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VOICE TECHNOLOGY IN HEALTHCARE

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ALEXA, WHAT'S THE DEAL WITH VOICE TECHNOLOGY?

Growth of Voice Tech

Over the past few years, voice assistants have become a household staple in the United States.

Today, nearly 1 in 5 of adults own a smart speaker and it is predicted that 50% of global searches will be voice-based by 2020. Voice has become such a ubiquitous platform of communication and has been adopted at record speed.

This is because voice is considered the “universal user interface,” meaning that communicating through spoken word is inherently natural to all humans. That, coupled with the power of Natural Language Processing and Machine Learning, have enabled this interface to grow into what it is today.

New Voice Use Cases

Apple’s Siri (2011), Amazon’s Alexa (2014), and Google Home (2016) have been around for a while now, but market share and size have exploded over time and have become commonplace in everyday life. While Alexa was first developed to enable Amazon shoppers to purchase more from the Amazon platform, home assistant capabilities have expanded well beyond shopping.

Today, many industries beyond technology are being disrupted by the power of voice. Voice recognition and communication is now changing the face of retail, customer service, auto, and telemarketing. **But the industry that can see the highest impact from voice technology is healthcare.**

WHAT IS VOICE IN HEALTH ALL ABOUT?

Voice as Change Agent

Healthcare in the United States is notorious for its broken system and for being slow to adopt new technologies.

But voice communication and analysis have the ability to change the way things have been done for decades in the healthcare industry, from how patients engage with care outside of the hospital to how physicians will learn and interact with medical devices.

There are countless ways voice technology can be implemented into healthcare and a variety of players that are trying to enter the space. **But how will big tech companies integrate this new technology successfully?**

DEFINITION

HC VUI: Healthcare Voice User Interface

New Voice Use Cases

The healthcare industry in the United States today is worth over \$3 trillion annually, and 88% of people looking for health information start with search engines. Over the past 10 years, we have been seeing a steady uptake in the incorporate of digital health and telehealth platforms in healthcare.

Today, almost 70% of providers use some sort of telehealth or telemedicine tool, and 71% of people prefer to search using a voice assistant. An increasing amount of funding and investments are being made in the digital health space each year in effort to help solve the broken healthcare system in America.

Given this trend towards digitally enabled health tools, it is no surprise that the opportunity for voice in health to change the way we deliver healthcare is large and a lot of venture money is pouring into the space.

WHAT IS VOICE IN HEALTH ALL ABOUT?

Hospital VUI Pilots

Imagine a voice assistant being able to support a physician in making a diagnosis, or your Alexa being able to check in with you at home after a recent hospital discharge to give you medical advice. There are many startups and organizations that are pioneers in the healthcare VUI space, and the number is growing substantially.

There are also a few hospitals across the country that are beginning to pioneer Alexa within patient rooms and surgery units, such as **Boston Children's Hospital** and **Cedars-Sinai in California**. The chart below outlines the different use cases for how VUI is being implemented and piloted in healthcare.



How Boston Children's is Implementing Voice Technology

Boston Children's Innovation and Digital Health Accelerator (IDHA) combines clinical resources with advanced voice-recognition technologies. Pilots underway:

- **KidsMD** - personalized pediatric health recommendations through Alexa
- **Intensive Care Unit** - hands-free way to access basic information, maintaining infection control standards
- **Pediatric Transplants** - pre-operative organ validation and checklist process voice guidance

