

# **Mobile Consumer Health: The New Frontier of Technological Innovation**

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## **Executive Summary**

Over the last five years, rapid innovations in mobile technology have resulted in the explosive adoption of smartphones and tablets (and applications built for them) that not only allow users to access an endless amount of information, but that can collect a wide variety of real-time user data, regardless of location. The implications of this within the health industry are vast. Mobile devices can now be used as diagnostic tools, preventive health coaches, and healthcare coordinators – all for minimal, if any, cost to the user. These advances, combined with rising disease rates and healthcare costs, position mobile health products and services to gain increasing adoption and importance in the foreseeable future.

However, like many other industries characterized by rapid advancements, the future is still uncertain. Many questions remain about the future of mobile health, which may be shaped by many forces, including consumer adoption, technological innovation, healthcare industry adoption, and regulation of health-related technology. Our goal for this paper is to help mobile health players navigate and plan for some of this uncertainty, and thus position themselves for greater success in the next five to ten years. We will apply two frameworks in the paper: *Using Alliances to Build Competitive Advantage* and *Scenario Planning*. The former will help us highlight industry trends for using partnerships to mitigate risk and gain new advantages, while the latter will help us isolate and expand on the key trends that will likely inform the industry landscape for the next decade. We will paint several possible pictures of the future of mobile health, and while it is impossible to say exactly which scenario will emerge, we hope the paper will help managers identify the most important uncertainties and likely outcomes, and focus on adopting strategies that mitigate their vulnerability and capture opportunities within this emerging industry.

## **I. Introduction**

### **Background**

We are embarking on an age of transition in healthcare that is being driven by burdensome costs, emphasis on quality, and challenges to accessibility – a transition that is being enabled by new digital tools.

A new future is being imagined (time scale depends on your level of optimism) where science and technology advances can vastly improve health delivery, enhance diagnosis, prevent chronic disease, coordinate care effectively, and incentivize health outcomes (rather than services provided), all while reducing costs and helping people live longer and healthier lives.

Investors, established companies, doctors, hospitals, startup founders, and other actors are working to change healthcare through innovative technology. The future of healthcare will see the application of new tools from genomic sequencing, artificial intelligence, wearable and implantable sensors, as well as new mobile tools. Rapid changes will transform our idea of healthcare with a host of new actors, and traditional actors in new roles. We'll see “futuristic” tools as today's R&D within synthetic biology, robotic surgery, telemedicine, and 3D printing (to name a few) increasing in application and scale.

While examining the current innovations and near-term strategies that are shaping the future of healthcare for the next decade, we found there to be a recurring discussion of a health system that is more continuous and preventative, and less episodic. We have also seen many initiatives that focus on putting the patient, not the hospital, at the center of care. Common to these conversations has been the term "consumer health," and an emphasis on mobile technologies that are now enabling that new frontier. When we use the term consumer health, we mean a collision of forces including advances in technology, bioinformatics, behavioral science, design, and engineering that enable health to be personalized, preventive, and take place more outside the doctor's office than inside.

Focusing on mobile health as a central theme within “consumer health” allows us to explore a topic of great activity, and with strong potential impact. Today’s smartphone is a powerful computer in your pocket, and it enables consumers to obtain information in real-time, relevant settings so they can make informed health decisions. The phone also enables better communication and coordination between patients, healthcare providers, family, and friends, and can even support diagnostics and detection of issues. Today’s applications of mobile technology to health are just the tip of the iceberg.

Within this topic, we have two primary areas of focus. One area is the inputs that make up "the digital nervous system." The nodes of this system include wireless sensors in your mobile phones<sup>1</sup> and consumer-inputted data on mobile devices. We also focus on tools that give users the ability to make sense of and act on these data in order to drive better health outcomes. We will look at the software and "big data" services that analyze and visually represent health data for patients and consumers.

We focus geographically on the U.S. market given our access to companies for our studies, but many of the implications discussed remain relevant for other markets. As was the case in the field of mobile payments, consumers and providers in emerging markets are often adopting technology in mobile health earlier and faster than their counterparts in developed economies. Having fewer physicians in these areas has made the need for mobile health and telemedicine more pressing. The strict regulatory system and entrenched players in the U.S. are pushing innovation offshore, and we are already seeing great usage of mobile health applications in India and Kenya that warrants further study.

In this paper we explore how healthcare incumbents, startups, investors, and other organizations can position themselves to innovate effectively and harness value from mobile health technology. Which consumer groups and use cases will grow in the coming years? How will organizations form alliances and partnerships to improve clinical outcomes and earn financial returns? Does the future of health-tech

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<sup>1</sup> Note: The input nodes also include wristbands, digital pill bottles, and host of other smart/sensing other hardware that is outside

belong to designers, engineers, or game developers? Startups, or established companies with large R&D budgets? How quickly and dramatically can we expect improvements in clinical outcomes?

## **Driving Forces**

### *Healthcare crisis*

In the U.S. (like in most developed countries) healthcare spending is greatly outpacing GDP growth, while quality of care remains very uneven. In China dissatisfaction with the cost and quality of health treatment has even made doctors a target of physical attack.<sup>2</sup>

Demand and costs will continue to rise owing to ageing populations and the increase in chronic diseases.

In the U.S. we are in cost and quality crisis:

- Nearly one in two American adults live with at least one chronic illness<sup>3</sup>
- 68 percent of adults in the US are overweight or obese<sup>4</sup>
- We spend 17 percent of our national GDP on healthcare, or \$2.7 trillion in 2011 on healthcare expenditures<sup>5</sup>
- The U.S. spends twice as much on healthcare as any other nation
- The U.S. ranks 50th in life expectancy and 39th on the overall health status of its citizens worldwide<sup>6</sup>

The bad news gets worse in the U.S. as our problems are worsening:

- By 2020, 52 percent of Americans will have diabetes or pre-diabetes.<sup>7</sup>

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<sup>2</sup> "Heartless attacks: Medical staff are fearful as anger against their profession grows." *The Economist*. Print Edition: 21 July 2012.

<sup>3</sup> "Chronic Diseases: The Power to Prevent, The Call to Control At A Glance 2009." CDC's National Center for Chronic Disease Prevention and Health Promotion Web Site. Accessed November 2012.

<sup>4</sup> "Obesity and Overweight, FastStats." CDC's National Center for Chronic Disease Prevention and Health Promotion Web Site. Accessed November 2012. <http://www.cdc.gov/nchs/fastats/overwt.htm>

<sup>5</sup> "National Health Expenditure Data." Center for Medicare and Medicaid Services. CMS.gov. Accessed October 2012.

<sup>6</sup> "Country Comparison: Life Expectancy at Birth." *World Health Organization Factbook*, CIA.gov. Accessed November 2012. <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2102rank.html>

- By 2020, 31 percent will have high blood pressure.<sup>8</sup>

In the U.S. the passing of The Affordable Care Act was one step towards addressing America's ailing healthcare system. But it takes more than legislation to redirect a slow-moving, enormous ship that is sailing into dangerous waters.

### *Mobile technology adoption*

Recent data from "Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2011–2016" help quantify existing mobile activity, and forecast growth going forward.

