Mobile Usage at the Base of the Pyramid in South Africa

infoDev
Growing Innovation

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About infoDev

*info*Dev is a global partnership program within the World Bank Group which works at the intersection of innovation, technology, and entrepreneurship to create opportunities for inclusive growth, job creation and poverty reduction. *info*Dev assists governments and technology-focused small and medium sized enterprises (SMEs) to grow jobs, improve capacity and skills, increase access to finance and markets, ensure the appropriate enabling policy and regulatory environment for business to flourish, and test out innovative solutions in developing country markets. We do this in partnership with other development programs, with World Bank/IFC colleagues, and with stakeholders from the public, private and civil society sectors in the developing world.

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1 Introduction

Mobile phones are the primary means of accessing information or communicating for those who live at the base of the pyramid (BoP).[1] It is likely that the mobile phone will therefore also be the preferred medium to provide value-added services to those at the BoP, whether they be private users or informal businesses, for the foreseeable future. Although the prepaid mobile model has brought voice and text services to this group, sustainable, replicable models for enhanced services, products and applications are far more limited.

The purpose of the study is to investigate the demand for mobile applications, services and products, with a view to increasing economic opportunities and improving well-being for users at the BoP. The key objectives of the study are the following:

- To increase understanding of the actual usage of mobile services, products and applications at the BoP, and to understand their potential for economic and social empowerment

- To identify scalable examples of services, products and applications at the concept, prototype, or early product-development stages

- To develop tools and instruments to map viable operation models and objects of various segments of the BoP markets and to identify user needs

- To formulate recommendations for business planning and policy development that can support this potential.

Although the literature on the base of the pyramid generally uses as its measure those individuals living on less than $2.50 a day, this report adopts the 2012 South African National Planning Commission Development Plan poverty datum line, which is defined as households with income of less than R 432 per month per household member, which is roughly equal to $52.50. This is less than $1.80 per person per day. For a range of reasons, this serves as a better measure of poverty. In fact, running the data for this study at the $2.50 per person per day rate produced very few differences between the BoP and the rest, referred to in this study as the Rest of the Pyramid (RoP). There are several notable features of South Africa's poor, according to a nationally representative household and individual survey conducted in 2011:

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[1] The base of the pyramid draws on Roosevelt's notion that economic reconstruction after the Great Depression required using the resources of the "forgotten men" to develop new models of doing business, which see the economic potential in the billions of people worldwide who live in poverty but are nevertheless consumers of goods and services. The term was popularized by C.K. Prahalad in his 1998 book *The Fortune at the Bottom of the Pyramid* and the 2005 book *Capitalism at the Crossroads* by Stuart L. Hart, who focused on the capacity of BoP as not only consumers but producers. Subsequently, Ted London constructs a role for those at the BoP as business partners and innovators in a paper, "Reinventing Strategies for emerging markets: beyond the trans-national model." The evolution of this literature informs the use of the BoP concept in multilateral and donor agencies around the world, and in this paper.

- 76. 7 percent of households at the BoP are connected to the main electricity grid.

- 75 percent of people at the BoP have mobile phones.

- 59 percent of people over the age of 15 have a bank account.

- Only 3 percent of people over the age of 15 have used mobile money before.

- Of people who have a mobile phone at the BoP, only 11 percent have downloaded a mobile application, with actual usage and regular usage probably much lower.

At the same time, the last few years have seen an increase in the number of mobile applications available, even at the BoP. The chapter on mobile applications lists a range of different apps and their target markets. There is widespread acknowledgement that mobile applications (apps) have the potential to be a transformative tool for people at the BoP, giving them access to services and products that have not been available to them in the past. There are several success stories related to enabling access to government services, health care, financial services and agricultural support services, but these successes are often limited in their scope and scale. This is because there is a symbiosis between demand and supply. Services or apps fail to take off because they are constrained by a lack of either widespread access or affordability. Achieving scale (i.e., volume) and affordability of service and apps are linked.

Therefore, there are two key questions:

- Why don't the vast majority of people at the BoP use mobile apps?

- Why do those apps that target the BoP have very low usage?

One major obstacle is undoubtedly Internet illiteracy, and the related lack of awareness of mobile apps. For example, from the nationwide RIA ICT 2011 access and usage survey (See Appendix 1 for detail), we know that even when people have access to the Internet, they lack understanding of it. Among people who do not use the Internet, 86 percent said they do not know what it is.

