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Marketing Opportunities in Telemedicine and Mobile Health

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*Alla mia famiglia
che mi ha sostenuto
moralmente ed economicamente
durante tutto il mio percorso.
A Mattia.*

Introduction

Telecommunication technology is changing people's way of thinking, behaving and the means of communication throughout the world. These technologies, in general, have great potential for keeping people healthy, managing diseases, and lowering health costs. The U.S. healthcare industry faces numerous challenges with rising costs, evolving reimbursement and insurance models, and an aging, generally less healthy population. Telehealth is a twenty-first century solution to a persistent problem in healthcare: how to provide high-quality services with shrinking resources (Dansky and Ajello, 2005). When discussing telehealth, I incorporate a wide array of systems that transmit data from remote locations. The idea behind telehealth is that information is travelling through real-time transmission technology between the doctor and patient rather than through face to face meeting.

Technology in healthcare is having a meaningful impact on the way solutions are marketed, delivered, consumed, and administered. This study contextualizes telehealth in relation to the big scenario surrounding it and investigates marketing opportunities in telehealth. I discuss different relevant aspects of telehealth, presenting a framework for the range of factors and trends involved. This helps one understand the contexts that form the basis for marketing considerations.

The paper is organized as follows; in the first chapter I introduce the concept of telemedicine/telehealth and examine relative trends and major factors that drive its adoption. Subsequently, this work provides an overview of the telehealth industry, its current and predicted use, and some case studies demonstrated in chapter two. However, many questions remain about the adoption of wireless health technologies and the future

viability of companies that create them, as regulatory, legislative and reimbursement issues determinate its adoption as well. In the third chapter I consider these aspects that can ultimately decide whether a telehealth program has a real commercial prospect. Finally, having contextualized telemedicine in detail, I identify the value system of telehealth and marketing opportunities for it in chapter four. This sector, in fact, is open to a wide array of marketing applications with significant strategic consideration for the competitive business industry. Telehealth services have the potential to advance and improve quality and access to care as well as reduce costs, so long as demand and offer meet. I believe that the main challenge is working out how to fit people to the technology rather than the development of the technology itself.

This work is presented as a review of the literature. The methodology I have used in this project is reflective of material that I have collected from secondary sources such as reports, articles and other data which professionals in this industry have compiled. Although there was not a copious amount of literature that concerned how general marketing knowledge can be transferred directly to the telehealth market, from carefully considering, examining and referring to these sources, I was able to fabricate my thesis and develop my own considerations. My thesis was supervised by Professor Tina Klein of the Rady School Of Management at the University of California, San Diego.

Index

Chapter 1	9
Telehealth: general aspects	9
1.1 Definition and general aspects	9
1.2 Motivations of mHealth	12
1.2.1 Costs	12
1.2.2 Resource constraints	16
1.2.3 Patients empowerment	18
1.2.4 Rapid rise in mobile phone penetration	19
1.3 Developing nations	23
Chapter 2	25
Telehealth Industry Analysis	25
2.1 Current and predicted use of telehealth	25
2.2 Industry overview	30
2.3 Case study	34
2.3.1 Microsoft's HealthVault	34
2.3.2 Jitterbug wireless	35
2.3.3 Aetna	36
2.3.4 CardioNet	38
2.3.5 Best Buy	39
2.4 Non profit side	40
2.4.1 FrontlineSMS	40
2.4.2 SexINFO	41

Chapter 3	43
Regulatory, Legislative, and Reimbursement Consideration in Telehealth	43
3.1 Regulation and agencies	44
3.2 Who pays?	51
3.2.1 Health care business models	53
3.3 Interoperability	55
Chapter 4	57
The value system of healthcare: marketing opportunities for telehealth	57
4.1 Demand side	57
4.1.1 Provider: physician	58
4.1.2 Provider: hospital	62
4.1.3 Consumer	64
4.2 The value chain and relationship marketing	67
4.2.1 Business-to-Consumer	70
4.2.2 Business-to-Business	77
4.2.3 Government-to-Consumer	79
4.2.4 Government-to-Business	82
Conclusion	83
List of Acronyms	87
References	89

Chapter 1

Telehealth: general aspects

1.1 Definition and general aspects

The term "telehealth" or "telemedicine" is open to different definitions depending on the aspects of discipline in which you want to focus. In literature we can find different formulations. However, all possible forms converge to the idea that information is travelling through real-time transmission between people rather than patients and doctors. This is done through using computer systems and other technology to process this information, and telecommunications systems to transmit them.

The most comprehensive definition of the term telemedicine is probably the one developed in 1990 by a commission of experts of the European Community. According to the European Commission, telemedicine is

"the integration, monitoring and management of patients and education of patients and staff using systems which allow ready access to expert advice and patient information, regardless of where the patient or information is residing (Advanced Informatics Medicine programme, 1990)."

The Food and drug administration (FDA), an agency of the United States Department of Health and Human Services, one of the United States federal executive departments, provides another influential definition. The FDA defines the term "telemedicine" as

"the delivery and provision of health care and consultative services to individual patients and the transmission of information related to care, over distance, using telecommunications technologies, and incorporating 1) direct clinical, preventive, diagnostic, and therapeutic services and treatment; 2) consultative and follow-up services; 3) remote monitoring of patient; 4) rehabilitative services; or 5) patient education" (Food and Drug Administration, 1996).

As in any technological area, health care and telecommunication definitions change to adjust to the vagaries of language use and developing concepts. An example of this phenomenon is the distinction- or lack of distinction- between *telemedicine* and *telehealth*. The World Health Organization (WHO) makes a distinction between them:

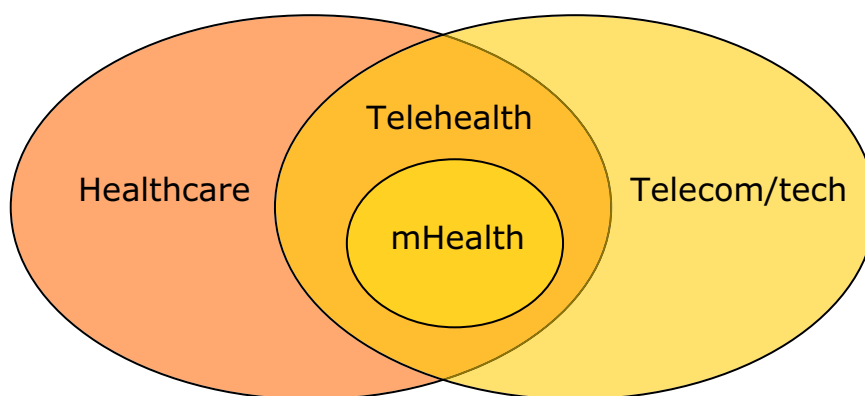
"If telehealth is understood to mean the integration of telecommunication systems into the practice of protecting and promoting health, while telemedicine is the incorporation of these systems into curative medicine, then it must be acknowledge that telehealth corresponds more closely to the international activities of WHO in the field of public health. It covers education for health, public and community health, health systems development and epidemiology, whereas telemedicine is oriented more towards the clinical aspect" (Antezana, 1997).

Telemedicine is sometimes associated more with direct individual clinical services and refers only to the provision of clinical services, while telehealth is associated with a broader definition of remote healthcare services and can refer to clinical and non-clinical services such as medical education, administration, and research. Another difference is that telemedicine implies that the remote delivery of health care is completely associated with physicians, whereas physician's role is changing (Dankins and Cary, 2000).

Pragmatically, it is much more realistic if telemedicine is thought of as a subset of a wider entity called telehealth.

In the world of information technology, changes are happening. Technology products and services are constantly evolving, so rigid definitions have become as redundant as yesterday's technology. For example, mobile-health (mHealth) is another term used to broadly encompass the use of mobile telecommunication and multimedia technologies as they are integrated within increasingly mobile and wireless health care delivery systems. E-Health is the area of telehealth that involves the exchange of health-related information, products, and services over the Internet.

In order to not constrain this study unnecessarily, I will refer to the broader definition of telehealth or use other terms, like mHealth or healthcare wireless, as synonyms.



Source: CSMG

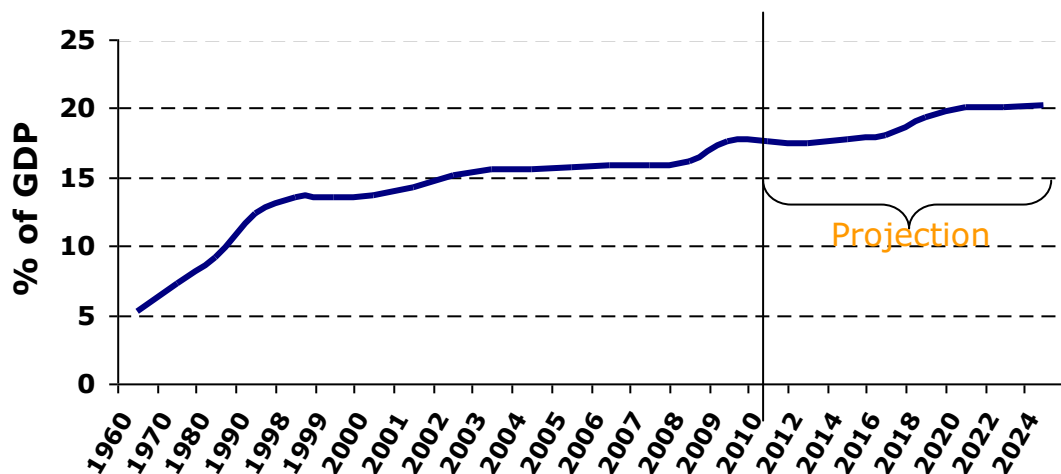
Figure 1

1.2 Motivations of mHealth

There are several different motivations behind the growth of telehealth. It is important to understand what the trends are and how they will affect telehealth and the possible benefits this will produce.

1.2.1 Costs

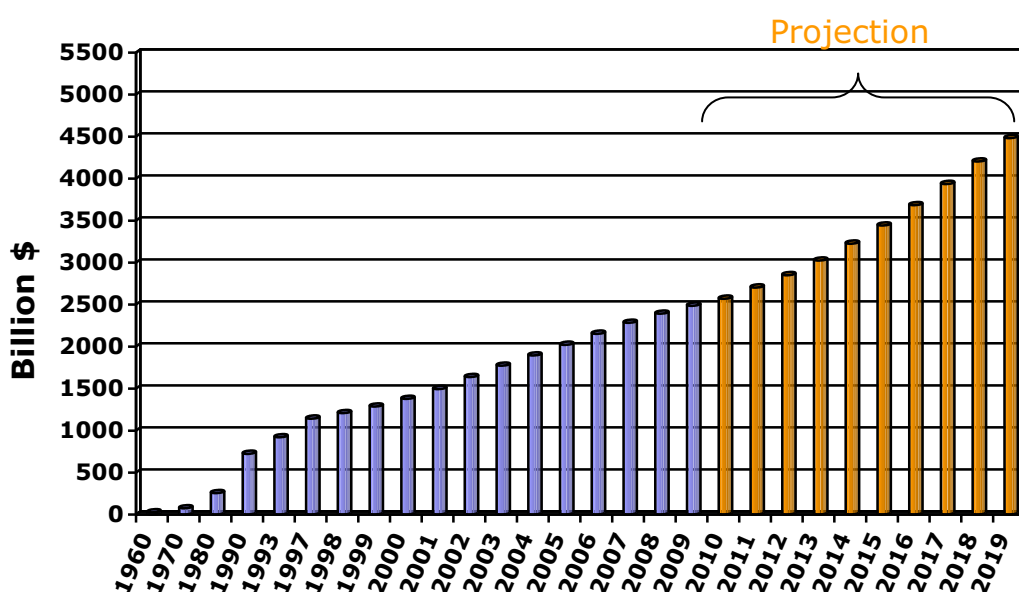
The Centers for Medicare and Medicaid Services (CMS) report that National Health Expenditures (NHE) in 2009 was 17.6 percent of Gross Domestic Product (GDP) and that it is inevitable that they will rise in the next few years. In fact, the health share of GDP is expected to continue it's historical upwards trend, reaching 19.3 percent of GDP by 2019 (Centers for Medicare and Medicaid Services, 2010) (graph 1).



Graph 1: National Health Expenditures as a share of Gross Domestic Product (GDP)

Source: CMS, Office of the Actuary, National Health Statistics Group

In 2009, the U.S. Health Expenditures amounted to 2.5 trillion dollars; an increase of 4% from the previous year. Growth in NHE is expected to increase to an average of 6.1 percent per year over the projection period (2009-2019), reaching 4.5 trillion dollars in 2019 (graph 2). Spending is divided between public (such as Medicare, Medicaid, Veteran Administration, etc.) and private company/personal funded health insurance. Public funded accounted for 47 percent of national spending in 2008, but this is expected to rise to 50 percent by 2011 as an aging Baby Boomer population enters retirement.



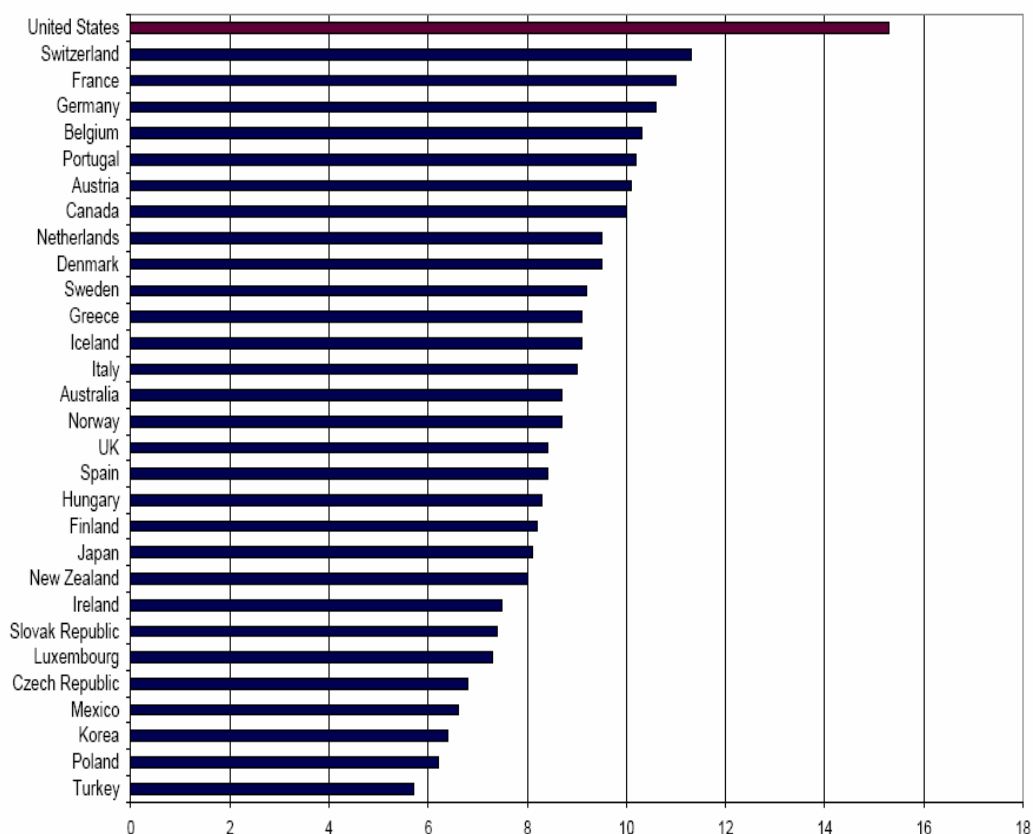
Graph 2: US Growth in Health Expenditures

Source: CMS, Office of the Actuary, National Health Statistics Group

U.S. healthcare costs exceed those of other countries, relative to the size of the economy or GDP (graph 3).

There are 4 types of factors that determine this constant growth in U.S. healthcare costs. One of these factors is **aging population** growth. There has been a shift in the age distribution of U.S. population, and of worldwide

population, toward older ages. Progressions in health science have led to greater longevity in the population however, this presents a challenge for public health that has to confront rising costs due to the consequent **increase of population**. For example, in 1950 one in every twelve Americans were over 60 years old, but this ratio is currently expected to become one in every five in 2050 (Pew Research Center, 2008).