HEALTHCARE MARKET SEGMENTS & VOICE TECHNOLOGY LANDSCAPE

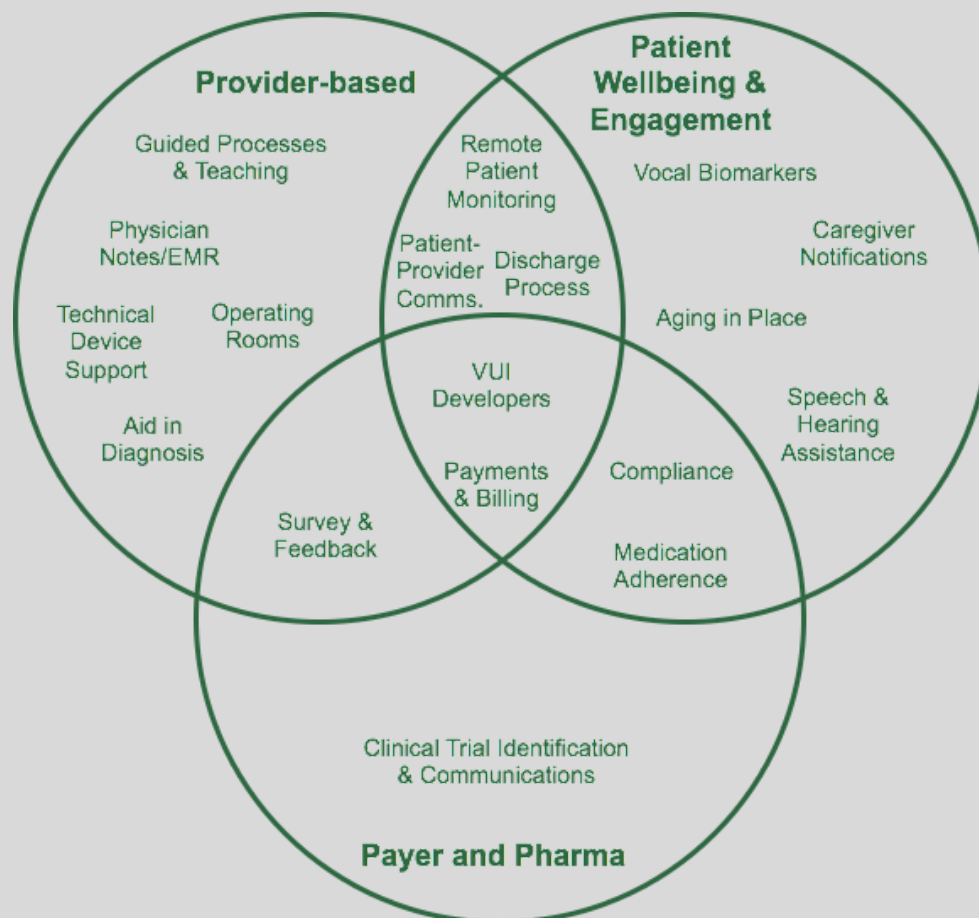
Healthcare Market Segments

There are a lot of different ways in which voice technology in healthcare is being implemented.

To understand the big picture of this landscape, it helps to boil the market down into three buckets:

- Provider
- Patient wellbeing and engagement
- Pharma/payer

TODAY'S VOICE IN HEALTHCARE LANDSCAPE



WHAT IS BIG TECH'S ROLE IN HEALTHCARE VOICE TECH?

Big Tech's Exploration of Health

So how does big tech fit into this healthcare landscape?

At first glance, one may think that implementing healthcare-based VUI into home assistants would be a natural fit for the large tech players. Amazon's Alexa has just begun to explore this space, figuring out different ways to best enable healthcare within the Alexa devices.

For example, in 2017, Alexa sponsored a diabetes challenge, which gave prize money to the team who developed a voice-enabled technology which helped people better manage their diabetes. Alexa and similar voice assistants have the opportunity to serve as a virtual member of a clinical care team, which is a huge opportunity both for health systems and big tech.

Focusing on 'Skills' Development

According to a Product Manager that works on the Alexa team, Amazon integrates unique capabilities into the Alexa ecosystem by employing 'skills,' which are built by third party developers and are individually downloaded to a consumer's device.

So today, if a consumer wants to use WebMD features on an Alexa, he/she would open the Alexa app, search for the skill, and then download to integrate on the device. Obviously, this process is somewhat clunky and the consumer needs to know exactly what to look for.

Some examples of health-centric skills that are available on Alexa today include FitBit, Healthcare Genius, and Health Tap, which offer generic, un-personalized health information.

WHAT IS BIG TECH'S ROLE IN HEALTHCARE VOICE TECH?

Incentivizing Skill Development

Perhaps not surprisingly, this model mimics Amazon's shopping platform model, which is made up of hundreds of thousands of sellers who connect to buyers through Amazon's platform.

Amazon's shopping platform business model allows them to scale extremely large without actually owning the sales or keeping the inventory. Similar to Amazon sellers, Alexa skills developers have the opportunity to scale and make money through their skills on Alexa, which incentivizes them to make the best possible skills to drive sales.