Another problem that emerged from focus groups held in deeply rural areas of South Africa—which have higher concentrations of unemployment and poverty—is that there is a suspicion of mobile apps. Some participants thought that apps could damage their phones or that using them would corrupt their morals or values. Further, some considered the usage of mobile applications, in particular social networks, as inappropriate for women.

Outside South Africa's indigenous social-network platform, Mxit, applications are predominantly available on the Apple and Google platforms, and are accessed via smart phone. However, neither Google nor Apple have viable social media platforms (the number of Google+ subscribers is still relatively small). Facebook is the dominant social media platform. Subscribers are quickly migrating from computers to mobile phones to access Facebook through its app, and large numbers of people are accessing it for the first time on their mobile phones. The number of people who accessed the Internet or used Facebook via mobile phone was limited in RIA's 2008 household and individual user survey. However, in the 2011 survey significant numbers of people accessed the stripped-down mobile version of Facebook, Facebook Zero, on feature or smart phones, or through the low-bandwidth mobile browser Opera. (Note that feature phones have only been available since 2011 on MTN, a mobile service provider.)

Facebook does not earn significant revenues from the mobile side of its business yet, but the findings of the survey in South Africa and several other African markets suggest that this is about to change. The accessibility and usage of social media networks has been one of the most significant changes between the 2008 and 2011 surveys.

Many people at the BoP, especially those without smart phones, access the locally developed social networking platform Mxit. Significantly, this platform was designed specifically for mobile access to text-based chat rooms, and so does not suffer from some of the transition problems faced by the major social networks as they move from computer-designed access. Mxit's model is similar to Facebook's, except that it is entirely based on a mobile platform. Currently, it earns about 50 percent of revenue from advertising, including splash screens and short text advertisements. Another 50 percent comes from services and applications bought by subscribers over the Mxit platform with Mxit currency, called Moola. There is a 70/30 split on revenues from these sales, 70 for app developers and 30 for Mxit (see detailed description of business model below).

To address its eroding revenues as subscribers move to mobile, Facebook appears to be trying to become the gateway to the web—a platform of platforms. (In the longer term, a Facebook phone, which is rumored to be in development, might address eroding revenues more directly). Similarly, Mxit is trying to get subscribers to interact with the web via the Mxit platform. Both are betting that their future lies in sitting on top of the platforms that are dominant today, Android and Apple. Neither Facebook nor Mxit has been successful yet. Nevertheless, the platform-of-platform model seems key to their success. We therefore contend that this model is the key to one of the main deliverables of this project: to identify scalable examples of services, products and applications at the concept, prototype, or early product development stages.

The benefit of adopting the platform-of-platforms approach is that bets are not placed on individual m-apps or apparent trends (that is, trying to forecast what phone the BoP will use). Rather, a systemic, indeed ecological, approach is adopted for an enabling framework that is conducive to m-app development by delivering a potentially massive user base. For example, being on the Mxit platform gives an app an instant potential base of 44 million people, at least 10 million of them very active.[2]

This approach, of becoming a gateway for users, lends itself to analysis based on the different levels or subsystems of the Information Communications Technology (ICT) ecosystem. The wider ICT ecosystem consists of networks, services, applications and content; their users; and governance that can help optimize or retard the investment, skills development, and innovation that are necessary for the ecosystem to function and evolve. Meanwhile, the mobile-app ecosystem consists of developers, service providers and users as a subsystem within the wider ICT ecosystem.

In South Africa there is "... a smart phone divide between those who develop mobile phone applications and those who consume [them]," according to mLab CEO Derrick Kotze. The divide exists because the majority of mobile applications are developed for either Android phones (and to some extent for Nokia devices) or for the iPhone (Kotze, 2012). "The majority of developers are in the middle-to high-income bracket, and they develop for the phones that they have and they use," he states. According to Kotze, the primary motivation for building apps and content is to monetize them, and there is some skepticism on how to make money with apps for the BoP.

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[2] Although this base is extensive and technically open, decisions can be taken arbitrarily (or formal policies may exist) that restrict access.

The wider ICT ecosystem affects the cost of mobile phones, data and short message service (SMS), which also influences the way services and applications are developed and evolve. In South Africa, the fact that SMS costs are high has driven people at the BoP to social media networks, which enable them to send messages to friends, families and colleagues at a fraction of the cost of the other types of messaging. This has played out in large numbers of subscribers on platforms such as Mxit and Facebook (with Mxit leading among people at the BoP).

