, multiple sources were used to gather this data: posts in relevant Facebook groups to analyze voice of the consumer, reports published by trade organizations and competitors, first hand stories maintained in online blog posts by hearing aid users. A complete list of sources used in the desk research phase is provided in the appendix. Different data sources are synthesized to develop a consumer journey and some of the most interesting findings from the desk research are presented below.

Consumer Segmentation:

Three kinds of consumers can be found based on the level of hearing loss and their dependence on the hearing aid. The 'first time users' are people with mild to moderate hearing loss who have not used hearing aids before and are taking their first step to the hearing loss journey (Findings from consumer survey - Summary report for first time users , 2018). The second category of consumers are named as 'experienced users' who have moderate to high hearing loss and have been using hearing technology for some years (Findings from consumer survey - Summary report Experienced Users , 2019). The last kind of consumers are 'power users' who have severe hearing loss and cannot maintain a social life without their hearing aids (Findings from consumer survey - Summary report: Power Users , 2018). The table below provides important information about these types of users and

enables us to chose the right consumer persona.

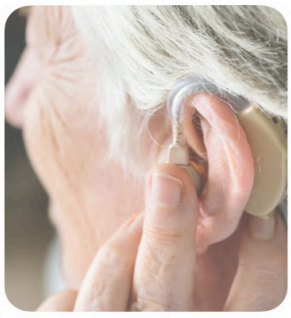


First Time Users

- 60% find it difficult to follow conversation
- 75% use the internet to search for next steps
- About 45% buy HA after 1st consultation
- Main motivators to go are free trial, free checkup 3 main drivers
- Hindering consumption: Effort (time, money, change), Stigma (of society), Trust (doctor, expert, system)

Experienced Users

- This user group is significantly older compared to first time users and 75% is 60 years or more.
- 50% consider themselves as socially active
- 69% are retired and spend majority of time at home / care centers.
- One of the main concern of these users is how bad will it get over time and can they afford future treatment.



Power Users

- They have very high dependence on hearing aid as well as 'human hearing aid' who is their closest relative
- Severe hearing loss to deafness among this group
- BTE hearing aid is the preferred choice
- The POV of their closest relative: partner, child is very important.
- They need close physical support from HCP.

Table 4. Consumer Segmentation based on the level of hearing loss and their dependence on hearing aid.

Previous research pointed at recent FDA ruling allowing sale of hearing aids over the counter for mild to moderate hearing loss, but it does not allow sale of hearing aid to consumers with sever hearing loss: power users and experienced users. This also fits with Cambridge Audio's goal of providing easy access to hearing aids to consumers with a low entry barrier and mild to moderate high hearing loss.

Based on persona segmentation, the early adopter target consumer for CA is 'First time Users'.

After a consumer persona is selected, the desk research focused on macro trends among consumers which can be valuable in designing the product and service. Some of the important macro trends and their relationships are presented below.

Hearing Difficulty Rate

The percentage of respondents in the 'new user' category who have suggested difficulty in hear-

ing has remained comparatively stable over the last 20 years. Hence consumer response has been different from other scientific research sources which suggests links between lifestyle change and growth in hearing loss (Dawes et al., 2014). Both sources provide a clear need for a service which is accessible to the selected consumer segment and a stable market.

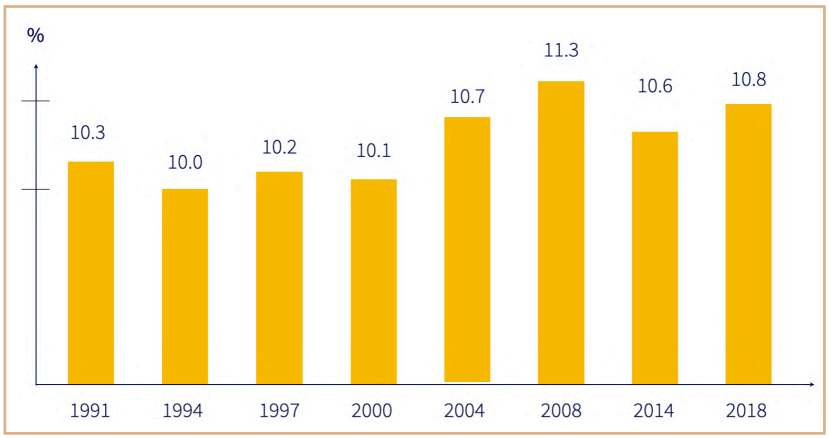


Fig 18. Hearing difficulty rates as a percentage of total number of respondents from 1991 to present interpreted from by Marketrak survey (Powers & Rogin, 2018)

Time delay to access Hearing Aids

Recent studies show there is a large time gap between first experiencing hearing loss to buying a hearing aid. An average time to get hearing aid is around 4.6 years in the US. Some other major milestones in the hearing aid journey is also plotted in the graph below. An efficient service with low entry barrier can lower the time to from knowing about hearing deficiency to acquiring a hearing aid significantly.

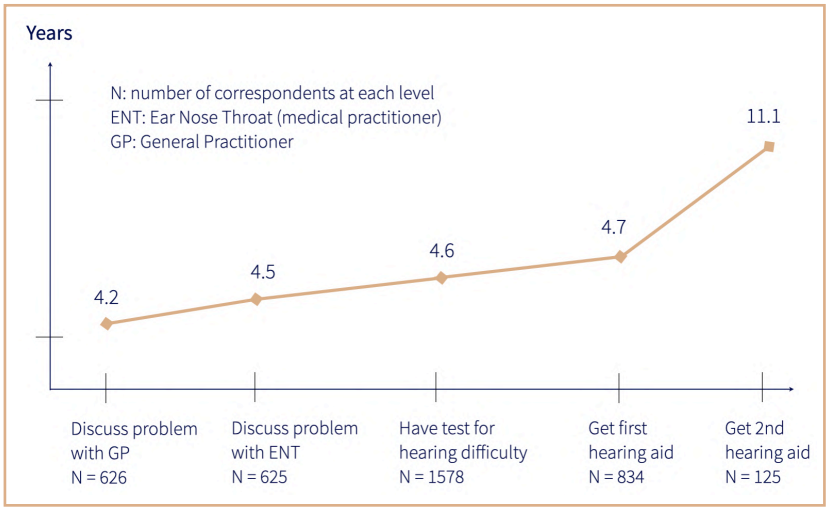


Fig 19. Average time taken by respondents to reach various milestones in their hearing loss journey. The first step to an ENT takes more than 4 years (Powers & Rogin, 2018).

Hearing Test

The graph below provides a comparison between different kind of testing methods and their prevalence within the survey respondents. A majority of hearing aid users go through formal or traditional testing approaches before buying an aid. One of the reasons is the shortcoming in technology which

are being addressed recently with advanced software test results comparable to hardware tests. A recent FDA proceeding to provide over the counter hearing aid to consumers can affect these metrics. One of the approaches in the final design can be finding the right technology partner who can provide medically certified hearing tests at the comfort of one's home. Mimi Technology, (Mimi Hearing Technologies | Mimi Defined | Personalize your sound, 2019) a startup from Berlin has been working on such technology for the last 5 years. A symbiotic partnership can create a disruption in the British Hearing Aid market.

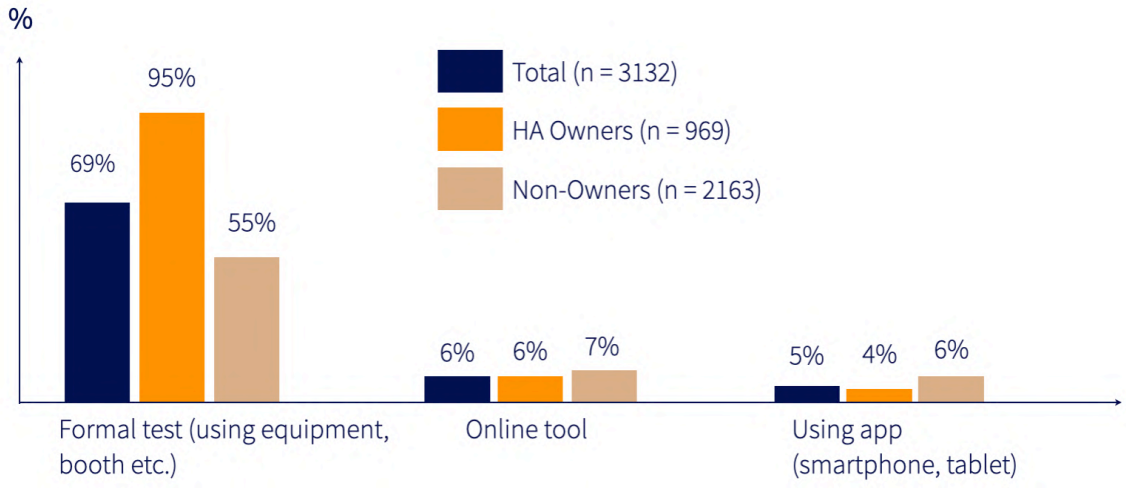


Fig 20. Hearing Test used by respondents of the research (Powers & Rogin, 2018)

Conclusion - Desk Research

The above discussed macro consumer trends for the first time hearing aid users have been particularly helpful in finding the right boundaries and developing the qualitative interview guide. They have also helped in understanding the user journey which are further explored in the qualitative interview with different stakeholders. Some of the major findings from the first phase of the consumer research is highlighted below:

- **Speech Recognition:** The CA hearing product should provide significant importance to speech recognition in different environments - this can be done with very good algorithm baked into the product and also with providing user controls through an application.
- **Online Marketing:** Strong internet presence with the right messaging appealing to the target demographic - this is particularly important because they visit the internet as a first point of research.
- **Online Hearing Test and Fitting:** Invest in good quality online hearing test and fitting technology - licensing model with tech partner can be used.
- **Entry Barrier:** Lower the barrier to access for non-consumers in the following ways - low wait times, digital support, off-site fitting, low up front cost.

Step 2 - Stakeholder Interviews

As discussed in the previous chapter, a good understanding of consumer macro trends is achieved and consumer segmentation has helped in narrowing down the early adopter user group.

Consumer Interviewee selection and Interview guide

The next logical step in consumer research is diving deeper into the early adopter user segment to understand their pains, wants and aspirations. This includes in depth interviews with consumers or potential consumers and other stakeholders in the value chain. For this project, I carefully selected the following:

- 6 consumers - moderate hearing loss, 3 of them already using hearing aids, 1 of them stopped used hearing aid and other 1 waiting for their hearing aids, and 1 does not yet use hearing aids.
- 1 sales person from Signia who could provide information about pain points and inefficiencies in the current value chain, relationship between different players in the market, current pricing strategies at different levels, profit margins etc.
- 2 audiologists, who provided a lot of valuable information on the patient journey, technical details, current product shortcomings, inefficiencies and relationships with patients.

The figure below provides an overview of the consumer interview guide in a infographic format, the detailed set of topics is available in the appendix of the report. The semi structured ~1 hour interview went wider from the hearing aid review to in context use to broad overall change in lifestyle. There was also a linear time component breaking the interview into pre and post use.

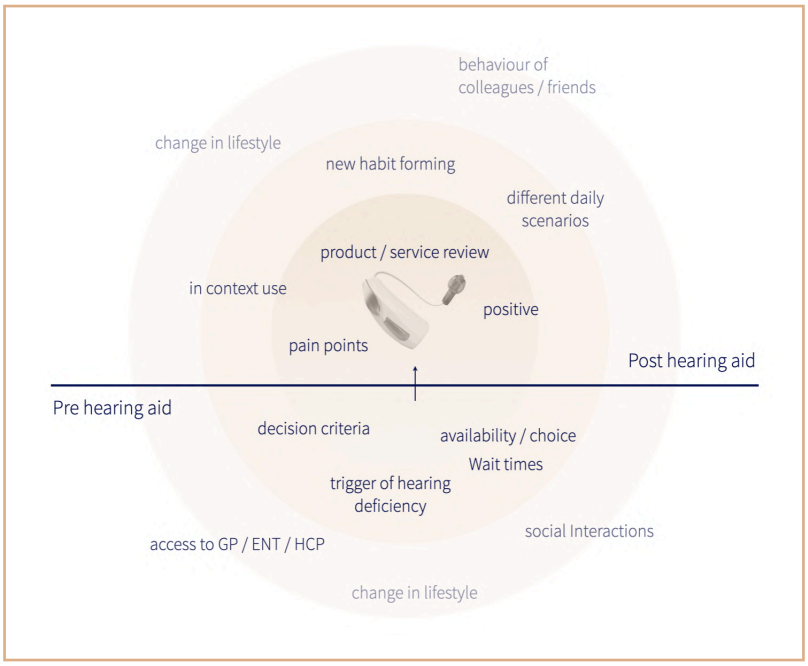


Fig 21. An visual representation of topics for qualitative semi structured interview. The interview started with the pre hearing aid and hearing loss journey inquiring about the pains and experience with loss as well as accessing the system. It then moves to the hearing aid: accessing and using the aid

Analysis of Consumer Interviews: Identified themes

The interviews were recorded and transcribed using an online tool (Otter Voice Meeting Notes, 2020) and then later manually checked with the voice note for irregularities. Thematic Analysis is a research method to synthesize broad qualitative data sets. An analysis of the transcripts led to a number of interesting recurring themes across interviews, some of which were further detailed and used to develop the questionnaire set for quantitative research. A transcript log of the interview has been attached in the appendix section of the report. However all details have been anonymized to protect identity of the users. The upcoming section describes in detail some of these themes and provides verbatim quotes to solidify their presence in the interview (Sandelowski, 1994).

Theme 1: Hearing experience in noisy environment

One of the most defining theme across interviews was the experience of a hearing loss patients with following conversation in noisy environment. There were a multitude of feelings and complaints as are depicted in the following infographic.

The overwhelming need for better performance in noisy environments is required based on consumer interviews. Most common aids have 3 modes for different environments to be selected by the consumer. Some of them responded that they did not use these modes and more often than not kept the hearing aid in the default setting. One of the reasons behind such user behavior is probably the low perceived benefit of changing settings or difficulty in accessing the options within a context (social gathering, restaurant, pub). Another reason pointed out by an user was consumer buy in. The hearing aids are set up by the audiologist and consumers do not get to adjust them as required.

Fig 22. Some power quotes from the interviewees for hearing aid performance deficiency in noisy environment

Theme 2: Experience with the hearing care provider

This is the broadest theme in the analysis and combines some independent elements in the user journey. The relationship of patients with their audiologist or the hearing care provider is mixed ranging from very good experience to very negative ones.

Fig 23. Some power quotes shedding light into their relationship of consumer with the hearing care system

The goal of this theme is to understand some common underlying shortcomings in the current industry and relate it to the previously found macro trends, a form of triangulation. The quotes clearly showcase different problems or pain points in the current user journey. Information access, wait time and happiness with the final product are some of the metrics where the system fails often. A detailed analysis of the market combined with the interviews show that private hearing care providers have considerably lower wait time compared to the NHS (UK). However they are often very expensive. Happiness quotient on the final product is partially dependent on consumer buy in, which can help the consumer feel more in control of the hearing care journey. This has been further illustrated in interviews with audiologists. Consumer buy in has also been explored in the first theme and repeats in the second theme.

The third shortcoming with the current situation and this particularly pertains to NHS in the UK is information access to patients. Multiple interviewees complained about being kept in the dark about their progress and access to hearing aid. They had to call after months of no response and they did not have much choice of hearing aids and the audiologist's recommendations were the only way forward. However a majority of the interviewees suggested that audiologists were important members in their hearing care journey. This topic has been reexamined in the quantitative research in order to understand the value added by audiologists and their contribution in the consumer journey.

Theme 3: Hearing Aid as Consumer electronics

One of the defining trends of the hearing aid industry is repositioning of hearing aids as consumer electronics instead of medical devices, however it is still not reflecting in majority of hearing aids Recent shift in technology supplement features like BlueTooth connectivity, rechargeable batteries, AI augmented sound processing, health parameter monitoring as well as changing modern designs which question the traditional products in the market.

An ubiquitous presence of hearables like air pods have started lowering the stigma around wearing hearing aids in public and major players in the market are starting to update their product lines to cater to this change. This theme highly featured in the discussion with the consumers with a common thread being:

> **NHS products are often BTE without modern features and look dated for 2020, sleek hearing aids with connectivity and other features are only available privately at a high price point.**

The infographic below provides some verbatim quotes from the interviews which showcase the importance of repositioning hearing aids and a gap in the market at the right price point. They also showcase the need of including modern feature set in hearing aids and at the same time make them more accessible. Some hearing aids like the Styletto Connect by Signia provides a modern outlook to this product segment but at a very high price point.

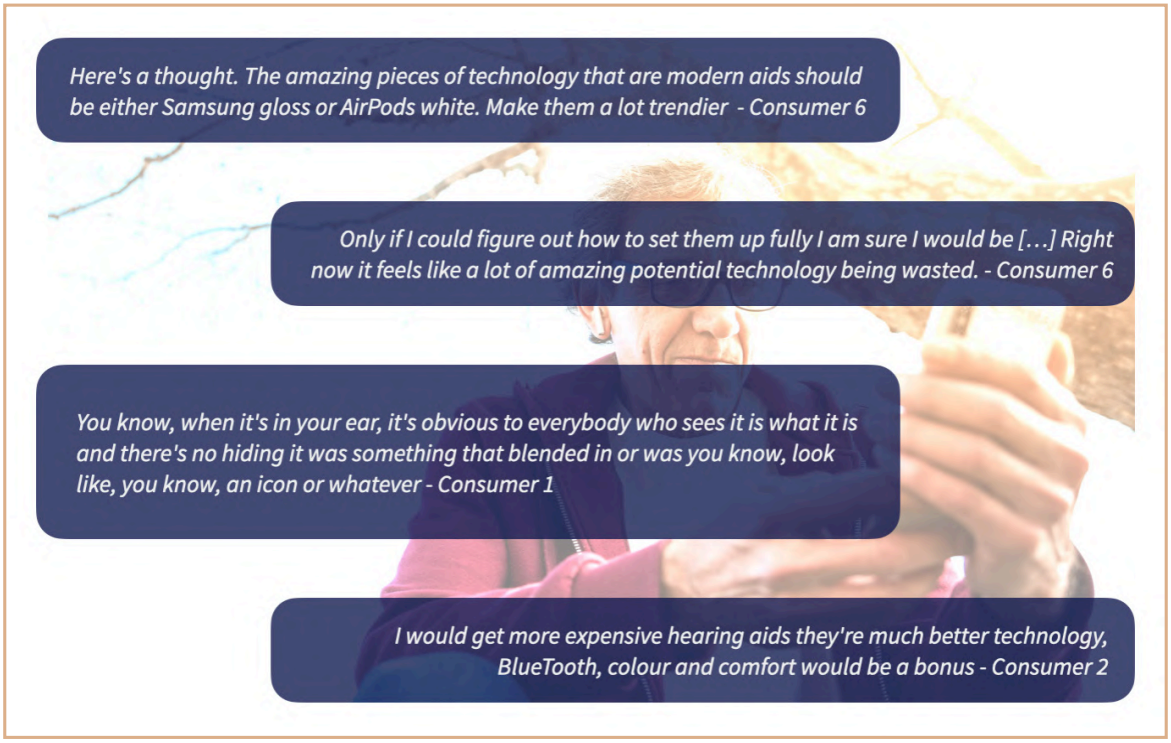


Fig 24. Some power quotes showcasing the need to reposition hearing aids as consumer electronics both in terms of user perception and features set + design

Conclusion: Consumer Interviews

The previous section provides three broad themes which were recurring in the discussion with the consumers. The first and second theme have a common thread of consumer empowerment which was reiterated in discussion with the audiologists. Reimagining the service between consumers and hearing care providers can address some of the pain points in the first two themes. The third theme was more related to product feature vs price point. There seems to be a market gap where modern hearing aids (new features and design) could be made more accessible at an affordable rate. Cambridge Audio has the right opportunity to disrupt the British market with a strategically positioned product and service which combines and addresses the pain points in the findings. The thematic analysis helped in narrowing down questions in the quantitative survey which was conducted after the interview. Before diving into the quantitative survey, presented are some key findings from conversations with experts and relates the findings to the thematic analysis of consumer interviews.

