Preface

The growth of mobile technologies is remarkable. At a recent Mobile World Congress Conference, Eric Schmidt, CEO of Google predicted that within three years, smart phones will surpass Personal Computer sales. The number of mobile phones used worldwide has exceeded 4.6 billion with continued growth expected in the future. In fact, in the United States alone, the numbers of mobile phone users comprise over 80% of the population. There have been over 300,000 mobile applications developed over the last 3 years, and these applications have been downloaded 10.9 billion times. Whether the applications are used for communication, entertainment, socio-economic growth, crowd-sourcing social and political events, monitoring vital signs in patients, helping to drive vehicles, or delivering education, this is where the mobile technology has been transformed from a mode to a medium.

The adoption of mobile technology is growing fast in many sectors. Banking is quickly adopting mobile technology, as is education, the military, and healthcare. Of course, this fast growing world of mobile technology is exciting to watch and to participate in. However, this new world of mobility also presents many questions. What is the impact of this shift to mobile technology? Is it of benefit to consumers or ways to reduce costs on the business side – or both? What are the human factor implications of a mobile culture? Will mobile technologies expand or reduce the digital divide? What are the security and privacy risks of using mobile devices for the transfer of private information? What are the opportunities and challenges of mobile technologies? Helping to answer these questions is the goal of this book which includes contributions from mobile experts and academics around the world.

Mobile devices are no longer simple voice communication devices. They have become a medium to create voice, music, text, video, and image communications. Importantly, these various interactions can be created and shared on demand by the mobile user. In addition to communication methods, mobile devices are also a tool used to access the Internet, view television and movies, interact with GPS (Global Positioning System), play games, and read and respond to barcode and augmented reality messages. The reach and functionality of mobile devices depends on their underlying network infrastructure and the capabilities of the mobile device or handset.

Mobile technologies have become the predominant mode and medium of communication in the world. Mobile technology is comprised of several levels of technologies, devices, and applications to provide people with a powerful communication tool. At its most basic level, the reach and functionality of mobile devices depends on their underlying network infrastructure and the capabilities of the mobile device or handset. This involves the physical communication of data through a limited set of available frequencies. It involves the maturity of the underlying network and the functionality of the mobile device itself. The world of mobile applications lay on top of the technology, and this is where we see the richness and potential of mobile technology.
Chapter 1 is authored by Dr. Barbara Ciaramitaro of the United States, and introduces the core elements of mobile technologies from three perspectives. From the user perspective, the history of mobile technologies began with the use of two way radios and evolved to the current state of prolific smartphones, tablets, and other mobile devices. From the technical perspective, the history of mobile technologies originated with the limited use of radio frequencies, where the ability to establish simultaneous two-way communication (full duplex) was considered a technological feat. In the present day, mobile devices are quickly becoming IP devices that use the TCP/IP protocols to access, receive, and transmit data. From the social perspective, mobile technologies began as a rare device used by limited personnel who needed to communicate to others in real time emergencies such as police and the military. Mobile technologies are used today to provide health care services, deliver education, organize political events, market new products, provide location services, and deliver games, music and video.

Chapters 2 and 3 discuss the important use of mobile technologies in education.

In Chapter 2, Ariel Velikovsky, from Israel, discusses how the mobile phone is fast becoming an invaluable educational tool that is available the world over. Owing to the diverse applications that are available, educational content and experiences can be provided on the mobile that are simply not attainable elsewhere. Education on the mobile has the potential for becoming one of the main components of mobile functionality, and as such, represents a sizeable niche for mobile application and content developers as well as mobile operators and providers. Aspects indigenous to mobile consumption such as the use of voice and rich media can be judiciously incorporated into the mobile teaching arena, with close attention paid to best practices of effective pedagogy that is well suited and specifically tuned for mobile capabilities but that also take mobile limitations into consideration.

In Chapter 3, Dr. Douglas Blakemore, from the United States, focuses on how small electronic devices, also referred to as handhelds, are impacting education in a variety of ways including teaching methods, student life and the need for support from technical staff. This chapter discusses the importance of handhelds in education, how handhelds are being used in education, the challenges presented by handhelds for those in education, and what might happen with handhelds in the future.

