

REINTRODUCING THE 'CARE' IN HEALTHCARE

IMAGINING THE ART OF THE POSSIBLE

A SuperApp(le) a day will keep the doctor away!

The healthcare team at Amazon is busy building its vision for the future of healthcare. In this article, we attempt to imagine a future for healthcare that can be executed with today's technology, and a vision that will foster accelerated innovation in healthcare. We have unencumbered ourselves from the regulatory knot - fully expecting that the clout of Amazon, Berkshire Hathaway, Chase (ABC), and other TechGiants, will do what incumbent players in the healthcare value chain have had little incentive in doing so far – disrupt and transform Healthcare.

EXECUTIVE SUMMARY

Healthcare is ripe for disruption. Customers, frustrated with the escalating cost of healthcare and the disjointed experience across the healthcare ecosystem (doctors, hospital systems, rehab facilities, pharmacies, and drug companies), are ready. In this paper, we explore the art of the possible. We will provide a view of a superior healthcare experience using today's technology that creates the baseline for what could be possible with tomorrow's innovations. Delivering this experience requires transformation in three areas:

- a. Digitizing healthcare players and stitching them together into a connected ecosystem
- b. Integrating emerging technologies such as connected devices, data analytics, and artificial intelligence into the above connected ecosystem
- c. Providing customers with ownership of their healthcare data and empowering them to manage their own health

Amazon, Berkshire Hathaway, JPMC (ABC) partnership signals the end of Business as Usual in Healthcare

In January 2018, ABC announced that they were forming an independent healthcare company for their United States employees. The excitement around this announcement and the anticipated disruption of the Healthcare industry sent stocks in established Healthcare organizations plummeting. ABC did not announce anything concrete, nor did they provide a digital timeframe for delivery (instead presenting a timeframe of several years). However, extreme frustration with the high cost of 'business as usual' and the promise of the holy grail of healthcare transformation was enough to rally the tech faithful. We believe that disruption in healthcare has finally begun and will rapidly gain traction. Established players need to put strategies in place now and execute them over the next few years to survive the tsunami of challenges that their peers in industries such as Banking and Telecommunications are beginning to face.

In our earlier paper, 'The Death of Business as Usual and the Unraveling of the Vertical Industry Structure', we highlighted a technology led disruption in Asia, enabling a digital lifestyle for Millennials through a horizontal ecosystem of seamlessly connected experiences. This experience, delivered through a single SuperApp on a smartphone, is quite unlike that in the West where we rely on numerous independent apps to provide the services we require. As an example of this connected experience, a customer in a SuperApp receives a message from a friend suggesting dinner. The same app suggests her favorite restaurants, makes the chosen reservation, sends the reservation information to the friend, reminds her of the upcoming dinner, orders an Uber prior to the reservation, and while at dinner, suggests they live stream to their common friends, and makes all of this happen with little effort. This joined-up, cross-industry experience is powered by information continuously collected and stored in a digital persona. As customers use these SuperApps, personas get refined, allowing these TechGiants to predict customer actions and be the first one present at the point of need. Providers of this cross industry ecosystem¹ now own the customer, not the current vertical industry leaders in Banking, Insurance, Commerce, Media, etc., thus making them a commodity. This will unravel the vertical industry structure as we know it, and there are seven players (the four Western TechGiants - Facebook, Apple, Amazon, and Google and three in China - Baidu, Alibaba and Tencent) best positioned to capitalize on this disruptive opportunity.