Graph 3: Healthcare Spending as % GDP

Source: Organization for Economic Cooperation and Development, OECD Health Data 2008

This fact is associated with the growth of **chronic diseases**, since they are age- related. 133 million Americans – 45 percent of the population – have at least one chronic disease (Wu and Green, 2000). People with chronic conditions are the most frequent users of health care in the U.S. They account for 81 percent of hospital admissions; 91 percent of all

prescriptions filled; and 76 percent of all physician visits (Partnership for solution, 2007). Examples include diabetes, hypertension, heart failure, various cancers, and Alzheimer's. Accordingly, chronic diseases account for the majority of health spending. Indeed chronic diseases cannot be completely cured or eliminated, and tend to require lengthy and often expensive treatments involving complex, ongoing care. In fact, they account for two-thirds of expenditures.

As you can see in graph 2, unless something changes in the future, costs will become unsustainable so that it will be difficult to provide broad access to healthcare and guarantee minimum **standard of quality and safety**. In fact, despite spending so much, the quality of U.S. health care as measured by life expectancy is no greater than many other developed countries.

To overcome these problems around costs, access, and standards, healthcare systems must be highly innovative in their approach to delivering services. Healthcare could learn from the experience of other sectors that have adopted a higher level of technology to improve their outcomes (McKinsey Mobile Health Record, 2010).

With regards to chronic diseases, remote monitoring services are likely to deliver the greatest benefit in their management in terms of improved disease evolution, patient lifestyle, and treatment costs. Remote monitoring cuts direct healthcare expenditures by 10-15 percent based on reduced hospitalization, nursing care, and ER visits (McKinsey Mobile Health Record, 2010).

mHealth/telehealth is a big challenge for the healthcare industry. The healthcare industry is able to use the IT market to solve these challenges and has in fact, already started to make steps in this direction. In fact, Compass Intelligence expects health care organizations including hospitals, doctors' offices, private practices, clinics and other health care organizations to spend an estimated \$73.1 billion this year on IT products, services and solutions. By 2014 expenditures are expected to climb to \$85.0 billion (Compass Intelligence, 2010).

According to Juniper Research's Mobile Health Opportunities Report, public and private healthcare providers will be able to save between \$1.96 billion and \$5.83 billion in healthcare costs by 2014 through the use of remote patient monitoring using cellular networks (Juniper Research, 2010). In particular, due to higher healthcare costs, the U.S. and Canada will generate the greatest economic savings.

1.2.2 Resource constraints

The U.S. is facing many resource constraints in the healthcare system. Hospitals are facing an increasing demand from Baby Boomers, **nurse shortages**, hospital redesign, and overwhelming IT complexity.

Today there are 160,000 registered nurse vacancies and by 2025 that number is expected to grow to 500,000. Recent education cutbacks means schools are providing fewer nurses than ever before. To add to the problem, hospitals have moved from traditional war style rooms to private rooms. Nurses can no longer easily see patients under their care and they are forced to walk from room to room hunting and gathering information from several locations. Nurses are bombarded with information from everywhere. As IT investment continues to grow, due to the American Recovery and Reinvestment Act, the demand of clinicians will only increase, which means more and more information will be sent to caregivers. The Joint Commission recently stated: "ineffective communication is the most frequently cited root cause for sentinel events". Not only does this affect patients' safety, but it is also costing the hospital money. \$4 million per year is lost due to waste communication.

Furthermore, the United States is likely to face a growing **shortage of physicians**. In fact, there is a shortage of 12,000 generalists (Health

Leaders Media Web site, 2008). Physicians seem to be increasingly choosing more lucrative career specializations over generalist primary care practice (McKinsey Mobile Health Record, 2010). Pursuing better career opportunity, physicians are moving in to major urban centers, so that rural areas have less access (or more difficult) to healthcare. Physicians' shortage is another consequence of the growth and aging of the U.S. population. Although the supply of physicians is estimated to increase modestly between now and 2025, it is anticipated that the demand for physicians will increase even more sharply (Health Leaders Media Web site, 2008).

As a consequence, these as well as many other factors, for example greater intensity of medical treatment, will affect healthcare quality. This includes longer waiting times for appointments, increased travel distances to get care, shorter visit times with physicians, higher prices and intensified use of non-physicians for care.

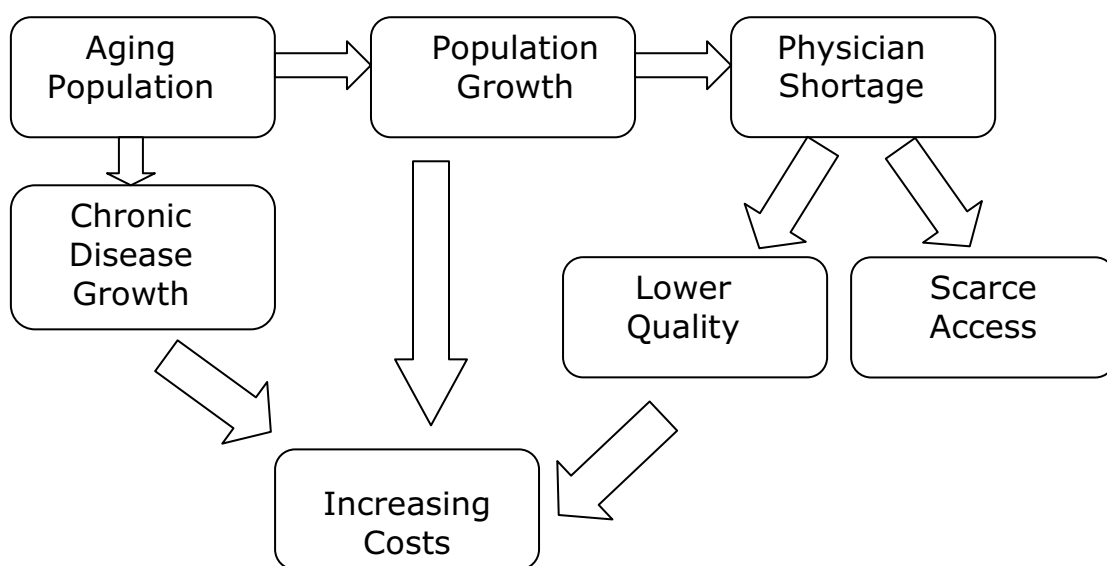


Figure 2

Healthcare organizations are experimenting with new approaches to managing costs and improving quality. Telehealth is one of these approaches. It is a solution to gain more access to rural areas and improve

quality. Nevertheless, it compensates the shortage of physicians and nurses.

All of these issues prompt the healthcare system to adopt innovations in healthcare delivery. The potential advantages are clear: it offers better services to a larger and broader number of patients.

The mHealth field operates on the premise that technology integration within the health sector has the great potential to promote a better health communication. This helps to achieve healthy lifestyles, improve decision-making by health professionals (and patients) and enhance healthcare quality by improving access to medical and health information and facilitating instantaneous communication in places where this was not previously possible (Shields and Davis, 2005, World Health organization, 2005).

"[Mobile health] will improve access to healthcare for patients in remote areas, and importantly, mHealth systems will allow caregivers to collect and analyze aggregated patient data and accelerate medical research innovations for better disease management," GSMA's Chief Marketing Officer Michael O'Hara said. "All of these measures will have a direct impact on cost savings through reduced hospital admissions and utilization."

1.2.3 Patients empowerment

Empowerment is a concept that has recently emerged in the health scene. It embraces the idea that everyone has the right to make their own choices about their health care. The empowerment model is based on the assumption that to be completely healthy, people must bring about changes not only in their personal behaviour, but also in their social situations and in the environment that influences their lives.

Nowadays more information is available through Internet and in particular, information on medical conditions and their treatment is available. This has enhanced patient's knowledge, creating a progressively more consumerist attitude. Patients are better informed and so they have higher expectations regarding treatments. Telehealth improves information availability.

According to a survey by InMedica (InMedica, 2010), by the year 2013, the shipments of home-use telehealth devices will surpass two million. This means a substantial increase in adoption.

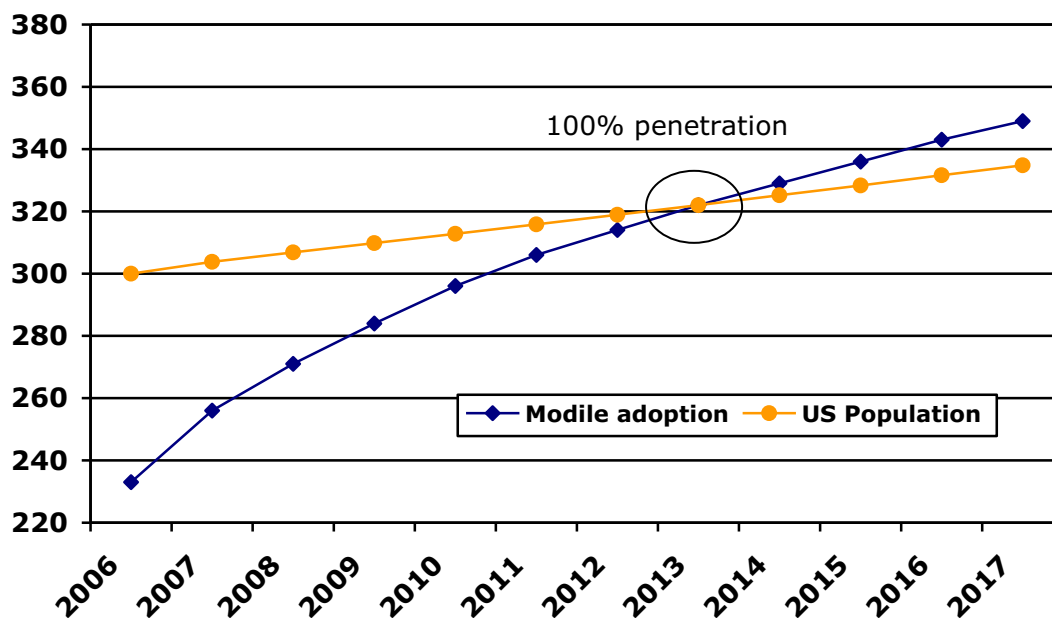
With data and other indicators pointing to a greater integration of emerging technologies into the mainstream telehealth market, coupled with increased utilization of technology for in-home monitoring, the result is a clear indication of a larger move toward patient empowerment (Kohler, 2010). In fact, the increased availability of remote patient monitoring systems will complement disease management and home health care to engage consumers with constant feedback on their health (Mobilhealth News, 2010a).

1.2.4 Rapid rise in mobile phone penetration

Mobile technology has made a rapid increase in adoption in these last years. Mobile phone penetration is reaching large segments of the population, allowing the development of telehealth. With greater access to mobile phones to many people in the U.S., including those living in rural areas, the potential of lowering information and transaction costs, due to healthcare delivery, improves.

Eighty-five percent of adults in the U.S. who are 18 and older own a cell phone, Blackberry, iPhone or other mobile device that acts as a phone, according to a new study from Pew Research Center's Internet & American

Life Project (Zickuhr, 2011). Cell phone penetration in U.S. is going to reach 100 percent by 2012 (graph 4).



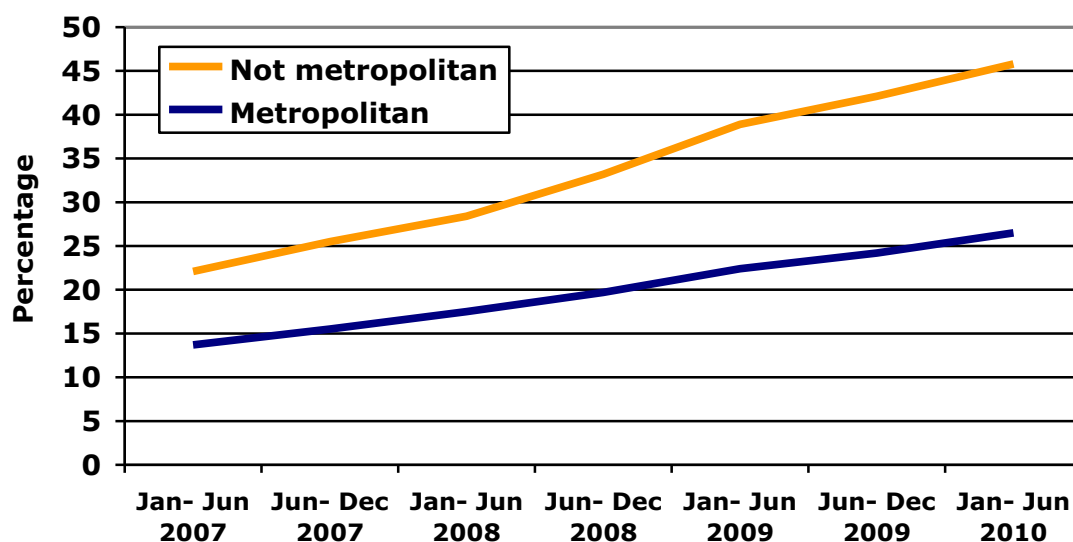
Graph 4: US mobile phone penetration

Source: SNL Kegan, a division of SNL Financial LC, estimates

Recently the Wireless Association CTIA switched from tracking the number of mobile subscribers in the U.S. to the number of mobile connections. At the end of 2009 there were 285 million wireless connections in the U.S. and more than 50 million Smartphone's in use (Mobilhealth News, 2010b). This has an even stronger impact on telehealth/mHealth because not only does technology, but also connectivity enhances its adoption.

Preliminary results from the January-June 2010 National Health Interview Survey (NHIS) indicate that the number of American homes with only wireless telephones continues to grow. More than one of every four American homes (26.6 percent) had only wireless telephones (also known as cellular telephones, cell phones, or mobile phones) during the first half of 2010; an increase of 2.1 percent since the second half of 2009. In addition, nearly one in every six American homes (15.9 percent) received all, or

almost all, calls on wireless telephones despite being in possession of a landline (Blumberg and Luke, 2010).



Graph 5: Wireless substitution

Source: National Health Interview Survey, January – June 2010, CDC

In both metropolitan and not metropolitan areas, wireless adoption is growing, although there is a slight increase difference between them (graph 5). This means that rural areas are adopting wireless connection, but at a slower rate. In fact, while a large segment of the U.S. population have regular internet access, a significant number of people do not. The segment of the population that does not have internet access is heavily concentrated in specific groups which include; non-English speakers, people with disabilities, and those living near or below the poverty line. Moreover, those with low levels of internet access in many cases have the greatest need of public health-related communication because of their adverse social and economic conditions (Fogg and Adler, 2009). On the other hand, simple, old-generation mobile phones are equally used across every segment of American society. In many cases, text messaging is more common among populations that are underserved by internet access. Hispanic and African

Americans for example, both utilize text messaging at a rate three to five times greater than the general population (Fogg and Adler, 2009).

"WiFi adoption has helped overcome initial concerns about complexity and reliability of wireless within healthcare," ABI Research principal analyst Jonathan Collins stated in a press release. "The growing number of wireless technologies and wireless applications being developed, piloted, and deployed within healthcare further underline the level of interest in using wireless to improve the flexibility and efficiency of healthcare services around the world."

Additionally, mobile network operators continue to improve speed, coverage, and cost structures of wide area network (WAN) which enable new health connected device speed models. 3G speeds are available nearly nationwide and should be sufficient to support most typical monitoring solutions. Faster 4G technologies may be required for more robust two-way mobile telemedicine consults. 4G should also improve the potential size and quality of images that can be carried across the network in remote specialist diagnostic solution (CSMG, 2010).

Considering physicians, Manhattan Research found out that 72 percent of U.S. physicians use Smartphone's. In 2008, only 50 percent of physicians used Smartphone's, but adoption rates have grown since 2009 reaching 64 percent, and it is intended to hit 81 percent in 2012 (Mobilhealth News, 2010b).

The positive trend for Smartphone's adoption among professionals working at care facilities is certainly an undeniable good supposition for telehealth.

