Chapter 2
Mobile Phones in Conflict-Stressed Environments: Macro, Meso and Microanalysis

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2.1 Introduction

Much as Achilles was impervious to war (save his much-discussed heel), mobile phones miraculously seem not only to persist in conflict-stressed environments but also even to flourish. Today's news has been full of stories as mobile phones somehow survive and thrive in some of the world's most war-torn countries such as Somalia (Winter 2004) or the Democratic Republic of the Congo (Sullivan 2006). Can we describe these phenomena? What can explain it?

In this chapter we examine mobile phones and conflict at three levels of analysis: across the entire globe (macroanalysis), statewide in Iraq (mesoanalysis), and among individuals in Liberia (microanalysis). Across all three of these levels of description we find that mobile phones are flourishing; seem impervious to insecurity and conflict; and provide individuals important security, business, and personal benefit.

2.2 Macroanalysis

By macroanalysis we mean a study of the performance and patterning of mobile phone usage across the globe. Do we find that mobile phone penetration rises, falls, or is unaffected by conflict and insecurity across many nations in the world? Through a statistical examination what we find is that cellular penetration correlates with measures of economic, social and political strength but does not significantly correlate with a measure of state insecurity.

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The 2008 Brookings Index of State Weakness in the Developing World (Rice and Patrick 2008) ranks 141 World Bank classified low- and middle-income countries ("developing countries" in the language of the report) on their relative economic, political, security and social welfare. Their principal goal is to establish an aggregate measure of state weakness and in doing so to bring attention to those especially fragile or at risk of collapse. They then arrive at a variety of policy findings suggesting lines of intervention especially for the government of the USA.

Brookings is not the first group to attempt to rank states according to their aggregate weakness. For example, most prominently for the last 5 years, The Fund for Peace has produced its Failed States Index (The Fund for Peace 2009). This index is particularly focused on predicting state failure by gauging a state's social, economic and political status (it does not offer a specific security scale). And more generally there has been an increasing focus on security and failed states among global stakeholders as evidenced, for instance, by the most recent World Bank's 2011 World Development Report which is entitled Conflict, Security and Development (The World Bank 2011).

The Brookings Index includes indicators on the economy (e.g. economic growth, policies, private sector development, and income inequality), politics (e.g. government accountability, rule of law, corruption, freedom of expression), and social welfare (e.g. nutrition, health, education, and clean water and sanitation). In addition, the Index's security indicator aggregates measures of "the occurrence and intensity of violent conflict or its residual effects (e.g., population displacement), illegal seizure of political power, widespread perceptions of political instability, territory affected by conflict, and state-sponsored political violence and gross human rights abuses" (Rice and Patrick 2008: 8).

Intuition would suggest that mobile phone penetration rates would correlate with all of these indicators. For instance mobile phone demand should naturally increase with economic growth (economic development); a robust mobile phone sector including foreign investment requires rule of law (political development); an educated and healthy population is likely to make more use of mobile phones (social development); and indeed political instability is apt to erode the private sector while violent conflict can diminish telecommunications infrastructure or people's ability to maintain phone subscriptions (security). Put simply, we hypothesize that measures of mobile phone teledensity (the number of phone subscribers per 100 people) should correlate with all four 2008 Brookings Index indicators: economic, political, social welfare, and security.

To verify this hypothesis we have analyzed 2008 ITU World Telecommunication/ ICT Indicators (ITU 2009) measuring mobile phone penetration globally, along with some other related ITU indicators. This ITU dataset is a well-established and indeed conservative measure of global ICT penetration.

An initial observation just from the ITU dataset is that while conflict-stressed societies do not have the highest level of mobile penetration it is post-conflict nations that seem to be enjoying the greatest growth in mobile subscriptions. Naturally it is easier to double your subscriber base when the levels are tiny to begin with. Nonetheless, when examining the ITU reported compound annual growth rates we find that the top

Table 2.1 Correlation between brookings index of state weakness and selected 2008 ITU ICT indicators

	Internet subscribers/100	Fixed phone lines/100	Mobile phone lines/100
Economics	r=.51, p<.0001**	r=.47, p<.0001**	r=.63, p<.0001**
Politics	r=.22, p=.02*	r=.2, p=.03*	r=.32, p=.0003**
Social welfare	r=.59, p<.0001**	r=.76, p<.0001*	r=.68, p<.0001**
Security	r=.21, p=.02*	r=.22, p=.02*	r=.18, p=.05

* p < .05
** p < .01

position is held by conflict afflicted Guinea-Bissau and the next fastest growth rate is Iraq, with an astonishing 230% and 194% CAGR respectively (ITU 2009).