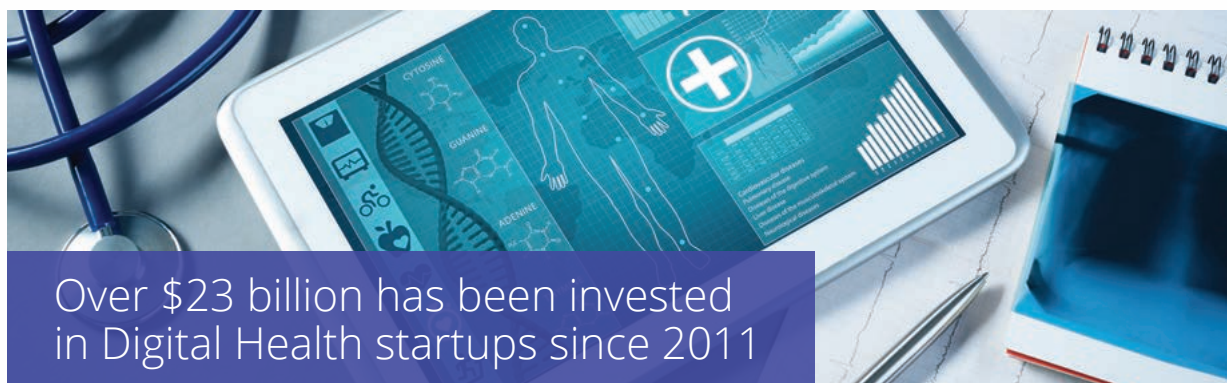
Borrowing concepts from the “Enable Your Digital Lifestyle” ecosystem, a “Protect your Health” ecosystem provides a disruptive opportunity for growth hungry TechGiants. Customers are ready to embrace a connected healthcare ecosystem with the benefits of better service and lower costs. This starts by connecting the healthcare delivery experience across siloed healthcare sub-industries - Health Insurers, Healthcare Providers, Hospital Systems, Retail Pharmacies, Pharma, Medical Device Companies, Pharmacy Benefit Managers (PBMs), and Ancillary Health Services. Then add in the use of new emerging technologies, like connected devices, and make them smart using data analytics and artificial intelligence. Finally, tap into changes in millennial customer behavior who want informed decision making, and you have the building blocks for the future of a connected Healthcare ecosystem.

The Technologies Exist, Who will Drive the Vision?

Innovation in healthcare has been in play over the past decade. According to Rock Health, over \$23 billion has been invested in Digital Health startups since 2011, with almost \$6 billion coming in 2017 alone . Startups and solutions are primarily focused on

- Consumer Health Information – Empowers consumers to better understand their own health
- Clinical Decision Support & Precision Medicine – Provides timely information or alerts to a health provider to help inform decisions
- Fitness & Wellness – Enables general health maintenance
- Disease Monitoring – Tracks a specific condition through biometric monitoring
- Diagnosis of Disease – Enables the diagnosis of a specific clinical indication
- Healthcare Operational Systems – Digitizes administrative, non-clinical operations

While there are hundreds of startups and solutions, only a few have managed to be adopted at scale and make a significant impact since the appetite for disruption has been low.



Over \$23 billion has been invested in Digital Health startups since 2011

In the exhibit below, we outline a vision for the future that is a single, seamless connected experience enabled by the technologies above to demonstrate the power of connecting and integrating capabilities that exist in silos today. This experience shows how a seemingly healthy individual effectively traverses the stages from being healthy, to that of a patient with a worrisome diagnosis, to surgery, to recovery, all through the appropriate application of technology in an ecosystem where relevant data is exchanged between organizations with the consent of the individual. The result is an experience that is transformational, is a life-saving diagnosis, and dramatically lowers costs. This experience can be replicated over and over again by attacking other existing areas of customer frustration.

¹ We anticipate at least four ecosystems: Enable a Digital Lifestyle, Protect Your Health, Protect Your Assets, and Connected Home.

² <https://rockhealth.com/> - 2017 Year end funding report

Our example is for a medical condition that can be fatal if not diagnosed in time – Hypertrophic Obstructive Cardiomyopathy (HOCM) is a genetic condition found in 1 among 500 people. Currently this is hard to diagnose because its symptoms are not easily detected. Independent technologies and services exist to ensure this condition does not lead to death, but it requires the connectivity of an ecosystem that a new healthcare SuperApp can provide to deliver a seamless experience. In this example, Joe, an avid basketball player with an undiagnosed HOCM condition, has lately been feeling a bit tired and breathless – symptoms that most people would ignore and attribute to their lifestyle. The digital assistant in his healthcare SuperApp has been quietly collecting data and monitoring Joe’s symptoms in the background. During a regular basketball game, Joe is alerted by his SuperApp via a feed from his wearable device that his heart rhythm has been irregular and instructs him to stop practice. It also prompts the healthcare digital assistant to perform a detailed analysis of the data collected so far - his heart rhythm, genetics, age, past conditions, etc. - and begins an interactive digital conversation with Joe, leading the SuperApp to set up a proactive video conference with his doctor. Based on the data collected by the SuperApp and a medical ECG conducted in real time, the doctor recommends a cardiac MRI that is automatically scheduled based on the earliest available MRI slot nearby and Joe’s benefit coverage. The results are sent to Joe’s cardiologist and, with assistance from AI imaging software, a positive confirmation of HOCM diagnosis is made. Joe is able to educate himself on HOCM and his options through videos prompted by his SuperApp, and he can consult his physician as he prepares for surgery. The SuperApp also helps Joe analyze and optimize the costs involved based on his insurance coverage. Post surgery, he is discharged with medications seamlessly delivered to his house. During his recovery phase, Joe’s smart bandage, which tracks his vitals, detects that his recovery is not on track and alerts his doctor, who then prescribes additional medications. As Joe begins rehab facilitated by his SuperApp, his vitals are continually monitored and forwarded to his care team, who confirm that Joe is doing well and on track for recovery.