- In 2011, global mobile data traffic more than doubled (133 percent increase) for the fourth year in a row.
- 2011's mobile data traffic was eight times the size of the entire global Internet in 2000.
- While smartphones represent only 12 percent of total global handsets in use today, they represent over 82 percent of total global handset traffic.
- Average smartphone usage nearly tripled in 2011 with the average amount of traffic per smartphone in 2011 was 150 MB per month (up from 55 MB per month in 2010).<sup>9</sup>

Growth will continue to accelerate, undeterred by slow economic growth. Cisco predicted that by the end of 2012, the number of mobile-connected devices would exceed the number of people on earth. They predict that by 2016 there will be 1.4 mobile devices per capita, representing 10 billion mobile-connected devices.

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<sup>7</sup> "The United States of Diabetes: Challenges and opportunities in the decade ahead." *United Health Care Group*. November 2010. Working Paper.

<sup>8</sup> "Blood Pressure Facts." CDC's National Center for Chronic Disease Prevention and Health Promotion Web Site. Accessed November 2012. <http://www.cdc.gov/bloodpressure/facts.htm>

<sup>9</sup> "Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2011-2016." *Cisco.com*. 14 February 2012.

In emerging markets, mobile phones have become the dominant way of getting online. In India, mobile Internet traffic surpassed desktop traffic in May 2012.<sup>10</sup> Mobile phone use has exploded in Africa, with the number of mobile subscribers rising from 54 million to 649 million between 2003 and 2011.<sup>11</sup>

In the U.S. more than 104 million people already own smartphones.<sup>12</sup> Globally, by 2016, mobile devices will account for about 80 percent of all broadband connections among the G-20 nations.<sup>13</sup>

### **Current Mobile Health Landscape**

At the intersection of these two forces is the mobile consumer health landscape, which is changing rapidly, and showing signs of momentum are all around. While the Internet and connected devices have changed the ways we shop, learn, manage our finances, and view media, the impact of “e-health” is still in early stages.

What we are seeing with mobile health, though, is the true promise of the web, as outlined by Albert Wegner of Union Square Ventures in his article “Power to the People:”<sup>14</sup>

[The web] is taking power away from existing large institutions and pushing it out to smaller entities and often all the way to individuals. In the process it is building up new institutions (such as Google), but the net result appears to be a distinct shift of “power to the people.”

To date, mobile health services have been heavily consumer and wellness-focused. Mobile health has been “growing in the *interstices* of the traditional system” with new products and services that are beginning to influence the traditional healthcare system.<sup>15</sup>

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<sup>10</sup> StatCounter Global Stats November 12. Accessed via Mary Meeker, “Internet Trends 2012 Year End Update.” 3 December 2012.

<sup>11</sup> Ghosh, Palash R. “Mobile Phone Service Skyrocketing in Africa, With Huge Potential for Further Growth.” *International Business Times*. 10 November 2011.

<sup>12</sup> “Comscore February 2012 US Mobile Report.” *Comscore.com*. 3 April 2012.

<sup>13</sup> Dean D, Di Grande S, et al. “The Connected World: The Digital Manifesto: How Companies and Countries Can Win in the Digital Economy.” *Boston Consulting Group*. 2012

<sup>14</sup> Wegner, Albert. “Power to the People.” *USV.com* 22 September 2008.

<sup>15</sup> “Booting Up Mobile Health: From Medical Mainframe to Distributed Intelligence Report.” *Institute For the Future*. May 2009



As one example of need, the healthcare system is overburdened with patients with chronic conditions who fail to take their medications regularly or comply with doctors' recommendations. Non-adherence is estimated to cost close to \$300B to the U.S. healthcare system annually. The National Community Pharmacists Association found that nearly 75 percent of adults surveyed said they failed to correctly follow physicians' instructions for taking medicine, and nearly one in five prescriptions for controllable conditions like high blood pressure are never filled. Non-adherence drives high costs, higher death rate, and lower quality of life for patients. It is just one area where personal, mobile tools such as reminders and alerts can potentially help lower cost and increase health outcomes.<sup>16</sup>

Overall, digital health startups raised over \$956M in venture funding in 2011, and many deals were struck in the mobile health space<sup>17</sup>. According to a recent study by Manhattan Research, the number of adults in the U.S who used mobile phones for health tools and information rose from 61 million in 2011 to 75 million in 2012<sup>18</sup>. The use of tablets to access health-related tools doubled in the last year, with 29 million people using them for health-related activities this year. Additionally, the survey found that among Americans age 55 and older who use tablets, about half are using them for health purposes. While 19 percent of smartphone users have health applications<sup>19</sup>, an estimated 84 percent of doctors use tablets – 74 percent iPads, 10 percent other.<sup>20</sup>

Overall, the U.S. mobile health market is expected to grow to \$4.6 billion by 2014 (up from \$1.5 billion in 2009), according to telecom, technology and media consultancy CSMG.<sup>21</sup>

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<sup>16</sup> Dr. Harris A. Berman and Dr. Michael Rosenblatt. "Prescription for national health: Get patients to take their medicine." *Boston Globe*. 17 April 2012.

<sup>17</sup> "Rockhealth 2012 Mid-Year Digital Health Funding Report." *RockHealth.org* 25 June 2012.

<sup>18</sup> "Cybercitizen Health U.S. 2012 Study." *Manhattan Research*. September 2012.

<sup>19</sup> Fox, Susannah & Maeve Duggan. "Mobile Health 2012." *Pew Internet & American Life Project*. 8 Nov 2012.

<sup>20</sup> Fox et. al.

<sup>21</sup> "Qualcomm Forms New Unit, Investment Fund For Wireless Health." *WSJ.com*. 5 December 2011.

## Early Signs of Opportunity

The promise of mobile health is to enable consumers to better understand their own health data, make linkages between their health metrics and behaviors, and take meaningful steps to improve their health, well-being, and happiness.

Mobile technology is starting to influence the quality, cost, and delivery method of healthcare - supporting chronic disease management, medication adherence, diagnostics, extending services to underserved patients and geographies, and improving clinical efficiency.

The current landscape is full of powerful examples of how mobile technology is influencing the ways in which we monitor our own health, coordinate with care networks, approach diagnostics, compliance, and more.

*Mobile for Monitoring:* **AliveCor** has developed a device (targeted at \$100) that will turn any smartphone into a clinical-quality electrocardiogram (ECG) recorder by both patients and medical providers. With this innovation, patients will be able monitor their heart health anywhere, at any time, with their mobile phone. Data can be sent to the cloud in real time, allowing your cardiologist to look at it instantly.<sup>22</sup> **Ginger.io**, spun out from MIT, has developed a mobile application that analyzes data passively collected from your location, activity, messaging behavior, and more to detect if you are having health problems or are on the verge of a critical health issue (e.g., manic episode, or case of the flu).

*Mobile for Diagnostics:* **DermLink** is one of many competitors launching HIPAA-compliant applications that enable remote diagnosis of dermatology cases via mobile phone by connecting users to doctors. Another competitor, **Skin Scan**, lets users take a picture of a mole, which is then

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<sup>22</sup> Regalado, Antonio. "Your Heartbeat on an iPhone." *MIT Technology Review*. 14 September 2011.

sent to servers for analysis, and finally sent back to the user with notes about risk levels and abnormalities.