Stakeholder Interview: Sales Person @Signia (Sivantos)

In the current hearing care industry, a sales person is an important member who builds and maintains relationship between the hearing care providers and hearing aid manufacturers. For this project, I interviewed a sales person from Signia Germany covering the following topics: manufacturing costs, market volume, profit margins at different levels, sales channels, legal scenario, product features, value added by audiologists and future industry outlook. The following infographic provides key insights on major topics from the engagement.

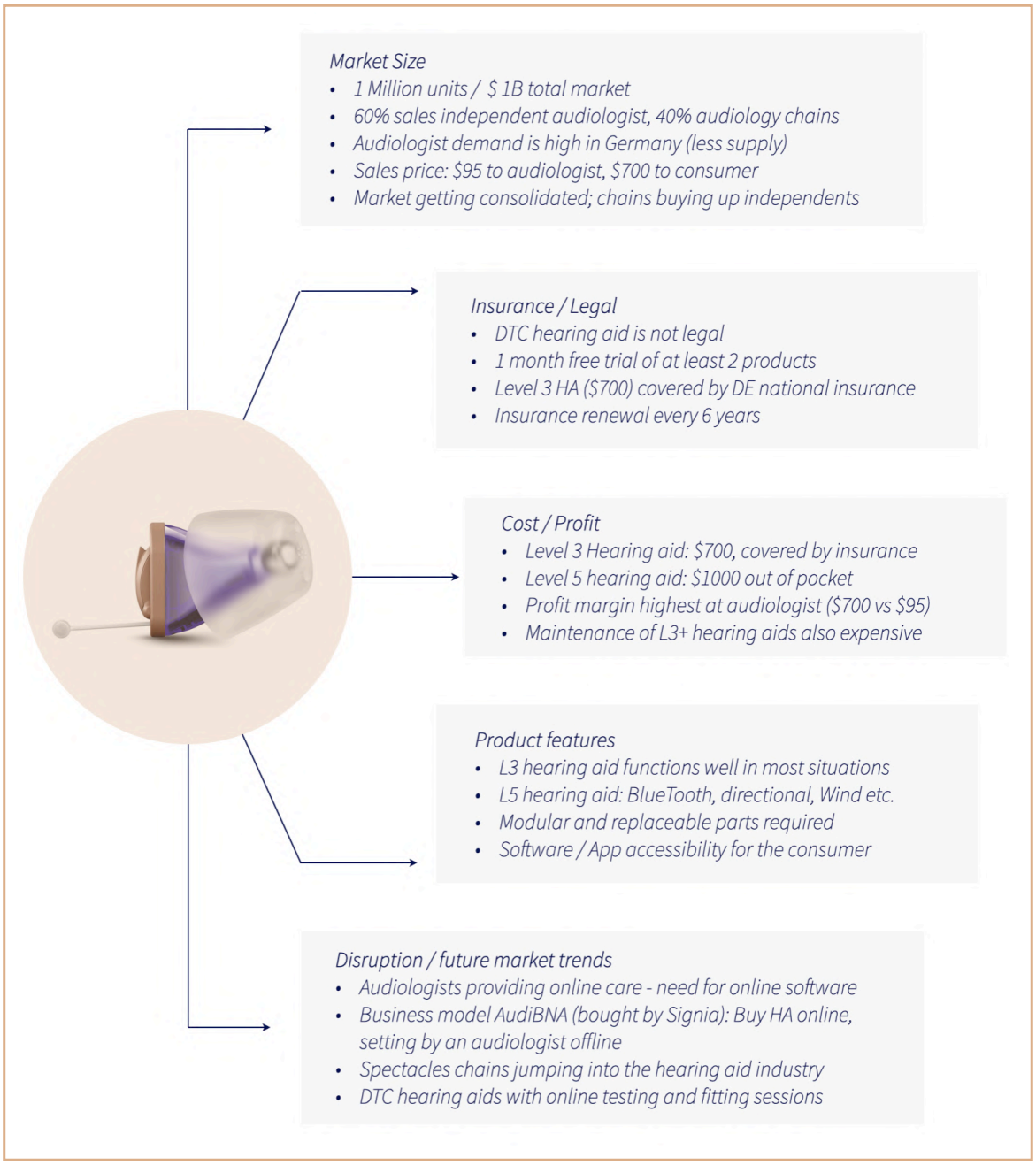


Fig 25. Key insights derived from the interview with sales person of Signia

Stakeholder Interview: Private Audiologists

Audiologists or hearing care professionals are the most important members in the current hearing care industry. To get a better understanding of the patient journey, I interviewed 2 private audiologists from London about patient journey, product recommendations, client buy in, over the counter hearing aids and future of hearing care industry. Some verbatim excerpts from the conversation provides insights and solidifies previous assumptions.

"The current technology is very capable and I recommend hearing aids from all the major companies [...] it is not about the manufacturer, but how the hearing aid is set up..." - Audiologist 1

"...People will call up and say, "Hey, do you do lyric?". The need for a discreet HA is there, but it is necessary to have the right setting for the hearing aid..." - Audiologist 2

Though both audiologists provided emphasis on setting up the hearing aid correctly, one of them suggested that clients should actively participate in the process:

"I mean, it's kind of almost as if it's allowing them to touch buttons and move dials. But it's done in a controlled way, it's just giving them that feeling of being the one who's in control of making a decision as to how they want to hear..." - Audiologist 2

A shared decision making process where the audiologist can digitally support the client is one of the possible approaches in the future. This also emphasizes the need for a consumer friendly application which can help them set up their hearing aid. But on the flip side, the audiologists also suggested that technology should be in the background and it only works good if it needs minimum interaction / input from the patient. This is possible through AI and advanced speech separation from noise. Some of these findings are crucial in redesigning the service for Cambridge Audio. A full transcripts of the interviews are attached in the appendix section of the report.

Conclusion - Qualitative Research using stakeholder interviews

The major findings from the desk research included an emphasis on speech recognition, lowering the accessibility barrier through internet access / other means and digital audiologist provisioning and licensing technology for hearing tests and HA fitting based on the hearing test. The interviews also provides some additional themes which enable us to reform the problem statement further:

- **Consumer Empowerment:** Providing more access to consumers in terms of product controls (as was validated by the audiologists) and helping them make decisions along the way. On a product level, more consumer controls coupled with AI could provide a better overall hearing experience.
- **Information Access:** A common pain point of users in their hearing aid journey was inability to understand audiology reports and also track their progress while getting hearing aids from the NHS. An easy and effective service with accessible audiograms explanations can help in this regard.
- **Personalized Solution:** Audiologists strongly suggested that a personalized solution is paramount towards client satisfaction and our service should implement that by incorporating consumer lifestyles (survey about their daily life, maintain experience diary in the initial phases etc).
- **Value of an HCP:** The HCP brings trust and expertise to consumer journey and we have not yet reached a point where audiologists can be removed from the value chain of a successful hearing aid business.

Step 3 - Quantitative Survey

The findings from the desk research and consumer research have helped identify the right boundaries which are crucial in shaping the problem statement. In order to verify the findings, one of the approaches is to conduct an online survey with the target consumers.

User recruitment and Survey topics

32 participants were recruited through relevant groups in Facebook and asked them to fill out an online survey with themes identified during the desk research and interviews. The following groups were used to recruit participants: UK Hearing Loss Community & Hearing Loss Worldwide. 20% of the participants chosen were non users and the goal of the outcome was to understand the reason for them not to use hearing aids. Some of the most interesting findings are presented in the coming sections. The online survey and an excel workbook containing all the responses is available in the appendix section of the report.

First point of contact and Wait times

The first step towards hearing loss journey is still dominated by medical care professionals. The first pie chart below showcases that more than 3 quarters of respondent either chose to go for a GP or audiologist checkup. Such an overwhelming finding should drive our future service to incorporate audiologists into their value chain instead of removing them.

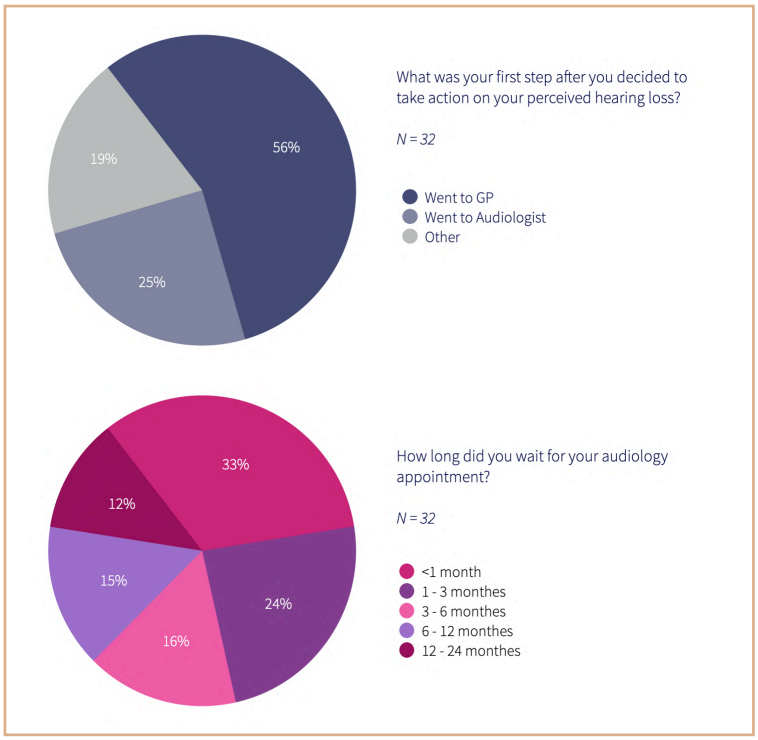


Fig 26. (Top) First step of the patient in their hearing loss journey where a overwhelming majority go to the GP before doing taking any other step.

(Bottom) Wait times for their first appointment with a hearing care professional with more than 40% waiting 3+ months for their appointment.

This brings us to the second question: wait times. More than 40% of respondents had to wait for more than 3 months to see an audiologist, of whom ~12% had to wait more than a year. The main reasons for this delay are patient to audiologist ratio and conventional chamber based appointments. A third follow up question about happiness about wait times suggested that more than 40% of respondents were unhappy and wanted a more prompt and responsive service.

Consumer Empowerment

Another repeating theme in the consumer interviews was shared decision making and consumer empowerment in their hearing care journey. A number of questions in the quantitative survey probed on this topic. As is evident from the chart above, the more than 50% in the consumers were unsatisfied with the information provided by their hearing care providers and more than 30% were very unhappy about the amount of information provided.

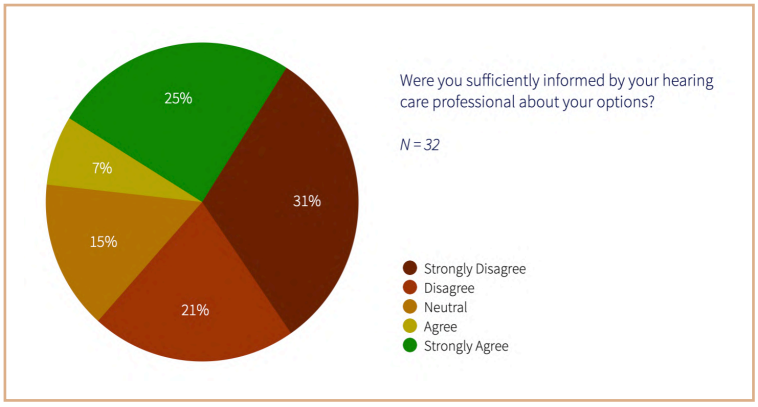


Fig 27. Hearing Care: Ease of information access and shared decision making for consumers (%). An alarming rate of 50% + consumers felt they were not sufficiently informed about their options and their pros and cons

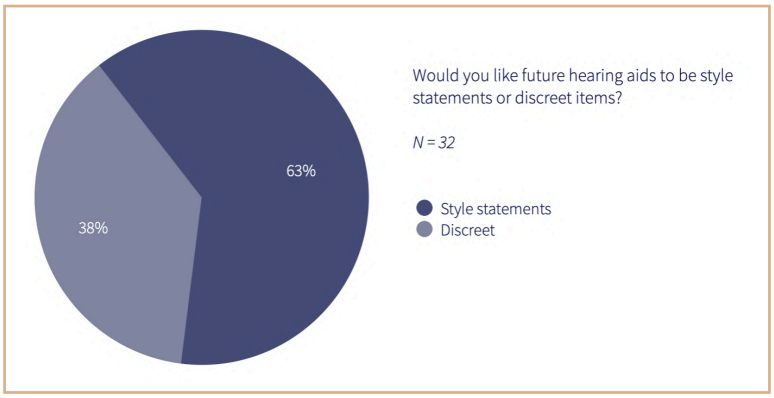


Fig 28. Consumer sentiment about hearing aid styles in the future (%). Though a majority of consumers wanted it to be a style statement, it may not be the actual sentiment as explained in the description below.

The stigma around hearing aid is changing over time and they are being re-branded as consumer electronics or even fashion accessories. The graph above reflects such a consumer sentiment with more than 60% opting for style.

Conclusion: Quantitative Survey

The online survey provides a quantitative measure of the themes identified during consumer interviews. One of the interesting findings from the survey was consumers point of view towards the future of hearing aids. More than 60% of them wanted a stylish trendier hearing aids, but interviewed audiologists suggested that their patients generally wanted a discreet solution over a style statement hearing aid. The point of view of the audiologists match with the findings of another question probing about the same topic: more than 68% of the consumers thought that designs like air-pods were 'too different' and not suited for hearing aid style.

Another common problems sometimes mentioned in literature is difficulty in replacing batteries, but the survey clearly suggests that there was very less friction by the target segment to replace batteries, but at the same time, an overwhelming majority would like to have a rechargeable option. The survey helped in quantitatively identifying the most common problems faced by consumers with their hearing aids:

1. Phone calls and listening to the speaker on the other end
2. Speech recognition in crowded environments like party, gathering etc.
3. Listening to music with headphones / earphones when wearing the aid
4. Ear wax accumulating in the hearing aid tube
5. Hearing change over time, but the calibration remains the same

While asked about paying for their own hearing aids, more than 23% buyers suggested that they would consider buying a hearing aid not covered by the NHS or insurance, where as only 30% strongly denied shifting to a private hearing aid. The remaining population suggested they would move to private options if the service catered to their need better than NHS aids

RESEARCH CONCLUSION

The consumer research section has provided a clear understanding of the target segment and helped identify their pains and gains. The desk research paved the way for probing the right topics which led to a number of interesting themes during the consumer interviews. Including stakeholders in the interview process has enriched the data and helped verify the identified themes. A short survey with the right target segment provided some more quantitative details on the conclusions of the qualitative research. The survey also helped verify some of the claims made by audiologists in the stakeholder interview section.

A thorough understanding of consumer culminates the research section thereby converging the initial problem statement to a redefined design challenge for an identified early adopter target demographic. The second chapter of the double diamond process explains the redefined problem statement and the target consumer. It also sheds light into the user journey of the target demographic and the pain points in the journey. The ‘define’ phase paves a way for the 3rd chapter of this booklet: develop necessary artefact’s for a successful product launch.

Part 2: Define

A thorough research of the context helps understanding the length and breadth of the problem. It helps in market and consumer segmentations and choosing the target segment. An in depth study of target consumers help in identifying problem boundaries and reframing the problem statement which can effectively represent the chosen market. Also called ‘creating the design brief’, this is the second phase of the double diamond process. This chapter discusses the reframed design statement through the following sections:

1. Selected consumer Persona
2. Reframed problem statement fitting target persona

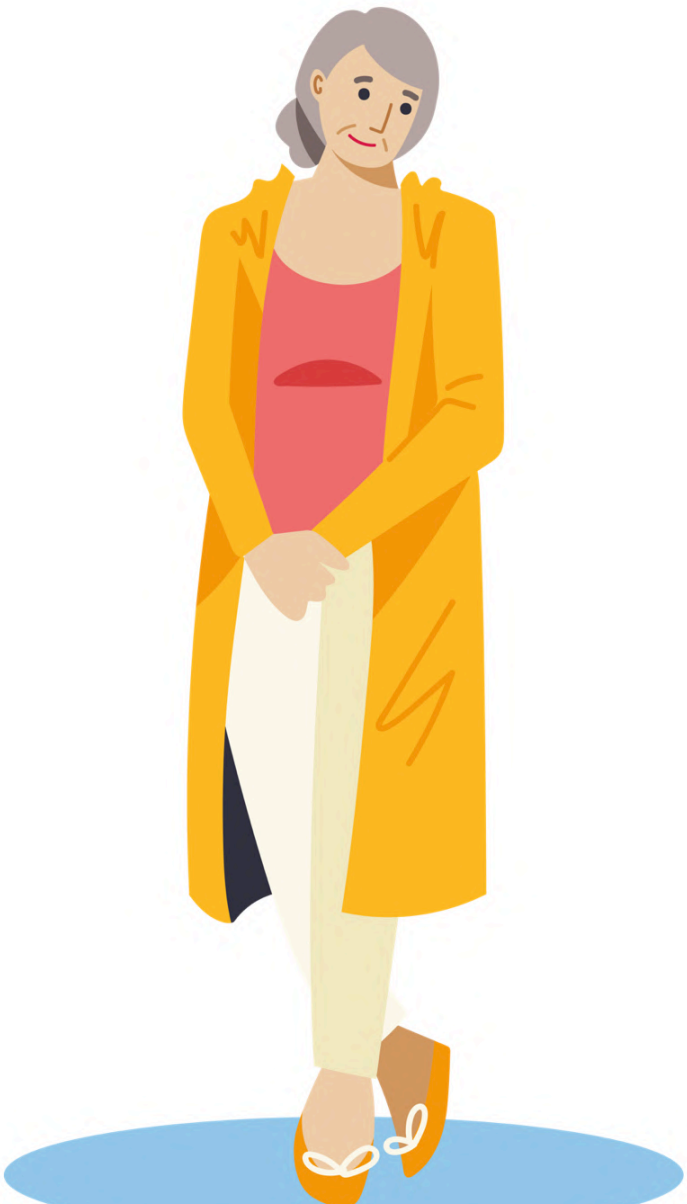
Credits: 投資先スタートアップ・株式会社Olive Unionより スマホ１つで個別最適が可能な「Olive Smart Ear」が日本初上陸, 2018

CONSUMER PERSONA

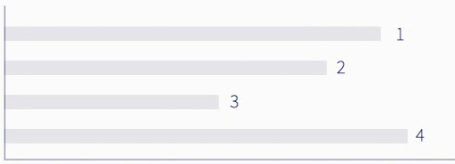
Consumer Persona: Defining Characteristics

They are in the age group of 40 to 60 years old and have an active professional and social life. They frequer family, go to restaurants, cinema and participate in other social activities. They are coming to terms with th the lookout for their next course of action. Some of their defining characteristics are as follows:

1. Full time working professional, busy
2. Middle Income; cannot afford private aids.
3. Online social, care about their online image
4. Use the internet to find solutions
5. Mild to moderate hearing loss / partially in de
6. Comfortable with modern technology



Top Expectations



1. **Participation**: Able to actively take part in social scenarios
2. **Integration**: Very less effort is required to get used to the H
3. **Stigma**: Hearing Aid is discreet and petite (30%)
4. **Hearing**: Get back natural hearing (55%)

Role of the Internet

More than 75% of respondents looked for inform professional. Some of the specific kinds of inform

1. General information about hearing, symptor
2. Self diagnostic tool to check for hearing loss
3. Overview of possibilities and solutions for th
4. Possibility to interact with a professional and

Accessing Hearing Care: Motivations

As in other industries, free services were the mai one of the major requirements for the UK where The free services include hearing test, first 30 da

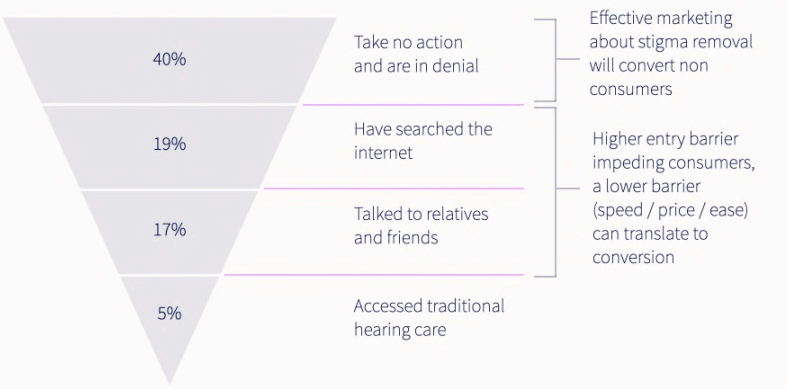
ntly go to get together with friends and
ne onset of hearing loss and currently on

enial

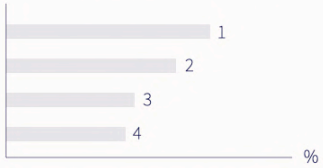
Major pain points with their hearing loss

1. 60% find it difficult to follow conversations in crowd
2. Almost half had to concentrate to hear someone
3. 30% have difficulties with the television / music
4. More than two thirds ask people to repeat
5. 30% face problems while responding to phone calls
6. One fifth respond incorrectly due to misunderstanding

Subsequent behaviour after discovering hearing loss



Reason for detractions

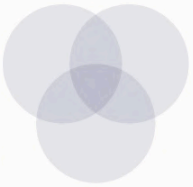


1. **Ignorance**: My hearing difficulty do not bother me so much (48%)
2. **Cost**: Hearing devices are way to expensive for me to afford (40%)
3. **Stigma**: I do not like the idea of wearing hearing aids (25%)
4. **Priority**: I have other things to worry about more (24%)

— %
(44%)
IA (34%)

Need Pillars

The needs of the target segment can be categorised into three major pillars: *Trust* (in the service and HCP), *Stigma* (hearing aid design, perception of ageing) and *Effort* (time, cost and change)



nation online before approaching a hearing care
mation they wanted to have more clarity on were:

ns, issues with age related hearing etc.
and understand their audiogram.
eir specific situation.
d get guidance.

n motivators in accessing hearing care and this is
consumers can access free hearing aids via NHS.
ys of trial period for the hearing aids.

Power Quotes

"I generally wear a hearing aid (NHS) and wondered why companies like yourselves i.e. 'specialists in sound' haven't gone into this market (making a necessity a bit more trendy, while giving a clearer quality of sound)"

"Only if I could figure out how to set them up fully I, am sure I would be. Right now it feels like a lot of amazing potential technology being wasted"

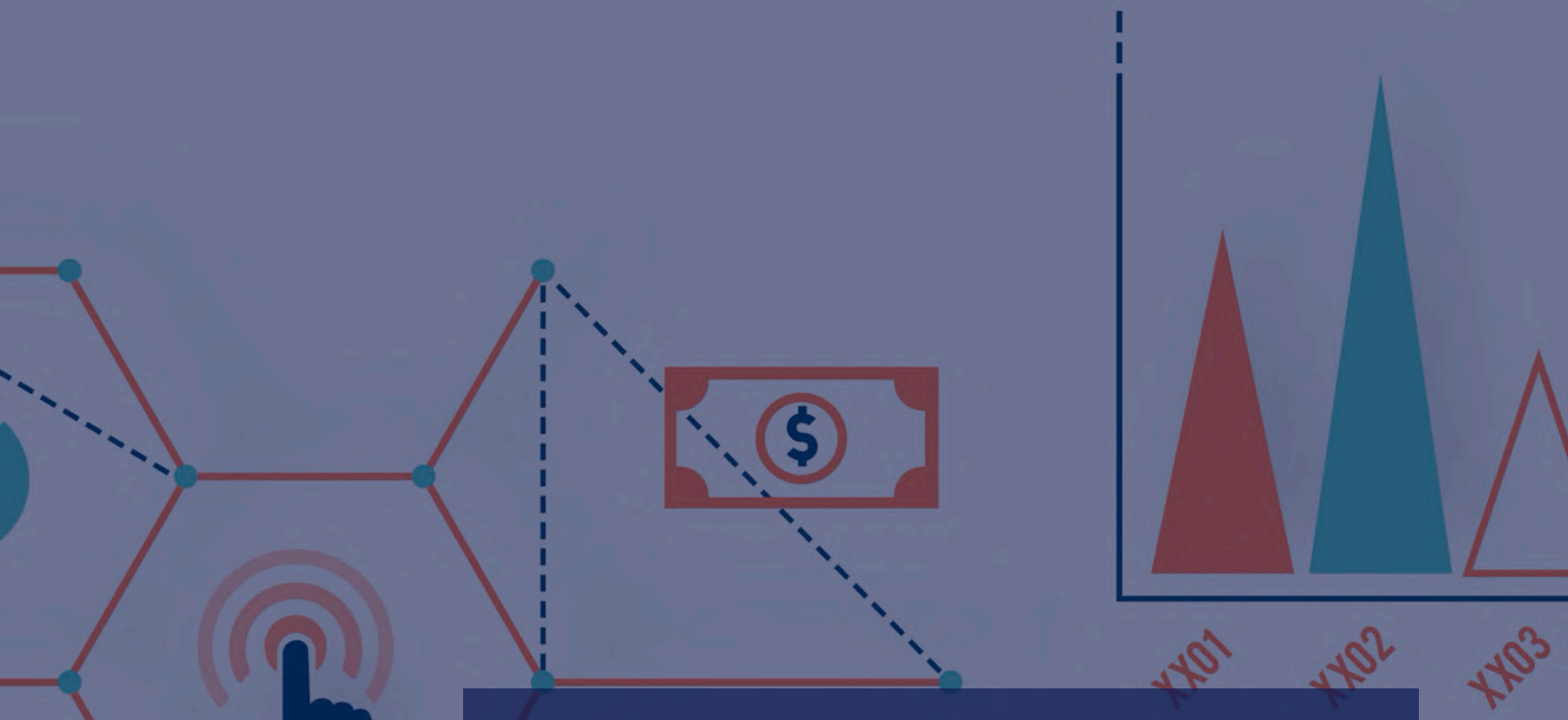
REFRAMED DESIGN STATEMENT

When the project was commissioned, the scope was undefined and Cambridge Audio is conducting preliminary investigation of this market. The nascent stage of the project gave me ample opportunity and independence to define and scope it down in order to deliver within the allocated time frame The initial scope was too vague and broad:

> How can Cambridge Audio enter and disrupt the British hearing aid market?

The research phase helped in identifying the correct consumer segment and their pain points to reiterate the initial design brief to a concrete design problem which is used for the next phase:

> Develop an easily accessible hearing care solution for the modern, technology oriented and price conscious netizens experiencing mild to moderately high hearing loss, which guarantees high consumer satisfaction at an affordable price and gives consumers the joy of enjoying their life to the full again.



Part 3: Develop

The design (of solutions) process begins at the second diamond of the Double Diamond. This phase encompasses all the necessary elements required to market and launch a new product. It starts with the strategic roadmap of the business followed by immediate product and service design. The designs is supported by the business model and marketing approach to reach the intended audience. An amalgamation of these elements can create a successful product launch in the market. Following are the broad topics discussed in this chapter:

1. Tactical 3 horizon roadmap
2. First product detailing - HoQ and high level sketches
3. High level service design
4. Business Plan
5. Strategic Partners
6. Pricing Strategy, revenue and profit projections
7. Brand DNA
8. Launch Strategy
9. Consumer validation - Brand, Pricing and Service
10. Example marketing materials
11. Marketing Budget

PRODUCT & SERVICE ROADMAP

For a business to maintain sustained competitive advantage over other players in the market, it has to look beyond the immediate product or service it is offering to its consumers and identify future opportunities in adjacent markets and consumer segments.

The tactical roadmap generally consists of 3 horizons with an immediate horizon, all the way up to 'moonshot', which is the 3rd horizon at least 10 years ahead. It generally consists of a brief description of the product and service which a company aspires to provide in the near and far future. Supporting the future scenarios, are technology trends which are going to be integrated into the different horizons. The accompanying partners and stakeholders are included to provide a sense of the interconnectedness in the far future.

An important aspect while developing the tactical roadmap is pointing out the source of competitive advantage of the company in each horizon, which helps focus on the in house development of specific capabilities.

While developing the tactical roadmap for the hearing aid business of Cambridge Audio, it is paramount to keep an eye out for changing social and demographic trends like shift in hearing deficiency, association of hearing aids in the society, aging population; and also technology trends like growth of processing power to energy consumption ratio, miniaturization of electronics, connected environment through IoT etc. The sections below provide a brief overview of the three horizons followed up by an infographic visualizing the horizons.

Horizon 1: Industry leading hearing care service at an affordable price point

The value proposition of this horizon is a high end yet affordable hearing care service with a low entry barrier for the working, technology oriented middle income persona with low to moderate hearing loss. It combines the best of NHS (low price point), private audiologists (high end product features) and hearables (modern, stylish hearing aids with very low entry barrier). It provides 'premium features' like call routing and audio via BlueTooth, advanced speech recognition and noise suppression algorithm, rechargeable battery with a case and all day battery life, a nascent AI which learns from users behavior and calibrates with the environment.

The high end product is supported by an auto testing and fitting application over the internet. If the user wants more support, there are bundled services like online audiologist appointment, calibration of the product and service etc. The main competitive advantage comes from price to quality ratio, low entry barrier and strong brand.

Horizon 2: Combined hearing technology from health monitoring

This horizon (2025) focuses more on recent technology developments which enable new use cases. The product size goes down and power to connectivity drops significantly. The product has longer battery due to energy harvesting. AI has significantly developed for environment based real time calibration with the help of smartphone computing. The hearing aid now sits inside the ear canal for very long periods of time and collects data. Cambridge Audio designs the product in house (ODM → OEM) and licenses technology from providers to incorporate into their product.

The main competitive advantage comes from price to quality ratio of the hearing aid and integration with IoT products from other vendors. CA is making inroads into the data driven healthcare sector.

Horizon 3: Enhanced hearing & health monitoring: extension of human body

This is the moonshot horizon in 2030. Affective computing and AI has become ubiquitous and bio material development has led to under the skin sensors which can get absorbed into the human body over time. Cambridge Audio provides highly customized 'enhanced hearing sensors' through fitting centers who operate under the CA banner. CA is an established name in the data driven healthcare market acting as a connector between the IoT product brands, healthcare professionals, insurance providers and care home industry. CA has transitioned into healthcare successfully.

The infographic below is a high level visual representation of how CA will transition through each phase to eventually reach Horizon 3. It also provides a glimpse of the most important technology trends in the coming years. The image should be viewed as an inspiration for future roadmaps and choosing to develop certain capabilities which can provide long term competitive advantage.

Horizon 1 : 2020

Horizon

SHORT DESCRIPTION

Industry leading hearing care service at an affordable price point

The hearing care service for 2020 will enable remote accessibility via tele-audiologists. The hearing aids will feature BLE connectivity with all smart devices (iOS, Android, smart TV etc.) , automatic + supported fitting, mobile calibration app, direct call routing, excellent speech augmentation, rechargeable battery case, AI capability to learn user behaviour.

Combined hearing technology with hea

The second horizon brings a smart liste where in the miniature device can be wo movement, actively screening ambient device (smartphone), connected to IoT necessary feedback as required.

DEFINING FEATURES OF THE SERVICE

TRENDS & TECHNOLOGY INTEGRATION

Connectivity of hearing aid to some smart devices	Common presence IoT devices and connectivity with hearing aid
Track health parameters	Development of affective compu
Growing use of Artificial Intelligence in hearing aids	AI focus on personalisation, no need of calibration app, screens a
Cases with inductive charging and energy harvesting	Energy harvesting in smart wearables, piezo harvesting coupled with low
	Growth of bio materials for casing and elect
Tracking health parameters through hearing aids	Continuous tracking and real time support with health

PARTNERS

Hearing Aid ODM

Technology Provider

Audiologists

Online Retailers

Hearing Aid ODM

Tech

Audiologists

Online Retail

2 : 2025

Horizon 3 : 2030

lth monitoring

ening and health monitoring service, orn over many months powered by noise with support from the secondary devices in the house / office to provide

Enhanced hearing and health monitoring as an extension of the human body

The third horizon brings hearing service as an extension to the human. They are bio material manufactured and inserted deep inside the ear canal for long periods after which they get bio degraded and absorbed. They act as natural organs while providing real time health and brain wave monitoring, ultra personalised natural audio signatures.

ds to provide necessary information

Hearing Aid as IoT device with real time monitoring and action

uting using health parameters from HA

Preventive healthcare through affective computing of health parameters from HA in smartphone

nd learns user environment sounds with omni mics

Ultra personalised AI minimising the need of an audiologist

power electronics = very long battery life and wearing period

Unlimited battery life / no recharging required

ronics = long uninterrupted use of hearing device as an extension of the human

Skin-Conformal and Biodegradable hearing aids

care provider

Electronics miniaturisation, low power requirement, longer life of sensors

nology Provider

Health care provider

Technology Provider

ers

Health care provider

Audiologists

Hearing Aid OEM

Insurance Provider

Fig 29. VISION 2030 - Tactical Roadmap of products and services surrounding hearing and healthcare

DETAILING HORIZON 1

CA is slated to enter into Horizon 1 with the first product in the mid of 2021. The product launch should coincide with a major buying season and the marketing campaign placing the service strategically between consumer electronics and hearing care devices. In order to fast track the process of product design and development, as well as have a low sunk cost, a decision is made to partner up with Original Design Manufacturer (ODM)s and co-develop the product.

Ideation product sketches

The ODM requires preliminary ideation sketches and feature sets to get a good understanding of the requirements and deliver accordingly. Hence the detailed design is out of the scope of this report. Presented below are some high level concept sketches explaining some of the important features and requirements. There are several designs varying the shape and material of the product, some of them inspired by available products in the market. Currently available Cambridge Audio products (Melomania 1) also serve as inspiration in ITE hearing aid design. The final outcome of releasing a RIC or ITE design or both is still under consideration. A set of microphones are explicitly presented in order to draw attention and ensure high performance in noisy environments. These sketches are intended for the ODM to get a clear idea of our need and design accordingly.

House of Quality - prioritizing feature set

One of the approaches to convert consumer requirements to measurable values is House of Quality (HoQ). Qualitative interview insights and quantitative questionnaire has helped in figuring out the consumer needs and their relative importance.

The left hand column lists out the main requirements of the consumer and top row contains the technical feature set of the hearing aid. We can see the relationship between the consumer requirements and technical capabilities. The score in the lowest row ranks the technical features based on importance and this can be used as a blue print for prioritizing product features during design.

Service Design

The service blueprint shows the flow of consumer types and how they access and go through the proposed CA service. The service design can be used to create the online service and test it with beta consumers. The service blueprint also help the ODM in envisioning the right product which will fit the CA service and brand. A validation of the service through a website mock up with potential target segment has suggested certain changes in the service design. Those improvements are noted in the relevant portion of the report.

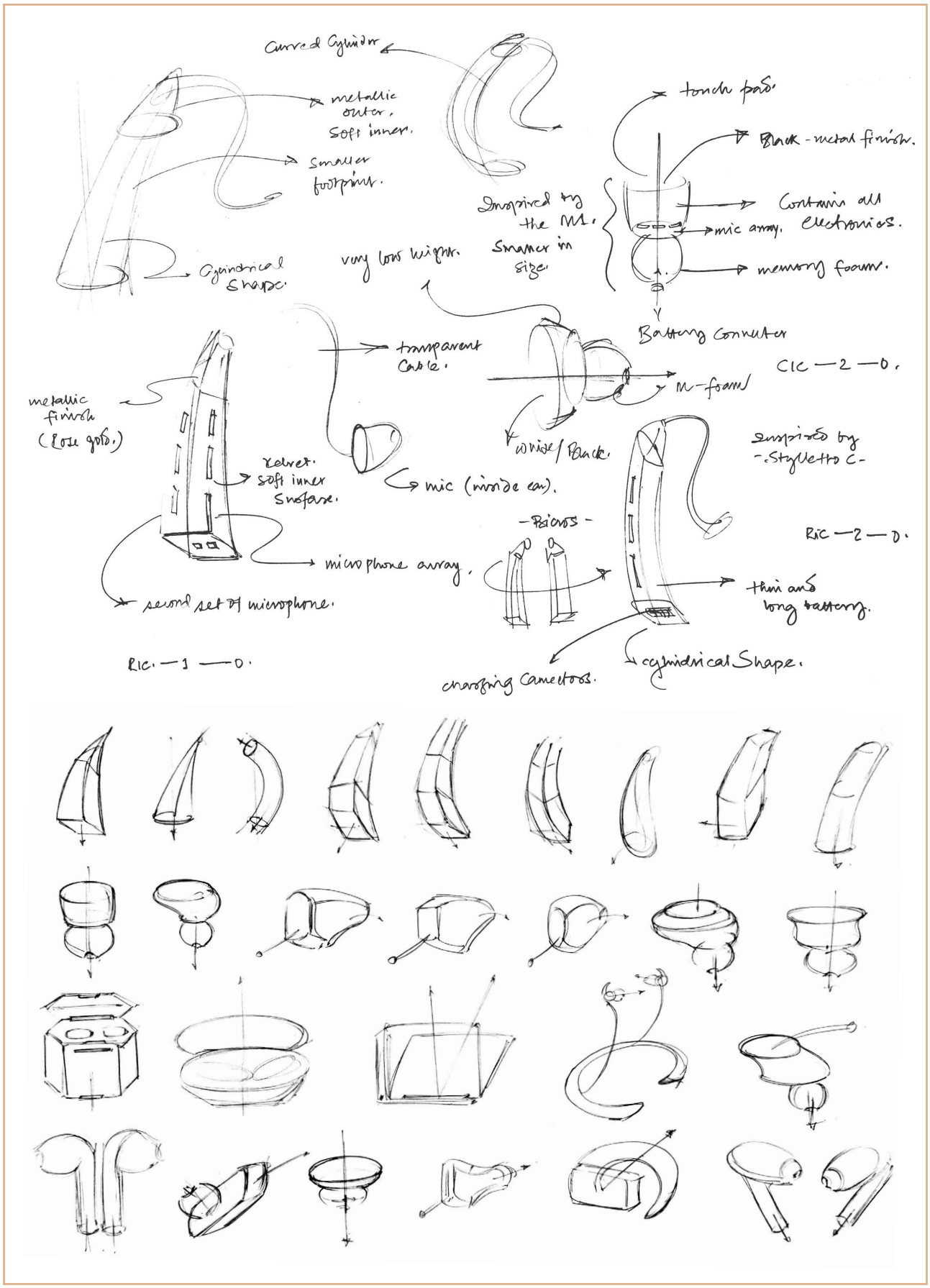


Fig 30. Ideation sketches of hearing aid features and shapes for RIC and CIC products