1.3 Developing nations

The potential for mHealth to improve patient care in developing countries is vast. Tens of millions of people who have no access to computing and communication technologies, due to investments in cellular network and low-cost mobile devices, are beginning to use mobile phones to access information about health and interact with healthcare professionals. In developing countries, mobile phones offer more access to healthcare than any other technology or health infrastructure. In 2012, according to UN Department of Economics and Social Affairs, half of all individuals in remote areas of world will have mobile phones. Even capabilities of basic mobile phones, such as SMS, could have significant impact on the health of the population (CSMG, 2010).

The United Nation Foundation and the Vodafone Foundation published a paper in 2009: "mHealth for Development: The Opportunity of Mobile Technology for Healthcare in the Developing World" that examines the impact that mobile technologies will have in developing nations, meeting health need and improving healthcare. Concrete benefits have been demonstrated through these kinds of projects, including:

- increased access to healthcare and health-related information, particularly for hard-to-reach populations
- improved ability to diagnose and track diseases
- timelier, more actionable public health information
- expanded access to ongoing medical education and training for health workers.

Furthermore, the long-term goal is to have a verifiable and significant positive impact on clinical outcomes such as reduced infant mortality, longer life spans, and decreased contraction of diseases.

Chapter 2

Telehealth Industry Analysis

In the telehealth industry many solutions have been developed and soon many others are going to be launched. The goal of this chapter is to take an overview of the state of the industry and analyse some case studies in order to understand the key aspects of the industry. Today the industry is very fragmented, there are many stakeholders playing different roles. In the paragraphs that follow, after an initial introduction, I going to analyze the issue from different perspectives.

2.1 Current and predicted use of telehealth

According to Compass Intelligence, in 2010 the healthcare industry has spent an estimated amount of \$706 million on mobile applications. In general, thanks to the federal stimulus monies, the U.S. health IT market will expand to \$85 billion in 2014, up from an estimated \$73.1 billion in 2010 (MobilHealth News, 2010b).

In the U.S., mHealth and Telehealth solutions already generate notable revenues in select monitoring and telemedicine solutions, even though this sector is not yet mature. In particular, revenues from remote patient monitoring services that use mobile networks are expected to rise to \$1.9 billion globally by 2014, according to Juniper Research's recent report,

“Mobile Healthcare Opportunities: Monitoring, Applications & mHealth Strategies 2010-2014.”

Another estimation that comes from a survey done by the Health Research Institute (HRI), calculates based on what consumers said they would be willing to pay, that the annual consumer market for remote/mobile monitoring devices in the U.S. is approximately between \$7.7 billion and \$43 billion.

Furthermore, one of the reports in InMedica notes that the current use of telehealth at home has been quite high. Most home devices have been used for chronic disease management and in particular, chronic obstructive pulmonary disease (COPD), congestive heart failure (CHF), hypertension and diabetes. InMedica says that the number of gateways used in telehealth applications will increase to more than 1 million in 2014 and to about 3.6 million in 2018. The estimates include both types of gateways: fixed hubs and mobile phones. Although home telehealth is not a recent phenomenon, it has not yet evolved into a mainstream application.

In 2009, nearly 50,000 blood-pressure monitors were used in telehealth applications. Shipments in U.S. are forecast to increase to more than half a million in 2013. Ageing world populations and unhealthy modern lifestyles are significantly increasing the prevalence of hypertension. It is also becoming an increasingly worrying cardiovascular risk factor. In the face of these major challenges, blood-pressure monitors are being increasingly integrated as a part of telehealth packages for managing disease conditions such as CHF, COPD and hypertension. Diabetes is another common chronic condition to be monitored using telehealth. Though the number of blood-glucose monitors used in telehealth applications was quite low in 2009, shipments are forecast to grow to around 300,000 in 2013 (Mobilhealth News, 2010b).

Other examples of existing mHealth innovations are:

- SMS alerts that remind patients to take their prescription drugs at the right time

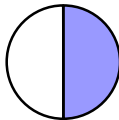

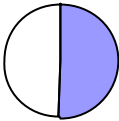
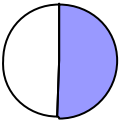
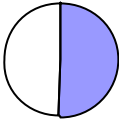

- Remote diagnosis and treatment for patients who do not have easy access to a physician
- Remote health monitoring (RHM) devices that track and report patients' conditions
- Healthcare/fitness-related applications that can be downloaded from Smartphone's and hundreds of other devices that track blood sugar, blood pressure, cholesterol, pain readings, count calories and fitness activities, and send medication reminders.

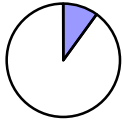
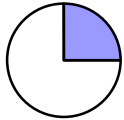
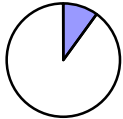
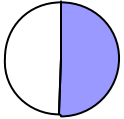

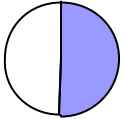

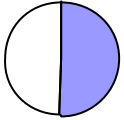
Hundreds of different solutions have been marketed and many others will be launched soon. It is important to group them into categories. To do that I rely on CSMG, a leading strategy consultancy that focuses on telecom, media, and entertainment sector, that categorizes mHealth solutions into 7 keys areas:

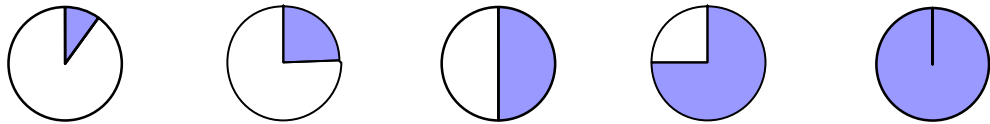
- **Monitoring** usually embraces a wireless device and a software solution to monitor patient activity, such as cardio activity, blood glucose levels, etc.
- **Personal Emergency Response System (PERS).** As suggested by the name, this is a connected electronic device that a patient can use to signal a dispatcher in case of need for assistance. Call centers stand by to offer emergency service support, such as calling 911 in the event of user request.
- **Telemedicine** is when diagnostics are delivered from remote locations. For example, life consultant is the most common form of telemedicine.
- **Mobile Medical Equipment.** Special machines that have wireless functionality built-in for remote diagnostics or rapid information synching.

- **Mobile Health Information.** A device and software platforms that allow physicians or home health care workers to view or update issued prescriptions, order follow-ups, and perform other health-related tasks from wireless-connected devices (like PCs or Smartphone's).
- **RFID Tracking.** It helps to track patient locations and value assets.
- **Health and Fitness Software.** This is generic software that is put on devices that let consumer to monitor, track, and update health and fitness information.

The chart below (table 1) shows actual and predicted market size, divided by solutions.

	2009 Market size	2014 Market size
Monitoring		
PERS		
Telemedicine		

Mobile Medical Equipment		
Mobile Health Information		
RFID Tracking		
Health/Fitness software		



Less than \$50M \$50M to \$250M \$250M to \$750M \$750M to \$1,5B Greater than \$1,5B

Table 1

Source: CSMG

There are a number of mHealth devices that have already been well introduced in the market. These include **monitoring, PERS, and telemedicine**. In particular, monitoring and telemedicine are expecting to grow significantly over the next five years. PERS already belongs to a more mature and established market where its target segment is limited to people over 65 years old, and to those with a disposable income. Approximately 2-3 percent of the 65+ population subscribes to PERS. However, capabilities such as locating tracking, fall monitoring, and basic

bio-metric monitoring functions could be built in to more sophisticated and mobile internet-connected PERS devices.

With regards to the adoption of **real-time location systems** (RTLS) by U.S. health care providers, this is expected to grow at a stable but significant pace over the next five years. According to the KLAS Enterprise survey January 2009, only 5 percent of hospitals have adopted this system and 35 percent intend to invest in RTLS systems in the next two years. Adoption is expected to grow as tag costs decline.

Moreover, **Smartphone health applications** are rising exponentially. Nowadays, this is one of the most important trends in the U.S.. There are 5,820 medical, health and fitness applications available for Smartphone's today. They currently account for 3-4 percent of application store sales (CSMG, 2010). In particular, 70 percent of these are intended for use by consumers, while only about 30 percent are intended for use by healthcare professionals. This may be a consequence of the patient empowerment phenomenon.

The National Survey on the Impact of Technology in Healthcare Reform (2009) found that about 57 percent of healthcare executives in the U.S. believe their IT budgets will increase, and 69 percent of them plan to invest in improving their technology during 2010 to accomplish their goal of improving productivity and efficiency to accommodate future patient demand on the healthcare system.

2.2 Industry overview

Many stakeholders are developing several solutions for different target health-related issues. In the following chart there is a list of mobile health efforts divided by type of stakeholder.

Stakeholder	Target Health-related issue	Who	Mobile Health Solution
Provider	Physician to physician consultation to enhance patient care	Physicians from Duke, Harvard, and JTCC	Virtual physician network and video mobile consult, starting with cardiology and oncology. Partnership at Duke University Medical Center, Harvard's Beth Israel Deaconess Medical Center (JTCC) and Zibbel, a health solutions technology company.
	Efficiency in coordinating care/physician work flow	Good Shepherd Health System	Developed own iPhone app to help physicians access patient records, track vitals, order medication and coordinate with care team.
		Huntington Hospital	Equips its nurses and other point of care workers with iPhones that contains a Voalte voice, alarm, and text message communication platform.
Health Insurer	Finding physicians in network or checking claims	Aetna	Mobilizing "doc" finder and claims check. Make appointment and research prescription prices from consumer handsets and Smartphone's.
	Allow physicians to access patients' clinical data, communicate with the patient, e-prescribe and recommend follow-up care	BlueCross BlueShield	Collaboration with American Well and Microsoft's Health Vault for a 24 hours consultations via web cams, phone or secure text messages.

	Leverage remote monitoring devices to more efficiently triage members with chronic heart conditions, while identifying patients at risk for a possible acute health crisis	Anthem Blue Cross	Work with wireless health company Ideal Life on a wireless body weight scales for in-home use for congestive heart failure (CHF) patient.
Pharma	Patient compliance in diabetes monitoring	Bayer	Digital glucose monitor (DIDGET) that integrates with the Nintendo game console.
	Sensing technology for organ transplantation	Novartis	Proteus Biomedical's system includes a wireless band-aid like sensor and technology that embeds a pill that measures certain vitals, like hearth rate, activity and respiratory patterns.
Drug company	Enhance care for patient with Gaucher's disease, an incurable genetic disease	Shire plc	iPhone app, called OnePath that tracks patient health metrics, provides real-time information to physicians and connects patients to dedicated case managers who streamline insurance coverage issues.
Retail Pharma	Cost information and prescription management cumbersome to obtain	CVS Caremark	iPhone app for prescription drug information and member management of prescription refills, history, and retail location finder.
Telecom	Bandwidth and capacity constraints on hospital networks	Verizon	4G and more robust Wi-Fi networks to allow for increased capacity for image and data transfer.
Mobile service	Help people feel better by providing them with proven techniques for relaxing, motivating and their overall well-being	Jitterbug	Mobile phone service, the Jitterbug Call and Heart Healthy Tips.

Retail	Access to remote monitoring devices	Best Buy	Partnership with Meridian Health to explore consumer access to health care monitoring devices through retail stores and determine the opportunity to leverage existing customer service team for installation and technical support.
Wireless Health industry	Pill reminder device to enhance consumer care	Vitality	GlowCap is a wireless pill reminder device that alert first the patient and eventually his family and doctor.
	Chronic diseases management	MiLife	Monitoring diabetes, high blood pressure, obesity, and high cholesterol using connected devices.
	Enhance care and reduce need for assistance by giving patients and providers timelier, relevant alerts	MicroCHIP	Implantable medical device that will deliver drugs inside the body.
	Remove traditional barriers to healthcare access including insurance coverage, geography, mobility, and time constraints	American Well	American Well has created the Online Care technology that allows customers to connect with physicians from their home or office whenever they have a health need. Physicians are compensated by per consult bounties.
	Help people to discover new, scientifically-based ways to improve the quality of their of sleep	Zeo	A personal sleep analysis device. it identifies periods of wake, REM, light, and deep sleep.

Table 2

2.3 Case study

In this section I am going to present some case studies. The purpose of this is to understand what different companies from various fields are doing in the telehealth industry and what the similarities and differences are.

2.3.1 Microsoft's HealthVault

Microsoft HealthVault is a platform from Microsoft to store and maintain health and fitness information. Started in October 2007, the website addresses both individuals and healthcare professionals. Access to a record is through a HealthVault account, which may be authorized to access records for multiple individuals, so that a mother may manage records for each of her children or a son may have access to his father's record to help the father deal with medical issues.

HealthVault Connection Center allows health and fitness data to be transferred from devices (such as heart rate watches, blood pressure monitors and the *Withings* Wifi Bodyscale) into an individual's HealthVault record. It can also be used to find and download drivers for medical devices. HealthVault supports a number of exchange formats including industry standards. Support for industry standards makes it possible to integrate with many Personal Health Records. Moreover, users can store and manage their health records without paying a fee.

An individual interacts with their HealthVault record through the HealthVault site, or more typically, through an application that talks to the HealthVault platform. When an individual first uses a HealthVault application, they are asked to authorize the application to access a specific set of data types, and those data types are the only ones the application can use. An individual

can also share part or all of their health record with another interested individual such as a doctor, a spouse, a parent etc. Microsoft made many efforts to ensure users' privacy. In keeping with Microsoft's promise to make storing data on the internet just as secure as keeping it in a bank, it was entitled the Health Vault.

Furthermore **Best Buy**, the largest consumer electronics retailer in the United States, announced that they were teaming with the Microsoft HealthVault team to identify solutions that health-conscious shoppers would be interested in. **BlueCross BlueShield**, a federation of 39 separate health insurance organizations and companies in the United States, is also integrating with Microsoft's HealthVault personal health platform to better connect patients and physicians.

2.3.2 Jitterbug wireless

GreatCall Wireless, is an American mobile virtual network operator founded in 2006 and based in Del Mar, California. The brand name "Jitterbug" refers to the handsets. The wireless service that GreatCall provides operates on the Verizon Network. The Jitterbug's trademark is a simplified mobile phone that is targeted at Baby Boomers and older Americans. GreatCall is relevant because it is the first and largest independent mHealth vendor to create a direct-to-consumer model for an in-demand health service which is offered to a large, well established market. Jitterbugs' intuitive design and push-to-talk live support phone feature made them simple, easy-to-use and ideal for seniors seeking to establish a greater degree of independence. This reduces costs and dependence of physical care.

Jitterbug offers many services. **Jitterbug's Live nurse** is a service that has attracted 12,000 users in the six months since it was launched. Live

Nurse has averaged about 4,000 calls per month. Most of the people (roughly 91 percent) that call the Live Nurse line ask for advice because they are unsure if they should plan a visit to their physicians or go to a hospital emergency room.

Jitterbug added two new health focused offerings to its Service Store: the Jitterbug Wellness Call and Heart Healthy Tips from American Heart Association. The Wellness Calls service has attracted 1,000 users in one month since it launched. The company describes its **Wellness Calls** as “recorded messages that help you feel better by providing personal tips and solutions for relaxation, motivation and overall wellbeing.” Users can schedule the four to five minute calls for certain days and time to fit their schedule. **Jitterbug’s Heart Healthy Tips** offers guidance and helpful information on exercising, eating right and living a heart-healthy lifestyle. The service counted 4,000 users after launching at the Consumer Electronics Show in the beginning of 2010 (Mobilhealth News, 2010b).

During fall 2010, Jitterbug launched a mobile personal emergency response service, **5Star Emergency Response**. The PERS service follows on Jitterbug’s acquisition of MobilWatch. This offered a keychain device that included an emergency button which activated a Bluetooth connection to the user’s cell phone that then connected to an emergency call center. Jitterbug plans to integrate this service into their phone.

2.3.3 Aetna

Aetna is an American health insurance company, providing a range of traditional and consumer directed health care insurance products and related services. Aetna is one of the few and most notable private payers engaging with mHealth.

The insurer launched a whole suite of new mobile services for its customers. "On-the-Go" is an application for various Smartphone platforms that combines with a mobile friendly version of its website to allow customers to find a doctor, dentist or facility via browsing on their Smartphone's.

Aetna also began offering text message powered services for those users without a Smartphone or web browser equipped phones. Users can look up claim statutes, find physicians, and make appointments, research prescription prices and more, straight from their handsets.