*Mobile for behavioral control and adherence:* Boston-based **Healthrageous** has developed a platform that combines biometric data from health-tracking devices with health information and personal goals to help users create action plans and overcome their chronic conditions. **Janssen Healthcare Innovation** (a unit of Johnson & Johnson) has launched Care4Today, a mobile messaging platform for aiding patients with their medication routines. **Azumio** has created several “biofeedback” health apps with behavior management apps targeted at sleep, fitness, heart rate monitoring, glucose monitoring, and even stress management.

The above examples represent just a small sample of companies and problems where mobile health is being applied. The use of mobile applications in medicine appears at an inflection point of development and uptake by consumers and medical professionals.

### **Relevant Stakeholders**

From health insurance providers to hospitals to tech startups, there are a wide variety of actors playing in the rapidly developing mobile health space and placing bets on the growing importance of mobile health technology.

*Insurance companies:* Insurance companies must now adopt a more consumer-driven marketing strategy, while increasing financial incentives for health insurance companies to offer preventive health management tools through the channels that members prefer to use.

*Employers:* There is a great incentive to reduce the costs of healthcare for employee sponsored health plans. Many employers have recently begun to embrace programs that incentivize and

engage employees to adopt healthier behaviors now – notably with focus on combating obesity and smoking – reducing the chances that they will require expensive treatment in the future.

*Hospitals:* New policies and rising costs have spurred hospitals to look at preventive measures such as mobile health monitoring and tracking to keep patients consistently engaged in healthy behaviors after they leave.

*Physicians:* Physicians represent both a significant opportunity and a barrier for the mobile health revolution. Doctor adoption of mobile health apps would drive consumer adoption and broader expansion of health apps into clinical territory, but incentives need to be aligned for doctors to participate in these platforms and offerings.

*Tech startups:* Given the rapid pace of technological advancement and the low cost of development in this space, nimble startups are well positioned and incentivized to compete with large, bulky corporations and take aim at the vast revenue potential in mobile health.

*Multinationals:* Large companies like Nike and GE are throwing their weight behind new health technologies in order to stake their place at the forefront of innovation and reap the potential financial benefits it holds. Both companies of those companies, for example, have recently spun out startup accelerators in order to incubate innovation from within, and GE has invested \$6 billion into its Healthyimagination fund, which is dedicated to finding ways to make healthcare more affordable and accessible around the world.

## **II. Methods**

## **Key Questions**

Due to the presence of great ambiguity in this industry, we have structured our research around two key questions:

1. What are the emerging partnership trends that are shaping (and being shaped by) the dynamics of this industry? How are companies successfully working with one another, despite competition, to gain advantages or mitigate risks?
2. What are the possible scenarios for the future of mobile health, and how can industry players plan accordingly?

We have employed a variety of research methods to help answer these questions, including industry interviews (ranging from startups to major institutional healthcare players), academic and industry articles, major news outlets, and more.

## **Research Frameworks**

For the purposes of this project, we considered seven possible frameworks for managing emerging technologies. In the end we selected two frameworks to help structure and enhance our analysis.

First, we use the framework of *Using Alliances to Build Competitive Advantage* to understand potential partnerships in the mobile health space. The framework suggests four general strategies: knowledge sharing, finding complementary partners, creating and managing assets unique to the partnership, and establishing effective governance system. We plan to examine these strategies, in the context of the mobile health industry with the goal of identifying effective ways for companies to develop alliances that are key drivers for success.

Lastly, we use *Scenario Planning* to makes sense of the complex and highly volatile environment in mobile health by organizing underlying uncertainties. The methodology is well suited for uncertain and

complex industries where it is difficult to accurately predict the future, and we feel this applies well to the future of mobile health.

### **III. Using Alliances to Build Competitive Advantage**

In markets like the one we are studying, companies can face high costs, large knowledge gaps, and significant penetration barriers when it comes to creating scalable products and engaging customers. For example, pharmaceutical companies might need help establishing touch-points with consumers beyond the point of sale in order to increase medication adherence. Small startups that are capable of high-quality app development may seek larger strategic partners to help them reach consumers in medical settings. Insurers might need to partner with a range of mobile health applications to broaden their offerings to their plan holders. A range of app providers might need to coordinate and partner to ensure consumers can get value from a “cross-platform” data exchange. Technologists may need to work with researchers and hospitals to measure efficacy from usage of new interventions. These examples show a need for a wide spectrum of potential alliances in the mobile health space.

Alliances are defined as a “cooperative relationship between two or more organizations, designed to achieve a shared strategic goal.” The co-existence of cooperation and competition is described as a “hallmark of strategic alliances”.<sup>23</sup> The ability for both sides to walk the line between these two poles is often what makes an alliance work or fall apart. We have found this interplay between cooperation and competition to be particularly relevant in mobile health partnerships, where alliance partners often have some element of competition for the same customers or data assets.

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<sup>23</sup> Day, George S. (Editor), Paul J. H. Schoemaker (Editor), & Robert E. Gunther (Contributor). *Wharton on Managing Emerging Technologies*. 30 March 2000.

Alliances provide an opportunity for companies big and small to tap into new technologies, markets and distribution channels. Alliances in high technology also offer ways for companies to broaden their value proposition to consumers and enhance their competitive proposition. In some cases, alliances offer opportunities to influence or control technology standards. Sometimes, they are necessary for survival. As the world of healthcare and our means of accessing it change rapidly, strategic alliances can mean the difference between boom and bust.

Market uncertainty plays a large role in the formatting of alliances within emerging technology industries. The combination of both customer demand and technology development uncertainty drives risk up in emerging technology-based industries.<sup>24</sup> From a technology development side, speed can be critical because powerful first-mover advantages can be driven by building an installed base of users (in turn driving critical mass and network effects). Given high technology costs and time pressure, forming alliances can be an alternative to developing technology in-house. In the current mobile health technology, there is enormous pressure to lock in early users to a platform, driving the creation of new alliances early in a company's life or product cycle.

Given high demand uncertainties, companies are often reluctant to sink costs into developing specialized assets based on current market trajectories. As a result, vertical integration has seen low success rates in highly volatile and new industries, and alliances can improve speed and flexibility. In mobile health, with lumpy, constantly changing markets and uncertain demand from "wellness-focused" consumers (and those with larger chronic health needs), alliances are often used as a means to target different market segments.

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<sup>24</sup> Wharton on Managing Emerging Technologies

Using this framework as a lens, we can help answer some looming questions about alliances in the mobile health space. Specifically:

- What kinds of alliances are most prevalent in this sector?
- What are the primary advantages mobile health companies are seeking through these alliances?
- Are there examples of alliances in mobile health between “unlikely bedfellows?” How does competition come into play?

Different types of alliances can also be generally categorized by stage; as a company or technology develops and uncertainty goes from high to low, alliances are forged for different purposes. For example, early on, “window strategies” are commonly used to acquire knowledge; “exploring options” is a strategy that provides an opportunity to hedge bets on future winning technologies; and later in a company’s lifecycle, “gaining position” tends to be most important to gain access to markets, lower cost, or differentiate product offerings.

Regarding strategies for managing effective alliances, this framework suggests four general mechanisms: knowledge sharing, finding complementary partners, creating and managing assets unique to the partnership, and establishing effective governance system. The importance of each mechanism is driven by the strategic goals of an alliance.