In Chapter 4, Dr. Ciaramitaro discusses the exciting world of mobile marketing. Mobile technologies have dramatically changed the world’s ability to communicate. They have become a medium to create voice, music, text, video, and image communications. Importantly, these various types of communication can be created and shared on demand by the mobile user. In addition to communication methods, mobile devices are also a tool used to access the Internet, view television and movies, interact with GPS (Global Positioning System), and read and respond to barcode and augmented reality messages. Each of these methods utilized by the mobile phone user becomes a tool that can be used in mobile marketing to expand beyond traditional marketing methods. The collection of accessible personal information amassed by mobile technology allows mobile marketing to target individuals at the time and place where their message will be most effective. Mobile technologies over the past 20 years have dramatically changed the way people communicate, collaborate, search for, receive, and share information. These dramatic changes have had striking impact on the world of marketing to the extent that mobile marketing has become the predominant form of customer engagement.

In Chapter 5, Dr. Jim Jones of the United States discusses how mobile technologies are used by government, military, and intelligence agencies. Government services, such as information access and certain transactions, are rapidly adopting mobile delivery mechanisms. The military is using mobile technology to share static information as well, but is also providing live data feeds and information sharing to support combat operations. Intelligence agencies are using mobile devices as a data collection platform for their
own agents, and are also accessing the mobile devices of enemy agents and intelligence targets to collect data surreptitiously. Military operations face unique challenges, given that they are often conducted in regions without existing networks and against an enemy trying to actively disrupt communications. The Government, Defense, and Intelligence communities all face the challenge of securing mobile devices and data in response to regulatory and statutory requirements, as well as a dynamic and evolving threat space of identity thieves, hackers/crackers, hostile military forces, and foreign intelligence services.

Chapters 6 and 7 describe how mobile technology is being used in healthcare.

In Chapter 6, Ade Bamigboye from the United Kingdom, discusses how successfully placing mobile technology at the centre of any healthcare delivery service can enable innovations in healthcare to be distributed quickly, globally and equally. For some patients this could mean being able to gain better access to healthcare where previously there was very little or none at all. For others it could mean closer, more convenient healthcare management. For medical professionals, it is about using mobile technology to deliver and manage healthcare services from wherever they happen to be. Mobile healthcare is a complex combination of mobile operators, medical device manufacturers, care providers, software developers, funding partners and regulatory bodies. Each of these stakeholder groups is motivated to participate in the m-health discussion in different ways but need to work together in order to ensure that this technology can be deployed on a scale that enables benefits to be captured. This chapter presents the challenges that the industry must collectively overcome in order for all stakeholders to be successful.

In Chapter 7, Drs. Ciaramitaro and Skrocki from the United States talk about the revolutionary use of mobile devices in healthcare. Much of its revolutionary reach is due to the widespread adoption of mobile devices such as mobile smart phones and tablets. It is estimated that there are over five billion mobile devices in use throughout the world. In terms of demographics, in the United States, it is estimated that five out of seven Medicaid patients carry a mobile smart phone. mHealth is viewed as changing the healthcare landscape by changing the relationship between the patient, healthcare provider, and between healthcare providers. There is clearly a growing interest in, and emphasis on, mobile healthcare applications in the world today by vendors, physicians, and patients. It is predicted that the mobile health application market alone will be worth over $84 million, and that by the year 2015, more than 500 million people will be actively using mobile health care applications.

In Chapters 8 and 9 the topics of the use of more advanced mobile technologies such as augmented reality, RFID, and Bluetooth are discussed.

In Chapter 8, Jorg Kloss from Germany, presents a realistic picture about MAR (Mobile Augmented Reality), where it comes from, where it currently stands, and where it is going. The chapter distinguishes between the variants of MAR, and explains their similarities, differences, and different development stages and outlooks. While describing potential application fields and their current limitations, the opportunities and challenges of MAR become obvious, as well as how much work is still to do. The chapter intends to categorize the challenges for MAR, covering also related issues in the mobile hardware, software and operator industry, and their efforts in standardization and open interfacing. Besides the technology-driven discussion, a strong emphasis will be taken also to the essential aspect of user experience. With ubiquitous MAR, the technology will become more and more secondary, and the user and her individual context moves into the center of attention.