The main goal of Aetna regarding mHealth is to meet their members where they are with resources that engage them in making well-informed health care decisions, improve their interactions with their physicians, and eventually help them save money.

Furthermore Aetna is collaborating with Intel in a pilot. The pilots aim is to demonstrate how remote patient monitoring and nurse case management could improve the health of Medicare patients with chronic heart failure (CHF). Dr. Randall Krakauer, Aetna's national Medicare medical director, presented initial findings from the Aetna-Intel study at the Institute 2010 conference: "Preliminary results revealed a number of successful early interventions and evidence of improved adherence from both clinicians and patients". According to these two companies, after the Intel Health Guide system was installed for the intervention group of 164 individuals, all 315 participants were monitored for six months. Participants in the intervention group recorded their weight and blood pressure daily, or as instructed. It was also mentioned that some were asked to input information into the Intel Health Guide about medication adherence, exercise, as well as recent emergency room visits and hospital stays. "While we are still in the process of reviewing the study results, we already know that there were several instances where the Intel Health Guide facilitated successful intervention," Krakauer said. "This includes timely attention to elevated blood pressure or weight readings, surfacing and addressing previous prescription drug errors, as well as facilitating timely engagement between the member and their physician or nurse case manager."

2.3.4 CardioNet

A pioneer of the mHealth space, CardioNet's Mobile Cardiac Outpatient Telemetry (MCOT), provides real-time analysis, automatic detection and transmission of cardiac data for the diagnosis of cardiac arrhythmias to central monitoring locations. It leverages a wireless connection to a land-line connected cradle when in one's home, and a cellular data network when out of the home.

Approximately 2.2 million Americans are living with atrial fibrillation and about 9 percent of people over age 80 have this condition. In the United States, more than 4 million people suffer from recurrent arrhythmias that warrant a physician's care. This technology offers significant clinical and economic benefits; it enables physicians to quickly diagnose and effectively treat arrhythmias, it reduces the use of unproductive diagnostic tests, repeated ER visits, and hospitalizations that contribute to the rising economic burden on healthcare. Moreover, early treatment of heart arrhythmias can prevent strokes, heart failure, and other serious complications that can result from undetected arrhythmias. CardioNet automatically detects and transmits arrhythmic events without any patient interaction, which is certainly an important advantage since many arrhythmic events are symptom-free.

CardioNet also provides an educator who instructs patients on the system's use, and an in-service specialist who assists the staff of physicians on the correct procedure in which to enrol patients.

CardioNet's clinical leadership and commercial success in mHealth has influenced technological progression in the telehealth industry. In fact, they have spent a significant amount of time and funds developing clinical proof of efficacy studies to demonstrate its value over legacy alternatives. In a relatively short period of time, CardioNet built a \$120 million business with a remarkable opportunity for growth.

However, insurance reimbursement requirements introduced significant business risk for this medical-grade solution. Recently, Highmark Medicare Service reduced the reimbursement rate on CardioNet's MCOT technology to from \$1,123 to \$754 per service, significantly cutting revenue perspective and even potential business viability.

Today, CardioNet has monitored more than 300,000 patients and service has expanded throughout the continental United State.

2.3.5 Best Buy

Best Buy is a specialty retailer of consumer electronics in the United States, accounting for 19 percent of the market. In 2009 Best Buy announced that 40 of its stores in the U.S. have begun offering personal health solutions devices like pedometers, Bluetooth-enabled weight scales and blood pressure monitors and many other devices.

Best Buy is a key strategy in the collaboration with many mHealth companies. This is because the health system does not have the great amount of experience in the retail marketplace. Best buy however, does possess this experience which is evident due to the fact that many people purchase technological products from this retailer. The wireless networks are going to be a major part of placing technology in the hands of consumers. Best Buy together with Geek Squad, an on-site installation service of Best Buy, are a good strategy to reach consumers.

One of its noteworthy collaborations is with Meridian Health, a clinical expertise of five hospitals, and Cypak, a technology expertise that creates consumers tools. The collaboration developed a product called iMPak's Health Journal of Pain, an electronic diary in which patients are given an auditory queue and answer two or three questions regarding their pain via buttons on the device. During office visits, physicians download the

information, or it can be downloaded at home into a web portal or personal health record (PHR) (Health Research Institute, 2010). The journal's intent was to allow patients to record and communicate their pain while resting at home. With more accurate communication, physicians can better understand the pain medication needs and their patients. This is one of the first steps of wireless healthcare to improve palliative care.

Retailers of consumer health electronics can allow providers to focus on their core services while leveraging the expertise of other industries such as technology and retail.

2.4 Non profit side

Telehealth has already been firmly established in developed countries, but has also begun advance in developing countries. Solutions have been introduced by non profit associations and consist of low-tech, low-cost products. I will now consider two examples of this.

2.4.1 FrontlineSMS

A lack of communication is a major barrier for grassroots Non-Governmental Organisations (NGOs) working in developing countries. FrontlineSMS is a text messaging system created exclusively to partially solve this problem.

By utilizing basic tools already available to most NGOs, such as computers and mobile phones, FrontlineSMS enables instantaneous two-way communication on a large scale. Moreover, the software is free and there is

no need for internet access. Since its launch in 2005, FrontlineSMS has been downloaded by NGOs in over 40 countries for use in a wide range of activity.

2.4.2 SexINFO

In 2006, Internet Sexuality Information Services, Inc. (ISIS) developed a pilot text-messaging program with funding from the San Francisco Department of Public Health. The service, called SexINFO, is a free sexual health service for young people that is accessible through mobile phones. Young people text questions and all answers given include basic health education information and referrals to local in-person resources.

This service reaches young people with information that will empower them to make key decisions at a time and in a manner with which they are familiar.

Chapter 3

Regulatory, Legislative, and Reimbursement Consideration in Telehealth

As well as the clinical and technical challenges of configuring workable telehealth services, there are regulatory, legislative and political dimensions to consider.

Complexity inevitably results because telehealth cuts across the traditional boundaries of many interest groups. These groups include:

- Health care providers
- Professional organizations
- Telecommunication companies
- Government agencies
- Medical equipment suppliers
- Patient organizations
- Health insurers

In this chapter we consider the aspects that can ultimately decide whether a telehealth program has real commercial prospects.

3.1 Regulation and agencies

Federal agencies are involved with telehealth and supporting policies.

The Federal Communications Commission (FCC) recently released a National Broadband Plan that contains telehealth provisions. The Food and Drug Administration (FDA) began considering regulations for mobile health devices, and the Health and Human Services Department (HHS) is setting up telehealth pilot and innovation programs that were established by Obama's administration health care reform legislation (Lipowicz, 2010).

It is important to now analyse what each federal body is doing regarding telehealth.

The **Federal Communications Commission** (FCC) is an independent agency of United States government that works towards six goals in the area of broadband, competition, the spectrum, the media, public safety, and homeland security.

FCC's broadband strategy, published in March 2010, emphasized telehealth/telemedicine and mobile health services, which they referred to as e-care. The strategy calls for expanded federal reimbursements and a conscious removal of the barriers that prevent adoption of telehealth by updating regulations for device approval, credentialing, privileging and licensing. To try to better connect the \$2 trillion health industry and its consumers, the FCC has established a new healthcare taskforce to focus its national broadband efforts on connectivity through health IT solutions like e-care to improve access/utilization.

In the FCC's National Broadband Plan, the agency estimates that remote monitoring across heart disease, diabetes, pulmonary disease, and skin disease may potentially save \$200 billion over the next 15-25 years. In order to claim these savings, the agency proposes incentives for pilots, expanded reimbursement and related regulatory changes to facilitate access and adoption for converged health care devices.

In general, broadband can help improve the quality, and lower the cost of health care through health IT and improved data capture and use. This will enable a clearer understanding of the most effective treatments and processes.

Many items of equipment used in health care must conform to regulatory codes enforced by government bodies in the United States, such as the **Food and Drug Administration**. The bodies impose specific standards for the specification, manufacturing standards and uses of health care equipment. Telehealth uses recognized medical devices, as well as equipment not previously associated with health care, to deliver services to patients. Innovative new ways of delivering health care services raise new issues about the safety of the equipment. Telehealth programs must make themselves aware of the regulatory barriers governing the equipment they use in order to establish any new area of service.

Many medical devices require clearance by the U.S. FDA before they can be sold in the United States. To obtain this clearance, companies must file an application and demonstrate that the device is significantly comparable to a device already legally marketed in the U.S., including substantial scientific and technical information.

When equipment or software is intended for use in the diagnosis or treatment of a disease or other condition, FDA considers the equipment or software to be a medical device. FDA requires registration and listing, premarket notification and/or approval, good manufacturing practices, and post-market surveillance.

The FDA also regulates the software used in telehealth systems. The distinction between the products that are not specifically intended for medical use, and the devices directly related to the storage, processing and display of medical images is not always clear. In fact, the distinction between a medical device and equipment that simply transmits data can indeed be considered challenging. For instance, e-Health is an area of

telehealth that involves the exchange of health-related information, products, and services over the Internet and so, it is the most difficult aspect because these cannot always be controlled and regulated.

Furthermore, the FDA wants to partner with industry manufacturers, providers and users to work out an appropriate regulatory pathway.

A section of the Federal Food, Drug, and Cosmetic Act of 1976 requires the device manufacturers who have to register, to notify the FDA at least 90 days in advance of their intent to market a medical device.

This is known as Premarket Notification, also known as PMN or 510(k). It allows the FDA to determine whether the device is equivalent to a device already placed into one of classification categories. Thus, "new" devices (not in commercial distribution prior to May 28, 1976) that have not been classified can be properly identified. If a device being submitted is significantly different, relative to a pre-1976 device, in terms of design, material, chemical composition, energy source, manufacturing process, or intended use, the device nominally must go through a premarket approval. Recently the Agency has cleared several 510(k) Premarket Notifications involving wireless technologies. These include:

- medical-grade wireless full HD video for minimally-invasive surgery (NDS Surgical Imaging)
- remote location glucose test systems
- transmission of patient physiological information over an encrypted internet connection to and from wireless patient monitors and a data server healthcare facility
- a device showing fetal heart tracings or maternal contraction patterns remotely on a personal digital assistant (PDA) or Smartphone.

The 510(k) could not clear the Smartphone application which was able to display medical images in full-resolution and was size-adjustable (i.e. zoom or pan), because it was not "substantially equivalent" to any similar device.

The iPhone software for instance, raises new issues specifically in terms of its intended use, safety, and effectiveness.

In summary, the FCC approves mobile devices, while the FDA approves all medical devices. Within mHealth, there is a high degree of probability that any mobile device used within a medical environment will request FDA approval.

The impact of their decisions could affect the speed of innovation as well as the investment in innovation. In fact, antiquated legislation and regulatory schemes provide barriers to telemedicine care models. For instance, currently, physicians must be licensed in the state they are practising in. This law confines the doctors' ability, in most states, to treat patients outside their country. This clearly limits one of the principles of telehealth, i.e. accessibility.

The FCC is working together with the FDA to clarify regulatory requirements and the approval of processes for converged communications and health care devices.

The FCC particularly used mobile health applications, Smartphone remote monitoring applications, point of care diagnostic Smartphone applications and wearable, wireless biometric sensors as examples of the products in need of regulatory clarification. For example, if an iPod includes an application for diabetes tracking or another medical use, does Apple need FDA approval before selling this iPod?

Thus, it is apparent that there are many unresolved questions surrounding mHealth devices.

The **United States Department of Health and Human Services (HHS)** is a department of the United States government with the goal of protecting the health of all Americans and providing essential human services. The motto of the HHS is "Improving the health, safety, and well-being of America".

As part of the role of the HHS to distribute economic stimulus law funding for electronic health records and other health information technology, they are involved in several telehealth programs.

The HHS supports several telehealth pilot projects. For example, the Health Resources and Services Administration run a \$12 million grant program for telehealth services in rural areas. HHS Secretary, Kathleen Sebelius, announced recently that the United States Department of Health and Human Services has approved \$32 million in funding to help provide rural Americans with access to quality healthcare using video conferencing and telehealth technology (Lipowicz, 2010).

According to the health reform legislation, HHS will establish a new Center for Medicare and Medicaid Innovation that will test payment and service models, and it is most likely that telehealth approaches will be part of that project. The center will evaluate using telemonitoring in intensive care units, and for behavioural health, it will subsidize other telehealth and remote patient-monitoring projects (Lipowicz, 2010).

In the FCC's National Broadband Plan, the FCC highlighted for the HHS three key suggestions to better help support telehealth technologies with reimbursement:

1. HSS should identify eCare applications that are easy to reimburse based on the defined outcomes.
2. When testing new payment models, HHS should explicitly include eCare applications and evaluate their impact on the models. Where proven and scalable, these alternative payment models will provide additional solutions to give eCare an incentive.
3. For nascent eCare applications, HHS should support further pilots and testing that review their suitability for reimbursement.

In June 2010, the HHS and the Institute of Medicine (IOM) joined forces to share the national government's database of public-health in the hope that the freely available data would encourage the development of healthy

Smartphone applications, social media, and other IT tools for health improvement. "Information is the key to awareness about health and action to improve health", IOM President Harvey Fineberg said at the launch event of the Community Health Data Initiative, which was a public-private partnership that was intended to connect IT developers with vast storehouses of publicly available health data (MobileHealth News, 2010b).

The **Centers for Medicare¹ & Medicaid² Services (CMS)** is a federal agency within the United States Department of Health and Human Services (HHS) that administers the Medicare program and works in partnership with state governments to administer *Medicaid*, the *State Children's Health Insurance Program (SCHIP)*, and health insurance portability standards. In addition to these programs, CMS has other responsibilities, including the administrative simplification standards from the Health Insurance Portability and Accountability Act of 1996 (HIPAA).

The FCC's National Broadband Plan included a number of provisions about how CMS should reimburse and incentivize the use of connected health or "e-care" services. In particular, CMS should seek to proactively reimburse eCare technology under current payment models.

The **Office of the National Coordinator for Health Information Technology (ONC)** is a staff division within the U.S. Department of Health and Human Services (HHS). It is primarily focused on the coordination of nationwide efforts to implement and use health information technology and the electronic exchange of health information.

The Office of the National Coordinator for Health Information Technology is charged with building an interoperable, private and secure nationwide

¹ **Medicare** is a social insurance program administered by the United States government, providing health insurance coverage to people who are aged 65 and over, or who meet other special criteria.

² **Medicaid** is the United States health program for eligible individuals and families with low incomes and resources.

health information system and supporting the widespread, meaningful use of health information technology (HIT).

ONC's position is fundamental, since its mission is to promote the development of a nationwide HIT infrastructure with the purpose of allowing electronic use and the exchange of information. The benefits of this are that it;

- ensures secure and protected patient health information
- improves health care quality
- reduces health care costs
- informs medical decisions at the time/place of care
- includes meaningful public input in infrastructure development
- improves coordination of care and information among hospitals, labs, physicians, etc.,
- improves public health activities and facilitates early identification and rapid response to public health emergencies
- facilitates health and clinical research
- promotes early detection, prevention, and management of chronic diseases promotes a more effective marketplace
- improves efforts to reduce health disparities

Moreover, ONC provides leadership in the development, recognition, and implementation of standards and the certification of HIT products, and coordinates health IT policy.

Recently, the HHS and the ONC awarded Harvard Medical School and Children's Hospital a \$15 million grant for a four year research project to "investigate, evaluate, and prototype approaches to achieving an "iPhone-like" health information technology platform model" (Mobilehealth News, 2010b).

The Center for Telehealth & E-Health Law (CTeL), established in 1995 by a consortium including; the Mayo Foundation, Cleveland Clinic

Foundation, Texas Children's Hospital, and the Mid-West Rural Telemedicine Consortium, is a non-profit organization committed to overcoming legal and regulatory barriers to the utilization of telehealth and related [e-health] services. CTel, based in Washington, D.C., specializes in compiling, analyzing and disseminating information on legal and regulatory issues information, associated with telemedicine. It also handles underlying issues such as licensure and reimbursement. CTel briefs public policymakers, writes reports, and provides testimony in support of telehealth. In its materials, CTel argues that expanding the use of telehealth can improve patient safety, reduce medical errors, and increase patient access to primary and specialty care in both rural and urban settings.