In order to elaborate on the types of partnerships mentioned above, we will explore two cases of mobile health alliances that exemplify the current landscape, one highlighting complementary partnerships and one highlighting asset sharing. We have selected alliances both between startups and larger incumbents, and between two or more small startups in order to represent the variety of prevalent alliances in this space.



## Case 1 - AirStrip and Qualcomm: Finding Complementary Partners

In complementary partnerships, the distinctive resources of alliance partners collectively generate greater competitive advantage than the sum of those resources obtained from each partner individually.<sup>25</sup> The resources also have to be distinct enough to add significant value to both sides. Sometimes, this results in collaborations between seemingly unlikely partners sitting at different ends of the technological spectrum. The case of the AirStrip-Qualcomm partnership is characterized by all of these elements.

AirStrip Technologies is a young software company that makes applications allowing doctors and caregivers to monitor patients' vital signs (such as heart rate, blood pressure, temperature, weight, pulse, and more) using their smartphones or tablets. The company's products send critical health data directly from hospital monitoring systems and bedside devices to caregivers' mobile devices through a secure, HIPPA-compliant process.

These products were originally designed only for patients who are inside hospitals, rather than at home. However, AirStrip understood that with a growing emphasis on quality care and better health outcomes, it was important to expand patient care outside hospitals by allowing physicians to receive important data and critical updates or alerts while patients are at home. They also needed to ensure that their native applications could scale and adapt within the ever-changing world of mobile operating systems and devices.

Many people were surprised when AirStrip announced an undisclosed strategic investment from Qualcomm, the global semiconductor giant, in February of 2012. After all, just a year and a half before,

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<sup>25</sup> Wharton on Emerging Technologies

they received \$30M in funding from Sequoia Capital. And the company was already bringing in significant revenue, reducing the need for additional investments.<sup>26</sup> However, a closer look at the partnership reveals why the alliance was uniquely beneficial.

The investment came from Qualcomm's \$100M Life Fund, a relatively new unit within the Qualcomm Ventures group tasked with focusing on venture-backed wireless health companies and aiming to “help accelerate commercialization of wireless health technologies.”<sup>27</sup> One of the first offerings of the Qualcomm Life unit was the 2net Platform, a cloud-based system that can collect data wirelessly from connected devices (whether they be hospital or at-home devices), encrypt them, and store them in Qualcomm's Web-based 2net Platform. Partners, such as app developers, can decide what data to collect from users' devices, what interface to collect them with, whom to send the data to (e.g., doctors, caregivers, etc.), and in what form to send them. The platform is designed to be universally interoperable with different devices and applications, enabling end-to-end connectivity while allowing device users and their doctors to easily access biometric data no matter what technology they are using.

Qualcomm executives have stated that the company doesn't plan to get into the healthcare business with its own software or devices, but rather is trying to enable partners' products. "We want to make it easy for these companies to get their devices on the Internet and get them to connect in ways that are relevant," said Don Jones, vice president of global strategy and market development for Qualcomm Life.<sup>28</sup> Given the extent to which wireless connectivity is becoming increasingly important within healthcare, it is not surprising that a company like Qualcomm is taking big bets in this space. In fact, according to a recent report by Rock Health, Qualcomm Ventures made the most digital health investments of any investor in

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<sup>26</sup> Dolan, Brian. “Qualcomm Life invests in AirStrip Technologies.” *MobiHealthNews*. 9 February 2012.

<sup>27</sup> “AirStrip Technologies Announces Investment from Qualcomm.” *Business Wire*. 9 February 2012.

<sup>28</sup> Dolan, Brian. “Why the Qualcomm Life 2net launch matters.” *MobiHealthNews*. 8 December 2011.

2012.<sup>29</sup>

For AirStrip, the implications of this partnership are significant. The 2net Platform provides the connectivity that allows them to integrate additional wireless devices, specifically those outside the hospital, into their patient-caregiver feedback loop, and transfer that data into AirStrip's medical software for physicians and caregivers. Now doctors can have access to a patient's progress, history and vitals no matter where they are. Also, patients can have a sense of security in knowing that they can be monitored in real-time and alerted to concerns even when they are at home. This additional connectivity provides a more holistic and dynamic view of a patient's health while they are outside the hospital, and enables more accurate treatments and better response times in emergency situations.

By integrating with the technology-agnostic 2net Platform, AirStrip can offer patients the opportunity to manage their health through multiple or subsequent devices, all of which would be compatible with 2net's back-end, allowing patients to maintain consistency in their health data, and experience easier monitoring and sharing.<sup>30</sup> Additionally, because Qualcomm is a global wireless leader with vast resources to spend on their healthcare division, AirStrip can be assured that their partner will continuously keep up with federal regulations and necessary approvals regarding the security and privacy of wireless health data transfers.

It is worth noting, however, that the 2net Platform allows all health data collected through its partners to be anonymized and aggregated for use by other partners, such as technologists, healthcare service providers, developers and pharmaceutical companies.<sup>31</sup> Patients are able to individually opt in to share their data, meaning AirStrip surrenders control of what otherwise could be considered a proprietary asset. The data collected by its users could theoretically be harnessed by a competing 2net partner.

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<sup>29</sup> Empson, Rip. "Digital Health Funding In '12: \$1.4B Raised, Up 45% Y/Y; Qualcomm Most Prolific Of 179 Investors, Castlight Takes Largest Round." *TechCrunch.com*. 7 January 2013.

<sup>30</sup> "Qualcomm case study, AirStrip: Continuing Patient Care after a Hospital Visit Within the Home." *qualcommlife.com*.

<sup>31</sup> "Qualcomm Forms New Unit, Investment Fund For Wireless Health." *WSJ.com*. 5 December 2011.

Nonetheless, the value-added benefits offered by the partnership are numerous. Not only could AirStrip expand the value proposition of its product and access new users (“gaining position”), but they could also ensure adaptability with new technology as well as compliance with uncertain regulations surrounding health data (“exploring options”). While startups have relatively low barriers when it comes to creating software platforms, the questions around future device and regulatory compatibility can be difficult to navigate given the fast-paced nature of change within this industry. For that reason, finding a larger, complementary technology partner with shared incentives can not only be helpful, but sometimes necessary for survival. According to an AirStrip statement, “From our perspective, this was not about needing additional capital at all but, with Sequoia’s encouragement, the investment is an excellent vehicle for us to more closely align with a key partner. As previously announced, we will be working with Qualcomm to invent a new paradigm for home care of chronic diseases, and this step will ensure all our incentives for success remain closely aligned.”<sup>32</sup>

## **Case 2 - EveryMove and Multiple Allies: Sharing Assets**

Described as a “mileage plan for your health”, EveryMove is a platform that seeks to reward consumers for logging their healthy behaviors. The app connects users to a marketplace for rewards, which are provided by insurance companies and employers that are seeking to reward healthy behaviors, and by brands looking to engage with health-conscious consumers. While users can manually input their healthy activities directly into the app, they can also automatically sync the program with other health apps to allow for seamless data integration. For instance, someone using a Fitbit device could link it to their EveryMove account in order to earn a reward for walking a certain number of steps per day.