Google Home mimics this third-party developer model as well, naming their 'skills' as 'services.'

Healthcare Is Different than Retail

Alexa has over 70,000 skills created by third-party developers, ranging from a Jeopardy-playing app to "200 ways to remove a stain" by P&G.

But healthcare is much more complicated than selling games or laundry detergent. Developers and big tech need to consider HIPPA, legality, and data ownership. So what is the best way for voice assistants to successfully integrate the opportunity of health within voice?

Big tech needs to think through how the business model of enabling healthcare skills will be structured

WHAT BUSINESS MODEL SHOULD BE DEPLOYED?

Assessing Third Party Developer Model

Before big tech uses the third-party developer model to enable health in voice, it is important to assess what are the benefits and drawbacks of keeping that structure.

The below assessment helps to determine the tradeoffs associated with integrating healthcare VUI business models, and big tech should keep these in mind when thinking through their business models.

Third Party Developer Ecosystem Tradeoffs

Pros

- **Diverse Ecosystem** – By allowing third party developers to create skills, home assistants can offer users a broad variety of options to patients and providers, meeting a diversity of needs in the market, quickly.
- **Speed** – According to a PM at Alexa, it's Amazon's role to show developers what's possible, and then let them do the rest of the work, which enables fast scaling.
- **Governance** – Obviously, HIPPA and patient data security are huge challenges when it comes to harnessing voice technology in at-home assistants. Although Amazon is currently working on personal authentication measures and speech-based user recognition, this technology is still far from being used as a single factor authentication – privacy risks.

Cons

- **Quality Control** – When it comes to people's health, delivering a mediocre product is a problem. By allowing limitless third-party developers to create VUI health tools, it is important that the patient receives the correct information.
- **Paradox of User Choice** – With a platform ecosystem of many skills that seem to do basically the same thing, how is a patient to choose? Healthcare is complicated enough - adding more options for the patient to choose from makes things even more complex for them.
- **Siloed Skills** – Keeping all skills separate can make things harder for the user. Will there be a medication adherence skill for every unique med a patient is on? How will skills talk to one another for patient and physician success?

WHAT BUSINESS MODEL SHOULD BE DEPLOYED?

Standardized VUI in Healthcare

It's unlikely that the big tech voice players will eradicate the third-party business model within healthcare skills.

However, if they want to play in the healthcare VUI space, **it is important that they take on some responsibility for the patient and provider.**

They may want to set best-practices for their healthcare skills, or even mandate a single standardized VUI, like **Orbita**. And at the end of the day, this business model and strategy will also need to align with organization goals and strategic principals.



Orbita develops AI-driven voice technology and chat apps for enterprise platforms in the health space.

Orbita's enterprise-grade platform does the heavy lifting of NLP and machine learning in the clinical space, and then licenses to healthcare consumers services, call centers, provider facilities, and population management tools.

WHAT IS THE RECIPE FOR SUCCESS?

Standardized VUI in Healthcare

There are always a lot of moving pieces when a cutting-edge technology is introduced into a new market. Big tech needs to become experts in the nuances of the healthcare industry to be successful in the space. They will need to invest a large amount of resources to enable their voice assistants to excel over their competitors. It is crucial to evaluate the potential roadblocks (such as HIPPA or integration with existing technologies) and consider tradeoffs (such as giving up data ownership) to help define future strategy.

The winning companies will be ruthless and diligent about taking an unwavering stance in the healthcare VUI space and know exactly where they will deliver value for the ecosystem.

Asking the Right Questions

Below is a handbook to think through some of the important topics and questions for big tech to ask when assessing how to implement voice technologies in the health space, organized around key areas likely to trip up healthcare VUI development efforts.



HANDBOOK: IMPLEMENTING VUI IN HEALTHCARE

Key considerations when implementing
voice technology in healthcare

DATA AND PRIVACY

Clarify Who Will Manage and Own Data

Determine who will own and store data across the care continuum, and consider how that may change across provider, patient, and payers.