3.2 Who pays?

As I introduced at the beginning of this chapter, telehealth cuts across the traditional boundaries of many interest groups. Hence, structure is not clear and controversies rise about who should pay for telehealth: government (with reimbursement), insurer companies (private and public), or consumers (patients). Health industry is a particular market that should be analyzed deeply in order to develop marketing strategies to enter right and success in this industry. We stress it later in the forth chapter.

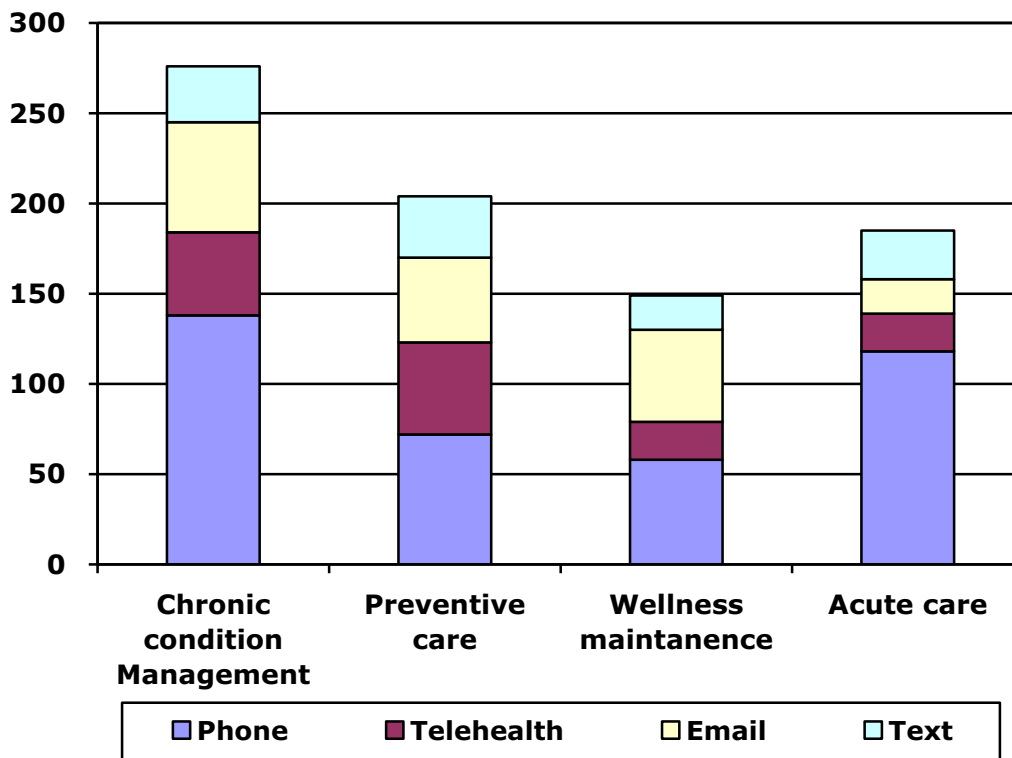
Many mHealth solutions require acceptance and reimbursement from insurance payers and/or Medicare, but currently industry compensation structures are not favourable given the pay-for-service reimbursement model. Thus, many mHealth solutions lack defined payers.

Broader reforms that could facilitate more fundamental integration of mHealth into the US health delivery system face significant challenges. For

instance, pay for performance (P4P) is an emerging movement in health insurance. Providers under this arrangement are rewarded for meeting pre-established targets for delivery of healthcare services. This is a fundamental change from fee-for-service payment.

Also known as "P4P" or "value-based purchasing", this payment model rewards physicians, hospitals, medical groups, and other healthcare providers for meeting certain performance measures for quality and efficiency. Disincentives, such as eliminating payments for negative consequences of care (medical errors) or increased costs, have also been proposed. Previous governments have conducted pilots and as a result promoted P4P through incremental, gradual shifts. However, creating of a true P4P system will become a challenge in the near future.

Despite an explosion of wireless technologies, patient visits outside of in-person consults remain infrequently reimbursed. Currently, Government programs do not pay for several of the applications that could boost outcomes. A prominent barrier is determining what Medicare is going to pay for (Health Research Institute, 2010). HRI's physician survey showed that phone consultations for chronic disease management were the most reimbursed, while wellness and maintenance was the least (graph 6).



Graph 6: Reimbursement of care through nontraditional channels (by number of physicians)

Source: PricewaterhouseCoopers, HRI Physician Survey, 2010

3.2.1 Health care business models

mHealth has many possible solutions. Depending on the type of solution, targeted payers may vary. Health care providers, insurance/Medicare or consumer critically impact the development of each opportunity. Any mHealth solution must fundamentally generate value for one or more of these groups else it will not be viable.

Based on the previous CSMG categorization of mHealth solution, I can now indicate who the primary payers for each solution are:

Solution	Primary Payer
Monitoring	Insurance
PERS	Consumer
Telemedicine	Insurance
Mobile Medical Equipment	Provider
Mobile Health Information	Provider
RFID Tracking	Provider
Health/Fitness Software	Consumer

Table 3

Insurance-paid mHealth models (medical-grade) could generate large-scale revenue, but have relatively high structural risk. As these solutions deliver traditional health care services but in a new way, they become eligible for reimbursement from private insurance providers and Medicare. On the other hand, as regulation reimbursement levels change, this creates significant risk. To gain adoption, insurance-paid models require proof of efficacy studies that demonstrate improvement in quality and decrease in costs. Public and private health insurers are primarily responsible for paying for healthcare, and they generally have not pushed for adoption.

Right now, the U.S government is the largest payer of homecare services and continues to enforce regulation for reimbursements based on better compliance and positive patient outcomes. Increasingly, mHealth solutions are improving the ability of case managers to improve patient conditions and are paving the way for reimbursement.

Provider-paid models adoption depends exclusively on hospital IT department decisions. These models are still nascent today because health care providers bear costs directly and they have to demonstrate clear return on investment. Moreover, doctors and health care professionals acceptance is needed too. This is not always something easy to gain because of their resistant to change.

Consumer-centric health care business models are proliferating and becoming relevant in mHealth. Nowadays, more and more consumers are willing to pay out-of-pocket for health care solutions, since solutions offer them stronger personal control over health decisions. Best Buy engaging with telehealth solutions is evidence of this trend already emerging. Given the risks of reimbursement-based business models, a parallel market of non-medical grade devices is expected to develop over time. These solutions generate revenue directly from consumer-paid devices or recurring service revenue, and it is likely that they will require Consumer Electronics (CE)/mobile handset-type distribution models.

3.3 Interoperability

Historically, healthcare is slower to adopt newer technology than other industries. An example of this is that it is still very common to use paper-based medical records. However, signs point to a number of health care specific technology developments that support the growth of the telehealth market.

Broad adoption of **Electronic Medical Records (EMR)** by health care providers and integration of health care information across multiple sources is critical to the growth of mHealth solutions and is expected to increase substantially over the next five years (CSMG, 2010). An electronic medical record is a computerized medical record created in an organization that delivers care, such as a hospital and doctor's surgery. Electronic medical records tend to be a part of a local stand-alone health information system that allows storage, retrieval and modification of records.

Using an EMR to read and write a patient's record is not only possible through a workstation but depending on the type of system and health care settings may also be possible through mobile devices that are handwriting

capable. Electronic Medical Records may include access to **Personal Health Records (PHR)** which makes individual notes from an EMR readily visible and accessible for consumers. PHR is a digital repository, typically web-based that stores patients' personal health information. Ideally, all healthcare providers (via Electronic Health Record) can send and retrieve medical record information to consumers' PHR. However, there are interoperability problems, and more importantly, security and privacy concerns. With interoperability, the PHR can share data with the physician's EMR and this will become very important, over time, to primary care physicians who are able to make a better diagnosis if the data has been tracked consistently over a period of time and has been well integrated with previous lab results.

Without EMR, information developed by mHealth connected devices remains isolated, and much less valuable as decision-making tools. Moreover, without EMR, it is unlikely that the benefits of telehealth can be demonstrated.

EMR adoption is limited today due to historical concerns with costs, patient information security, and usability (re-training of physician patterns).

Although it is clear that physicians adopting EMR is important for telehealth success, according to HRI's Physician survey, only half of physicians surveyed access EMRs while visiting and treating their patients.

However, through Stimulus funds, US federal government plans to invest \$10 billion per year for the next five years to accelerate EMR adoption with a target of 70 percent adoption by hospital and 90 percent of physicians. In addition, it plans to use Medicare reimbursement penalties after 2014 for organizations that have not yet adopted EMR (CSMG, 2010).

Chapter 4

The value system of healthcare: marketing opportunities for telehealth

To be successful, telehealth must be aligned with operational activities such as marketing. Marketing, as in any other market, is important when selling telehealth products and services. It helps to identify markets as well as interest potential customers and clients.

As I explained in the first chapter, motivations behind telehealth are many, but one of the most common errors new telehealth programs make is to assume that since there is a need for the service, there is automatically a demand for the service. I identified needs that could be filled using telehealth. In this chapter I will now determine if there is a demand for the service that is backed by the willingness and/or ability of customers to pay for the service. This is called purchasing power. Moreover, organizations need to provide real value for costumers in order for adoption to occur.

4.1 Demand side

Our first step in the market analysis is to identify key customers. While we often think of patients as the primary "customer", we need to look at the customer bracket more broadly. It is important to identify the individuals or groups that need to be engaged in order for a program to be successful.

The demand side is represented by physicians and individuals, and by providers, like hospitals and health care organizations.

Based on a survey conducted by PricewaterhouseCoopers' Health Research Institute (HRI), I now analyze the demand side for different stakeholders.

HRI conducted 35 in-depth interviews with thought leaders and executive representing healthcare providers, payers, private sector technology organizations, academic medical centers, telecommunication firms and employers. HRI also commissioned an online survey in the summer 2010 of 2.000 consumers and 1.000 physicians regarding their use and preference of mobile technologies in the United States.

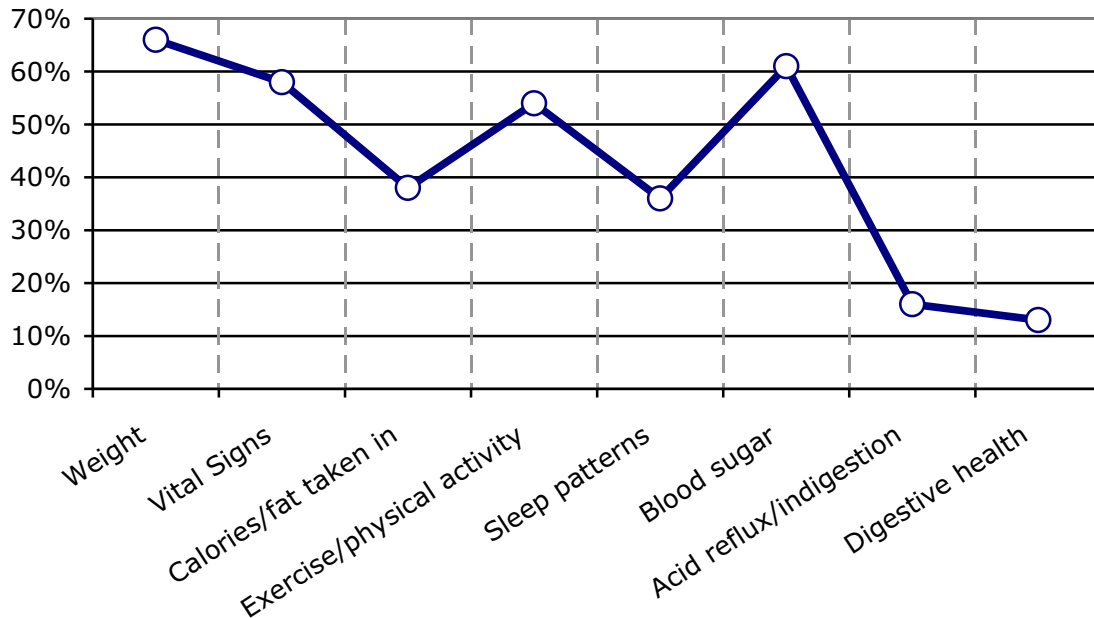
4.1.1 Provider: physician

Physicians are generally paid by task. They waste time on tasks that could be automated, eliminated or reduced in scope through mobile health.

Their time is valuable and in fact, more than half of physicians surveyed by HRI said that a significant amount of office visits could be eliminated through mobile health, which could improve access for patients, and facilitate the growth of in-person visits from chronic care patients. Forty percent of physicians surveyed think that 11 to 30 percent of office visits could be eliminated through the use of mobile health technologies like remote monitoring, email, or text messaging with patients.

Remote monitoring, in particular, could be a better, more efficient way to reduce office visits. Eighty-eight percent of physicians said they would like their patients to be able to track and/or monitor their health at home. The first data they would like their patient to acquire through self monitoring is their weight and blood sugar (respectively 65% and 61%), and vital signs, which includes blood pressure, heart rate, and respiratory rate.

What physicians would like to track regarding health is well represented in the next figure (graph 7).

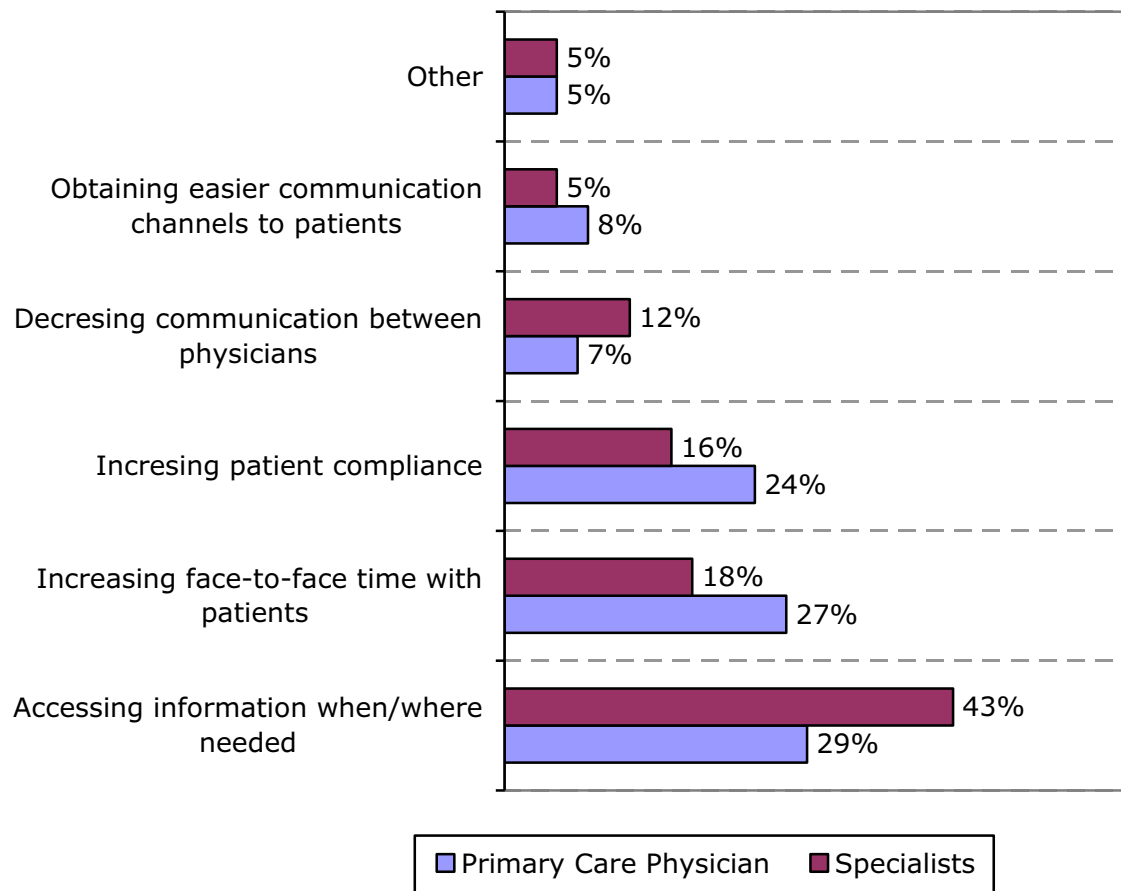


Graph 7: What physicians want to track regarding health

Source: PricewaterhouseCoopers HRI Physician Survey, 2010

Physicians usually get paid for the number of patients they treat, and so an efficient work flow is important to them. According to the HRI survey, physicians indicated that accessing information where and when it is needed was their primary challenge. Currently, one-third of physicians said they make decisions for nearly 70 percent of their patients based on incomplete information. Only half of physicians surveyed access EMRs while visiting and treating their patients.