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<sup>32</sup> Dolan, Brian. “Qualcomm Life invests in AirStrip Technologies.” *MobiHealthNews*. 9 February 2012.

Launched in 2012, EveryMove is a company built on innovative partnerships. Early on, they received funding from Premera Blue Cross, Blue Cross and Blue Shield of Nebraska, and BlueCross BlueShield Venture Partners. This represented a strategic investment that gave EveryMove access to the BlueCross BlueShield network to help them acquire new users en masse, a goal that otherwise might have required a significant marketing expenditure. Investments like this have become increasingly common among small health-tech players, especially when the goal is to acquire new users and/or penetrate complex healthcare systems that are difficult to access without an established partner. EveryMove has also partnered with over 30 consumer companies such as Bartell Drugs, Born To Run, and Tinytrekker.com to populate the rewards section of the site with compelling offers aimed at incentivizing users to upload their health activity data.

Most interesting, though, are the partnerships between EveryMove and other consumer health and fitness applications, which sync with EveryMove and supply a steady, automatic stream of data about users' activities. Like many new health-tech startups, EveryMove is essentially a connector. It helps connect users with their (otherwise fragmented) health data, and also helps connect them with the organizations that most want to reinforce healthy behaviors. In order to fulfill the former goal, the company needs to make data aggregation as seamless as possible for participants – and that requires extensive partnerships with popular apps. One such example is their partnership with BodyMedia. BodyMedia offers a body monitoring and health tracking system to help users meet weight-loss, fitness, and other health goals. The system includes an armband and an app for collecting and tracking data, respectively. Through the partnership, users can connect their devices to their EveryMove profile and earn rewards for the healthy activities they're already doing. They can also view these activities in the context of their other “connected” health behaviors. For BodyMedia, this means increased value to those who already use the system, and increased exposure to those who haven't yet adopted it.

While this type of partnership is still in its infancy, and not many details about EveryMove's alliances are yet public, this serves as an example of the types of partnerships this industry is likely to see in coming years. As mobile apps become increasingly capable of collecting consumer health and wellness data, a new category of tools is emerging to integrate and extract value from that data on a large scale. In many cases, the companies collecting the data (such as BodyMedia) are holding a single piece of the big data puzzle, and are not equipped to take full advantage of their assets. On the other hand, companies like EveryMove (or, in the previous case, Qualcomm), which are seeking to pool large, collective data assets, can help startups gain visibility or broaden their value proposition to users.

One thing we see from both of these cases is that data is becoming an increasingly shared asset among emerging players in mobile health. Despite the fiercely competitive nature of the mobile health space, given the current trend toward greater connectivity and universal interoperability, startups with limited resources for user acquisition or product development will likely have to share in order to grow. This may seem like a catch-22, but for startups that are able manage their data assets closely and develop or reinforce other competitive advantages, there is a lot to be gained by forming alliances with partners across the spectra of size and industry.

Right now, there is a long list of established companies within various industries that are recognizing the need to foster innovation within mobile health. From Qualcomm to Premera Blue Cross to General Electric, there are many opportunities for young companies to find strategic investors who can help them gain access to new users groups, healthcare networks, technological assets, and development resources with little worry of competition. It is likely that we will be seeing many more of these partnerships in the next few years as competition between small players heats up, and an increasing number of established organizations place bigger and bigger bets on mobile health innovation.

## **IIV. Scenario Planning**

Scenario planning is a disciplined method for imagining possible futures. Scenario planning derives from the central observation that, given the futility of trying to predict precisely how the future will play out, managers should adopt strategies that play out well across several potential futures while monitoring signals. Scenario planning attempts to capture a range of possibilities for a sector, often beyond those considered through existing planning techniques (e.g., sensitivity analysis, contingency planning). Good scenarios challenge tunnel vision by forcing managers to understand and evaluate the many factors that will shape a future in their industry.<sup>33</sup>

Scenario planning has been applied by a great range of organizations across a variety of industries. The methodology is well suited to address uncertain and complex industries where it is often difficult to predict the future. In these situations, a single forecast (or probability weighted forecasts) based on continuation of past trends can drive managers to overconfidence, tunnel vision, and exposure to strategic surprises.<sup>34</sup> Given the vast uncertainty in the mobile health market, scenario planning is an extremely useful framework for our research.

Scenario planning frameworks should be used by organizations in the mobile health industry to understand new growth areas and opportunities, anticipate risks, and understand driving forces and trends. Scenario planning helps us to make sense of the complex and highly volatile environment in mobile health by organizing underlying uncertainties. These inputs can help organizations build a long-term vision and understand which “robust” strategies it can commit to because they work in multiple futures.

### **Step: 1 Defining the Scope**

We have worked to understand the degrees of uncertainty and volatility that the mobile health industry has already witnessed to calibrate our timeframe and scope. We have tracked the growth of the mobile

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33 Russo, J. Edward and Schoemaker, Paul J. H., *Decision Traps*. Paperback, Simon and Schuster. 1990.

34 Schoemaker, Paul. "Scenario Planning: A Tool For Strategic Thinking," *Sloan Management Review*. Winter 1995

health industry that has emerged with the development and adoption of smartphones, and health-focused smartphone applications. Given the pace of technology changes and other forces, we believe a 5-year time horizon is best for evaluating trends.

In terms of scope, there are enormous potential hardware and software applications to consider in this space, including a multitude of sensors and actuators embedded in physical objects and linked to wireless networks that make up the that make up the “Internet of Things”<sup>35</sup>. These sensors include familiar objects like pedometers, cell-phones, but also smart pill bottles such as Proteus Biomedical. Within the nodes that inputs that make up the digital nervous system we focus on wireless sensors in your mobile phones and consumer-inputted data on mobile devices. When appropriate we analyze more advanced sensors (including implantable sensors) as they relate to mobile applications. We also analyze tools that allow uses to make sense of this data to drive health outcomes including analytics and data visualization tools.

## **Step 2: Identifying Major Stakeholders**

We have considered stakeholders (e.g., policy makers, insurers, consumers, competitors) that will be impacted by scenarios, but focused primarily on the perspective of “business” stakeholders:

**Insurance companies:** Recent legislation, namely the Affordable Care Act, has set the stage for a new market of over 30 million customers looking to buy health plans. As a result, insurance companies must now adopt a more consumer-driven marketing strategy, rather than simply relying on their employer partners for customer acquisition. In addition, with the instances and costs of behavior-driven illnesses such as heart disease rising, there are increasing financial incentives for health insurance companies to offer simple and convenient preventive health management tools through the channels that members prefer to use. One example of this new approach is Aetna, which has rebranded itself as a “health-solutions company” and begun offering consumer-facing wellness tools, signaling an industry shift

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35 Chui, Michael, Markus Löffler, and Roger Roberts. “Internet of Things,” *McKinsey Quarterly*. March 2010.



toward balancing prevention and treatment.<sup>36</sup> In February Blue Cross and Blue Shield introduced its Blue365 program, offering employer-sponsored members deals on services such as gym memberships, healthy meal delivery, and sneakers. These examples are just a few ways that the insurance industry has begun to “consumerize” its offerings and focus on engagement, and that individual companies have started to look beyond the traditional scope of what a health plan entails.