What is the relationship between the development indicators from the Brookings Index and the ITU ICT indicators? Again, our hypothesis is that all Brookings indicators (economic, political, social and security) should correlate positively with mobile phone penetration and other similar ICT variables. Table 2.1 shows the Pearson correlation coefficient along with *p* values for the four Brookings indicators and three of the 2008 ITU variables, Internet subscribers, fixed phone lines, and mobile phone lines, all expressed per 100 people. For Internet subscribers and fixed phone lines we see that all four Brookings indicators are positively correlated with statistical significance. The most significant relationships are between these ICT penetration levels and the economic and social welfare indicators where the richer and more socially advanced states have higher levels of Internet and fixed line use. We find similar correlation levels between the mobile phone penetration rates and economic and social development.

However, and in conflict with our hypothesis, we do *not* find a statistically significant correlation between the security indicator and mobile phone penetration, though there is a small but significant relationship between Internet subscribers and fixed line penetration and security. Put simply, our macroanalysis shows that mobile phone penetration is sensitive to money, politics, and social development – but seems immune to security concerns.

Our macroanalysis shows that across the globe low-income countries mobile phone penetration rates is unrelated to that nation's level of state security. Insecure nations are not more likely to have *more* phones nor are they more likely to have *less* phones. In contrast, rich countries or more socially developed countries are indeed more likely to have mobile phones.

Perhaps if we dive down to a single country, or to a survey of individual users, we might be able to understand more completely why mobile phones seem immune to conflict.

2.3 Mesoanalysis

In our macroanalysis we noted that Iraq has enjoyed the second highest compound annual growth rate for mobile phone penetration in the world. This occurring as the country continues to right itself after a USA lead invasion and occupation resulting

Fixed Line Teledensity
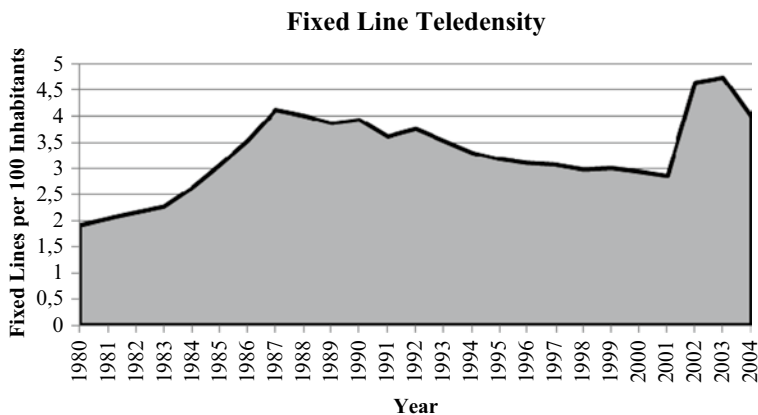
Fig. 2.1 Fixed line penetration per 100 people in Iraq (Source: ITU (2009))

in significant security instabilities. Indeed, Iraq's mobile phone sector is one of the most robust in the region. A meso level analysis of this single conflict-affected state, between a global study of activity and the microanalysis of individual users, shows many factors contributing to the sector's success, and to some of its challenges. Critical factors include issues of national infrastructure and government policy. But overall, consistent with our macroanalysis above, we find that mobile phones flourish in this conflict stressed state.

2.3.1 State of Internet and Phone Infrastructure

The prominent fixed-line network operator in Iraq is the state-owned incumbent telephone operator, the Iraq Telecommunications and Post Company (ITPC). The ITPC, along with the state-owned SCIS (State Corporation for Internet Services), provide fixed-line and backbone network facilities.

Immediately prior to the 2003 invasion the fixed-line teledensity had shown a sharp increase in Iraq as ITPC successfully began to increase phone penetration (Fig. 2.1). In 2002 there were nearly 1.2 million fixed-line phones in service, or 5 for every 100 people in Iraq (ITU 2009). While the growth rate was impressive the overall absolute teledensity at this time was low by regional standards where the regional average in 2003 was 17 phones per 100 people (ITU 2009). And regrettably, since 2003 the majority of fixed-lines in the country, particularly in Baghdad, have remained largely inoperational or damaged (UN ESCWA 2009).