Relative Weight (importance rating / total)	Customer Importance Rating (1 = Low to 7 = High)		▲ Noise reduction / suppresion algorithm	▲ Directional microphone (multi, omni, front, back)	Rechargeable large Li Ion 18 hour battery life	Bluetooth 5 wireless with iPhone / android / other device / 2nd HA	Save multiple (user defined) scenario settings
		● Strong 9 ○ Medium 3 ▽ Weak 1					
8%	7	Ease of hearing in noisy places like gatherings, restaurants	●	●	▽	○	●
8%	7	Functions with a single charge for the whole day	▽	▽	●	▽	▽
7%	6	Wind noise reduction	●	○	▽	○	●
7%	6	Seamless phone call experience	○	○	▽	●	○
5%	5	Listening to music direct streaming	○	○	●	●	○
4%	4	Easy access to the physical and digital settings of the HA	▽	▽	▽	●	○
8%	7	Good fit without uneasiness while wearing for long	○	▽	▽	▽	▽
8%	7	Robust and does low self maintenance	▽	▽	●	▽	▽
7%	6	No delay in sound transmission	○	○	▽	●	▽
5%	5	easy to replace parts	▽	▽	▽	▽	▽
4%	4	Empowerment - understand reports and set up own HA	▽	▽	▽	●	●
8%	7	Inexpensive	▽	●	▽	○	▽
8%	7	Volume gain to hear clearly	●	●	▽	○	●
5%	5	Modern Looking with multiple color options	▽	○	●	▽	▽
5%	5	Discreet	▽	○	○	●	●
4%	4	Tinitus masking	○	▽	▽	▽	▽
		Importance Rating Sum (Importance x Relationship)	334.8	354.3	319.6	419.6	384.8
		Relative Weight	5%	5%	5%	6%	6%

Functional Requirements													
				▼	▲			▼		▼	▼	▲	▼
Wind Noise reduction algorithm baked in	Binaeural processing (Synchronisation)	Occlusion reduction (Own voice processing)	16+ channels / bands	App for setting adjustment, log, update online (user friendly)	Tinitus masking white noise generator	Feedback reduction (ear bud vent / feedback canceller)	Acclimitisation feature (slowly go closer to the prescription)	Battery indicator (sound / in app)	Wax catcher in receiver	Multiple size and types of ear buds for good fit	Modular parts (RIC, wax catcher, connection wire)	Adaptive / automatic adjustment based on environment (AI)	Small size and shape of the product
●	●	●	●	○	▽	●	●	○	○	●	▽	●	▽
▽	▽	▽	▽	▽	●	▽	▽	▽	▽	○	▽	▽	●
●	●	○	●	○	▽	▽	○	▽	○	●	▽	●	▽
○	●	●	●	○	▽	○	○	▽	○	○	▽	○	▽
▽	▽	▽	▽	○	▽	▽	○	○	○	●	▽	○	▽
▽	▽	▽	▽	●	▽	▽	▽	▽	▽	▽	○	▽	▽
○	○	○	○	○	○	○	○	▽	○	●	○	●	●
▽	▽	▽	▽	▽	▽	▽	▽	▽	●	●	●	▽	▽
▽	●	○	○	▽	▽	○	▽	▽	○	▽	▽	○	▽
▽	▽	▽	▽	▽	▽	▽	▽	▽	●	●	●	▽	▽
▽	▽	▽	▽	●	▽	▽	●	●	○	●	●	▽	▽
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●	●	○	●	○	○	●	○	▽	●	●	○	○	▽
▽	▽	▽	▽	●	▽	▽	▽	○	▽	●	●	▽	●
▽	○	▽	▽	●	▽	▽	○	●	▽	▽	▽	●	●
▽	▽	▽	▽	▽	●	○	▽	▽	▽	○	▽	●	▽
302.2	404.3	269.6	369.6	339.1	226.1	271.7	273.9	215.2	354.3	597.8	337.0	419.6	323.9
5%	6%	4%	6%	5%	3%	4%	4%	3%	5%	9%	5%	6%	5%

Fig 31. House of Quality Matrix showcasing the functional requirements with their importance rating

Consumer type and projected flow

No Action due to no knowledge → Broad advertising

Internet / friends → Directly find CA

Internet / friends → Unhappy PSAP consumers

NHS GP → Recommends Audiologist → Unhappy patient

Private audiologist → Free first consultation → Hearing test reports

Free first consultation → Buy hearing aid

Deliberate Ignorance → Targeted advertisement

Consumer trigger for moderate hearing loss
- *Turning up the TV volume compared to partner*
- *Asking friends to repeat themselves constantly*
- *Difficulty following conversations*
- *Becoming socially inactive over time*

Upload hearing reports

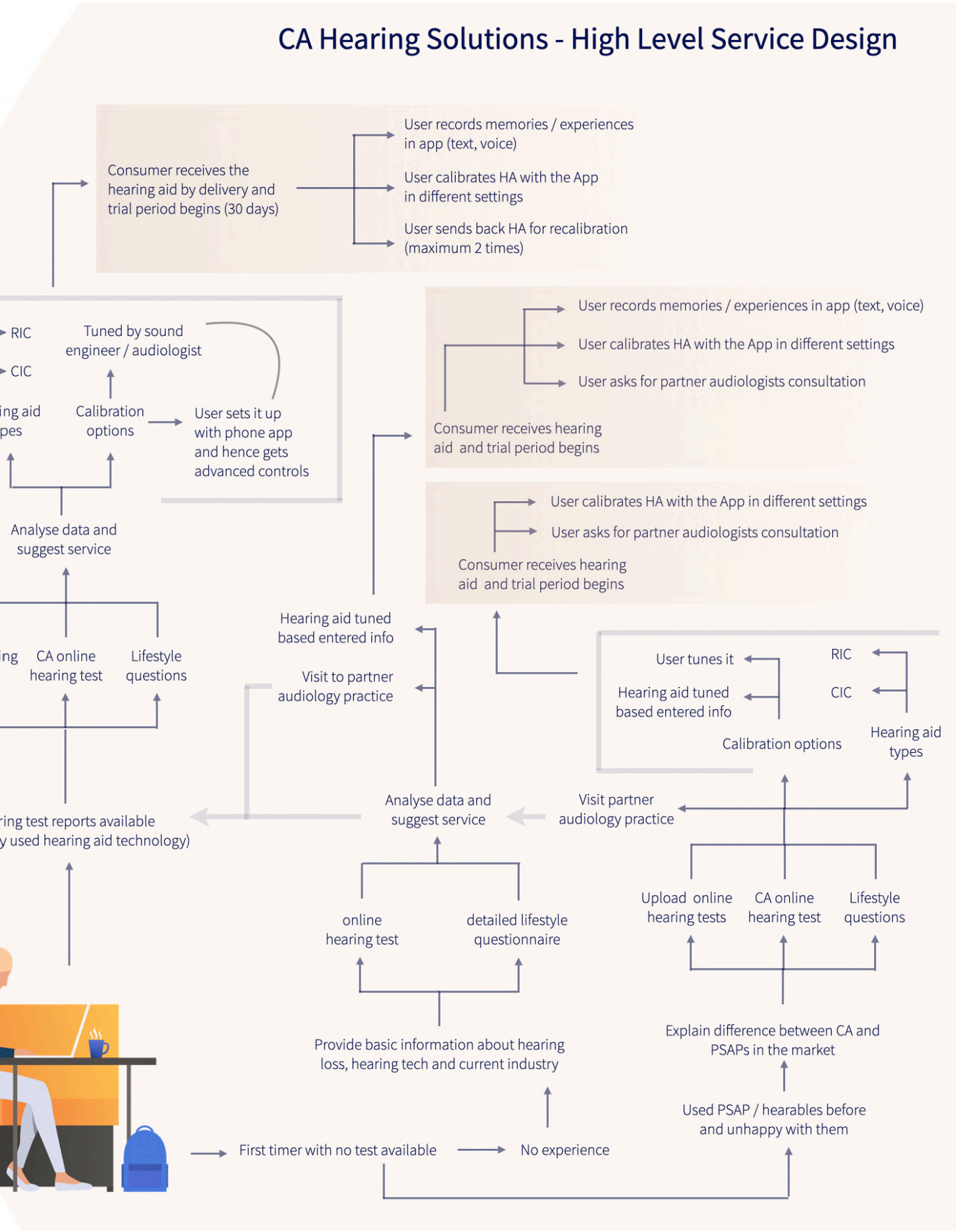


Fig 32. Service Design : Consumer flow on the left and the service design of the CA service on the right

BUSINESS PLAN

Once a long term vision is established, the next phase is to further develop the immediate horizon in the roadmap and a detailed plan to implement it. The first step as showcased in the previous section is to create a detailed design of the product - in our case, out sourced to the ODM partner with preliminary inputs. Once the product design and technology integration is out of the way, the next parallel activity is to develop a business plan and map out the different stakeholders in the value chain.

A popular model, Business Model Canvas (Osterwalder & Pigneur, 2010) is used to map out the key activities around arranging a new business. Before jumping into the business model canvas, discussed below are main stakeholders and the relationship between them. Infographic below identifies main players in the business model and the flow of information / capital / services among them.

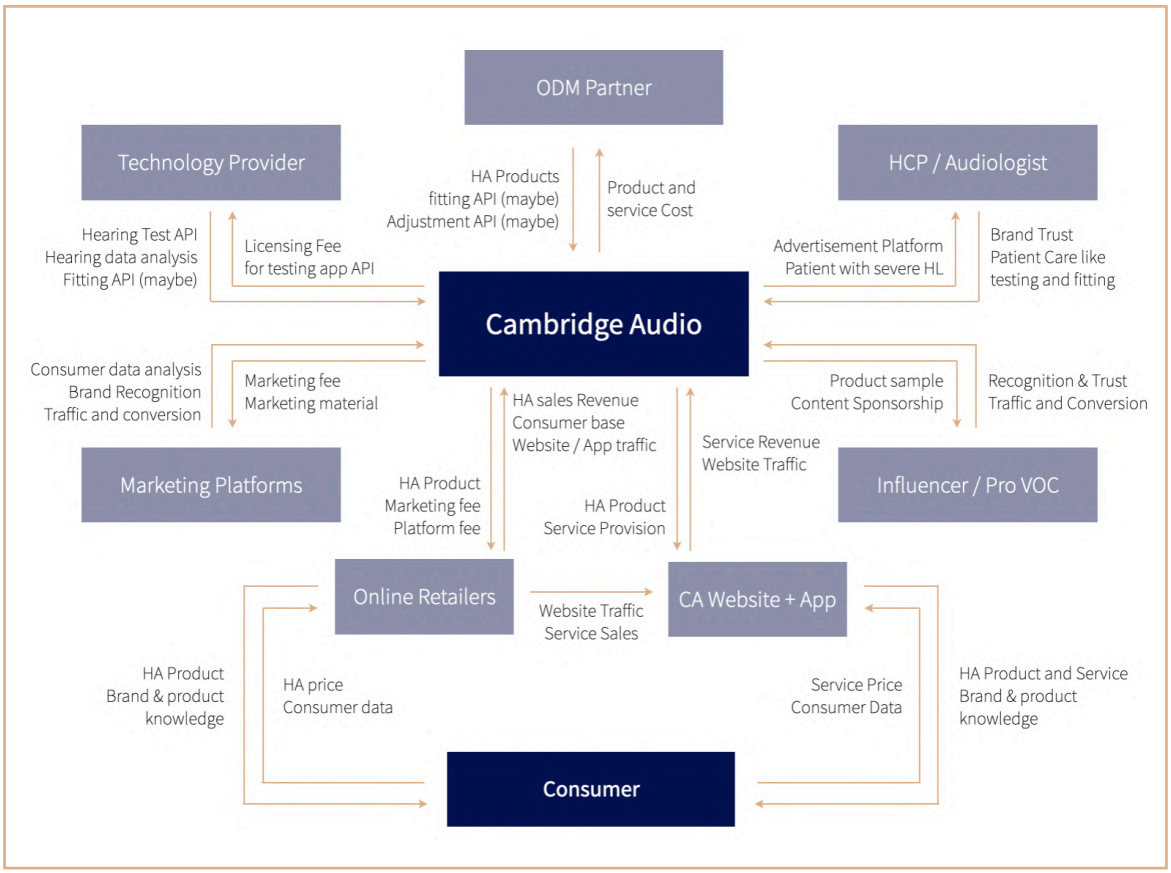


Fig 33. Partners and their relationship in the CA driven hearing aid business

Stakeholders and Partners

The key stakeholders in the product and service development phase are the ODM and the technology partner. ODM co-develops the product design with inputs from the in house CA team and contract manufactures it to scale. The technology partner provides two key enabling technologies to lower the involvement of the hearing care professional and also lower the entry barrier for the user:

1. 'Hearing loss testing technology' to effectively and accurately test hearing loss at the any silent location using available earphones / headphones
2. 'HA Fitting technology' to fit the hearing aid to the users need and ear parameters comparable to REM measurement fitting in a clinic.

Audiologist as a Key Partner

Another key partner is the audiologist who helps develop 'mutual trust' in the brand and provides internet based audiology care (recommendation, remote fitting) through the app. The partners in the launch and marketing of the product are social media platforms and influencer + beta tester consumers. Facebook and YouTube ads are the chosen platforms considering the target segment. Influencers include audiology channels and pro consumers who have hearing loss and are on boarded to share their experiences of the product and service. The audiologist requirement is higher in the British market than the American market, as we can expect the importance of audiologist (in the journey of the consumer to drop gradually as the FDA ruling takes full effect.

Key Activities

Once the product is launched, the access pathways include in house website as well as online markets. The preferred choice of online marketplace is Amazon where the product is strategically marketed as a consumer electronics and health device. When buying the product from Amazon, the user completes all necessary activities through the app or CA website. Alternatively the user can access the product and associated service from the CA website. The most important activities to successfully execute this plan are:

- **Partner Audiologists:** on board influential audiologists to endorse the brand, will provide the necessary trust required in a health care brand.
- **Testing and Fitting Technology**: Absolutely necessary to provide a product comparable to other players in the market at a fraction of the price
- **Certification**: Get certified as a hearing care product to differentiate from PSAPs and modern hearables flooding the market.
- **Accompanying App:** Develop user friendly application which empowers the (not so technology savvy) user to take decisions and calibrate their hearing aid.

Key Partners

1. Original Design Manufacturers: Design and manufacturing of the Hearing Aid. 4 ODMS from China identified, final product to be manufactured by one or multiple. May also provide self fitting and adjustment application.
2. Hearing test Partner: Mimi Technologies providing hearing test API to be integrated into the service. May also provide fitting application / API based on future discussion.
3. Partner audiologist: Provides patient appointment via online / offline channel based on specific cases.
4. Online marketplace: Provides a wide customer base for marketing and sales. This sales channel will be exploited at a later stage when the brand name is established.
5. Influencers: Provides reviews of HA product and service in their platform. Two major kinds of tech platform - YouTube channel dedicated to audiology like Doctor Cliff, AuD and technology websites like Digit, Tech Crunch, Digital Trends, Forbes etc.

Key Activities

1. Hearing Aid Certification: It is absolutely paramount to get the hearing aid product certification in the UK and Germany ASAP.
2. Partner Audiologist: It is necessary to have a (low involvement) partner audiologist in order to develop brand trust within consumers
3. Testing and Fitting tech: Get product fitting comparable to REM fitting only with audiogram - Mimi / ODM help
4. Application: Develop user friendly but rich capabilities app for HA calibration.
5. Early Adopter recruitment: Pilot program to be started for brand awareness and product + service validation.

Key Resources

1. Hearing Aid from ODM
2. Relationship with UK certification board
3. Testing and fitting API from partner(s)
4. App development resources (ODM?)
5. Partner Audiologist
6. Website development team for service
7. Early Adopter

Value Prop

1. Value Proposition: empowering, custo modern hearing so segment [technolo middle income, 40 mild to moderate lo to access.
2. Job to be Done: Pr and accompanying penetrative price p but with the compa quality of a private
3. Consumer Segmen consumers with mi hearing loss who h accept the NHS (Ge hearing aid due to unease of access b expensive private h
4. Ease of Access: On easing the pathway aid and this is done service of online he questions and mail delivery. The servic the user's previous hearing care.

Cost Structure

1. Project Amortisation (includes project research, ODM initial setup and tooling, cost of HA certification etc.)
2. FOB Cost (ODM)
3. Testing and Fitting- licensing model to the technology partner *(shared profit to be explored)*
4. Marketing cost - Facebook targeted marketing, YouTube targeted marketing, Google Adwords, Email Advertisements
5. Amazon Platform fees and marketing costs
6. Cost to maintain partner audiologist *(relationship and profit sharing to be explored)*

position

Provide an
mised, affordable,
lution service to target
gy oriented, working,
to 60 years old with
oss] with a low barrier

ovide L5+ hearing aids
service at a
oint over the Internet
arable experience and
audiologist.

t: Middle Income
ld to moderate
o do not want to
erman Insurance)
quality, stigma,
ut also cannot opt for
hearing care solutions.

e of the major goals is
to access a hearing
e by a seamless
aring test, lifestyle
order hearing aid
e is tweaked based on
experience with the

Customer Relationships

1. Trust: It is necessary for the consumer to have trust in the brand and Cambridge has already developed it in the British market. This has to be augmented by clever audiologist reviewer recommendation and marketing.
2. Caring and continuous Relation: The service should embody a caring connection with the consumer with a continuous relation providing ancillary services like periodic checkups,
3. Shared Decision Making: Consumers expect to understand their hearing ability and audiogram tests and the service should be able to explain the results to the consumer.

Channels

1. Marketing Channels: Facebook targeted marketing (video, static), YouTube advertisement (video), email advertisements (static), YouTube influencer, hearing website reviews, Google Adwords and organic SEO
2. Sales Channels: Dedicated website for customised service provisioning, Amazon and other online sales platforms, offline partner audiology centres (to be decided later on)
3. Challenge: Should we use CA brand recognition while marketing Hearing Aid?

Customer Segments

1. Target Segment: Middle Income consumers who do not want to accept the NHS (German Insurance) hearing aid due to quality, stigma, unease of access but also cannot opt for expensive private hearing care solutions. They are 40 to 60 year old with mild to moderate hearing loss, have a hectic life and use the internet for ease of access like shopping, groceries, bookings, other services.

2. Early Adopter within target segment: Consumers within target segment who are already associated with CA products , and are currently ignoring their mild to moderate hearing loss should be used as early adopter groups. Customer support team can help identifying them. Second group: FB group participants who have mild to moderate hearing loss and do not like the HA style, wait times, one way decisions of NHS audiologists; can be recruited through targeted FB messaging.

3. Broader Segment: Non consumers, who ignore hearing loss till it is severe; higher income consumers who would otherwise choose private clinic.

Revenue Stream

1. Sale of customised product + service through own website - one time payment and subscription model.
2. Amazon (and other online platform) product sale - one time payment
3. Sale of accompanying service on products bought on Amazon and other online retailers - one time pay and subscription
4. Ancillary services for returning consumers - product repair, replacement parts, audiology periodic checkups - subscription

Fig 34. Business Model Canvas detailing out the CA hearing aid business.