**Employers:** For companies offering health plans, there is an enormous incentive to reduce the costs of healthcare, which have risen seven percent in just the last year alone, and are expected to rise another seven percent over the next year. With employers paying for over 60 percent of the total cost of healthcare for their employees in 2011, even marginal reductions in costs can make a big difference. As a result, many employers have recently begun to embrace programs that incentivize and engage employees to adopt healthier behaviors now, reducing the chances that they will require expensive treatment in the future. According to a recent survey, 19 percent of employers consider wellness programs that incentivize employees to improve their overall health to be a strong cost-control option.<sup>37</sup> The number of employers embracing the use of monetary incentives to promote engagement in health and wellness programs has increased notably, from 37 percent in 2011 to 59 percent in 2012. The number using such incentives to promote engagement in disease management programs nearly tripled, growing from 17 percent in 2011 to 54 percent in 2012.<sup>38</sup> Within this rise, the prime targets of employer-driven efforts have been behavioral changes aimed at combating obesity and smoking. The number of companies providing discounts on healthcare premiums to employees who did stopped smoking or took part in a weight-loss program more than doubled in the last four years.<sup>39</sup> Unfortunately, the results of these measures are still unclear. While there is reason to believe that smoking cessation programs have been effective, newer measures like weight-loss programs have not yet shown significant effects. With this in mind, employers will be

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36 Beals, Rachel Konig. “Employees Get Paid to Exercise, While Some Get Paid to Sit Out,” *US News and World Report*. February 2012.

37 2012 Survey by the National Business Group on Health (NBGH)

38 “Employers Stressing Health Incentives for Employees.” *Insurance Journal*. 8 August 2012.

39 “Employee Health Incentive 'Benefit' A Perk For Employers More Than Workers.” *Huffington Post*. 25 June 2012.

focusing on wellness program monitoring and outcomes, not simply participation<sup>40</sup>

**Hospitals:** One of the biggest preventable costs to hospitals is re-admissions, particularly for cardiac events. In many cases, congestive heart failure is manageable with the right medications and behavioral changes (such as exercising more and eating less salt). However, more than a third of patients with this condition who are released from the hospital are readmitted within one year. A single readmission can cost a hospital anywhere from \$10,000 to \$40,000, or more. On top of those costs, Medicare and Medicaid have recently stopped reimbursing hospitals for heart-failure readmissions occurring within 60 days of release.<sup>41</sup> This policy change has spurred some hospitals to look at preventive measures such as mobile health monitoring and tracking to keep patients consistently engaged in healthy behaviors after they leave.

**Physicians:** Physicians represent both a significant opportunity and a barrier for the mobile health revolution. On the one hand, having doctors embrace and follow the mobile health data of their patients would likely drive wider consumer adoption of these programs and technologies. However, in the current system there are not strong incentives for individual providers to follow monitored data, as questions still remain about data quality, liability, and the value of both the time and financial expenditure. There is no direct incentive for doctors to participate in (and pay for) mobile health platforms, and little proven benefit to the patient. Until those factors become more compelling, it is unlikely that doctors will see widespread mobile health technology adoption.<sup>42</sup>

### Step 3: Identify Trends

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40 Appleby, Julie. "More U.S. employers tie health insurance to medical tests," *Kaiser Health News*. April 2012.

41 Gravitz, Lauren. "Wireless Technology Could Slash Health-Care Costs." *MIT Technology Review*. 4 November 2010.

42 Gravitz, Lauren.

We have also focused on compiling key trends – forces that have high impact on our field of interest and people believe are highly predictable – and key uncertainties, or forces with much lower predictability.

Below is a set of forces related to our sector of interest based on secondary research and expert interviews. We have made an effort to include forces across the social, technological, economic, environmental, and political domains. By definition, these trends will be present in every scenario. Key trends include:

- Aging populations in developed countries (societal)
- Increased prevalence rates of chronic diseases including diabetes, obesity, heart disease, and high blood pressure (societal)
- Increased penetration of smartphones in developed economies (societal)
- Diagnostics used by consumers, not solely as tools for health professionals (societal)
- Increased use of mobile devices for consumer-health research (societal)
- Lower cost self-tracking resources (science & technology)
- Health personalization leveraging genomic data, preferences, predictions etc. (science & technology)
- Transition of healthcare from an acute, episodic care model to a more continuous, chronic care model (multiple domains)
- Greater focus on preventive measures in health-care system (economic)
- Rising costs pressures in healthcare (economic)

#### **Step 4: Identifying Uncertainties**

Unlike trends, uncertainties are forces that cannot be reliably predicted at this point in time. Below are key uncertainties in our time horizon, framed as questions:

*Uncertainties*

- How will financial incentives for doctors shift from fee-for-services to one that compensates physicians for time spent keeping their patients out of the hospital? (economic)
- Will mobile health applications show real efficacy? (multiple domains)
- How quickly will doctors embrace new technologies and integrate data from health applications into their care regimens? (societal)
- What services will transition to more outpatient and convenient care options from centralized locations? (societal)
- Will self-initiated health tracking (the “quantified-self” movement) transition more “mainstream” beyond fitness/health early adopters? (societal)
- Will consumer health applications expand faster in wellness categories or in deeper chronic health conditions? (multiple domains)
- Will health data continue to live in data silos or will interoperability emerge between applications, and between applications and electronic medical records? (political, economic)
- Will government regulate of interoperability and privacy standards for consumer health services, or will private sector find a path towards interoperability? (political)
- How strictly will FDA regulate consumer health applications?
- Will healthcare incumbents (e.g., insurers, managed care organizations) mostly acquire, partner, or compete with new mobile health startups? (economic)

### **Step 5: Selecting Two Key Uncertainties**

Central to scenario planning is understanding the nature and impact of the most uncertain and important driving forces affecting an industry. Following a common scenario planning methodology, we have chosen the two most important key uncertainties. In selecting these uncertainties we looked for forces that will exert influence on the sector, and also whose outcomes are not predictable. While many of the above

forces above have strong correlation and interaction with each other, we also looked to select uncertainties with lower correlation.

### *Uncertainty 1 – Data Interoperability*

Will personal health data become interoperable, portable, and shared, **OR** will data remain in silos across health applications, and remains outside EMR and other patient data.

- **If data is portable**....the promise of coordinated care gets closer to reality. Big data scientists proclaim that, if we can collect enough data about medical treatments and analyze it effectively, we can provide more accurate and effective treatment interventions for patients<sup>43</sup>. This promise of greater coordination care across providers, accelerated R&D, and ultimately better patient outcomes largely depends on data interoperability. Data sets can include clinical studies, insurance data, hospital records, DNA sequence data, longitudinal drug, medical claims, clinical data, and of course mobile health application data, as well as non-health data and other public data sets. In one extreme we can imagine an aggregated patient data system that is made accessible with proper privacy controls.
- **If Data is in silos**....mobile health applications continue to build proprietary data sets are not linked to external data sets. Data remains “locked” up by different applications and systems – giving more power to “data controllers” and less to consumers. Currently there is little incentive for hospitals (trying to optimize income from medical treatments), insurance companies (trying to minimize payments), app developers (trying to monetize their data), and others to fully cooperate and share data. Many applications will use only one source of data as a core element of a solution, or must acquire/purchase data set from 3rd parties (e.g., app developers, private payers).