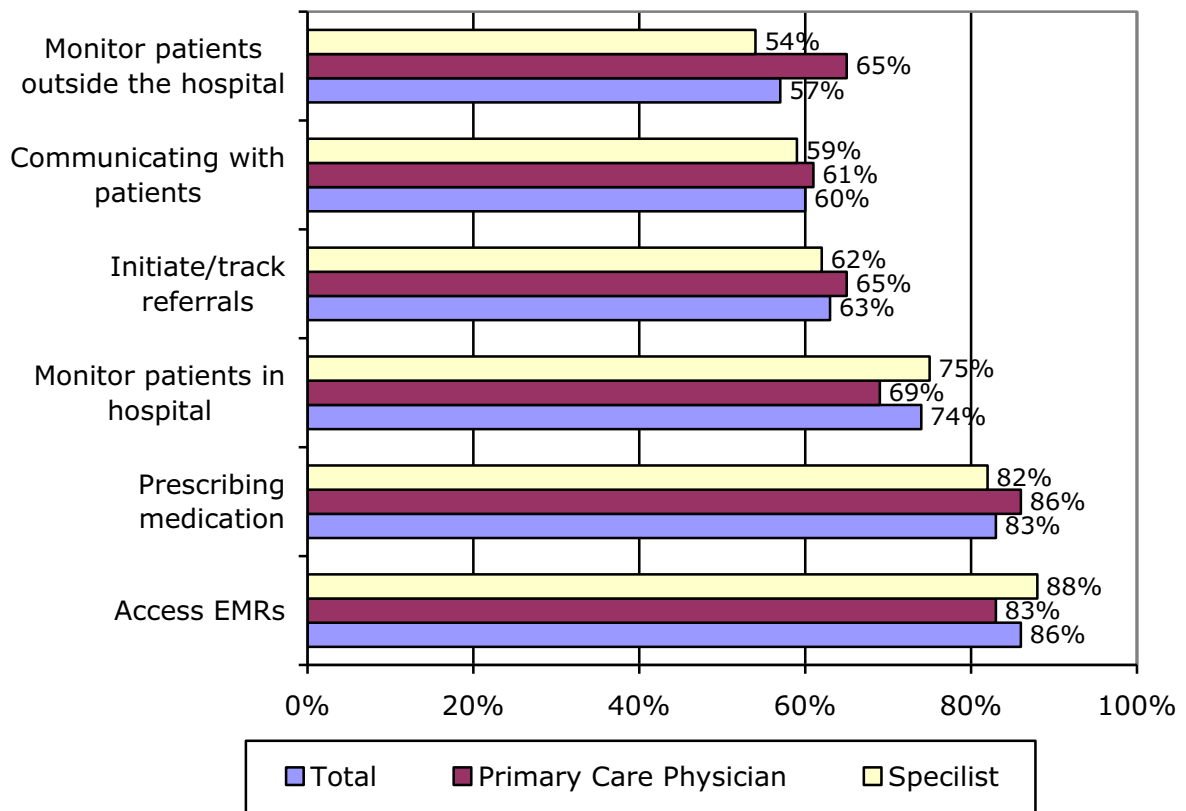
The physicians have observed that the biggest obstacles are; increasing face-to-face time with patients, increasing patient compliance, decreasing communication between physicians, etc. (see graph 8). The major obstacles that occur whilst seeing patients and when running a practise could all be overcome by mobile health solutions.



Graph 8: Biggest obstacle when seeing patients or running practice

Source: PricewaterhouseCoopers HRI Physician Survey, 2010

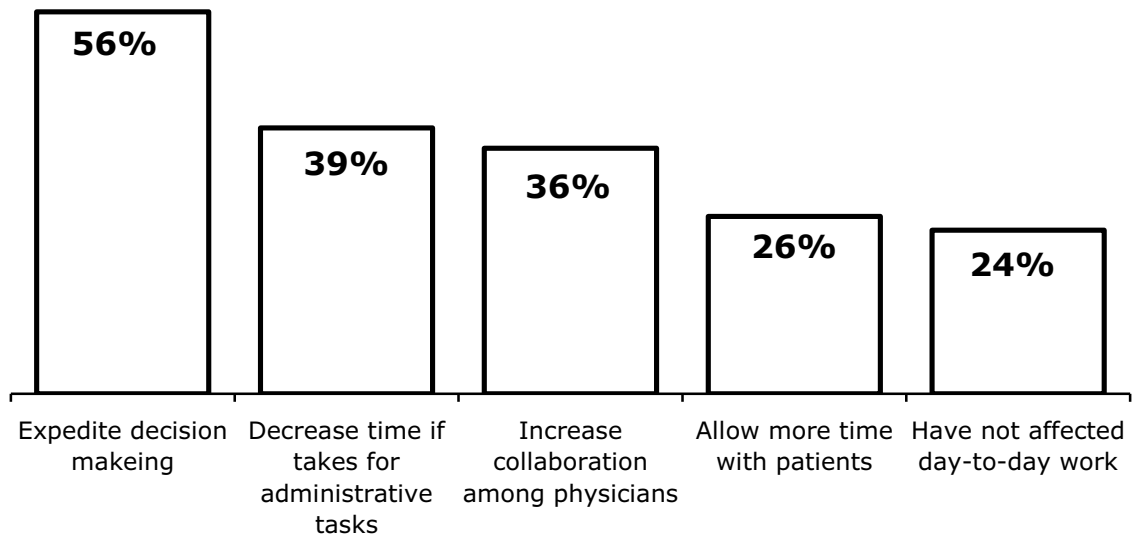
Physicians spend 20 percent of their day on mobile devices. Having information at their fingertips ensures physicians that their time is used more effectively. In HRI survey, both specialists and primary care physicians have a high degree of interest in e-prescribing. This means that physicians' most common orders are automatically populated on their devices. Besides, experienced nurses can post order requests on physicians' phones and they can sign or modify them wherever they are (see graph 9).



Graph 9: Physician interest in performing various tasks wirelessly

Source: PricewaterhouseCoopers HRI Physician Survey, 2010

Of physicians who are using mobile devices in their practise, 56 percent said that mobile health would have a positive impact expediting their decision making, while 39 percent think that they would decrease administrative time (see graph 10). On the other hand, 24 percent of physicians surveyed said that mobile health would not affect day-to-day work. This may be a consequence of the fact that physicians experience with health mobile is weak and so they have to deal with new interfaces. Moreover, when physicians were asked about barriers to adopt mobile health in the HRI survey, their top answers indicated that they were mostly concerned about privacy and security issues. This could therefore be considered a roadblock to adoption.



Graph 10: Percent of physicians surveyed who said mobile health would have these impacts

Source: PricewaterhouseCoopers HRI Physicians Survey, 2010

4.1.2 Provider: hospital

Hospitals care about cost containment and clinical excellence. This may lead to the conclusion that providers are more likely to adopt mobile health solutions. On the contrary, early research showed mobile health reduces provider revenues (see table 4). Hospitals, as well as physicians and other providers, are primarily paid by volume, referred to earlier in this work as the “fee-for-service” business model. This means that the more they do, the more they get paid. Hence, hospitals generally have not pushed for adoption and 30% of physicians said their hospitals or practice leaders will not support the use of mobile health device.

	Where	What	Result
Diabetes	Pennsylvania	Post discharge remote monitoring	42% drop in overall cost per patient ³
	Cleveland	Cell phone size wireless transmitter transferring vital sign to HER	71% increase in number of days between office visits ⁴
Congestive heart failure	Trans-European Network-Home-Care Management System	Remote monitoring of patients who received implantable cardiac defibrillators	35% drop in inpatient length of stay; 10% reduction in office visits; 65% drop in home health visits ⁵
Chronic obstructive pulmonary disease	Canada	Remote monitoring of patients with severe respiratory illness	Reduced hospital admissions by 50%; acute home exacerbations by 55%; hospital costs by 17% ³

Table 4: Early research shows mobile health reduces provider revenues

Source: PricewaterhouseCoopers, 2010

On the other hand providers in search of additional funding, consider marketing mobile health solutions. According to the survey, consumers said that their preferred location to purchase mobile health products was hospitals and an overwhelming statistic showed that the most trusted source for obtaining health information was through doctors.

³ Max E. Stachura, MD, and Elena V. Khasanshina, MD, PhD. "Telehomecare and Remote Monitorin: An Outcome Overview." The Advanced Medical Technology Association, October 31, 2007.

⁴ "Cleveland Clinic/Microsoft Pilot Promising; Home Health Services May Benefit Chronic Disease Management." March 1, 2010.

⁵ Hphn G.F. Cleland, MD, Amal A. Louis, Alan S. Rigby, PhD, Uwe Janssens, MD, Aggie H.M.M. Balk, MD, and others. "Noninvasive Home Telemonitoring for Patients with Heart Failure at High Risk of Recurrent Admission and Death," *Journal of the American College of Cardiology* 45,no.10 (2005): 1654.

4.1.3 Consumer

Consumers are patients who need services, but also parents, spouses and others that assist in making decisions about service offerings and care provision. It is important to know who these consumers are in order to well market them.

First of all, the HRI survey showed that men are twice as likely as woman to use their mobile cell phone to get health-related reminders, even though the survey showed women make most health decisions for the family. This, we think, is related to the fact the women are usually less confident with technology than men. Implementing easy-to-use solutions is a key feature when targeting women. Furthermore, I believe that solutions for early market adoption should focus on pain points that are important for men.

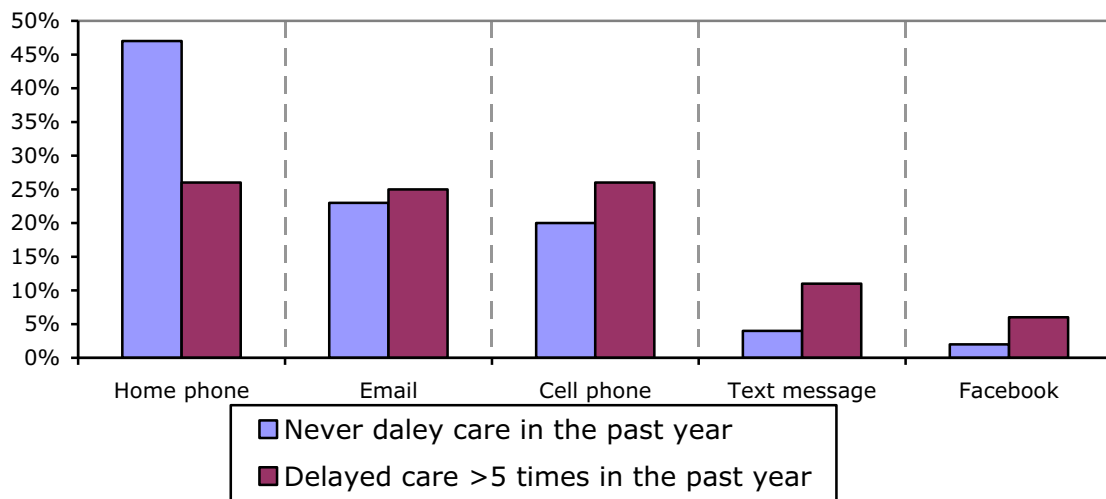
Another counterintuitive result is that the survey showed that even though patients who are in poor health are the dominant targets of these applications, consumers who are in good health are more likely to pay for them. Furthermore, consumers with chronic diseases are the least likely to incorporate an application into their cell phones to monitor their health.

This creates more challenges in being able to reach the highest users of the healthcare system, those in poor health, and therefore this reality lowers the potential of greater profits.

Additionally, health insured individuals are more likely to buy mobile health applications and to pay out-of-pocket for electronic visits with physicians. In particular, forty percent of consumers interviewed by HRI said they would pay for remote monitoring devices and a monthly service fee to send data automatically to their doctors. HRI estimates that the annual consumer market for remote/mobile monitoring devices is \$7.7 to \$43 billion, based on the range that consumers said they would be willing to pay. Of those who are insured and would pay out-of-pocket, 40 percent report having at least one chronic disease. Of those uninsured, instead, only half would be willing to pay out-of-pocket and 42 percent of them have a chronic disease.

Out-of-pocket payers are, in my opinion, the best and most profitable target group for health mobile providers because they are a low-risk investment in an industry that is marked out by uncertain reimbursements.

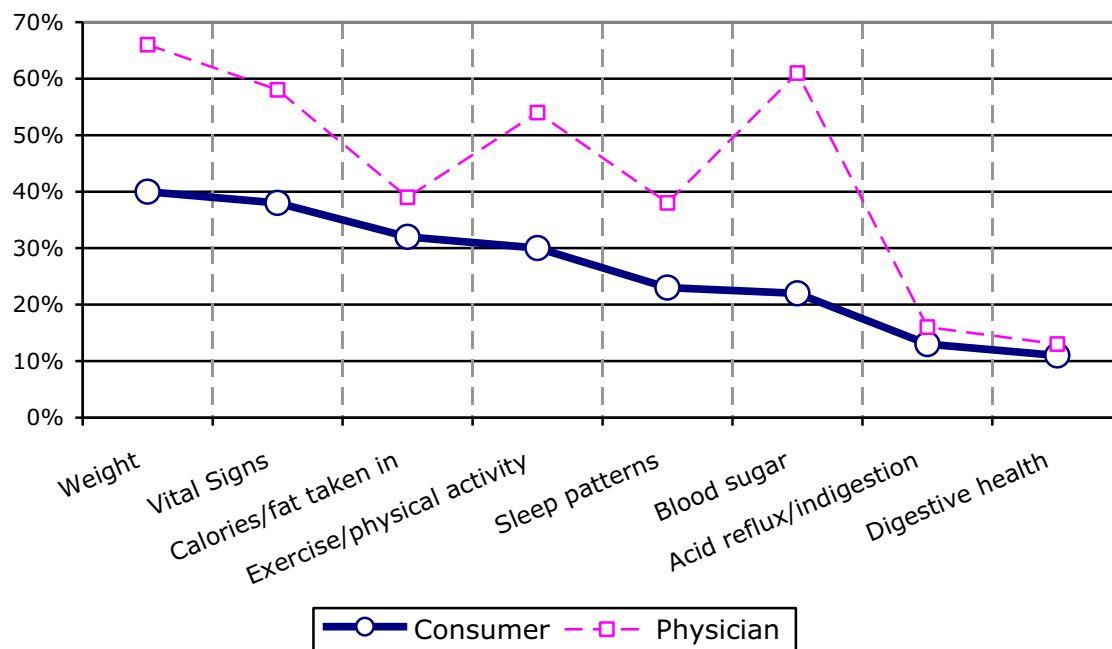
On the other hand, willingness to pay out-of-pocket continues to be the main barrier to mobile health adoption. Healthcare could learn from other markets in which consumers pay a premium for immediate fulfilment. The HRI survey showed that individuals who delay care more than five times in the last year are more willing to pay out-of-pocket for doctor visits, electronics or in-person. Developed countries are seeing a rising trend where people are taking less care of their health due to being over worked and increasingly busy, causing them to have less time to be concerned about this aspect of their lives. There is a possibility that Non-traditional communication and electronic doctor visits could be new, and perhaps more effective ways of reaching individuals who do not proactively engage on a regular basis in self care. The following graph shows preferred types of communication by those who delay care and those who do not:



Graph 11: Preferred communication method for routine tasks by those who delay care compared with who don't

Source: PricewaterhouseCoopers HRI Consumer Survey, 2010

I will now show what consumers prefer to track and monitor regarding health (graph 12).