JOE'S DIGITAL HEALTH JOURNEY

Healthy	Assessing The Risk	Getting Diagnosed	Preparing For Surgery	Surgery & Post-op Care	Proactive Monitoring
<ul style="list-style-type: none"> ➔ Joe is an active 24-year-old who regularly plays basketball. He is health conscious and tracks his daily activities, monitors his vitals, and has also invested in wearables, and genetic tests ➔ Something is Off – Recently, during a break in a playing session, Joe felt out of breath and had to sit out the rest of the game. <p>His Health App (which is integrated with a 'heart app' that measures heart rate data from Joe's smart watch) also alerted him that his heart rhythm might be irregular/off</p>	<ul style="list-style-type: none"> ➔ Proactive Digital Engagement Joe's Digital Health Assistant, (which is connected to the Health App) analyzes the heart rhythm data with his genetics results and identifies the need for an intervention. The App's recommendation – Get in touch with your Primary Care Physician (PCP). Once Joe approves it, a PCP virtual visit is set up ➔ Virtual Investigation – Joe describes his symptoms over a video-conference consultation using the Health App <p>The PCP analyzes Joe's comprehensive medical data – biometrics (ECG), genetics, medical history – along with data from his wearable available through the Health App</p> <p>PCP recommends a Cardiac MRI and refers Joe to a cardiologist</p>	<ul style="list-style-type: none"> ➔ Getting Scanned – The Health App is able to recommend and schedule an MRI (based on location, availability, benefit coverage, and pricing) ➔ Effortless Experience – Joe goes in for his cardiac MRI. Once done, he leaves the facility without being bothered with paperwork, payments, etc. ➔ Results Are In – The scans are processed through AI imaging software, which identifies that Joe has a condition called – Hypertrophic Obstructive Cardiomyopathy (HOCM): thickening of muscle tissue in heart, which results in less blood pumping <p>It's a largely asymptomatic, often genetic, and can cause sudden death</p>	<ul style="list-style-type: none"> ➔ Diagnosis – Joe engages with his PCP and cardiologist to understand the diagnosis and more importantly, what's coming next ➔ Surgery – The Health App recommends options – surgeons, medical facilities – based on provider reviews gathered through analytics ➔ Financials – The Health App runs a financial analysis to explain the cost of treatment – customized based on his benefits ➔ Preparation For Surgery – As the issue was spotted before any actual damage to the heart, Joe has multiple options to choose from. The Health App helps educate Joe by providing access to digital content on HOCM – latest research, videos, local support groups etc. 	<ul style="list-style-type: none"> ➔ Joe successfully completes his heart surgery, completes his initial recovery at hospital, and is sent home for further care ➔ Smart Monitoring – Joe is now wearing a "smart" bandage on his chest that tracks his vitals. It suddenly indicates irregular heart rhythm and high heart rate. Wearable indicate a low BP. An alert is sent to Joe's physician through the Health App ➔ Proactive Care In Case Of Anomaly – Joe immediately receives a call from his physician – some additional medications are prescribed ➔ On-Demand medication delivered – Joe's pharmacy receives the order and Joe approves its delivery through a transportation services app (integrated with the Health App) 	<ul style="list-style-type: none"> ➔ Post-Surgery Rehab – Joe uses the Health App to get recommendations for the top physical therapists based on community preferences, national ratings, proximity and outcome metrics ➔ On-Going Health Tracking – Joe's care team continues to monitor his vitals and overall health based on data continuously collected and analyzed

This seamless connected healthcare experience is possible by leveraging technologies that exist today.