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43 O’Reilly, Tim, Mike Loukides, Julie Steele, and Colin Hill, "How Data Science Is Transforming Health Care." *O’Reilly Media*. 2012.

## *Uncertainty 2 –Efficacy Studies Emerge & Attract Medical Community*

Will we see an emergence of efficacy studies from use of mobile health applications driving doctors, insurers, and hospitals to embrace consumer facing mobile health applications **OR** will mobile health applications show little efficacy (potentially compounded with privacy concerns) keeping the medical community at bay, and driving applications to develop “outside” traditional healthcare channels?

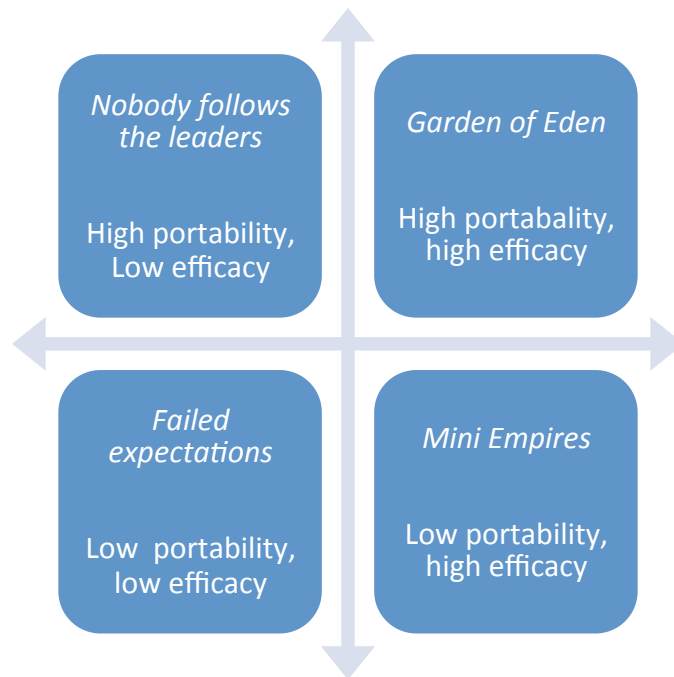
- **If efficacy is proven**...mobile health applications will make stronger inroads to medication managements, chronic care managements, and medical diagnostics. Treatment regimens would be synchronized to users phone applications that would “make the task of following doctor’s orders — all too often neglected — easy and even fun.”<sup>44</sup> Mobile applications will also continue to grow outside the clinical setting.
- **If efficacy is not seen**...mobile health applications will focus remain outside mainstream health systems, with continue focus on wellness and fitness applications. Hospitals, insurers, R&D, and legislation will not pour in. Without reimbursement incentives and established practices to support health apps, adoption will be slow and fragmented within the medical community. Patients utilizing their personal mobile technologies will supplement their care without the recognition or support of their healthcare providers.

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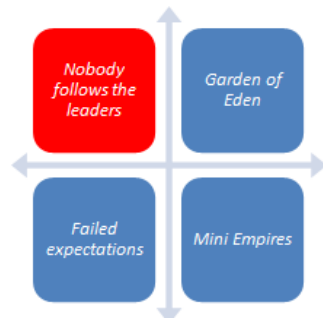
44 Moss, Frank. "Our High-Tech Health-Care Future." *New York Times*. 9 November 2011.

## Step 6: Developing Scenario Narratives

Given our two uncertainties – one around data portability and one around efficacy and medical adoption – the below framework provides four scenarios. Each of the scenarios described below is divergent and plausible, and all incorporate less uncertain trends.



## *Nobody Follows the Leader*



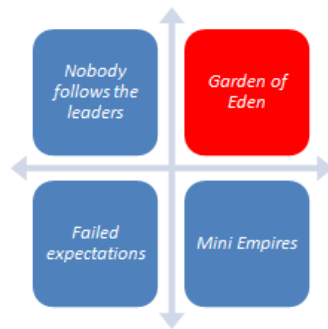
This scenario represents the convergence of High Data Portability and Low Efficacy from mobile health applications. In this scenario, the private sector has sorted out issues of data portability with relatively seamless data exchange between companies large and small collecting and analyzing consumer health data from mobile health applications. Data interoperability standards also facilitate transfer of data across hospitals, applications, researchers, and others. Users have easy data portability, but some privacy concerns still “spook” many potential users.

Unfortunately, the healthcare system including doctors, hospitals, insurance companies, and employers do not jump aboard with limited efficacy communicated in terms of clinical health outcomes. The promised benefits – fewer hospital visits, better care, and lower costs – do not materialize. As healthcare promises are unfulfilled, the medical community pays less attention to mobile health – insurers stop rewarding adoption and usage of apps, doctors don’t recommend app usage to patients. Still a small medical community continues to support medical application, but this is more of a “niche” practice. Less VC funding pours in the space – as more portable data means no group is able to harvest value from data.

The Quantified Self early adopters continue to use mobile health applications, as data connected between “wearables” (e.g., Fitbit, Jawbone Up) and other tools are increasingly integrated with sensors at home, medical records, and across apps. More wellness-focused applications continue to grow, as fitness groups and Weight Watchers-like group motivation concepts are undeterred by lack of efficacy studies.



## *Garden of Eden*



This scenario represents the convergence of High Data Portability and High Efficacy from mobile health applications. Studies are released showing mobile apps increasing compliance for type II diabetes patients, consistent weight loss and health improvements from overweight patients, and lower hospital readmissions. We witness mass consumer adoption of mobile health apps, driven by encouragement from hospitals and insurers.

There is an explosion, of mobile health tools linked to disease managements, chronic care managements, and medical diagnostics. Consumers gets subsidized devices and applications, and cost-savings bonuses for compliance and associated cost reductions to their health plans. Patients now have total integration between mobile apps and their medical health management.

After great negotiation, privacy standards are legislated and protected as very rare agreement across political divide is reached. The U.S. passes Health Data Rights as amendment to Bill of Rights. Business reacts positively to consumer protections, which results in a huge reduction in market uncertainty. A huge influx of capital comes in to the market from venture capitalists, private equity firms providing private capital to scale successful pilot initiatives.

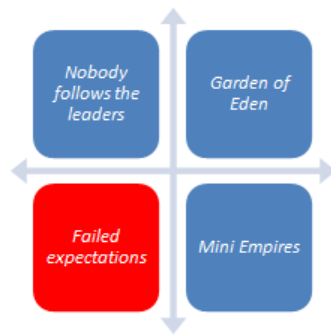
When a patient comes in for a check-up, the doctor discusses their health regimens, including exercise data, eating habits, etc. with data fed from their mobile phone and connected at-home sensors. Both doctors and patients can relay health-related info to and from health databases in real time. A set of more

advanced hardware – “health phones” – comes to market to handle frequent transfer of large medical files, mostly used by doctors. Nearly all outpatient services include some mobile health application integration as “prescribed” by doctors and nurses.

With data portability and privacy protections, researchers, biotech, pharmaceutical companies gain widespread access to large repositories of data to inform better evidence-based medicine. Given this data and lower costs of clinical trials, we see improvement in clinical outcomes and accelerated shift to “pay for outcome” reimbursements. We also see a greater realization of “personalized medicine” leveraging patient's proteomic, genetic, and metabolic profile to tailor medical care to that individual's needs.