While fixed-line penetration has been in decline, in contrast mobile phone penetration has, as we know from the CAGR figures, shown remarkable growth and resilience. Prior to 2003 mobile telephony was specifically banned in Iraq though small networks were operating in Iraqi Kurdistan (E. I. Unit 2008; The Louis Berger

Fig. 2.2 Commercial mobile operator geographic penetration for Asiacell, Zain and Korek (Source: Asiacell, Zain, GSM Association)

Group 2006). But since the end of the 2003 conflict the mobile sector has flourished with three GSM operators providing national service with broad geographic coverage[1] (see Fig. 2.2 for national coverage maps). And penetration rates have skyrocketed with recent estimates ranging from a conservative 57% of the population (ITU 2009) to 66% (Bevir 2009b) to an astounding 83% (Economist 2009).

As mobile penetration has flourished the mobile phone sector has matured into one of the region's best. Indeed, Iraq has recently been rated as the Arab world's most competitive mobile market, based on indicators such as competitiveness, penetration, and access to 3G services, according to market consultancy the Arab Advisors Group (Field 2009a). Similarly, USAID has picked mobile telecommunications as one of ten Iraqi sectors that "posses intrinsic advantages (or relatively few disadvantages) and therefore should be able to compete in an open market with as little assistance from the public sector as possible," (The Louis Berger Group 2006).

The mobile phone sector notwithstanding, the state of network infrastructure and ICT deployment is not without challenges. For instance the number of Internet users in Iraq is estimated at roughly 300,000 or about 1% of the population. While this number is small it is still the result of significant growth since 2003. Indeed, Iraq rated number one in *growth* of Internet users in 2007–2008 according to the Madar Research Group (UN ESCWA 2009). (Iraq also rated number 1 in growth of installed personal computers for the same period.)

An important driver of Internet penetration in Iraq is the availability of backbone terrestrial networks and the connection of those networks to international Internet gateways. Both of these aspects are critical indicators as to the robustness of the ICT sectors R&D capacity. In addition the presence of reliable and affordable broadband Internet connectivity, including the on-going access to the international Internet

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[1]The three operators are Asiacell (www.asiacell.com), Korek Telecom (www.korektel.com), and Zain (www.iq.zain.com).

cloud, is a critical tool to robust research and scientific innovation in all sectors; these networks are fundamental drivers of the overall science and technology capacity of the nation.

Market reports and foreign tenders have indicated that the state operator, ITPC, has begun deploying high bandwidth national backbone networks. Reports indicate an optical fiber network provided by Nortel (ITP.net 2006b) and a fixed-wireless microwave network provisioned by Alcatel (ITP.net 2006a). Nonetheless the state of national terrestrial fiber networks is still weak and there is a lack of clarity as to the ground realities of these proposed backbone networks (Bevir 2009a). Recent signals as to the state of international gateway connectivity, where Iraqi networks connect on to the international Internet cloud, have been more promising. A recent report states that Computer Data Networks (CDN) has just completed and tested a fiber network connecting across the Iraqi border and into Kuwait (Sutton 2010). This could potentially link Iraq to the FLAG FALCON submarine fiber cable which travels through the Gulf. And Gulf Bridge International's (GBI) forthcoming "Gulf Ring" cable is slated to land in Iraq according to an announcement made by GBI and the ITPC (Field 2009b). This fiber connectivity could dramatically increase Iraq's international gateway network capacity.

2.3.2   Government Regulation

The role of a stable and capable government in facilitating the mobile phone sector in conflict-stressed areas is critical. Best practice in government policy and regulatory interventions can create a sector that encourages and rewards innovation while ensuring a robust and level competitive field.

To ensure a vibrant mobile network, international best practice calls for a strong and capable independent regulatory agency designed to ensure the twin goals of innovation (especially among small corporations) and fair competition (especially among large operators) (ITU-infoDev 2008). Independence of a regulator has two principal components: first is full independence from any of the operators or service providers including any state owned incumbent, and second is independence from the day-to-day political concerns of the government and its policy makers. This latter form of independence is best realized when the regulator is ran by fixed-term commissioners who are kept at arms-length to the daily activities of policy makers and who have separate authority and financial resources.