Key questions to answer:

- **When patients and providers interact with third-party skills, who will own the data generated?**
- **What can (and can't) your company do with the data generated?**
- **Who will own and fund the data storage?**

Understand How You Will Determine Patient Recognition and Comply With HIPPA

In order to determine sensitive patient information, voice assistants need to validate patient identity. While Amazon's Alexa just became HIPPA-eligible, most third-party developers still have a long road before voice is HIPPA compliant. There are HIPPA-compliant voice software startups, including Sopris Health, Suki, and SayKara. Key considerations for success:

- **Consider partnering (or purchasing) a HIPPA compliant voice technology startup**
- **Take leadership on HIPPA validation to help third-party developers and pave the road to compliancy**

Key questions to answer:

- **How will identity validation change from skill-to-skill?**
- **How will patient information be anonymized?**
- **Where will anonymizing happen in the data analyzation process?**

HIPPA requires strict rules around who can handle PPI, and this process can be complicated to set up within an organization, so defining it earlier, rather than later is wise.

DATA AND PRIVACY

Define Ownership and Legal Responsibility

Defining ownership and responsibility are extremely important for big tech to think through in order to avoid lawsuits and publicity. Key considerations for success:

- **Include a legal team as early, and often, as possible**
- **Clarify who is responsible for patient mis-information from third-party skills**

Think through different scenarios unique to healthcare, including:

- **What happens if Alexa recommends a patient who is experiencing tightness in their chest to take an Advil and sleep, but that person was having a heart attack?**
- **What happens if someone assumes a different identity when interacting with voice?**
- **What if a voice assistant records malpractice from providers in hospitals?**

SALES AND PARTNERSHIPS

How Should You Integrate with Existing Entities?

Integrating with the existing technologies used by payers, pharma, and providers is important to enable a cohesive ecosystem. Key considerations for success:

- **Hire a seasoned healthcare sales team to decide which skills are relevant to which institutions**
- **Determine whether to sell individual solutions or bundles of skills**
- **Figure out how to create cross-functional skill communication to create a seamless experience**
- **Determine who has purchasing decision to implement voice assistants within each of these settings**
- **Define metrics that are most important when deciding to integrate certain skills and how to prove those metrics out**

It is likely that the first adopters will be the Innovators (typically only 2.5% of the overall market), so think about how you will convince the next wave of customers, the Early Adopters, to deploy voice assistants in healthcare.

QUALITY OF CARE

Validation of Skills for Quality

Think through the process for validating skills to deliver quality VUI in the healthcare space. Key considerations for success:

- **Build a rigorous, defined skill validation process that your team follows diligently to ensure patient protection and quality**
- **Build an internal expertise board to critically assess each incoming skill**
- **Create a team to determine which skills are relevant to various audiences and help connect end-users to the best possible skills**

Investing in Healthcare VUI

Building an entire lexicon of clinical language is extremely complex and includes extensive logic and machine learning capabilities. Key consideration for success:

- **Consider investing in a single platform/language to standardize all VUI in healthcare, such as Orbita**

This may give a more seamless user experience throughout the platform, no matter which skill you are interacting with.

Understand Changes in the Voice Ecosystem

It is important to understand changes to the voice assistant ecosystem and to determine how these changes will impact the health space.

UNDERSTANDING PROVIDER SETTINGS

Integration With Existing Technology

Rules and regulation around how different pieces of technology interact with one another in a clinical setting is complex, and integrating with hospital Electronic Health Record (EHR) systems can be a clunky process. The largest EHR provider, Epic, built its own app store, called App Orchard, that allows other tech-enabled services to sync with the Epic patient data records. Key considerations for success:

- **Prioritize integration and compliance with hospital EHR systems**
- **For providers using Epic EHR systems, leverage App Orchard offerings already developed and approved for provider settings**

Clinical Workflow Expertise

Understanding the clinical workflow to enable utilization of the technology is critically important for developing effective voice solutions in healthcare. Key considerations for success:

- **Determine who within your organization is best positioned to map to existing clinical workflows**
- **Consider hiring deep healthcare expertise or consultants/partners to help map voice solutions to clinical processes**

Rollout Strategy

Rollout should happen in small stages using pilot programs before widespread introduction. Key considerations for success:

- **Identify teams willing to pioneer and test VUI applications to launch initial pilot program**
- **Determine how you will track success of rollouts**

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