Students now find lucrative jobs at the intersection of medicine, statistics, and computer science. Medical students develop mobile applications while in medical school, where many future doctors drop out to start companies to capitalize on lucrative opportunities. For many players, big money and improved health outcomes go hand in hand.

## ***Failed Expectations***



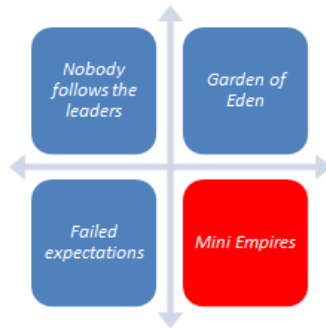
This scenario represents the convergence of Low Data Portability and Low Efficacy from mobile health applications. Similar to *Nobody Follow the Leader* scenario, studies fail to find linkages between usage of mobile health applications and clinical outcomes.

Data portability remains a pipe dream as mobile health applications remain “walled gardens” and data is not shared outside applications, or linked to healthcare systems and electronic medical records.

Time Magazine cover story is published “Failed expectations – why we all fell for the mobile health hype.” Several mobile health startups fail to gain traction, and VC funding and corporate VC investment in mobile health applications begins to dry up without clear government support or health system adoption.

Small companies and users continue to experiment with mobile health applications, but without support of health providers and hospitals systems, data portability, and large user bases, consumer benefit remains limited.

## *Mini Empires*



This scenario represents the convergence of Low Data Portability and High Efficacy from mobile health applications. As in the *Garden of Eden* scenario, positive efficacy studies for both chronic illness and wellness management drive consumer adoption of mobile health applications – encouraged by payers, insurers, employers, and even hospitals.

Mobile phones are used to track illness and promote wellness from a broad set of user, but this occurs through a separate apps doing different jobs with incompatible data. Given frustration with lack of data portability standards, large tech companies and healthcare companies begin to form large health data alliances (e.g., Google and Blue Cross, Qualcomm and Aetna). Alliances and companies compete heavily to gain users leveraging promotions, subsidized devices, etc.

In the summer of 2016, ABC airs “Google and Microsoft renew rivalry – who controls the health data in your pocket?” David Pogue of the New York Times writes, “A step by step guide for taking your data with you when you change jobs.” The report started as column, and become a 30 page e-book because of the complexity.

Smaller mobile app startups must decide which alliance to join to synch data, or be left out of a major data networks. Some smaller companies try to undergo expensive development and difficult negotiations to work with competing platforms.

With competing alliances and partnerships – greater consumer lock-in occurs once you choose a provider, suite of mobile apps, etc. Often these decisions are driven by health plan options, making it difficult for customers to transfer data when they leave jobs or insurance plans. Despite great promise, fragmented services provided to patients prove to be less effective than integrated services. Instead of managing an integrated system, patients must patch together data from two platforms – similar to users of Apple and Android hardware and software. Consumer health advocates lobby for government regulations to pave ways for greater consumer health choice.

### **Step 7: Using Scenarios - Strategic Insight**

Once we have developed scenarios for this matrix, it is useful to view them from a lens of key stakeholders, and look to understand strategic insight. Most importantly, we can evaluate the commitment different stakeholders should make in pursuing a particular set of products, technologies, and markets.

#### *Considering major barriers*

We chose to look at implications through the “business side,” but focusing on startups in the mobile health space. We believe scenarios the scenarios useful to highlight both potential of mobile health, but also barriers to adoption. Scenario planning is often cited as a great tool to overcome overconfidence, so we intentionally played up downsides in our scenarios.

While there is undeniable momentum and optimism by mobile health companies and investors – there are also significant barriers. We highlight commonly acknowledged barriers to adoption within current healthcare system, but also emphasize the scenario of poor efficacy studies. What if the purported benefits do not materialize? Similarly, we believe companies should consider implications of data-portability, or lack there of. While encourage by projects like the Open mHealth project at UCLA and UCSF, providing

data sharing for a variety of health apps, we also see signs of competition among data alliances. Startups would be smart to consider who they get in bed with from a data perspective.

In addition to considering barriers, mobile health companies must continue to ask the question, “What don’t we know that might matter?” Technology companies may need to better understand medical markets, doctor needs, insurance company practices, and even government policy.

### *Decisions in lumpy markets*

We also think scenarios are useful for companies with interesting technology looking to develop applications with market fit. Our scenarios highlight very different rates and types of market adoptions for mobile health application.

Mobile health exists in a vast and diverse market landscape, with consumers ranging from young fitness devotees to aging patients with chronic illnesses. And when it comes to technology, each segment has its own set of needs, attribute preferences and comfort levels. Some scenarios paint a very rosy clinical application tied closely to the insurance, physician, and hospital networks. Others focus on growth in the wellness and fitness-focused markets largely complementary to but outside this system. Some consider mainstream adoption, while others with deeper niche focus on chronic health and “quantified self” geeks.

Due to the emerging nature of the mobile technology landscape, the all of these are subject to change over time. This creates uneven concentrations of customers with inconsistent sets of preferences, or, in other words, a *lumpy market*.<sup>45</sup> As such, it can be difficult for managers to determine which segment/s to target, and to understand how to align their product with market preferences (both current and anticipated).

Some of the major questions that a *lumpy market* framework seeks to answer include: Which segment/s are most worthwhile to focus on, given the company's technology assets? How can a company maximize

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product attributes in its segment and understand how to allocate resources accordingly? Is it better to take a niche approach and target one or few segments, or to deploy new applications across segments?

These questions help companies better understand how they can use their technology resources for the greatest impact. Scenarios above highlight how complex factors could shape the development of these customer markets. Startup mobile health companies should consider the evolving needs of customers including those both overserved and underserved by existing solutions.<sup>46</sup>

### *Detecting weak signals*

Most important, startups in the health space can use scenarios to detect and analyze *weak signals*.<sup>47</sup>

Scenarios can help companies in the mobile health space track events with greater peripheral vision, but also make sense of new events as they emerge. While different scenarios may be more relevant for many players in the mobile health industry, we hope our scenarios help companies consider multiple lenses through which to view future events.

## **V. Conclusion**

The mobile health industry continues to move towards rapid change. Driven by legislation, technology changes, consumer adoption, rising costs, and other factors, incumbents will be forced to change the way they currently do business in the market – and new opportunities will emerge for nimble new players.

Although our paper presents four scenarios, there are many more issues worthy of exploring. We limited our focus to “mobile” for the scope of this paper, but believe additional sensor technology will overlap significantly with many trends explored in this paper, while many applications will move beyond what we have imagined.

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46 George S. Day & J.H. Paul Schoemaker, "Scanning the Periphery," *Harvard Business Review* (November 2005)

47 Schoemaker, Paul. "Scenario Planning: A Tool For Strategic Thinking." *Sloan Management Review*. Winter 1995.

Additionally we believe pay for performance (P4P) will be a major driver in coming years, with a need for tools and software to collect relevant data and mine that data to determine how to improve outcomes and reduce costs. Mobile will play a large role in the development of P4P model and if we were able to dig deeper, we would have further researched potential opportunities in this space.



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