- **Emerging IoT devices and wearables** enable valuable data capture, allowing physicians to diagnose using days of continuous data rather than one off data anomalies.
- **Genetics kits** available today can detect an individual's likelihood of developing critical conditions far before any symptoms and/or significant damage is done.

- **Artificial intelligence and machine learning** play a big role in analyzing multi-source comprehensive medical data to identify conditions that require medical attention.
- **Tele-medicine** helps patients connect with specialists locally, nationally, and even globally.
- **Artificial intelligence and cognitive analytics** on data from medical devices and medical records allow healthcare organizations put together comprehensive individual profiles with customized care plans.
- **Smart pills, patches and remote monitoring devices** enable effective care at home and outside of expensive hospital facilities.

The Healthcare industry needs to work towards an integrated and intelligent cross-industry experience amongst Providers, Payers, Medical Device organizations, Pharmacies, and other services such as transportation, retail, etc. that increases the effectiveness of the treatment while optimizing the costs of care.

The result is an experience that is transformational, a diagnosis to save a life, and dramatically lower costs.



MAKING DIGITAL HEALTH A REALITY

The big disruption in Healthcare will be realized when (a) Healthcare organizations get digitized, (b) they capitalize on the value of emerging technologies, and (c) provide ownership of healthcare data to their customers and empower patients to own their own health. These are described below.

Invest in Digitization – Innovate or Perish

Moving Healthcare into the digital age has traditionally required major government intervention. The creation of Electronic Medical Records (EMR) was primarily driven by the government. Healthcare players from doctors, to hospital systems, to rehab facilities, to pharmacies, to drug companies are all in need of digitization. Now imagine having to integrate these businesses into a seamless cross-care, cross-industry ecosystem. No government intervention can successfully nudge healthcare players to change, only competition can. The ABC joint venture, with its large enough ecosystem, can disrupt by better connecting the healthcare experience at a dramatically lower cost, forcing incumbents in healthcare to either innovate or perish. Digitally enabled businesses would allow for sharing real-time data, sharing diagnoses through AI engines, and a host of many other improved user experiences.

Capitalize on Emerging Technologies

Establishing the organizational foundations for the digital world immediately opens up the potential to leverage the power of technology to innovate and experiment with a seemingly endless set of digital health solutions that benefit customers. These range from helping customers stay healthy, to utilizing smart devices and pills, to helping customers manage their conditions and prevent medical complications. The collection of real-time biometrics, along with the right insight that AI can provide, can help medical device organizations deliver care to customers within the comfort of their homes and alert care providers to take action on preventable emergency room visits.

Individuals Owning Their Healthcare Data

The true potential for Healthcare will be realized when customers have full access to ALL of their healthcare data. This is something we expect and take for granted in many aspects of our lives. For example, tech companies make it easy to link, gather, and assess financial data from multiple financial institutions (e.g. banks, brokers, credit card companies, etc.) and provide meaningful insights. Until now, organizations have used data security and privacy as a reason to keep ownership of data they deem critical for their competitive advantage. Technologies like blockchain can address this issue. When customers have the ability to consolidate their health information that is across multiple organizations and use artificial intelligence applications to analyze that data and provide insights, they become empowered to take the right actions to manage their health.

Emerging Chinese giants, like ZhongAn, are already building their own healthcare ecosystems around 'Protect Your Health'. ZhongAn is an all-digital insurance company at scale that creates innovative healthcare products that range from dynamically priced insurance premiums based on an individual's daily walking step count, to deeply customized health insurance products that leverage 'medical big data', such as covering pregnant women for diseases their newborn might develop. It has successfully digitized and integrated the Provider-Payer-Pharma ecosystem, which is still a major challenge in the US ecosystem. They use integrated intelligence to determine the effectiveness of treatments to suggest changes to the way a patient needs to take the medication, or coach a physician to make changes to the treatment itself. They are expanding a range of healthcare services through the SuperApp, while allowing for transparent itemized pricing including insurance coverage and digital one-click payment options.

As these Chinese TechGiants are demonstrating by innovating around existing capabilities, it is apparent that none of the concepts we have put forward is wishful thinking or dreaming about technology that is yet to come. However, nobody in the current US ecosystem has had an incentive or the capability to pull this technology-rich disruption together – that is, until now.

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