In Chapter 9, Dr. Greg Gogolin from the United States, examines the use of embedded mobile, RFID, and augmented reality in mobile devices. He explains that the proliferation of mobile devices such as smart phones and other handheld devices has stimulated the development of a broad range of functionality including medical, retail, and personal applications. Technology that has been leveraged to enable many
of these uses includes radio frequency identification (RFID), embedded mobile, and augmented reality. RFID involves communication between a tag and a reader. Mobile RFID extends the technology by tagging the mobile device with an RFID tag to perform tasks on the device. Embedded mobile refers to preprogrammed tasks that are performed on a mobile device. Personal care and monitoring is one of the most common uses of embedded mobile. Augmented reality involves the use of computer generated or enhanced sensory input such as audio and visual components to enhance the perception of reality. This is commonly used in situations such as video games where there is feedback in the game controllers.

Chapter 10, authored by Nabil Harfoush of Canada, presents a very important discussion on the impact of mobile technologies on social and political movements. The strength of social and political movements is often correlated with the cost and risks of organizing the effort. Reaching large numbers of people to inform them of a movement’s goals, and the ability to recruit supporters, has historically relied on mass media, both printed and electronic, along with traditional canvassing, public assembly, and public speaking. This has naturally favoured economic and political elites who had easier access to media channels, and who controlled in many cases the rights to public assembly and free speech. The emergence of affordable communications in general, and mobile communications in particular, is bringing radical change to this balance of power. This chapter explores some of these changes and suggests directions for future research in this area.

In Chapter 11, a team of researchers from Vicomtech Research Centre, Spain, led by Mike Zorilla, discuss the challenges of next generation multimedia on mobile devices. They explain that the multiplatform consumption of multimedia content has become a crucial factor in the way of watching multimedia. Current technologies such as mobile devices have made people desire access to information from anywhere and at anytime. The sources of the multimedia content are also very important in that consumption. They present the content from many sources distributed on the cloud and mix it with automatically generated virtual reality into any platform. This chapter analyzes the technologies to consume the next generation multimedia and proposes a new architecture to generate and present the content. The goal is to offer it as a service so the users can live the experience in any platform, without requiring any special abilities from the clients. This makes the architecture a very interesting aspect for mobile devices that normally do not have big capabilities of rendering but can benefit of this architecture.

In Chapter 12, Nalin Sharda from Australia discusses the important topic of using mobile technologies to support iMaintenance activities. iMaintenance stands for integrated, intelligent and immediate maintenance; which can be made possible by integrating various maintenance functions, and connecting these to handheld devices –such as an iPhone– using mobile communication technologies. The main innovation required for developing iMaintenance systems is to integrate the disparate systems and capabilities developed under the current eMaintenance models, and to make these immediately accessible by ubiquitous and intelligent computing technologies –such as Digital Ecosystems and Cloud Computing– connected via wireless networks and handheld devices such as the iPhone. A Digital Ecosystem is a computer-based system that can evolve with the system that it monitors and controls, and can be embedded in the system’s components, thereby providing the ability to integrate new functionality without any downtime. Cloud Computing can provide access to additional software services that are not available in the local Digital Ecosystem. This chapter will show how these computing paradigms can provide mobile computing and communication facilities required to create novel iMaintenance systems.

In Chapter 13, Dr. Ciaramitaro and Velislav Pavlov, from the United States, discuss the important challenges of security in mobile technologies. Over the past few years, cyber criminals have expanded their focus from desktop PCs to mobile devices such as smart phones, PDAs, and tablet computers.
Unfortunately, even though many mobile devices approach personal computers in functionality, most mobile users are not aware of the degree of security threats in the mobile environment. There are several security threats related to mobile devices, each of which is discussed in detail in this informative chapter.

I am sure you will find the collections of chapters and perspectives on the various aspects of mobile technology consumption to be interesting and worthwhile.