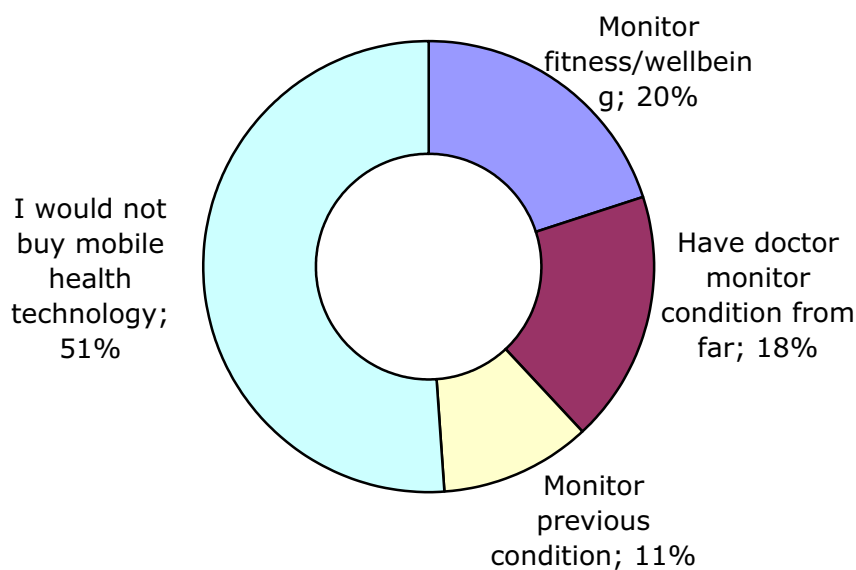


Graphic 12: What consumers want to track regarding health

Source: PricewaterhouseCoopers HRI Consumer Survey, 2010

Consumers and physicians agree on two of the top three metrics they would most prefer to track: weight and vital signs. Where they differ is that consumers rank calories and fat taken in as the third metric they would prefer to track, and physicians rank blood sugar ahead of vital sign. This is evidence of why different groups should be targeted differently.

Only half of consumers surveyed by HRI said they would buy mobile technology for their health. Of those, 20 percent say they would use it to monitor fitness/wellbeing, and 18 percent want their doctor to monitor their health conditions (graph 13). While 40 percent of respondents would be willing to pay for a monthly mobile phone service that could send information to their doctor, they would prefer to pay less than \$10 for the monthly mobile phone service and less than \$75 for the device.



Graph 13: Most important reasons consumers would buy mobile health technology

Source: PricewaterhouseCoopers HRI Consumer Survey, 2010

4.2 The value chain and relationship marketing

The continuing growth, use, and availability of information and communication technology into healthcare have opened the sector to an array of marketing applications with significant strategic considerations for the competitive business industry.

The transfer of marketing knowledge to the sector is not copious. This may be reflective of a lack of consensus on the applicability of commercial marketing orientation to healthcare.

Marketing opportunities now consider identifying where and how marketing knowledge can be better used in the field of telehealth. Failure to apply marketing techniques properly, such as effective targeting, can slow down adoption, which results in loss concerning costs.

The concept of value network (Parolini, 1996) is a useful tool to analyze the competitive environment of a company. The value network surpasses the concept of value chain proposed by Porter (Porter, 1985). The concept of value network is a broader perspective, dynamic and full of strategic and managerial implication. I present it as a graphical formalization of all the activity that influence each other within this sector (or part of it). The focus is no longer direct to a single company, but it is extended to the whole system with contributes to the creation of value for the consumer. The relevant environment for the competitive advantage of a firm is only represented by upstream and downstream actors, but it includes a broader and more complex system of actors and socio-cultural, political, scientific-technological, and economic factors. Each company can use the links with other subjects as leverage to gain competitive advantage. The following representation shows the different economic actors within the system and the relation among them (figure 3).

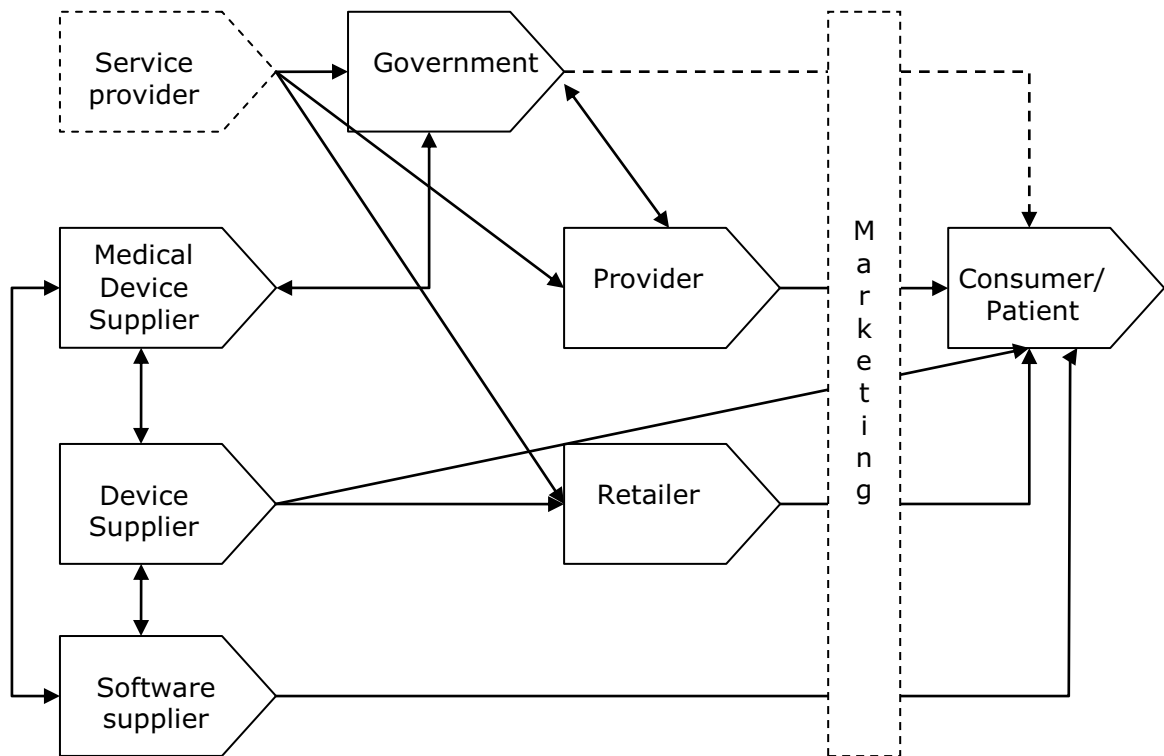


Figure 3

- supporting activities
- ↔ cooperation/collaboration
- flow of goods/services
- -> flow of information

Companies and markets are networks of relationships within which they interact, completely in accordance with the definition of Relationship Marketing (RM). Relationship marketing is usually defined as an approach to develop long-term loyal customers and thus increasing profitability. Gummesson (1999) gives a different definition of it: "Relationship Marketing is integration in networks of relationship". This concept goes beyond the mere techniques of handling customer relationship in practice. The idea behind RM is that marketing needs to be implemented in a relation approach, where networks and interactions become as important as marketing traditional schemas. Research and practise, in fact, showed the

significance of marketing in managing relationships and interactions. When actors are discussed in the following chapters, they are treated as part of a network of relationship. Within the sector exchange are primarily four categories business models; Business-to-Business (B2B), Business-to-Consumer (B2C), Business-to-Government (B2G), and Government-to-Consumer (G2C).

It is important to consider focusing on one of these models when implementing marketing strategies. In this paragraph we take a broader view of the issue analyzing different stakeholders and their relations.

Most of the considerations made in the following paragraphs can be applied to many business models, but to avoid redundant repetitions we present each consideration for the model that best fits it.

4.2.1 Business-to-Consumer

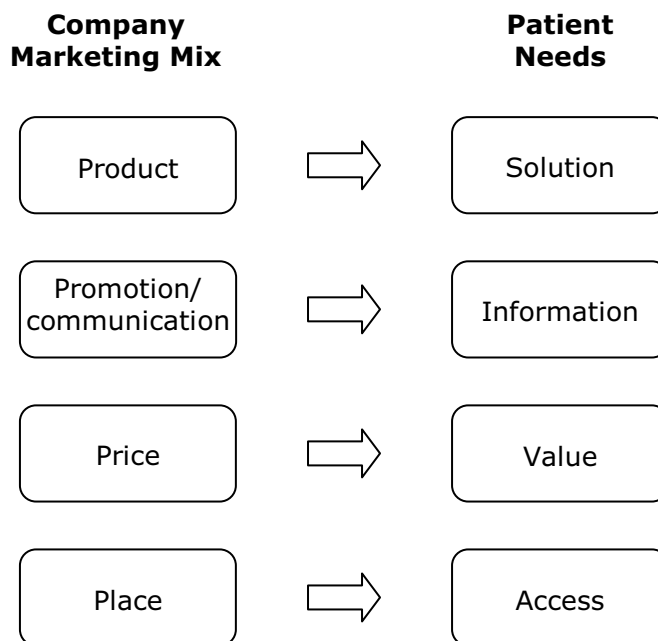


Figure 4

PROVIDER-to-CONSUMER

Increasingly, healthcare companies are redefining their business model according to marketing logics. One of the goals is to improve the dialogue with patients encouraging the generation of a positive experience. In this case, providers are meant like an organization, such as hospitals and practise leaders.

Marketing practices may vary widely across providers, but are correlated by motivations to adopt telehealth. Dansky and Ajello (2005) have identified three possible different goals for adopting telehealth; (i) clinical excellence, (ii) technological primacy, and (iii) cost reduction and control. The research was conducted through interviews with senior manager of home health agencies. Results showed that organizations with the highest marketing activity emphasize clinical excellence as a main rationale for using telehealth, while those with the lowest marketing activity are inclined to focus on cost reduction.

Clinical excellence refers to the view that to meet the clinical needs of the population, healthcare organizations adopt new technologies to supply and improve the health status of patients. The *technological primacy* objective is founded on the supposition that healthcare organizations will adopt new healthcare technologies to enhance their images as technological leaders, consequently attracting physicians and patients. Finally, *profitability and cost reduction* is linked to the motivation that technology adoption depends on factors related to current or projected costs or revenues. However, in any of these cases telehealth, to be used effectively, must be planned and must be consistent with the organization's long-term strategic objectives. This means in particular that telehealth must be aligned with operational activities, such as marketing.

I strongly believe that through market segmentation, providers can identify opportunities and risks and therefore avoid detrimental pitfalls. In order to succeed, providers need to have an adequate understanding of consumers. It is important to take a look at the various types of consumers that exist in the market. Since telehealth is a relatively new concept, a well-defined

market does not exist. Therefore, to effectively market telemedicine, a market need to be defined.

Additionally, Dansky and Ajello (2005) suggested not only to scan and interpret the current environment for trends, opportunities, and threats, but also to try to change the environment in which providers and caregivers are operating, which should help to create a niche for the services provided by the new technology. The first step for doing this is to conduct a review examining the strengths and weakness of the current and future health environment. Secondly, strategic goals need to be aligned within the environment. Thirdly, cost must be analyzed. Start-up costs of implementing a new technology which include the initial cost of the technology, technical support, cost of staff and patient training, have to be considered into budget constrain. On the other hand, the Baby Boomer population is becoming increasingly technology savvy and this may, over time, lead to a reduction in the training time necessary for the implementation of telehealth. Furthermore, costs may be also partially compensated through federal and private grants. These trends as others should be considered in particular when implementing long-term strategy. Finally, providers must examine the characteristics of their patient population to efficiently target them. Depending on which goal providers want to achieve (*clinical excellence, technological primacy, or cost reduction*), they should identify a different message. An organization that pursues *clinical excellence* should emphasize better outcomes and fewer rehospitalisations. *Technological primacy* on the other hand can attract more customers who are not only general patients, but also service partners or physicians. The basic justification behind the message given should illustrate telehealth's ability to improve patient care as well as providers' capacity to use technology effectively. Regarding *cost reduction*, potential patients are not interested in "cheap" treatment; on the contrary, they care about the quality of the healthcare and are less concerned about cost. For this reason, cost-cutting moves should be stressed when approaching third-

party payers, like private insurance companies, in order to increase patient volume.

In any of these cases, I believe care providers need to educate patients and physicians about devices and services if they want them to adopt telemedicine. Patients and physicians' perception is the first step toward adoption. In fact, once physicians have been involved, together with providers, they are perhaps in the best position to stimulate consumers and trigger interest in this industry.

SUPPLIER-to-CONSUMER

If telehealth programs focus predominantly on the technology, clinical process, and finance issues rather than on the patients, it is not surprising to find that telehealth programs with several million dollars invested in equipment are not attractive or even known by hundreds of patients.

The strategy of many telehealth service providers has been to market and sell their products directly to large health care provider organizations. This is because they assume health care providers (usually large hospitals) to be the main customers for telehealth products, instead of patients. A growing dilemma for telehealth providers is whether to keep concentrated their marketing effort toward large hospital providers as their key clients. These sale strategies are often based on selling relatively low volume high-cost equipment.

In the United States, where the health care system is more strongly market driven than elsewhere, health plans and health organizations clearly recognize the growing demand of patients for information, and the strategic importance this has for their business. Moreover, I believe the business of telehealth relates first and foremost to the delivery of care to patients, not to the technology. Hence, companies should consider the eventual consumer – the patient – when looking at telehealth products.

No competently managed company thinks of launching a new product line without first market testing and getting a detailed analysis of consumer preferences. This also applies to telehealth. The point is to illustrate the

difference in the emotional climate between the health care organization and a common company. Being health of primary importance, as it touches so deep inside the personal sphere, it can not be considered regardless of the centrality of individuals /patients.

Consumer empowerment is an opportunity for a shift from offer, to demand-driven healthcare. Consumer behaviour is influenced by the information available to the consumer. The creation of consumer empowerment may be a tactical move in support of marketing strategies for competitive advantage. Approximately 75-80% of U.S. adult internet users have looked for health information online, making internet resources second only to a physician when it comes to gathering trustworthy information about healthcare-related topics (The Pet Internet and American Life Project).

The “consumerization” of medical devices is a common vision for the wireless health industry. The term was first popularized by Douglas Neal and John Taylor of CSC's Leading Edge Forum in 2001. It describes the trend for new information technology to emerge first in the consumer market and then spread into business organizations, resulting in the convergence of the IT and consumer electronics industries. Consumers are beginning to drive a lot of changes in healthcare. This was particularly clear in the Digital Health Summit at the 2011 Consumer Electronics Show. In fact, the focus was on the booming market of consumer-based health and wellness innovations that sit at the convergence of technology and healthcare. Innovative companies are providing tools, products and services that enable consumers to customize options for their own health needs that provides better value and easier access. Hence, concentrating on the consumer is a common vision in the telehealth industry.

Consumer models introduce a number of new business variables such as understanding which products better engage consumers, price sensitivity

and a particular need to strengthen user interface/usability⁶. Examples of consumer solutions are fitness applications, social health communities and Smartphone mHealth applications.

I believe that, in the short time, moving patients to most profitable product can be a low-risk strategic move. In particular, companies that develop mobile health solutions may have better response. Mobile phones have several characteristics that make them an attractive platform for delivering health-related services: they are personal (they make it possible to target applications to specific individuals); they are portable (they can provide direct access to a wide range of external resources); they are intelligent (mobile phone handsets are increasingly resembling small personal computers) (Fogg and Adler, 2009). Even the simplest services, such as receiving information by texts or text remainder, have a great potential. Fogg and Adler (2009) collect different casa studies that demonstrated how mobile health text messaging can promote better health, and improve personal and public health. This topic matters because texting is the most viable interactive channel for reaching people on mass scale around the world. Mobile phones make consumers more independent, and nowadays this ability is a high-valued and highly-rewarded advantage for the consumer. Moreover, through mobile phones it is possible to deliver customized communication. This is a key feature, since the days of mass communication are over. In particular, personalization and interactivity are good characteristic for mobile phone success in telehealth.

As with many innovations, consumer responses will in part determinate their ultimate effectiveness although; their response to telemedicine may vary depending on market segment. When developing a mobile health device or application I believe the following questions are key issues that companies need to answer:

- What are consumer perceptions of new health care technologies and their willingness to use them?

⁶ **Usability** is the ease of use and learnability of a human-made object.