In Iraq the policy-making entity is the Ministry of Communications (MoC) while the regulator is the Communications and Media Commission (CMC). The CMC was stood up in 2004 by the Coalition Provisional Authority and enjoyed a number of years of robust service. However from April 2008 until late 2009 the CMC was without a director and significantly weakened creating what some referred to as a "regulatory void" (World Bank 2010). This period of a "paralyzed" CMC (Albany Associates 2009) has negatively impacted the sector in the eyes of the private

operators, who saw the MoC as over-reaching and unfairly advantaging the state-owned operators (Bevir 2009a; ITP.net 2008).

As the regulator weakened during this period the Ministry of Communications found itself serving as policy maker and regulator as well as operator (with the ministry in charge of the state-owned ITPC). This PTT (post, telecommunications, and telegraphy) model, with a single government body providing service while also setting policy, has historically been less effective in encouraging growth and innovation. So movements towards corporatization and privatization of these state owned enterprises is likely to encourage the sector.

While the MoC should certainly eliminate its role as regulator and operator, its role as policy maker is of paramount importance. And though the CMC has developed national broadcast communication policies, a national ICT policy has yet to be fully established (UN ESCWA 2007a). The lack of a unified national ICT policy, according to some sector analysts, is one of the largest challenges to the development of mobile phones and computing in Iraq (Gara 2009). The MoC produced a draft ICT strategy, developed in collaboration with ESCWA, and it was hoped that this policy would have been adopted in 2009 or early 2010 (UN ESCWA 2009). And while the MoC is one natural entity to anchor the development of a national ICT policy, it is also reported that the Ministry of Planning and International Development has created a Central Organization for Statistics and Information Technology for the purpose of developing a national ICT policy (UN ESCWA 2007b).

Whether the policy comes from the Ministry of Communications or of Planning (or a collaboration between the two, the regulator, and additional government bodies) Iraqi stakeholders are expecting reform of the ICT sector including a renewed policy and regulatory climate, corporatization of the incumbent operator, and restructuring of government entities over the next few years according to World Bank officers (2010). This is in tension to alternate reports of the ministry planning to abolish or diminish the role of the CMC, give the government monopoly control over key infrastructure including the international gateways, tighter government control of media content, and other troubling possibilities (Albany Associates 2009). As the excellent report from the Albany Associates puts it, this would in effect re-establish the Ministry of Information from the Baathist era.

Increasing the independence and capacity of the regulator and liberalizing the incumbent are critical factors in enhancing the innovation and reach of the sector and the reach of broadband digital networks. Meanwhile the Government of Iraq broadly has shown impressive capacity to use the Internet for its own purposes, especially when providing access to public information (UN ESCWA 2009). In a review of all 47 "Important Sites" of the Government of Iraq listed by the CMC[2] we found that 13 of the sites had been updated within the last 3 days, and an additional 16 had been updated over the last 6 months. Thus nearly two thirds of these critical government sites were dynamic and hosting current information.

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[2]http://www.icmc.iq/english/linkfrind.html (Accessed on 5 May 2010).

2.3.3   Mobile Phones in Iraq's Future

The role of the government is central in establishing a strong mobile sector. While the CPA made significant missteps with their ICT policies, in particular as related to financial and spectrum management, they did set Iraq on a path towards a liberalized and privatized sector with strong oversight by an independent regulator. Over time, however, this policy and regulatory structure has been undermined. Where the mobile phone sector is heading in Iraq is not entirely clear.

Government regressions notwithstanding, post-conflict Iraq today has one of the region's best mobile sectors and is positioned to develop strong national network infrastructure. Similar to Liberia, described below, this rapid development of the mobile network has occurred along with the partial or total decline of the fixed-line network brought about by war. But should the state policy and regulatory structures indeed retrograde from their post-2003 conditions the entire ICT sector's progress could be halted and even reversed.

2.4   Microanalysis

Can the patterns and passions of individual users account for the mobile phone's robustness in security weak and post-conflict environments? Results from Liberia may shed some light on this question.

Unrest has been a staple within Liberia for more than 15 years with two major civil wars (1989–1996 and 1999–2003) in this time period. A peace was brokered and transitional government was established in 2003 and democratic elections were held in the fall of 2005.