Pricing Strategy and Projected profits

The average price paid by consumers in the UK for hearing aids in the private clinics is £2613. Specsavers in the UK has a starting price of its inexpensive offering at £495, which has no recharge ability, old design, low noise suppression and basic functionalities. On the other hand, PSAPs start at online retailers at £50 and can go up to £200. Bose Hearphones which has comparatively good reviews by consumers and audiologists start at $399. It has a different form factor, is bulky and does not have medical grade certification. So the PSAP / hearables cost bubble lie between $100 to $400 where as basic (medically approved) hearing aids start at $600+. Our goal would be providing high end hearing aids at a price point which lies just beyond the PSAPs / hearables and well below hearing aids pricing.

Brand Equity is going to play a strong role for this service in the British market. However in the US market, even if people do not know it as a specialist audio brand, the name 'Cambridge Audio' coupled with 50 years of history gives potential buyers certain confidence. More details about sales price, profit margins and total marketing budget and can be found in the appendix.

Fig 35. (Top) Cost vs revenue worldwide projection of 3 years with a diffusion curve of 16%, 34%, 50% of total target and penetration target of 0.10% of the total target consumer size. Projected sales year on year approx: 7014, 14900, 21900 units (Bottom) Cambridge Audio has a strong brand name in the UK , but low brand equity in the US market. In the British market, Cambridge Audio will be competing with NHS who have sub par service at negligible cost, so the main competitive advantage is lower access barrier (in all aspects). In the US market the competitive advantage is more straight forward : 'price vs quality' Majority profit is projected to come from the US market due to a significantly larger target segment more receptive towards competitive pricing. The price point will be further validated with beta users.

DESIGNING A BRAND

As the service design is being finalized, and we have developed the pricing strategy, the next step is to design the brand to go along with the product and service. This starts with researching the current competition in the market using a tool called 4C analysis. The analysis is based on a specific Job to be Done (Christensen et al., 2007): Partially or fully restore the hearing of a 'hard of hearing' person. The visual tool helps in mapping out all the major types of competition in the market as shown in the figure below.

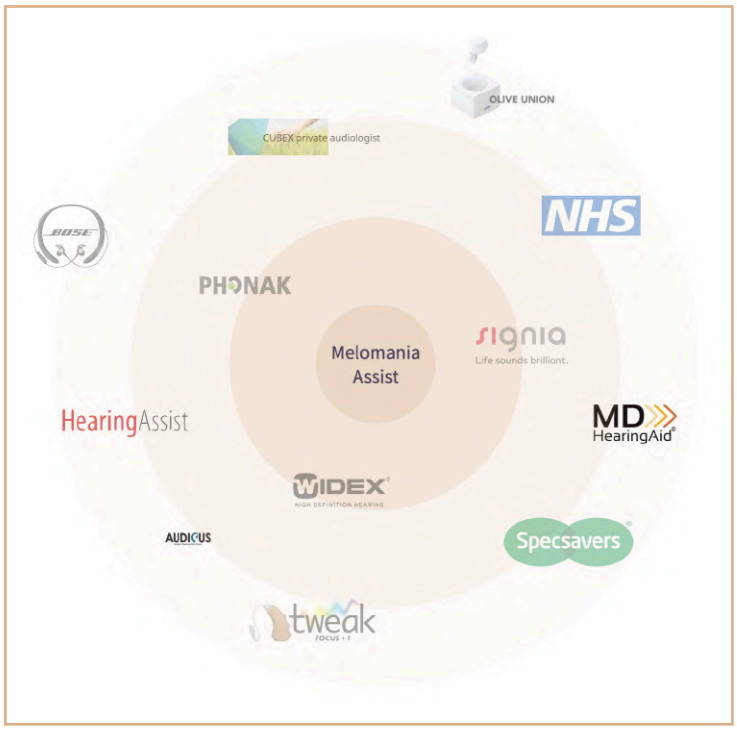


Fig 36. 4C analysis mapping out all the main competitors of Melomania Assist showcasing 4 kinds of competition as we grow outward from specific product level competition to more generic competitions like non consumption with behavior change like listening to music at a continuously high volume

The four layers of the competition are as follows:

- **Product Level Competition:** These are major 6 hearing aid manufacturers who have more than 98% of the market share. They are competing with 'Melomania Assist' on the product category and are slowly moving towards service competition as well by opening up high street stores.
- **Product Category Competition:** This layer includes companies which provide hearing aids to consumers: NHS (in England), private audiologists, Specsavers (UK based chain with a line of hearing aid and audiology practices).
- **Generic Competition:** The third category is generic competition which include a plethora of hearing assist products which help in boosting hearing in some way or other. It should be noted here that 'non-consumption with behavior change' like maintaining high music volume is also a major competitor for low to moderate hearing loss.
- **Price Competition:** This competition layer is not very relevant here as it is a very specific type of Job to be Done and other solutions cannot fulfill the intended 'job to be done'.

Competition Axis

The 4C analysis provided a good understanding of the different kinds of competitors in the market. The next phase of creating a brand is identifying the key elements of the product and service which can be advertised to our advantage and can provide competitive edge. A way of doing this is finding out 'polar parameters' within an industry and putting them together to create a brand. (Vorst, 2017). A typical example is Zara, which (during its inception) combined 'the latest in fashion' with 'low price point', something not a lot of competitors had done at that time. It is also possible to achieve tri-polarity where three mutually polar parameters can form the main brand properties. The following figures identify some key qualities of the service which can create competitive advantage for Cambridge Audio.

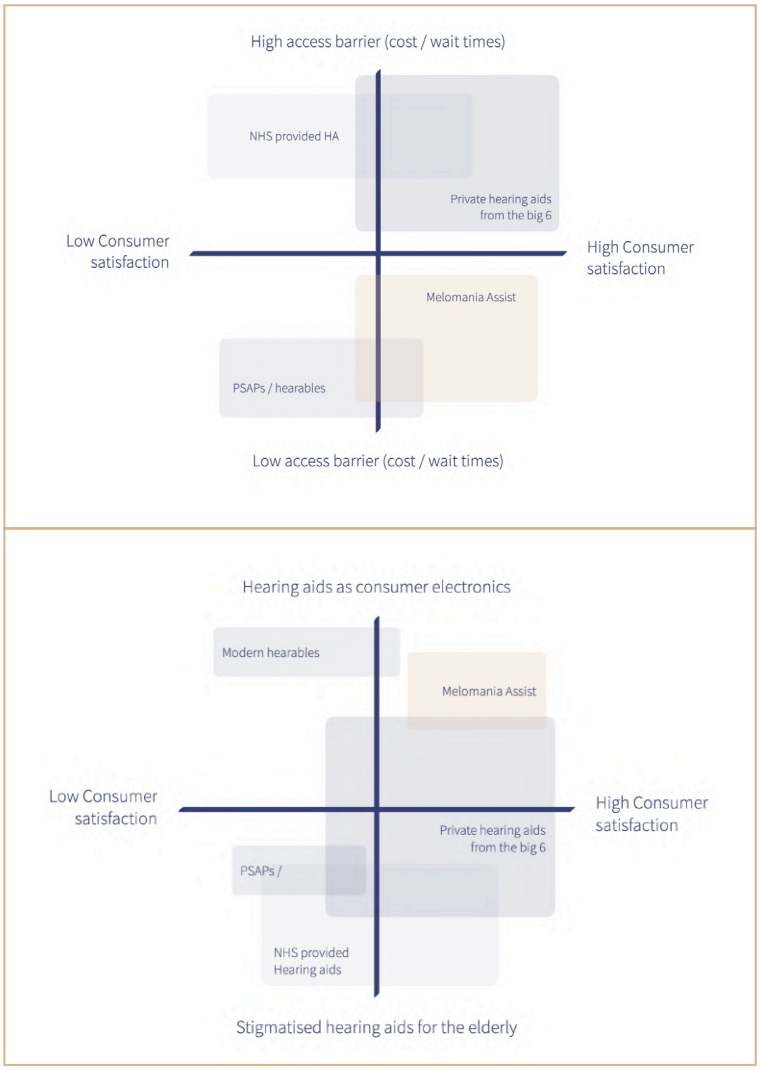


Fig 37. (Top) The two parameters explored here are 'access barriers' and 'consumer satisfaction'. It should be noted here that access barrier includes difficulty in getting hearing care service due to every kind of factors. What if Melomania Assist (brand) combines low access barrier with high consumer satisfaction and to create a unique position in the market?

(Bottom) Shifting image of an hearing aid in society vs consumer satisfaction. Major hearing aid manufacturers are repositioning their brand to cater to the shift upward in the Y axis and releasing supporting products. However their mainstream product line is still marketed and perceived as traditional hearing aids for the elderly.

In case of NHS, access barrier relates to long wait times, less choice of hearing aid types, multiple visits to the audiologist, kept in the dark about updates etc. On the other hand, private audiologists have lower wait times, convenient scheduling and over all better experience at the expense of considerably high service cost. Consumer satisfaction at NHS varies widely from night mares to

pleasant where as patients going to private clinics are more satisfied on average by the product and service. On the other end of the spectrum are PSAPs and hearables which can be conveniently bought though the internet at a fraction of cost compared to private audiologists. But the consumer satisfaction is generally lower compared to private audiologists and their service. Some new companies in the US market namely Hearing Assist, MDHearing, Audicus are trying to shake up the industry by providing low cost hearing 'aids' through an online model.

In the second Competition axis, consumer Satisfaction is plotted against the changing image of hearing aids in society. Major hearing aid manufacturers are repositioning their brand to cater to the shift upward in the Y axis and releasing supporting products like Styletto Connect (Signia Styletto Connect is more than just a hearing aid., 2019). However their mainstream product line is still marketed and perceived as traditional hearing aids for the elderly. On the other hand modern hearable companies like Olive Union and Bragi Dash are redefining hearing aids as consumer electronics with modern designs and features. But they have low brand trust and not so positive image.

Competition axes helped in identifying the three main characteristics which should be used in defining the new brand: High Consumer Satisfaction, Low access barrier (time, information, cost) and positioning Melomania Assist closer to consumer electronics as brand and product.

Visual Manifestation

Now we have a clear idea about the qualities to be included in the brand, this phase discusses the brand name, tag-line, brand DNA (purpose, positioning, personality), key message and visual brand appearance.

Brand Name

The name should cater to two kinds of audience, one who has no prior knowledge of the Cambridge Audio brand - for them, I wanted to provide a key word which is clearly related to health care. However the word should not invoke the emotion of a healthcare brand, hence I wanted to pair it with a second word which is unrelated to healthcare. I want them to feel the relationship between a healthcare word and a different (music related) word. The second kind of audience has an association with the brand, for them, Melomania is a true wireless earphone, adding a healthcare word to it makes it move from consumer electronics to 'care electronics for the modern netizens'. It is still differentiated from healthcare brands.

The goal is to create a feedback loop between Cambridge Audio main brand and the new brand extension which ventures into hearing care and healthcare in the future

Tag-line / Slogan

The tag-line should be short, catchy and to the point. It follows the Cambridge Audio tag lines of first prioritizing the use case or the consumer and then adding the (perceived) benefit, like: 'Your music, for longer' and 'Just add vinyl'. Though these tag lines directly advertise the product feature, it is better to keep it slightly vague for the new brand because it is about a complex hearing care service We should think of this new venture as a brand extension (rather than a product line), with a goal of diversifying the business over time.

Fig 38. Visual representation of the brand name, tag-line, and color palate.

The brand name is a continuation of the Melomania product line which has given Cambridge Audio quite a lot of good press. It is perceived as a low access barrier product which is functional yet high quality. The word 'Assist' does not necessarily relate to hearing but relates more to care. This is done deliberately keeping in mind the business roadmap in the coming 10 years: moving gradually towards enabling preventive healthcare by data provision through hearing aid. The tag-line is deliberately kept slightly vague, however it clearly signifies that it is not a hearing aid / hearing product brand, but an overall end to end hearing care brand. Also it starts with the user need or service, 'hearing care' and then adds the ambiguous word 'reimagined'.

The wave form playing between the two 'M' is an indication of music as well sound wave for hearing (inspired by the Widex logo). The goal of this wave form is clarifying the current brand but also providing the link between the two brands

Brand DNA and Key Message

The name, tag-line and the visual representation provides a concrete image of the brand, now it requires a DNA (purpose, positioning and personality) and key message to solidify. This is the last leg of brand development. Marketing materials, websites, applications and every other engagement with the wider audience should stick to the core brand values which are outlined in this section. The infographic below provides these core qualities.

Purpose

Hearing care should not be postponed till it becomes a serious condition and costs a fortune. At Melomania Assist, We are committed to delivering a *modern, affordable, accessible, top of the line* hearing care service to every netizen with mild to moderately high hearing loss.

Melomania Assist

Hearing Care, reimagined.

Personality

Trustworthy (brand), Approachable, Quick Response, Transparent, Credible (service), Caring, Flexible

Positioning for early adopters

Who: Technology oriented, price conscious netizens with mild to moderate hearing loss.
What: Hearing Care service with substantially lower price but excellent quality.
How: Very low accessibility barrier (time, cost, information), trusted brand, new and fresh
Where: Email to select CA consumers, targeted FB advert to specific group participants, VOC

Positioning Statement

For the *modern, technology oriented and price conscious consumers experiencing mild to moderately high hearing loss,* Melomania Assist provides *a high quality audiologist led hearing care service over the internet,* which *guarantees a great user experience at an affordable price* and allows consumers to *enjoy their life to the full again.*

Repositioning the brand for US / DE market

It should be kept in mind that the designed brand and its qualities are aimed at the UK market where NHS is as strong a competitor as private hearing care providers. However in the US where low cost / insurance covered hearing aids are difficult to access, the brand has to be reoriented to strongly advertise price vs quality ratio instead of access barrier vs consumer satisfaction as in the British market. It should also be marketed to a broader target segment of any age group individual with mild to moderately severe hearing loss.

Launch Strategy

Once the brand is manifested, the next section details out the launch strategy where the consumer is guided through the AIDA model over a period of 6 months. The launch strategy provides a detailed plan in different platforms and ways to reach the consumer over time. It also maps out the development of sales platform and accompanying app for a better, unified and end to end user experience in a single platform. The next spread visually showcases the AIDA model for Melomania Assist.

Attention

Interest

1 month

2 months

WEBSITE AND APP

SOCIAL MEDIA PLATFORMS

INFLUENCERS

EMAIL MARKETING

PHYSICAL PRESENCE

Launch landing page (LP) with current industry graphics, white papers, service teaser, why us - CA values

- Link of LP in CA homepage
- LP link in graphical white papers
- Teaser videos
- Hearing test + lifestyle questions

traffic

use test results

Launch hearing test with limited product release to early adopter, convert landing page to full website

- Comparison with traditional industry
- VOC videos of early adopters
- Website has full service including RIC product, testing, audiologist, kickstarter pricing

traffic

consumer stories

Social media marketing (SMM) to specific groups
Goal: drive traffic to LP, recruitment for validation and VOC, develop brand awareness and anticipation

- FB marketing in specific groups for recruitment
- LinkedIn advert with white paper for industry interest
- Share technical details in white papers)
- Marketing focus on new features

traffic

2nd Wave: SMM to LLA segment and partly wi
Goal: Traffic to website, convert early adopter
more VOC, generate anticipation and trust an

- FB marketing to LLA audience - compare price wit
- Catchy YouTube advert with clear messaging- incr
- Audiologist review of the service - trust
- Semi professional VOC story (music / TV / profess
- A / B testing with ad type and platform

News, technology, audiology website - provide teaser material to attract innovators and drive traffic to LP

- Hearing / Audiology websites
- Tech section of news websites
- Tech websites

News, technology, audiology website - provide teaser material to attract innovators for (CA + product)

- Hearing / Audiology websites
- Tech section of news websites
- Tech websites

Email to innovators to drive traffic to LP.

- CA consumers fitting narrow category
- Email to semi professionals for future VOC story.

Email to early adopters

- Email blast to target user segment
- Email using bought content

Participate in industry conventions

- Audiology conventions
- Consumer electronics conventions

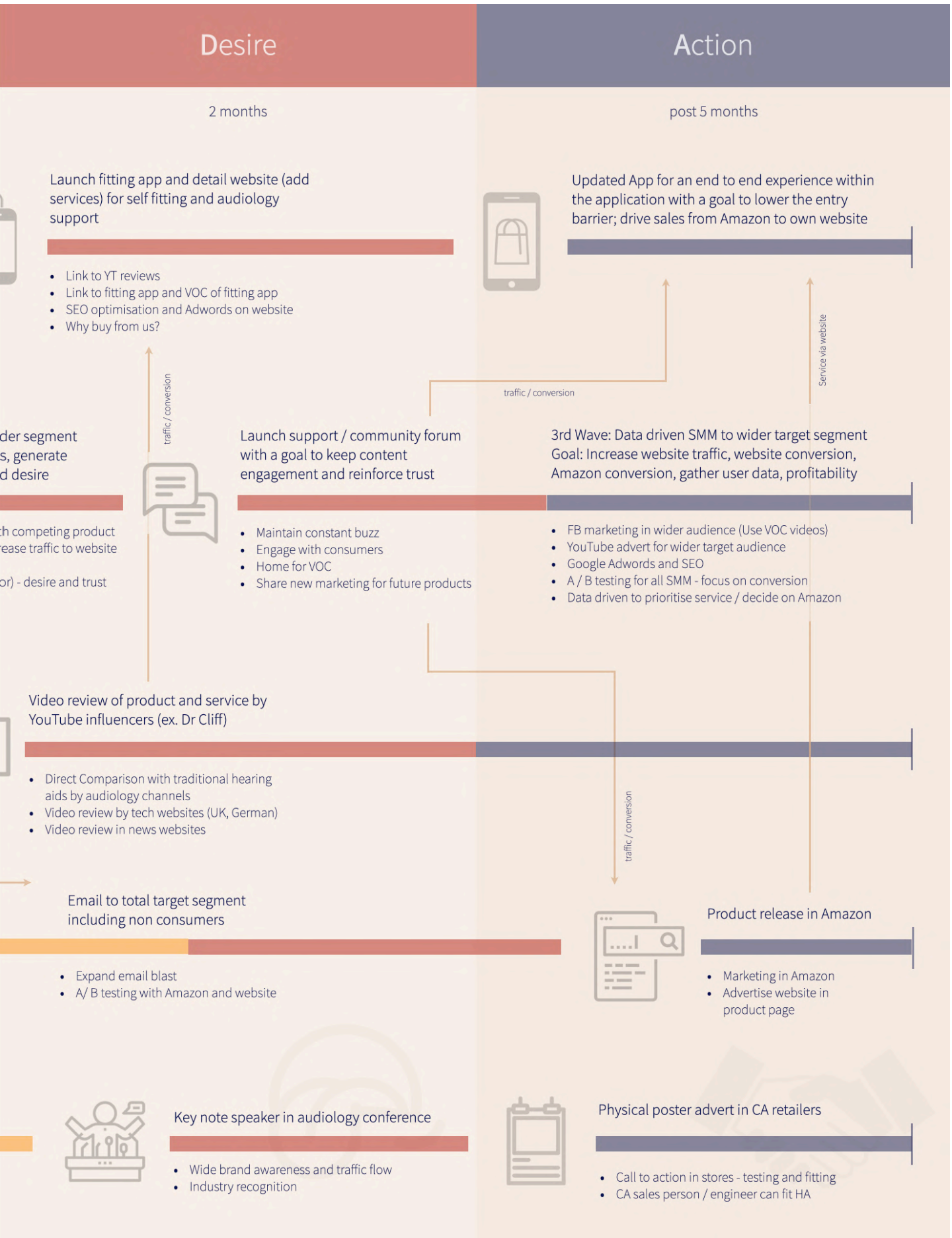


Fig 39. Detailed Launch Strategy for Melomania Assist nudging the consumer through AIDA model