Mxit's primary advantage here is that there is already a community of users on Mxit who engage with each other and use m-apps—a community that is connected. This sets it apart from other app stores such as the mainstream Vodacom App Store, whose subscribers have no connection to the store apart from using it as a channel to download apps. Vodacom's model is not how the world now works: people make decisions based on recommendations within their networks. M-apps that are located within a social media platform have access to a volume of subscribers and an existing web of relationships that is not available elsewhere.

In its next chapter, this report explores this notion of community further by reviewing the status of the information communications technology (ICT) sector against the sector's policy objectives as operationalized in the legal and regulatory framework. The chapter then draws on the concept of the ICT ecosystem as the context for developing a conceptual framework in which to locate the mobile apps ecosystem and its existing and potential relationship with users, particularly those at the BoP.

Access to and usage of ICT, particularly mobile services, devices and applications, is explored in the third chapter through a nationwide household survey and qualitative focus groups. The chapter also reviews the applications currently available in South Africa, their developers, and the way the apps are funded and distributed. As little empirical research data exists, it was necessary to rely on interviews and media reports for the information.

The findings of these two empirical chapters are then analyzed through an examination of available platforms, apps and revenue models, to determine which are most viable as a sustainable business model for the development of applications that will satisfy the needs and desires of those at the BoP. The final section makes recommendations for m-app development, as well as policy and regulatory recommendations for the wider ICT ecosystem and for eliminating the bottlenecks that inhibit platform and apps development and innovation, including for those at the BoP.

2   Status of ICT in South Africa

South Africa has characteristics of both an advanced and developing economy. It has access to technology, sophisticated institutions including research entities and universities, a strong private sector, and fiscal resources. At the same time, half the 50 million people in South Africa live below the poverty line, and a large proportion of them have very low levels of education and lack e-skills to use emerging technologies and services. However, although official unemployment levels are 25 percent (and unofficial figures are closer to 50 percent), the government also invests in its poor (it has the largest welfare investment in South Africa). As a result, many of South Africa's poor have access to some form of social grant.

With a GDP of $357 billion, South Africa is one of the largest and most advanced telecommunications markets on the African continent. It has two national fixed-line operators, Telkom and Neotel; five mobile operators: CellC, MTN, Vodacom, 8ta and virtual network operator Virgin Mobile, as well as hundreds of Internet service providers and value-added service providers. South Africa is an early adopter of leading-edge technologies for high-end users (both individuals and corporations) in ways that parallel developed economies, although the majority of the population, the public sector, and most small and micro enterprises reflect the slower adoption patterns characteristic of a far less developed economy.

Policy uncertainty in the ICT sector has hurt the country's ability to provide affordable access to services, including universal broadband. Mixed, often contradictory strategies and sequencing problems with privatization, liberalization and independent regulation have been compounded by weak state coordination (Gillwald 2005).

South Africa led reform initiatives on the continent in the early 90s, introducing mobile competition for its incumbent telecommunications provider (which was subsequently partially privatized in the mid '90s). This was followed by further liberalization of the fixed and mobile telephone markets at the turn of century.

However, these early reform efforts were undermined by ineffective regulation and subsequent policy failures. The result is an uncompetitive market structure and weak institutional arrangements, which have compromised regulatory effectiveness and resulted in South Africa's plummeting in international ICT indices.

The South African ICT market has opened slowly, often after court challenges, but these reforms have generally not been supported by enabling regulations. Unless the bottlenecks that exist in current regulation are removed, the rights secured through the courts for service providers may be hollow, and continue to constrain the institutional responsiveness of the regulator (RIA 2010, "Towards Evidence Based Policy: ICT Sector Performance in South Africa").

Regulatory interventions that would support market entry and competitor viability, such as cost-based interconnection, regulation of essential facilities and spectrum allocation, have been stalled, most recently by the onerous demands of the 2005 Electronic Communications Act. The Act requires South Africa's regulator, the Independent Communications Authority of South Africa (ICASA), to re-license the entire sector on horizontal lines to reflect convergence in the sector. On top of that, the authority must unbundle the local loop and declare essential facilities, spectrum valuation and interconnection pricing, to name but a few activities, on the basis of market definitions and determination of dominance in the market. Devoid of any supporting policy document, the poorly drafted Act, together with ICASA's lack of either

capacity or expertise to respond swiftly to the demands made on it, has created a critical regulatory bottleneck to a fair, competitive telecommunications environment.