An outcome of these years of civil conflict was the complete destruction of the fixed-line telephone infrastructure. The copper network was wholly destroyed or looted and all but one switch was destroyed (Best et al. 2007). This is clear from the precipitous drops in mainline penetration occurring in 1991 and 2003, both the outcome of major civil wars. The result is that by the time of the establishment of peace all mainlines where gone.

On the other hand, mobile telephone adoption in Liberia has recently been growing at a staggering rate, as also shown in Fig. 2.3. Competition within the Liberian mobile phone sector is also robust with four active operators. Indeed, usage costs are reportedly the lowest in West Africa (Southwood 2007). All county capitals and most other population centers currently receive signal from at least one of the mobile providers' services, and two providers currently offer GPRS mobile Internet services. Operators are actively extending both their networks and services.

Why is the mobile phone sector flourishing so intensely and how do individual users perceive their phone and its value? In a survey of 85 mobile phone users in both the capital city of Monrovia and in various rural areas, and interviews with experts from two major service providers and the industry regulator, we tried to identify why Liberians were using mobile phones (Best et al. 2010). We discovered
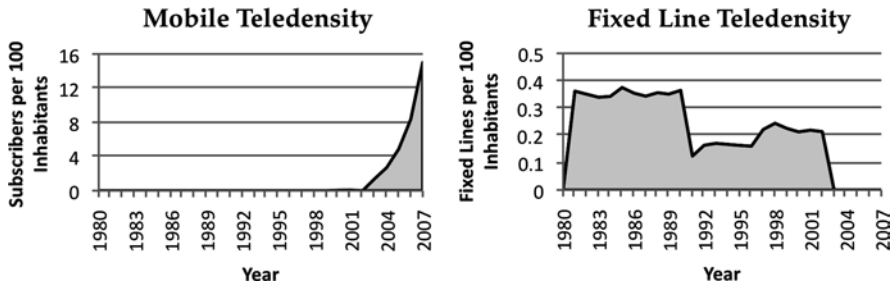
Fig. 2.3 Fixed-line and mobile teledensity in Liberia from 1980–2007. Steep drops in fixed lines are evident in 1991 and 2003. Introduction of competing mobile carriers in the mid 2000s produced a soaring number of mobile subscribers. Note the difference in vertical scale between the two charts (Source: ITU (2009))

Table 2.2 A selection of some of the 31 statements, grouped within broad conceptual categories, used in our Q-sort

Concept	Statement
Connectivity	I use my mobile phone to stay in touch with my customers.
	I use my mobile phone to stay in touch with my family.
Information	My mobile phone helps me find work.
	My mobile phone helps me keep informed about prices in my business.
Intrinsic	Having a mobile phone makes me feel more important.
	My mobile phone is stylish.
Productivity	My business is easier now that I have a mobile phone.
	My mobile phone lets me get more done during the day.
Security	I use my mobile phone for emergency calls.
	My mobile phone makes me feel more secure.
Other	Getting a mobile phone changed the way I do business.
	I am interested in learning about new features or mobile phone models.
	I keep my mobile phone with me at all times.

a number of user perspectives including sets of users who saw their phones as productivity enhancers, means of connectivity to family and friends, essential business tools, and technological curiosities. Interestingly, the idea of the phone as a stylish object was markedly rejected, especially in rural areas.

In our survey of 85 mobile users we employed the Q-sort method originally developed by the British physicist William Stephenson for psychological studies (Stephenson 1953). In our Q-sort participants we asked to arrange a series of 31 statements along some semantic differential, from "Describes me best" to "Describes me least". Our statements were based upon a list developed for a similar study conducted by Jonathan Donner (Donner 2004) in Rwanda; some example statements are shown in Table 2.2. Subsequent analysis of how these individuals sorted the statements established groups of individuals, separated between our urban and rural informants, who sort particular traits in common places within the semantic distribution.

We placed the urban participants into four groups based upon common themes in their responses. The only statement, which was ranked positively for all four of these groups, was "I use my mobile phone for emergency calls." The first group, composed of nine respondents, focused on the phone as a productivity tool. For instance, they rated the statement "My mobile phone helps me make more money in a day" very highly. Thirteen participants were sorted into the second group, which seemed to view the phone as mostly an instrument of connectivity. For instance, with this group communication with friends and constant availability is essential. Our third urban group, with 12 members, was the most business oriented rating high statements that they bought a phone for their business and use it to gain access to new customers. Our final group of just four participants seemed to view their phone mostly as a tool for security. They all assigned the highest rank to the statements "I use my phone for emergency calls" and "I keep my phone with me at all times."