- Are consumer perceptions related to willingness to use telehealth? Hence, is high perception equal to a high willingness to use it?
- Do consumers differ on selected demographic and usage variables with respect to willingness to use telehealth?

Unlike ordinary products or services, health products/services are marketed differently. This is because in the purchasing process, usually the decision maker, payer, and whoever consumes a service or good, is the same person. I maintain that in the case of health care products often the three figures do not overlap (figure 5).

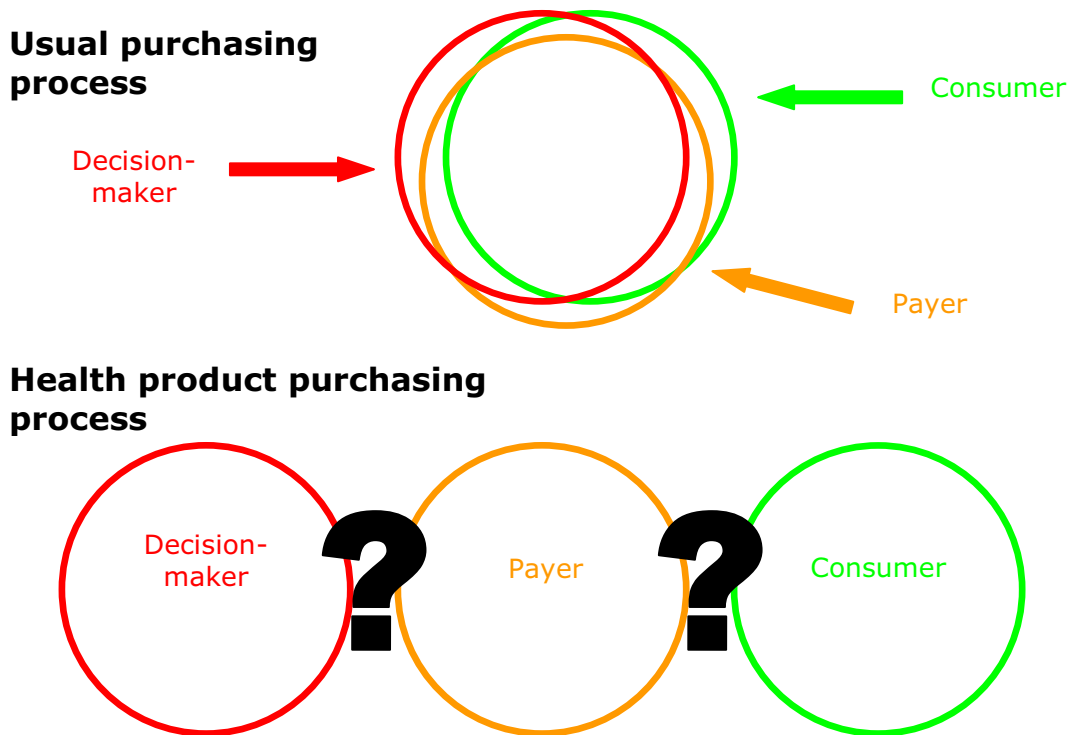


Figure 5

Pricing strategy is not easy to examine, due to this unclear structure. The consumer market can be a high-volume, low-price market.

In order to attract customers willing to pay out-of-pocket, I have considered that a good strategy is penetration pricing, i.e. launching a new product at a

low price and then raising the cost over time. This means, for example, selling telehealth products at the same price as equivalent devices. Though reducing costs to bid competition is not always easy because innovation costs and regulation do not always facilitates innovation.

Adoption of health care technological products, like any other innovation, follows a normal distribution. Therefore, it is important to take a look at the Technology Adoption Phenomenon (Moore, 1995). All potential adopters of a new product do not adopt the new product at the same time. Based on their product adoption initiative, consumers can be classified as belonging to one of the following categories: innovators, early adopter, early majority, late majority, laggards. With this in mind, the “innovator” and “early adopter” will be the first group of consumers that will in part determine telehealth adoption. Feedbacks from this group are particularly important for suppliers.

Communication is required to reduce barriers that prevent acceptance. I believe that communication, especially right after a launch of a product, has to involve education, to inform the consumer on the product itself.

Last but not least, it is evident that not only will patients’ perception influence adoption, but they may also influence the willingness of insurer and payers to provide reimbursements for such services or products.

4.2.2 Business-to-Business

There are a number of obstacles in the way of gaining the widespread use of mobile phones to deliver health-related services; the market is fragmented (there are multiple types of handsets using different communications protocol and different operating systems; each mobile network functions as a “walled garden”, controlled by the network operator), the technology has been developed to support consumer-

oriented applications, not health, and the existing health care system is not particularly well suited to support applications such as continuous remote monitoring of the patient's health (i.e. EMR) (Fogg and Adler, 2009).

More than half of existing mHealth companies sells directly to providers. In fact, the clinical market is the more mature regarding telehealth and is expected to continue to grow.

Business-to-business models require collaborative models to deliver highly persuasive solutions. Regarding organizational strategic initiative related to telehealth, we can mention three types of growth strategies, which include expanding the program internally, developing managed care contracts, and partnering with other organization. There is high potential for contributions from multiple value chain participants. Collaboration and partner selection will be critical to optimize devices and address core competency gaps. For instance, Consumer electronics device players already understand the distribution and go-to-market strategies for a consumer-oriented device offering. Software companies already understand end-user-centric user interface design principles. In general, new players will face fewer challenges from established health care vendors in consumer-oriented markets (CSMG, 2010). As I reported in the first chapter of this project, mobile phone penetration is high. Providers could potentially partner with recognized brands to provide industrialized mHealth solution, exploiting mobile communication wide knowledge to deliver innovative technology. About 15 percent of all text messages are "commercial" – that is, they are sent to or received from a company or an organization that is conducting a "mobile marketing campaign" rather than from an individual (Mobile Marketing Association, 2008). In fact, an entire industry has developed to support the development and implementation of these campaigns that can be involved in delivering mHealth solutions.

Successful companies will properly identify strengths and weaknesses to assess where direct participation is better than collaboration (CSMG, 2010).

4.2.3 Government-to-Consumer

The government aspires to deliver effective, safe, and affordable healthcare to its citizens. It must ensure access to all citizens in terms of both costs and direct access, i.e. disposability, and improve the standard of living. Telehealth can help improve quality and lower the cost of healthcare through health technology and enhanced data capture and use, which will enable a clearer understanding of the most effective treatments and processes.

The government may have a strong impact in telehealth adoption. Moreover, it benefits from delivering effective telehealth solutions because of the ever increasing high healthcare costs that it faces.

In the past, great attention has been given to the link between social marketing and public health in the academic literature. Social marketing was "born" as a discipline in the 1970s, when Philip Kotler and Gerald Zaltman realized that the same marketing principles that were being used to sell products to consumers could be used to "sell" ideas, attitudes and behaviors. Nowadays social marketing is well used to create awareness in populations where there is a need for preventative actions for particular health risks, like fat consumption and low physical activity. Examples of such actions include; announcing new medications, new health institutions and acclaiming new research advances; generating an awareness of, and support for the needs of health challenged minorities; inducing behavioural change and improve health outcomes (Randolph et al., 2004, Coreil et al., 2000, Walsh et al., 1993). Social marketing is, by definition, the process of developing, distributing, and promoting products or services for the purpose of eliciting a behaviour for members of a targeted population that is in their or the society's best interest.

I think that developing a new theory that integrates telehealth into social marketing campaigns will lead to immediate effects as well as long-term effects in telehealth adoption, since the use of social marketing in public health is mostly effective⁷ and over time it has been recognised its potential in influencing individual and social behaviour (Greir and Brayant, 2005).

My idea comes from the concept that social and commercial marketing are distinct. When speaking about healthcare, concerns are raised about issues like ethics, disempowerment, manipulation of stakeholders, commercialization of health information, and inadequate application of marketing strategy. For example, there is a lack of certification or accreditation on web sites that include information and clinical services, and sponsorship of sites from company with conflicts of interests. The commercialization of healthcare solutions might raise possible conflicts between company objectives and the social goods when profit seeking companies are involved in delivering healthcare. For these reasons I think that the government should intervene in the promotion of telehealth solutions. mHealth could form part of prevention policies.

For example, an investment in telehealth promotion through social marketing may increase societal returns in the form of lower people suffering from chronic diseases and less future related healthcare needs. Moreover, costs containment and improved health care quality might improve social welfare. Another benefit regards information access. I think that government could drive conscious choices and save patients from a sea of confusing information. The government is a source of trust and it eventually will help to avoid tensions or anxiety due to the high involvement of the consumer in the process of purchasing and adopting telehealth solutions. In fact, consumers often pay intangible costs, such as time and psychic discomfort associated with gathering information.

⁷ There are evidences in the academic literature that interventions adopting social marketing principles could be effective across a range of behaviours, with a range of target groups, in different settings, and can influence policy and professional practice as well as individuals.

I believe that one possible strategy for the social marketing campaign for mHealth might be to identify consumer, advertising, and marketing research techniques used by past campaigns in delivering healthcare solutions. The objective is to explore how the identified techniques might be used to develop pro-telehealth marketing campaigns.

A core concept adopted from the commercial sectors in social marketing is the marketing mix, also known as the four Ps: product, price, place, and promotion. These key elements of social marketing are central to the planning and implementation of an integrated marketing strategy. *Product* refers to the set of advantages associated with the desired behavior or service usage. To be successful, the product must provide a solution to problems that consumers consider important and/or offer them a benefit they truly value. *Price* refers to the cost or sacrifice exchanged for the promised benefits. This cost is always considered from the consumer's point of view. As such, price usually encompasses intangible costs, such as diminished pleasure, embarrassment, loss of time, and the psychological hassle that companies often change, especially when modifying fixed habits. *Place* refers to the distribution of goods and the location of sales and service encounters. *Promotion* is often the most visible component of marketing. Promotion includes the type of persuasive communications marketers used to convey product benefits and associated tangible objects and services, pricing strategies, and place component.

I believe that mobile health suppliers will benefit as well due the fact that social marketing will perhaps increase sales of telehealth solutions.

4.2.4 Government-to-Business

I cannot ignore that in terms of the adoption of telehealth technologies, the resistance comes from providers as well, intended both as hospitals and physicians. The challenge is in regards to providers who are working a full day and they do not have the time to learn something new. Moreover, many mHealth clinical solutions require large, up-front costs to implement. These costs go well beyond the solution itself and include upgrading out-dated IT systems and infrastructures, as well as hospital and clinic workflow re-training.

The government should intensify discussions around mHealth cost benefit, and encourage investment in telehealth initiatives. Nevertheless, it should be responsible for developing telehealth solutions through pilots in order to recognize metrics and milestones of successful adoption. This can be a way of promoting mHealth solutions. If the government plans to do a lot of pilots and intends on funding clinical trials acknowledging an “evidence based medicine”, this will build confidence amongst wireless health companies.

Government should be in charge of physician’s education/training in order to overcome adoption challenges.

Furthermore the government should stimulate standardized and modularized interfaces and establish standards that are critical to reach scale and player/provider acceptance.

Conclusion

Telehealth is an exciting area to observe for new developments. It is a consequence of the great revolution created by technology, internet and e-commerce. In this moment, technology is moving so quickly that the healthcare industry, the players, and the ideas and concepts that deal with it are all rapidly evolving.

As medical knowledge and technology become more sophisticated the complexity and cost of delivering health care services raises.

Due to an increasing aging population (associated with the growth in numbers of people suffering of chronic diseases), and resource constraint that threatens broad access to healthcare and a minimum standard of quality and safety, the U.S. is facing rising costs in this area. On the other hand, more information, regarding medical conditions and their treatments, is available through the internet, and adoption of mobile technology has rapidly increased, allowing easier access to information. This has enhanced patients' knowledge generating an increasing consumerist attitude toward medicine and higher expectations regarding treatments. Rising costs, patient empowerment, and high mobile and internet penetration are a rising trend that enhances telehealth adoption. Telehealth holds great potential for delivering mobile healthcare solutions that lower costs and increase access.

There are a number of telehealth solutions that have already been well introduced into the market. Current and predicted use of telehealth is a positive trend. On the other hand, regulatory, legislative and political dimensions inevitably create complexity. Telehealth solutions require regulatory acceptance and reimbursement by insurance payers and the government. On the contrary, payment models are not clear, hence this

creates a barrier for telehealth adoption. Furthermore, standards and interoperability are needed in order for adoption to occur.

Based on a survey conducted by PricewaterhouseCoopers' Health Research Institute, the demand side sees telehealth as a solution for: patients who delay care because they are too busy to wait in a doctor's office, physicians who do not have enough time to spend with patients and who want to ensure their patients are taking the medicine they need, and for hospitals that do not have the capital to build more beds.

If telehealth programs are properly introduced and based on "evidence of effectiveness", I believe it will have the capacity to improve the quality of health care, provide equity access to health care services, and reduce cost of delivering health care.

However, noticing all benefits that telehealth could bring to the healthcare sector is not enough to make it successful. Instead, organizations need to provide real value for customers in order for adoption to occur. In particular, the potential of telehealth industry stands in the network of relationship. Business-to-consumer, business-to-business, government-to-consumer, and government-to-business are primarily business models presented in this sector. In order to create value for the consumer, all relationships in the value network need to be implemented in a marketing approach.

In this work I discussed how government might have a strong impact in telehealth adoption through social marketing campaigns to awaken awareness in consumers. Additionally, the government is responsible for developing telehealth solution through pilots in order to provide "evidence of effectiveness" and engage suppliers and providers. This may be done through direct investment or collaboration among parties in this sector.

As well as government-to-business, business-to-business also requires collaborative models to enhance value for consumers, and for the business itself. Collaboration and partner selection will be critical for companies who want to optimize devices and address core competency gaps. In fact, the

recent situation of the market is fragmented, and this sector lacks of standards.

Consumer involvement, in particular, represents an important assumption for telehealth. Suppliers need to focus on the consumer since, as with many innovations, consumer response will in part ultimately determine telehealth effectiveness. Moreover, the creation of consumer empowerment is an opportunity for a shift from offer- to demand-driven healthcare. Classic marketing concepts are used to launch products or services, but it is important to note that there is a difference in the emotional climate within healthcare.

Finally, providers are in the best position to trigger interest. Hospitals and health care organizations should use marketing tools to describe the market, as well as to interest potential customers and clients in their telehealth services.

The potential value of the telehealth industry stands in the relationship among all parties playing in this market. Marketing concepts help to manage these relationships in order to create value for the final user of telehealth services and product, i.e. the consumer. The fact that telemedicine is an evolving phenomenon, means that there are high risks involved. On the other hand, there is a high demand to integrate telemedicine in the health sector. And so, in conclusion, individuals involved in this scenario cannot bring about its full realization. Hence, its implementation needs to be done through the collaboration, among government, suppliers, retailers, providers and consumers, which will bring more value to telehealth.

List of Acronyms

- B2B.....Business-to-Business
- B2C.....Business-to-Consumer
- B2G.....Business-to-Government
- CE.....Consumer Electronics
- CHF.....Congestive (chronic) Heart Failure
- CMS.....Centers for Medicare & Medicaid Services
- COPD.....Chronic Obstructive Pulmonary Disease
- EC.....European Commission
- EHR.....Electronic Health Record
- EMR.....Electronic Medical Record
- ER.....Emergency Room
- FCC.....Federal Communication Commission
- FDA.....Food and Drug Administration
- G2C.....Government-to-Consumer
- GDP.....Gross Domestic Product
- HHS.....Health and Human Services Department
- HIPAA.....Health Insurance Portability and Accountability Act
- HIT.....Health Information Technology
- HRI.....Health Research Institute
- ISIS.....Internet Sexuality Information Services

IOM.....Institute of Medicine
IT.....Information Technology
NGO.....Non-Governmental Organization
ONC.....Office of the National Coordinator for Health Information
Technology
P4P.....Pay For Performance
PDA.....Personal Digital Assistant
PERS.....Personal Emergency Response Services
PHR.....Personal Health Record
RFID.....Radio Frequency Identification
RM.....Relationship Marketing
RTLS.....Real-Time Location Systems
SMS.....Short Message Service
WAN.....Wide Area Network
WHO.....World Health Organization
WiFi.....Wireless Fidelity

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