Projected Consumer Growth

This section explains the growth of consumers from the launch period to the wider dissemination. The infographic below showcases this flow describing consumer types at each level:

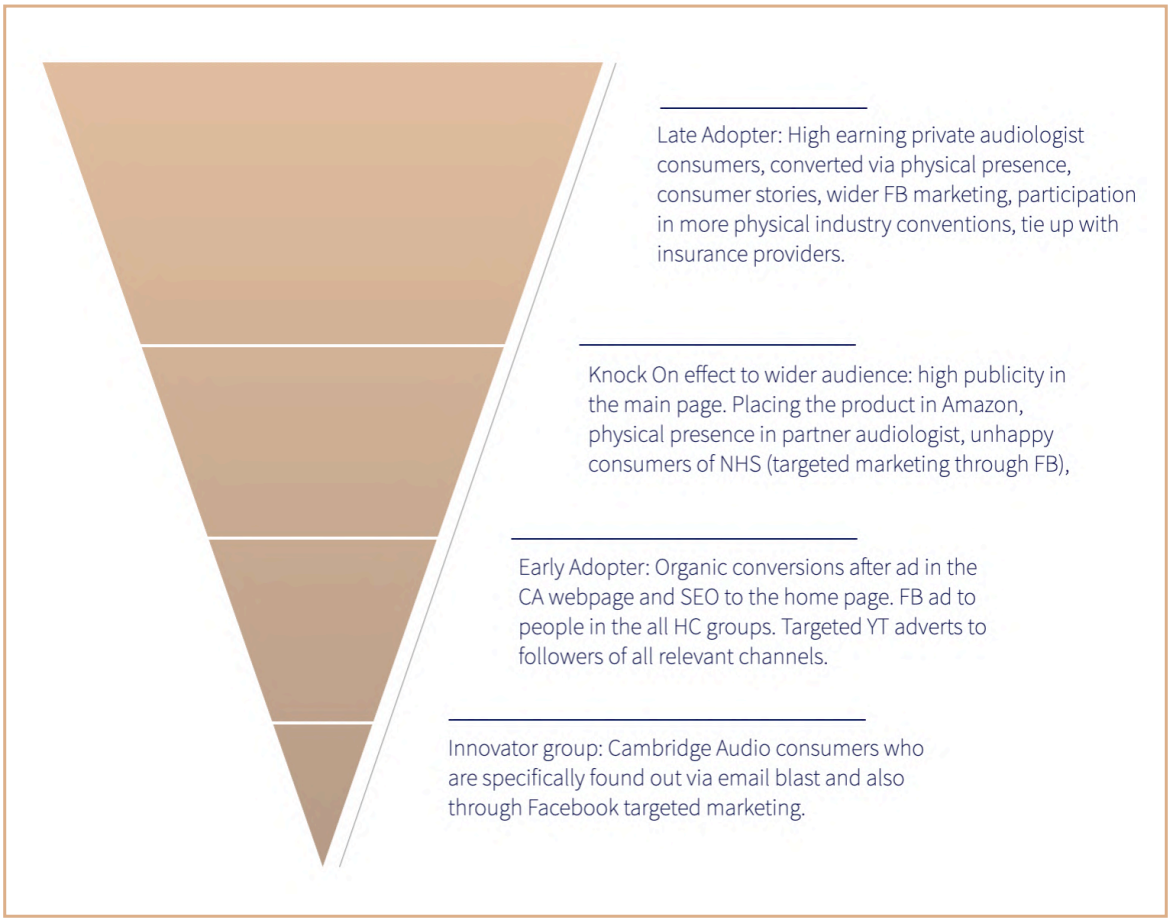


Fig 40. Innovator, early adopter, majority and late adopter consumers

The launch strategy is created in a way to reach the different stages of consumers as stated above in a staggered manner. It is very important to develop the brand trust as early as possible by prioritizing consumer reviews, professional reviews and (occasional) support in the consumer forum.

The task of generating and maintaining trust would be challenging because it is a disruptive service assuring high consumer satisfaction at an affordable price point. But at the same time, the venture has high rewards because it undercuts competition by a very high margin: the growth rate would be phenomenal if the service takes off via consumer stories. The AIDA model is designed in a way to create this funnel where different kinds of consumers can be 'sucked' into the website and converted.

DESIGN VALIDATION & ITERATION

Consumer validation is one of the most important step towards any product and service introduction. It ensures that the design problem is addressed in the correct manner and the solution is attractive to the target consumer segment. Consumer validation follows a similar approach to consumer research: an initial set of qualitative interviews helps iron out the product or service before pushing it to a wider audience of beta tester for quantitative consensus. For this project, the validation was restricted to qualitative discussions with a small group of testers as discussed below.

Methodology

The final service is designed to be offered via a website and a smartphone application. Keeping that in mind, a website was used as the medium of user validation. Users were asked to use the service while on a video call. Their screen was recorded while they were using the (low fidelity) system and providing their inputs. As per the service design, 'lifestyle check' is a detailed user questionnaire to mimic the interaction between the user and an audiologist. It precedes the hearing test or audiogram upload option. Since the hearing test technology and API was still not integrated into the website, users were explained about that part of the service. Once beta testers had gone through the service they were presented with the 'right care, calibrated to their needs'. Users were explained how a mix of AI and audiologists decided the final care package for them. They were given more options to configure their package and finally options to choose a payment method. Instead of providing a retail price, it asked beta testers about the right price point of the service according to them. The test was comprehensive in getting inputs about the service, brand design as well as the price bracket.

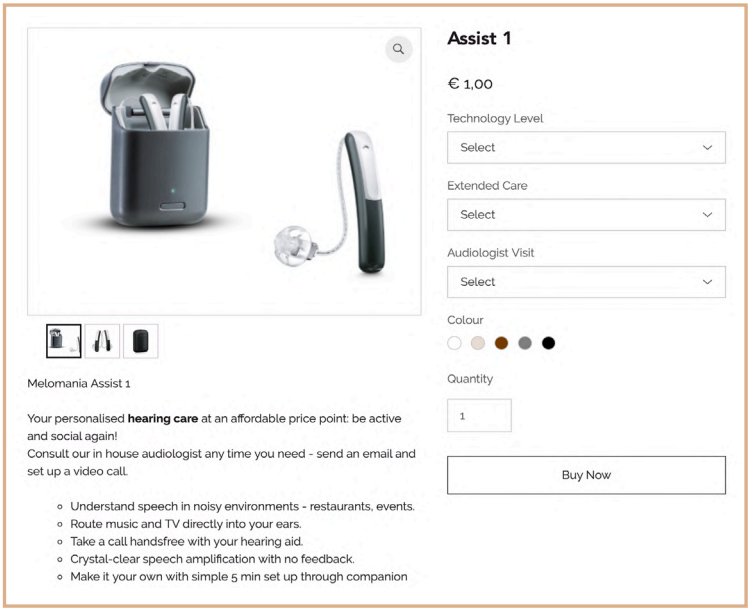


Fig 41. An example of the Assist 1 (early design of the product) shown to an user with options to configure it further as they need. The price point is set at a customary $1, providing an opportunity to ask the user about the right price bracket according to them

Consumer Insights & Service Iteration

Validation with beta testers provided valuable inputs about the current service design with suggestions for subtle changes to fit the target segment better. Seven validation interviews were conducted over two weeks to get a good triangulation of data and some of the repeating themes from the validation sessions are presented below along with proposed changes in the service to mitigate them.

Theme	Validation Quote	Service Iteration
 Science and Education	*"Am I getting the same tests like in my audiologist chamber, can you do it online without...?"* *"I am not sure if this hearing aid will be calibrated to my exact audiogram."*	There were certain understandable doubts about the new technology and some changes can help: • An optional explainer video at the beginning • A visual comparison between the user uploaded audiogram and hearing test to assure user. • Dedicated 'Science' page explaining the tech. • Teach how to calibrate the aid using the app
 Credibility and Accountability	*"Can I trust this company, I mean don't get me wrong: but it is totally new to get hearing care like this..... Where do I go when I need help?"*	The service model is new and consumers are not accustomed to this approach of accessing care: • The service will provide (bundled) video call with the audiologist whenever required. • It should be possible to look up the in house audiologists in online database for credibility. • Access to physical visit in certain cases.
 After Sales Support	*"What should I do in case my aid needs calibration afterwards?"* *"Do I need to change my hearing aids when my hearing gets worse?"*	When the service is advertised as online, trust in after sales support can be lower: • Unlimited bundled video calling along with a minimum number of physical visits. • Educating the consumer about self fitting while provisioning adjustment as an add-on service. • Call back every few months to check up + sales
 Benefits and Comparison	*"I think, you should say how this service is going to help me better than my NHS aids"*	This theme is more related to marketing the product and service and less to service itself: • Explicit comparison tables with NHS and private hearing care should be included. • The beginning of the service should integrate an explainer video of how this is different. • Marketing strategy prioritize consumer stories.

Table 5. Major themes developed after validation of the initial service design; suggested service iterations to cater to these shortcomings and serve the target segment better

Brand and Brand Name - Consumer Response

The consumer validation was designed to test not only the service but also the brand design, name and pricing strategy. Consumers had a strong opinion about the brand name:

> Melomania ↔ Melanoma *(a form of skin cancer)*

Interestingly this concern with the current name was also mentioned by the project owner and the CEO of the company, James Johnson-Flint. On probing further, it became clear that the brand value of Cambridge Audio in the British market was stronger than Melomania. Hence 'Melomania' is replaced by the brand name: Cambridge Audio to create the new brand design:

Fig 42. New Brand logo with the word 'Assist' along with the previous tag line and the parent brand name

Beyond the naming concern, other form of brand validation included asking beta testers about their perception of this new brand and the positive responses were: fresh, modern, easy to access; the negative response was: 'I can trust it more than other PSAPs but not as much as my audiologist'. This theme is covered in the previous section. The right kind of marketing, information, consumer stories and tweaking in the service can increase trust in the brand.

Pricing Validation

Consumers expected the price of this service to be lower than the price of traditional hearing aids. However the response varied vastly across interviews. It is difficult to reach a conclusive price bracket from qualitative tests and it is necessary to perform a quantitative test.

The range of pricing varied from $120 to $1000, with private hearing aid users generally rating them higher compared to NHS users. One of the interviewees was a user of the Melomania 1 (ear pods by Cambridge Audio) and he suggested that the price of the product should be similar to the Melomania 1. On the other end of the spectrum, private users felt that they would not buy them beyond $1000 as they could get a low end high street private hearing aid for that price point. Based on these inputs, one should price them below $500 to be competitive and provide strong value for money.

BRAND MANIFESTATION

Once the brand DNA is developed and along with the launch strategy, the last leg of launching the product is manifestation of the brand and the service. The upcoming section provides examples of marketing material in different channels. The first section is about the landing page of the service. It should be very clear, explaining the perceived benefits with a comparison with other competitors in the market. It should reflect the brand persona: high quality service with a very low entry barrier. The landing page is used as a validation tool for the consumers and is iterated over the length of the project. The manifestation also provides examples of advertisement in other platforms like Facebook, Email Blast and LinkedIn. These examples can be taken as inspirations for Cambridge Audio team to design the marketing campaign in the coming months.

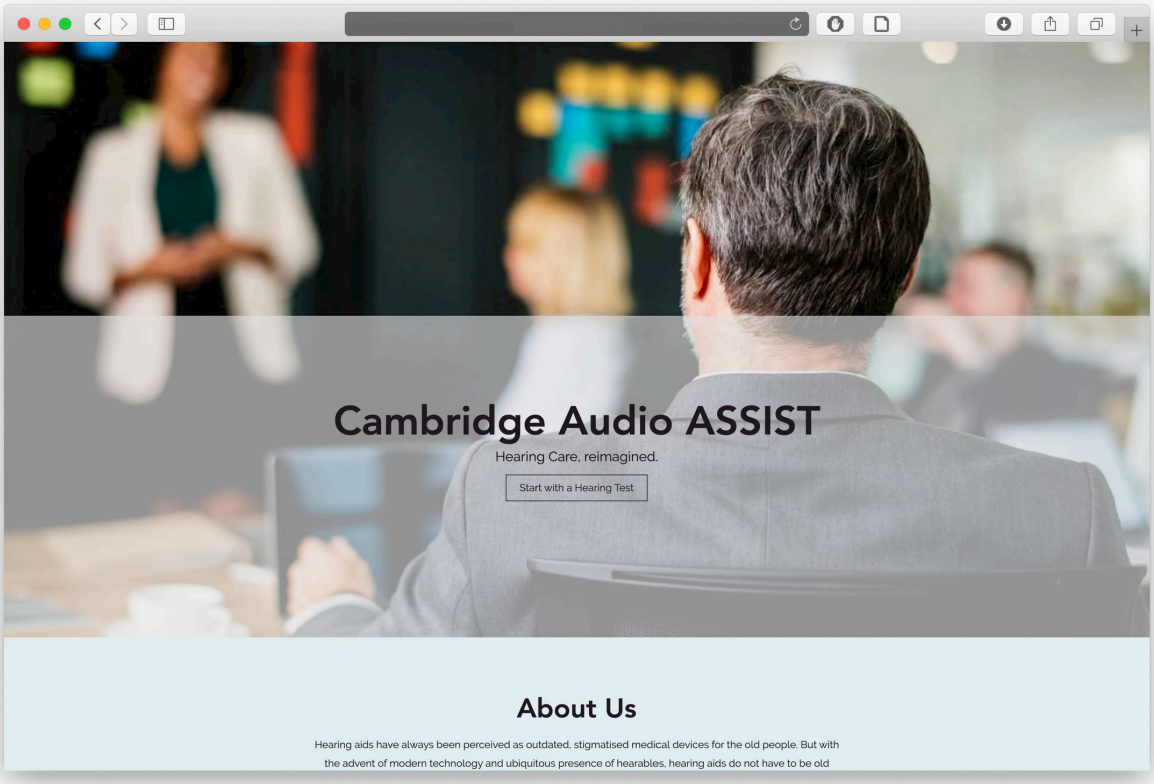
Landing Page design

The key access point for consumers to connect with Cambridge Audio is through the website and the application. As suggested in the launch strategy, before the website is launched, we should launch the landing page with a goal to attract early adopters and innovators. This group of early adopters can later on act voice of consumer and increase trust in the brand. This landing page contains the following elements:

1. Brand and service name Introduction, also contains the tag-line.
2. A clear and concise 'About Us' section explaining the company and service.
3. Introducing the product and service: explainer videos, images, renderings
4. Ancillary services explainer: application and video call with audiologist
5. Word from an in-house audiologist: video explaining her role
6. Comparison with traditional hearing aids
7. Coverage: related articles and videos in the press & voice of consumers
8. 'Configure your now' nudge with renderings of the product

In order to quickly prototype and develop the landing page, I have taken the liberty of borrowing some images from the internet and use it place holders. The CA marketing team may use this early prototype as an inspiration to develop the final website. I used the website builder tool by WIX to quickly come up with a prototype and test with users. Based on user inputs the page has undergone significant changes during the project and the latest version can be found at the following link:

http://sunny75167.wixsite.com/website



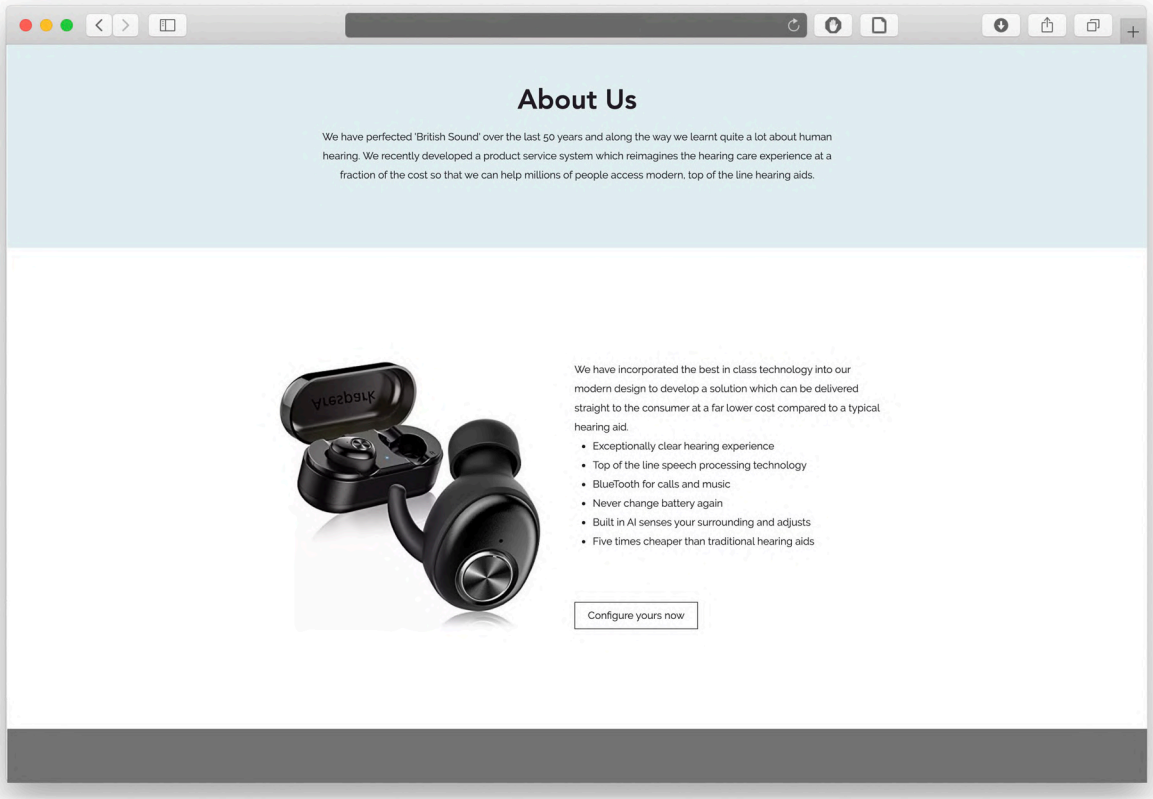


Fig 43. (Top) Landing Page of the service presents a middle aged person listening to his colleague in a meeting and no hearing aid is visible. (Bottom) The About Us section borrows from the rich history of Cambridge Audio as a brand as well as the quality of their engineering capability to position them in the hearing care industry.

The landing page is designed to get the early adopter interested and convert them to brand propagators. The early adopters can act as propagators of the brand at the second stage of the AIDA model. The image in the previous page showcases most important features of the product.

> The phrase ‘configure yours’ is explicitly chosen instead of ‘buy now’ to suggest that it is not an ‘one solution for all’ like other hearable / PSAP products in the market.

The page also contains among other elements, the product video and description of ancillary elements like the app and video support with audiologist. High importance should be given to the audiologist support along with a dedicated section where the audiologist explains the service along with the technology behind it. Consumer reviews in written and video format is also necessary to develop brand trust and create anticipation.

A comparison section with other hearing care services in the market is also provided so that benefits of the service are clear and consumers can take an informed decision. A dedicated ‘Science’ section is to be developed so that consumers get better clarity on the technology and can get educated on this new form of service. A dedicated 24 hour chat section will also ensure that the consumer always perceives the needed support.