We also placed the rural respondents into four separate categories. In contrast to the urban data, which had just one significant common statement across all four groups, several statements emerged as items of consensus for most of our rural participants. All four groups agreed that their mobile phones make them feel more connected to the world, all rejected the statement that "My phone is stylish", and all showed widespread reliance upon the phone for emergency use. Several participants offered compelling stories of using their phone to call for help during a robbery, to call for medical care for a loved one, or as a deterrent against sexual violence.

Studying the four categories of rural respondents we find that 13 participants seemed to focus on business uses, ranking high the assertion that business is easier to conduct thanks to the phone. The second group affiliated with a variety of personal uses of the phone. Above all, the eight in this group enjoyed talking on the phone with their family and friends though they also rated the statement "My phone makes me feel more secure" quite high as well. Our third rural group of five individuals was clearly enthusiastic about intrinsic uses of their phone. Their most highly rated distinguishing statement was "Having a mobile phone makes me happy". Finally, our analysis discovered a group of six participants with a very broad and general blend of valued uses that did not admit to any clear category of interest.

Thus, our Q-sort analysis of 85 mobile phone users in post-conflict Liberia found people reporting a number of uses for their phone including seeing it as a means of connectivity, for business and even as a technological curiosity. But there was a consistent prevalence of security and emergency uses. Data from Monrovia suggested a distinct factor emphasizing security, while rural data revealed security as an item of consensus. From informal discussions with participants, it was clear that the safety and security of self, of loved ones, and of personal property is still a major concern in Liberia. This is by no means surprising. Despite the 15,000-strong UN peacekeeping mission, the country's police force is still under development, and many ex-combatants have turned to crime as a source of financial support. In such a situation, it is understandable that a mobile phone is seen as providing security, as it allows the user to call a family member or an authority in the event of a crime or transgression.

In several cases, even police officers themselves spoke of their mobile phones as a source of security.

The importance of the phone for security uses was confirmed through our expert interviews with operators and the regulator. One phone operator framed the phenomenon concisely, as the difference between a *lifeline* and a *lifestyle*. He claimed that, in rural areas, the phone is seen more as a tool and a connection to the outside world both to acquire information but also financial support. But "lifeline" affordances related to security are relevant in both urban and rural settings. One operator related that when his company considered removing free calling during late night hours, customers complained that late night was when they most needed the ability to make calls without credit on their phone, in case of an emergency situation. Another operator suggested that many users leave their phones on at night for safety, rather than switch them off to conserve battery: "I have a couple of friends who… could not afford for the phones to stay off at night… because, you know, the criminal rate in the night."

2.5   Conclusions

In Liberia people cling to their mobile phones as tools for security and safety. They use phones to combat crimes, sexual violence, and to help in medical emergencies. In Iraq's post-conflict setting mobile phone penetration has skyrocketed with the world's second largest compound annual growth and the regions most competitive market. But government mismanagement of the sector threatens these extraordinary increases. Globally, while mobile phone penetration correlates directly with a nation's economic, social and political levels of development, cell phones seem impervious to conflict and insecurity.

At three levels of analysis – the globe, the state, and the individual – mobile phones are shown to survive and even thrive in conflict-stressed environments. While these findings provide some modest indication as to how and why mobile phones seem impervious to conflict and insecurity, subsequent chapters will continue to build this case with specific findings, theories, and systems aimed at avoiding, managing, and ending conflict.

Since the end of World War II humanity has experienced frequent incidences of armed conflict. Indeed, the occurrence of conflict worldwide, in particular civil wars, has generally been on the rise in modern times (Harbom and Wallensteen 2009). An obvious outcome of these conflicts is that a significant percentage of people today live in fragile conflict-affected states; the World Bank estimates that one-sixth of the planet's population live in such conditions (The World Bank 2011). This figure alone makes it clear that work in conflict-affected environments is of critical importance to humanity. The problem is too vast to ignore. Meanwhile, the collective findings in this volume suggest the power of computers and mobile phones in helping to avoid, end, and heal conflict. Indeed, the promise of these tools is too vast to ignore.

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