

# Chapter 22

## Incorporating Usability Testing into the Development of Healthcare Technologies

**Shilo H. Anders**

*Vanderbilt University, USA*

**Judith W. Dexheimer**

*Cincinnati Children's Medical Center, USA*

### ABSTRACT

*The use of mobile devices in healthcare is increasing in prevalence and poses different constraints for use than traditional desktop computing. This chapter introduces several usability testing methods that are appropriate for use when designing and developing mobile technologies. Approaching the development of mobile technologies through a user-centered approach is critical to improve the interaction and use of the hardware and software that is implemented on a mobile platform in healthcare. User-centered design adds value by getting feedback about functionality, design, and constraints that need to be built into the system prior to its completion. Future work in this domain will require further tailoring and use of novel usability methods to evaluate and improve the design of mobile healthcare technologies.*

### INTRODUCTION

Standard mobile devices function frequently as more than just as cellular telephones, and include additional functionality such as email, Internet access, and application. Mobile technology is pervasive throughout the culture of the United States. As of 2012, approximately 326 million mobile devices are used (CTIA: The Wireless Association, 2012) with a wireless penetration of greater than 100%. (CTIA: The Wireless Association,

2012) It leads from the saturation of mobile technology, that it will become very important not just in personal but also in professional settings.

The goal of this chapter is to provide an understanding of how the user-centered design process can be incorporated into the design and development of mobile applications. Especially as applications evolve to provide individuals with targeted and just-in-time interventions tailored to incorporate an individual's specific healthcare needs. In this chapter, we will discuss

DOI: 10.4018/978-1-4666-8756-1.ch022

the importance and strategies for implementing usability testing, and more broadly human factors engineering, into mobile healthcare technology design and development. We will discuss what user-centered design entails, why it is important to use when developing mobile Health IT, how it can be incorporated into system design and development, and finally we will discuss common barriers to the implementation of a user-centered design process and how these may be overcome. We will include an example of a mobile Health IT system that incorporated usability testing into its development process.

## **BACKGROUND**

Mobile devices and associated technologies are transforming clinical healthcare systems, communication between patients and clinicians, and the utilization of personal health information. Advances in integrating mobile technology with the Internet, cloud computing, and clinical data systems provide unparalleled abilities to monitor, support, and motivate just-in-time clinical and patient-centered health decision-making. Examples of the potential of mobile technology transforming healthcare systems include providing low-cost, real-time means for assessing disease, behavior, environmental toxins, metabolites and other physiological variables, as well as integrating multiple sources of data from movement, images, social interactions, to inform health behaviors and healthcare decisions. With the increasing popularity of technologies, new issues arise that involve not just the accuracy of the medical advice but also the user's interaction with the system. It is important to involve the users in the design and implementation of any electronic system, but it is also important to ensure the system is well designed.

Mobile healthcare (mHealth) technology has the potential to bring data and contextually appropriate support to patients, clinicians and research-

ers in ways never before possible but only if they are efficient, effective and easy to use. Mobile technology encompasses cellular telephones and tablet computers. In two US surveys, approximately 90% of adults reported using mobile phones with 61% of them using smartphones (Sterling, 2013), and approximately one third of adults have a tablet computer. (Pew Internet & American Life Project & Zickuhr, June 2013) Mobile devices have the ability to store reams of information in a small, convenient and lightweight device that is highly portable for easy communication or reference. Devices are frequently wireless enabled that allow a user to access wireless or cellular networks. The devices have the potential to provide both data stored on the device along with external data that can be accessed through network, like cloud-based computing. This provides a mountain of information and support at each users almost instantaneous disposal.

What are some of the issues with using mobile devices and why are they difficult to use?

While the portability of mobile devices is valuable for the availability of information, the devices have some issues that hinder their usability. The security of mobile devices should be considered. Several key factors are important to consider including password protection, requiring 2-step authentication, and ensuring secure wireless transmissions. Devices are electronic and therefore users must be mindful of being charged, being available, as well as knowing where to find the appropriate data. If the data is available externally, network connectivity is an issue to overcome, especially in clinical care when immediate access may be necessary. Software included on mobile devices must be user-friendly and optimized to be viewed and digested on significantly smaller screens than may be currently used. Mobile devices are frequently small to optimize portability, which leads to a lessening of screen size. With this limited viewing area software needs to consider what is optimal to display, when it needs shown and how to display it.

13 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

[www.igi-global.com/chapter/incorporating-usability-testing-into-the-development-of-healthcare-technologies/138412](http://www.igi-global.com/chapter/incorporating-usability-testing-into-the-development-of-healthcare-technologies/138412)

## Related Content

---

### Choosing Technologies for Handheld and Ubiquitous Decision Support

Darren Woollatt, Paul Koop, Sara Jones and Jim Warren (2007). *International Journal of Healthcare Information Systems and Informatics* (pp. 1-11).

[www.irma-international.org/article/choosing-technologies-handheld-ubiquitous-decision/2207](http://www.irma-international.org/article/choosing-technologies-handheld-ubiquitous-decision/2207)

### Reforming Public Healthcare in the Republic of Ireland with Information Systems: A Comparative Study with the Private Sector

David Sammon and Frederic Adam (2010). *Health Information Systems: Concepts, Methodologies, Tools, and Applications* (pp. 1151-1171).

[www.irma-international.org/chapter/reforming-public-healthcare-republic-ireland/49922](http://www.irma-international.org/chapter/reforming-public-healthcare-republic-ireland/49922)

### An Exploration of the Experiences of Migrant Women: Implications for Policy Development of Effective User Driven Health Care Delivery Systems

Jane Fitzpatrick (2013). *User-Driven Healthcare: Concepts, Methodologies, Tools, and Applications* (pp. 954-967).

[www.irma-international.org/chapter/exploration-experiences-migrant-women/73874](http://www.irma-international.org/chapter/exploration-experiences-migrant-women/73874)

### RFID in E-Health: Technology, Implementation, and Security Issues

Peter J. Hawrylak, Nakeisha Schimke, John Hale and Mauricio Papa (2012). *Telemedicine and E-Health Services, Policies, and Applications: Advancements and Developments* (pp. 347-368).

[www.irma-international.org/chapter/rfid-health-technology-implementation-security/64994](http://www.irma-international.org/chapter/rfid-health-technology-implementation-security/64994)

### Visual Communication to Improve Relationship Quality in Spousal Caregivers of Individuals with Alzheimer's Disease

Nola Freeman (2013). *International Journal of User-Driven Healthcare* (pp. 96-111).

[www.irma-international.org/article/visual-communication-to-improve-relationship-quality-in-spousal-caregivers-of-individuals-with-alzheimers-disease/101346](http://www.irma-international.org/article/visual-communication-to-improve-relationship-quality-in-spousal-caregivers-of-individuals-with-alzheimers-disease/101346)