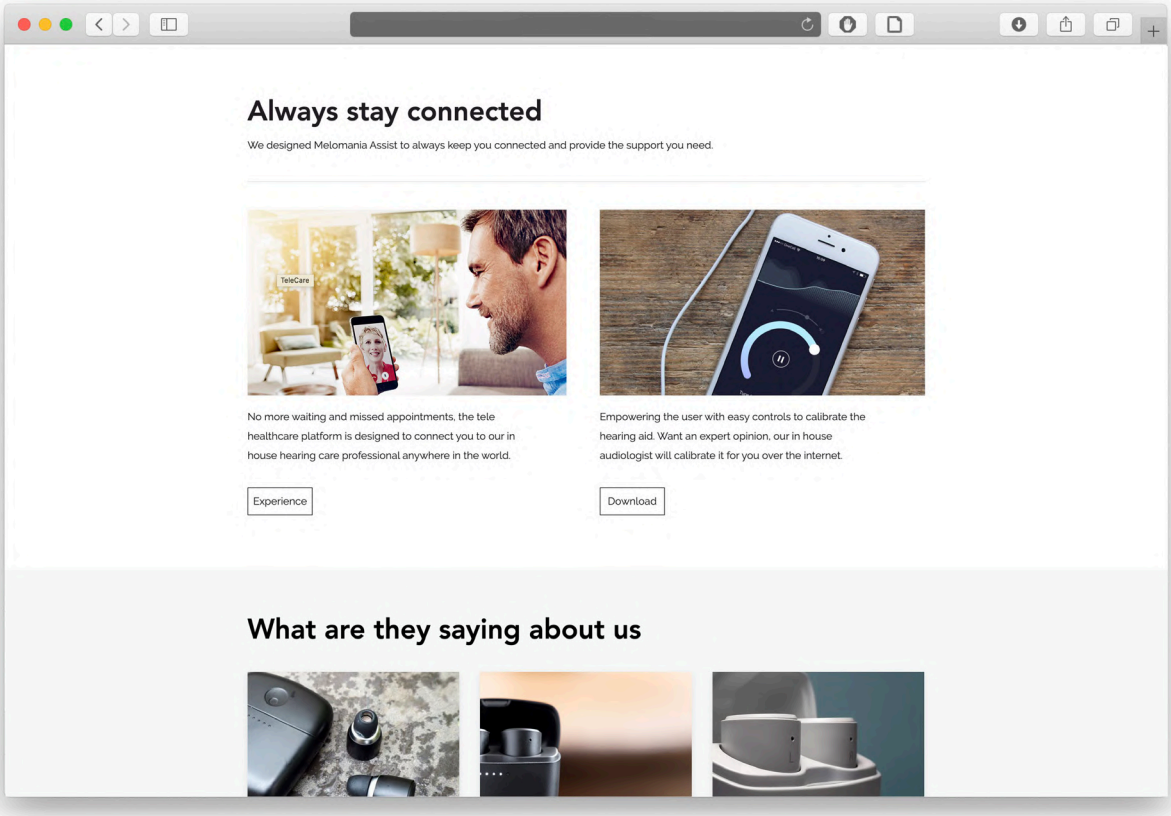


Fig 44. Ancillary services like Application and internet healthcare support is showcased in the home page

Facebook Advertisement

Considering the age of the target segment and the service type, Facebook is a very important advertisement platform for this service: below are some examples of marketing materials for Facebook.

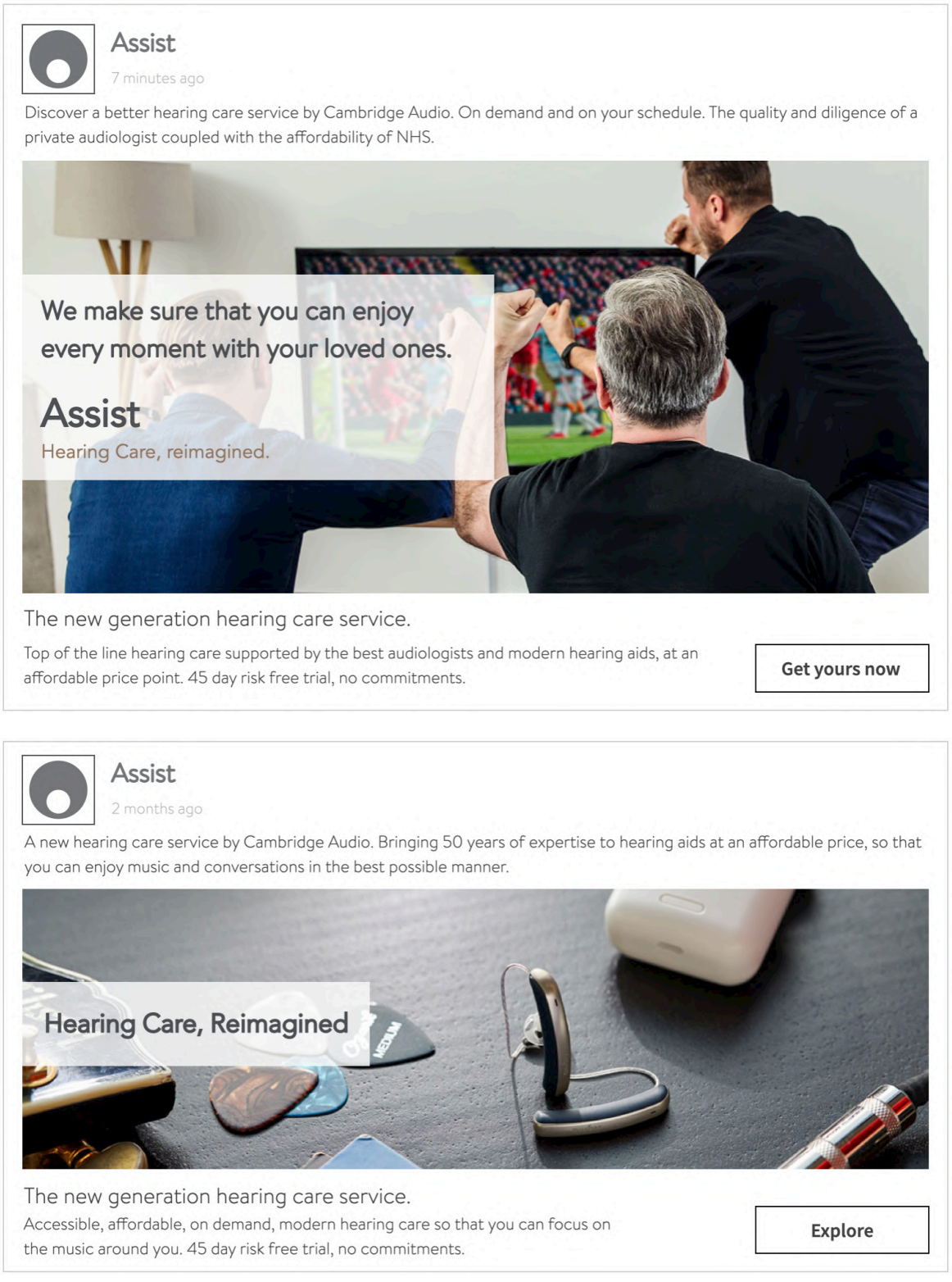
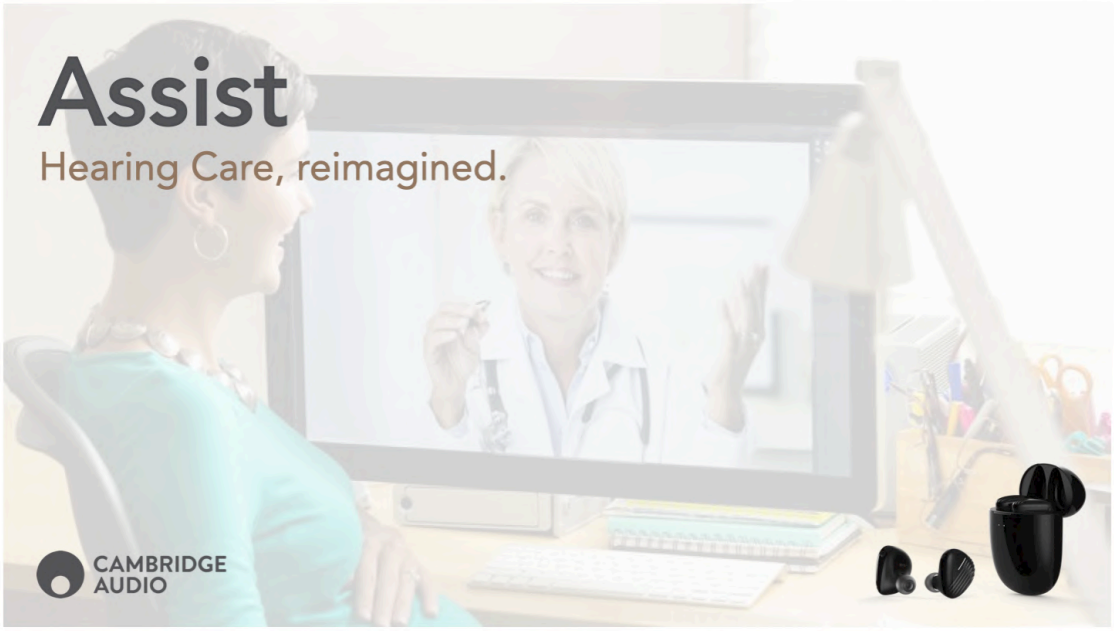


Fig 45 (a,b). Example marketing materials to consider for the Attention and Interest phase of the launch plan.

Assist
7 minutes ago

Discover a better hearing care service. On demand and on your schedule. The quality and diligence of a private audiologist coupled with the affordability of NHS.



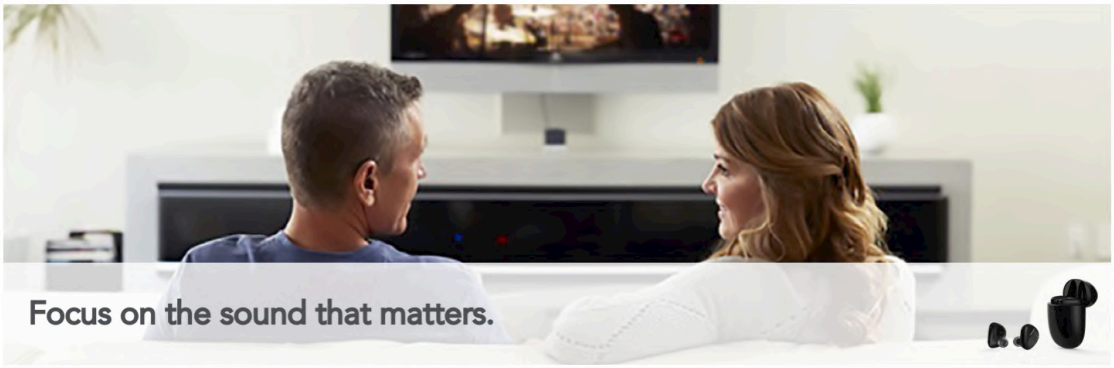
The new generation hearing care service.

Top of the line hearing care supported by the best audiologists and modern hearing aids, at an affordable price point. 45 day risk free trial, no commitments.

Discover

Assist
2 months ago

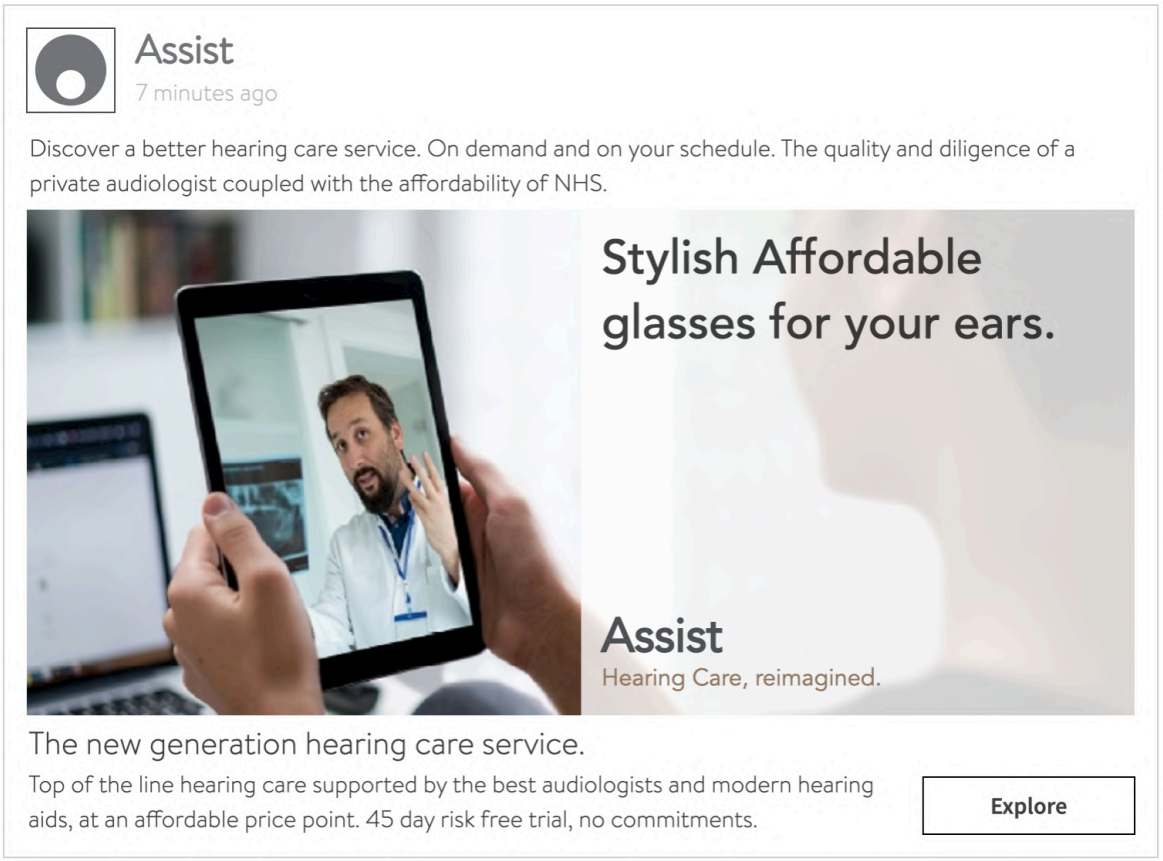
A new hearing care service by Cambridge Audio. Modern hearing aids at an affordable price, so that you can enjoy music and conversations in the best possible manner.



The new generation hearing care service.

Accessible, affordable, on demand, modern hearing care so that you can focus on the music around you.

Explore



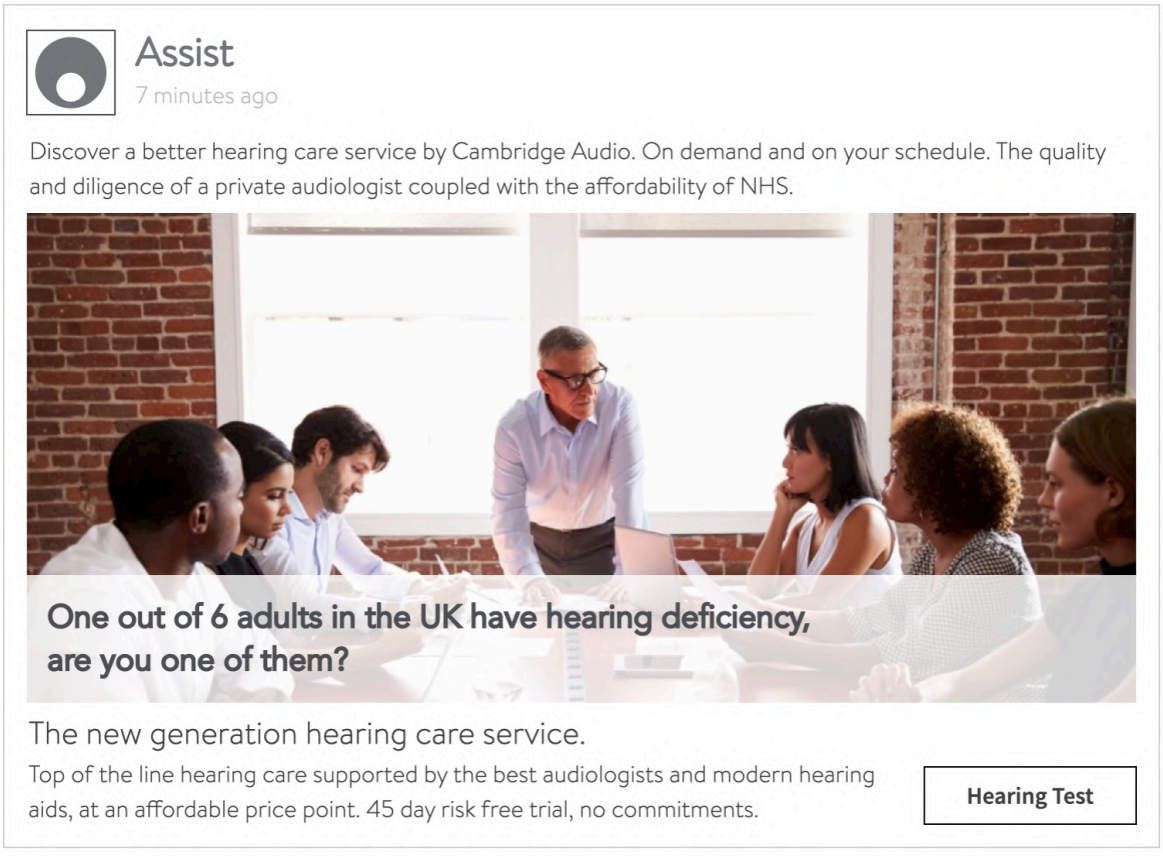


Fig 46 (a, b, c, d). Multiple examples of Facebook advertisement with example copy focusing on key features

Email Marketing

The target segment is known to use email heavily in their work-flow and personal lives. Some examples of email marketing are presented for the marketing team to take forward.

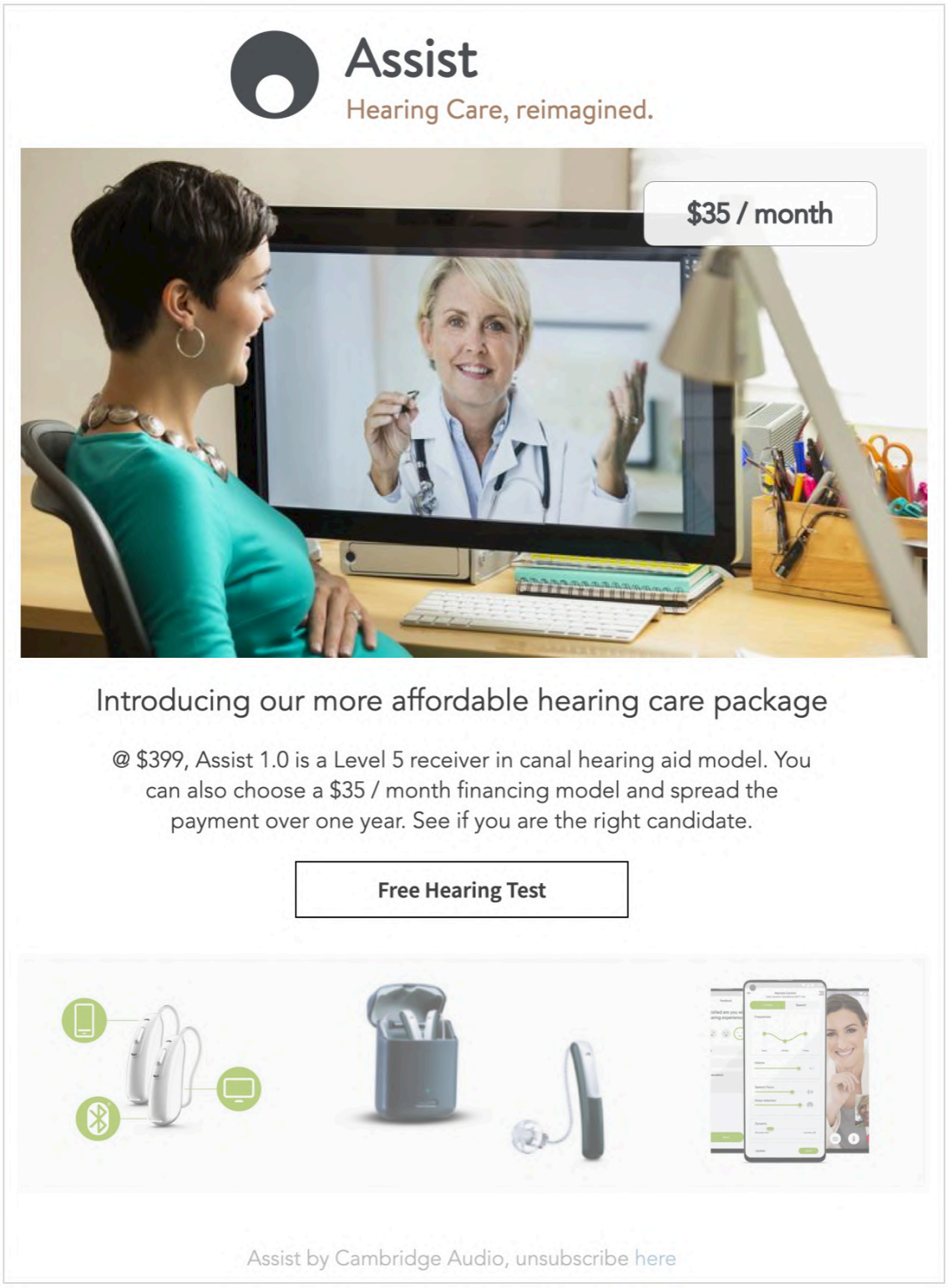


Fig 47. A typical example of email marketing showcasing one of the main selling points - price

Assist

Hearing Care, reimagined.

At Cambridge Audio, we have reimagined hearing care to be more affordable, more accessible and modern. Starting as low as $399 or subscription at $35 / month

Phone conversations without anyone else listening

At Cambridge Audio, we have designed hearing aids which allow flow of sound to and fro between your hearing aids.

No more loudspeaker on the phone!

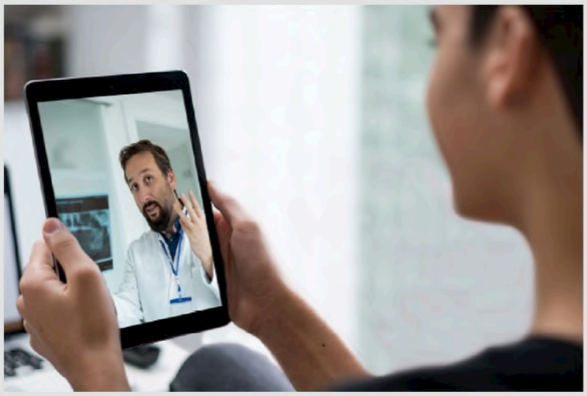
Get yours now

High Fidelity British music in you hearing aids

We have been researching music for the last 50 years, now we are bringing it our hearing aid line.

Experience a new range of fidelity!

Experience



Any problem? Our audiologist is just a call away

No more waiting for weeks for an appointment, our support team is available 24 / 7, set up a consultation.

Call today!

Appointment

Assist by Cambridge Audio, unsubscribe here

Fig 48. Email advertisement showcasing certain qualities anc competitive advantages in CA service.

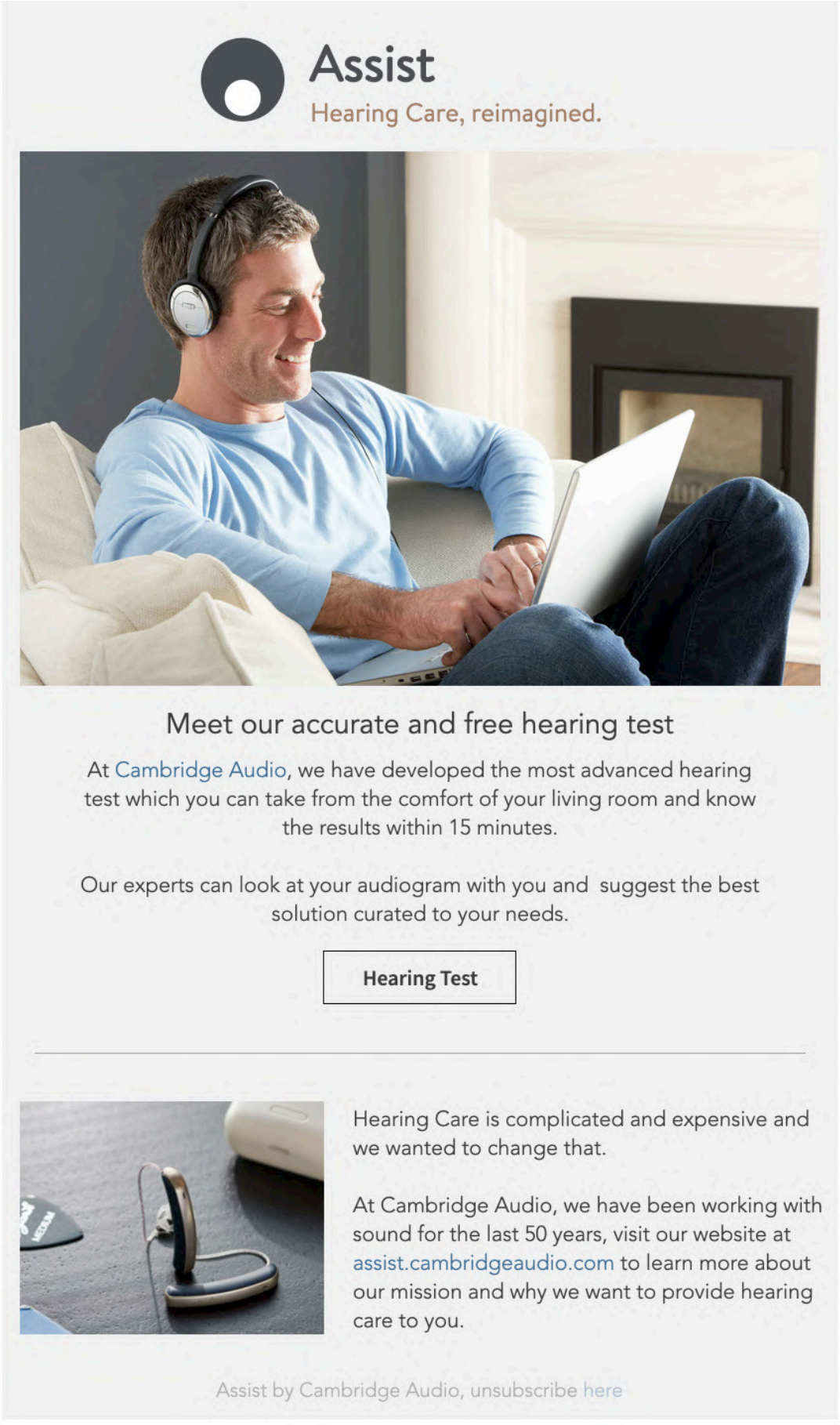


Fig 49. Email advertisement prioritizing the free nature, easy access, and high quality of the hearing test

MARKETING BUDGET

The marketing budget is calculated based on industry average of the medical and consumer electronics sector. The marketing budget of Melomania 1 is also taken as a benchmark: 15% of the sale price and dedicated to Amazon market place. Since the product is quite different from the usual business verticals of Cambridge Audio, the marketing spend is capped at 20% of the base retail price for the 1st year. That amounts to $80 per product sold worldwide. With a goal to sell approximately 7000 products in the first year, the total marketing budget stands at $560K. This number may need to be adjusted to increase the higher cost of marketing in the first year.

The majority of the marketing budget will be spent on Facebook advertisement, Google (and YT) adverts and email marketing. A discussion with the Google digital marketing team provided certain key information which would help in drawing up the overall strategy and budget with Google:

1. **Search frequency** for 'hearing aid' related key words is fairly consistent over time (24 months) and stays above 80% of peak search frequency. The peak happens in new year.
2. **Top search terms** within the 'hearing aid' search category were generic, so competition is not so deeply entrenched and we as a new player have a fair chance.
3. **Search is happening predominantly on mobile devices**, necessary for CA to optimise website for mobile consumption.
4. **Certain competitor entrenchment** in Google search list: 'Eargo', 'Costco hearing aids'.
5. **Cost per Click** for hearing aid and related terms: $1.8 to $2.3. Averaging at $2.
6. **Eargo** (major competitor in US market) spends $60K / month on Google advert platform.

Expecting a propagation of word of mouth after the 1st year, the marketing budget would be lowered to 15% of the sale price and it would be further lowered to 10% of the sale price in the 3rd year. Accordingly the total marketing budget for the 3 years would be:

Year	Sale Price ($)	Projected Sales (#)	%	Marketing Budget ($)
Year 1	399	7015	20	560K
Year 2	449	14905	15	1M
Year 3	499	21920	10	1.1M

Table 6. Marketing budget of hearing care service of Cambridge Audio over the next 3 years.

The breakup of the marketing budget into different channels to be done at a later stage of the project after further discussion with Google and Facebook as the 2 main target channels.

NEXT STEPS FOR THE PROJECT

This document has aimed at providing concrete directions about starting the Cambridge Audio hearing care service. The next step of the project is to realize these outcomes.

Currently Cambridge Audio is looking at a timeline of 9 to 12 months to launch it.

TImeline: Jul 2020 to Jun 2021

A small dedicated team headed by a product manager along with an audiologist with some technical knowledge should spearhead this project. Immediate steps should prioritize the product development and internal (alpha) testing to have a market ready hearing aid within a time frame of 4 to 6 months. This phase will also include integrating accompanying technology namely hearing test and fitting of the hearing aid.

3 to 4 months from Dec 2020 should be dedicated to development of the consumer facing artefact's: website and application. In parallel, real user testing should commence with beta testers with inputs on product + service + pricing + brand. The sophistication and completeness of the 'user test' should increase over time so that we have a market ready hearing care service by the end of March 2021.

The last 3 months (March to May) should be dedicated to marketing and pre release with press to release the final service by the mid of June.

Part 4: Deliver

..... And reflect. This is the final chapter of this strategy document, where an overall guide of the strategy document is provided to showcase the journey and all the deliverables. It also contains a reflection section on the whole process and knowledge products. The following topics are included in this chapter:

1. A visual representation of the journey and deliverables
2. Reflection on the context, design process and deliverables

JOURNEY

The design deliverables presented in the previous chapter all fit together to form a concise launch blueprint of the hearing care service. The infographic below provides an over all view of the design process along with all the outcomes and how they fit into the launch strategy.

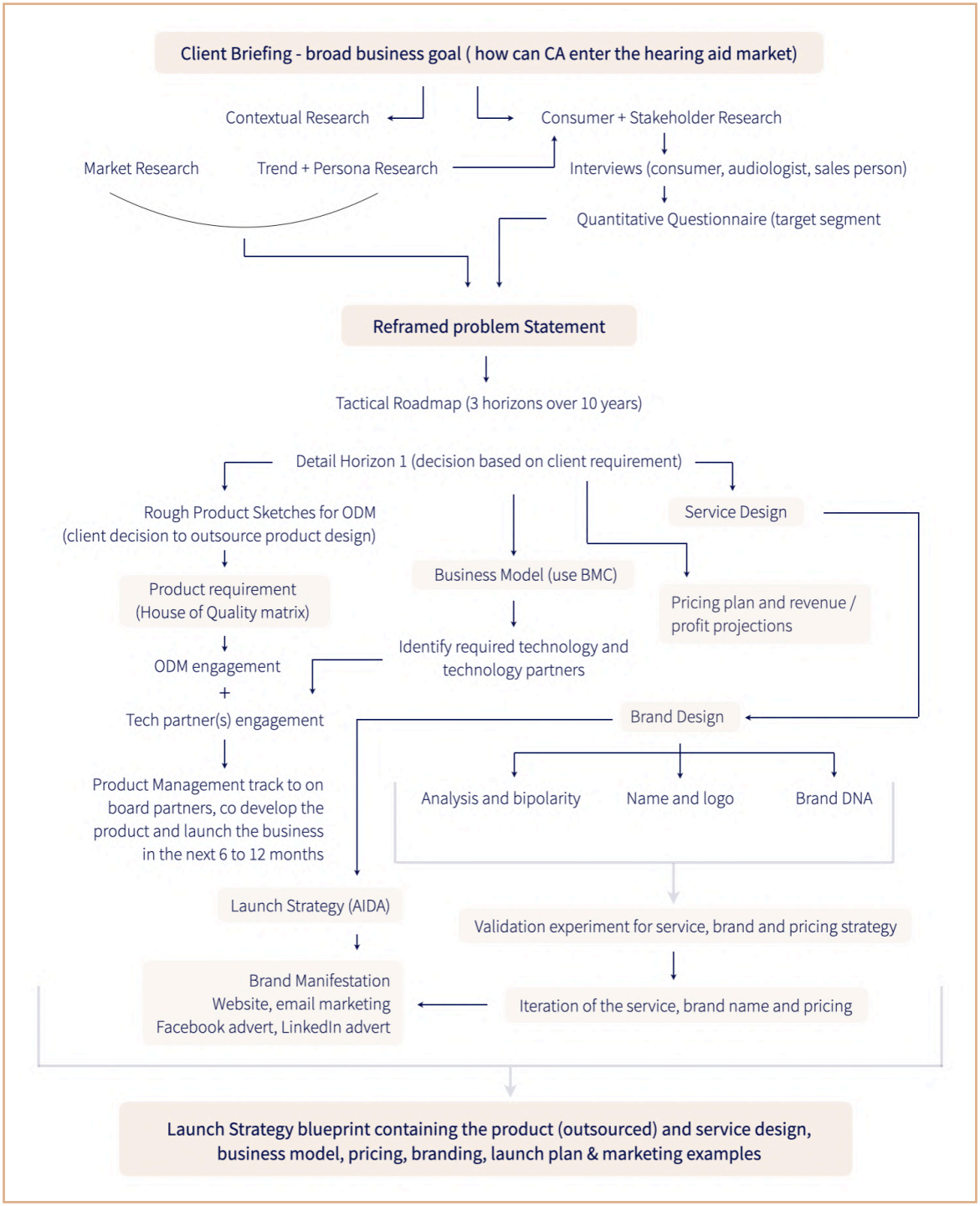


Fig 50. Different deliverables of the design project mapped within the 5 month timeline, major milestones are in bold and minor milestones are highlighted.

A PERSONAL REFLECTION

Any design project is unfinished without a reflection on the process and outcomes of the project. The same goes for this particular hearing care strategy project at Cambridge Audio. This is a personal reflection of my experience for the last 5 months.

Precursor to the project

The project had an unusual beginning: my (would be) chair, Erik Jan Hultink was vacationing last summer and happened to play some tennis with the CEO of Cambridge Audio, James Johnson-Flint. During their holiday, they discussed among other things, different business ventures James had and also his future aspirations. Knowing that Erik was a professor in new product marketing, James asked for help with the launch strategy of one of his future business ventures.

When Erik came back from his holidays, I approached him to be my chair, we had already worked together for almost a year by then; so he happily agreed. He also suggested me to look up James and see if I found his proposal interesting. Amazed by Cambridge Audio, I contacted him in November 2019; and after a few rounds of interview and discussion I was on-boarded. At this point of time, I also requested Sander Mulder, who was already working with me on a different project to be my mentor. Luckily Sander and I visited England in January of 2020, and had a face to face conversation with James as well as the Cambridge Audio team. After this, I came back to the Netherlands and finished all my mandatory courses before starting my graduation from February 2020.

Phase 1: Research Phase and the growth of COVID 19

Fast forward to February: I started my desk research from the Netherlands with a plan to fly to London at the end of February to continue with consumer research on site. A viral pandemic was brewing in China from January and started spreading in Europe from the end of February. I could still fly to England and started interviewing consumers, but this was a major roadblock to physical consumer research. All interviews had to be rescheduled via telephone or video calls.

> Reflecting objectively on the process and outcome, it seems to me that the quality of consumer insights was not compromised due to the pandemic but it did take away the emotion and joy of interacting physically with users as well as having generative sessions.

The pandemic turned so serious by the mid of March that European nations started canceling flights and closing international borders: I (almost) escaped from England and entered Netherlands just a day before the Dutch border was closed. Since everything was telephonic now, I continued conducting the remaining qualitative interviews and adjusting to the new norm of working from home while going out once a week for absolute essentials.

Phase 2: Converging into a Design Statement and living with COVID 19

By the end of March I had gathered & analysed quite a large amount of contextual information to converge to a problem statement and target consumer persona. Considering the commercial nature of the project, I could have done a more detailed quantitative consumer survey for better triangulation. However I was quite happy with the amount of consumer research and the final design goal. By this time I had adjusted well to working from home and living with COVID 19; though it somewhat affected me personally, the pandemic had low impact on the project going forward.

Phase 3: Develop & Validate

My personal goal on this project was learning how to combine different (disconnected) modules of the SPD curriculum to create an (almost) market ready strategy to launch a product or service. Keeping true to that intention, I decided to focus more on detailing the near term scenario (1 to 3 years) and design necessary artefact's to support it.

I combined service design, business model, partner selection, pricing plan, branding, launch strategy and marketing plan to develop a seamless product launch blueprint document.

Reflecting on the process, I am happy how naturally all the different elements fit together to be able to tell a continuous story. I am also content with the pacing of the design phase, being able to manage different deliverables and share them with my university and company supervisors. The final service is an online hearing care solution which fits well in a world ravaged with a viral pandemic. The validation experiment was created as per Sander's suggestions and it was designed to provide inputs on the service, brand and price bracket at the same time. It went surprisingly well, suggesting various changes and setting a platform for future quantitative testing. Overall I am very happy at my design outcomes.

Phase 4: Deliver, Reflect and Plan ahead

This is the closing chapter of a design project and calls for a final round of reflection. Broadly speaking, the initial phase was a bit haphazard with a lot of unconnected qualitative and quantitative data to be synthesized and formed into a closed addressable problem statement. I am happy to have chosen the double diamond method for this project, it is a proven, easy to follow process and provided me the necessary boundaries when I felt lost with information overload. Another aspect of the project which steered certain design decisions was its commercial nature: I prioritized practical design choices and shied away from bold aspirations. Had it been an exploratory research, I could have played more with 'moon-shot' ideas and futuristic designs. However, that also means that a lot of my work will be directly used in the implementation phase over the next 12 months with little to no changes. On top of all of that, I am glad to have got this opportunity to work with an amazing team tackling a problem which is silently affecting millions of people worldwide, every year.

References

This is the closing section of this strategy booklet providing all the sources used while penning the document. As seen next, a mix of academic articles, news clippings, reputed website sources, journals and books were consulted while writing this report.

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