The outcome has been to constrain growth in new services and infrastructure, resulting in high wholesale and retail prices that have inhibited optimal usage of services (particularly new data services). South Africa has fallen steadily in global indices of ICT performance and general economic competitiveness, (WEF, 2012 and ITU, 2006, 2007, 2008, 2009, 2010). Over the past decade, SA has fallen in ITU's ranking from 72nd in 2002 to 97th by 2010. In Africa, SA ranks fifth after Mauritius (69), Seychelles (71), Tunisia (84), Morocco (90), and Egypt (91).

Telecommunications has been a high priority for the new regime in South Africa: ICT policy review and evaluation have not been comprehensively reviewed for 15 years. In 2011, the then-Minister of Communications, Roy Padayachee, brought large communications companies together, aiming to achieve 100 percent broadband access and to create one million jobs through ICT in the "Vision 2020" process. A new minister, Dina Pule, was appointed in 2012, and broadened the process to a wider group of stakeholders. Minister Pule instituted a national policy review in 2012, with the goal of developing an integrated e-strategy for the country by the end of 2013 (Gillwald, Moyo and Altman 2012).

The e-strategy is part of the National Development Plan for South Africa, a government-wide plan for change that among other things proposes that by 2030, ICT will underpin the development of an inclusive dynamic information society and knowledge economy. In the short term—2012 to 2015—this will entail the development of a "comprehensive and integrated e-strategy that reflects the crosscutting nature of ICTs" (National Development Plan, 2011). To promote ICT diffusion strategies that will develop in tandem with e-literacy and wider ICT skills, and institutional development strategies to enable inter-governmental and private/public coordination are key parts of the broader strategy. Another key focal point will be to create affordable access to a number of services through effective regulation of competitive markets (National Development Plan, 2011).

From 2015 to 2020, the goal is to achieve 100 percent broadband penetration by 2020, a target that had been proposed earlier by the Department of Communications. This goal includes expanding the definition of broadband from 256 kilobits per second to at least 2 megabits per second (National Development Plan, 2011).

Between 2020 and 2030, the South African government plans to use ICTs extensively in delivering services to citizens. These services will include government, information and educational services. Part of the strategy involves greater collaboration between the state, industry and academia (National Development Plan, 2011).

Although the goal of the plan is to achieve 100 percent broadband access by 2020, currently there is only connectivity for 9 to 13 percent of the population. South Africa will need to strike an appropriate balance between quality, speed, access, and diffusion to achieve its ambitious goal.

Affordability and access will be critical factors in ensuring faster diffusion of Internet usage. While estimates for meeting South African broadband needs have been estimated at $80 billion, modeling for the Vision 2020 process by the Human Sciences Research Council indicates that an additional $40 billion will be required to expand the current networks to achieve 100 percent broadband with a combination of mobile and fixed line access (Gillwald, Moyo & Altman 2012).

To attract this kind of capital, the government must to create an environment conducive to investment, by making credible commitments and clear regulations. However, capital is not all that is required. The creation of an integrated information structure will require a clear delivery strategy, including demand stimulation strategies.

Market Overview

Although a horizontal licensing regime was introduced through the Electronic Communications Act of 2005 to deal with convergence within the sector, in effect the market remains structured around a number of vertically integrated operators. Public-switched telephone networks (PSTNs), public mobile network operators (PMNOs), value-added networks (VANs), broadcasting signal distribution, and public, commercial and community licenses were converted into networks, services and content licenses. There are effective duopolies in both the fixed-line and mobile markets, which have been characterized by price matching, poor service quality and uncompetitive behavior.

Within the fixed-line market, Telkom, the incumbent operator, maintains dominance over the backbone and competes downstream with other electronic network services (formerly VANS and Internet service providers, or ISPs). The services market includes both managed data network providers and first-tier Internet access providers, such as Internet Solutions, MTN Business Solutions, MWeb and Telkom. Following a groundbreaking ruling by the courts in 2009, the market also includes hundreds of smaller ISPs, who hold class licenses only.

Figure 1: South African mobile operators market share based on reported number of subscribers (SIMS sold)

Sources: Vodacom, Integrated report for the year ended 31 March 2012. MTN, Integrated Business Report for the year ended 31 December 2011. Cell C, ITWeb July 2012. 8ta, author's calculations.

Neotel, the second PSTN, only became operational in 2006, following licensing delays. The company primarily offers fixed wireless communications to residential users and small- to medium-sized enterprises. The fiber-optic networks of the railway network, Transnet, and power network, Eskom, which originally had been set aside for the second network operator, were reclaimed by the state as the Neotel license was being finalized and transferred into a state-owned broadband company, Infraco Broadband Limited.[3]

Initially, there was some concern that Infraco would squeeze out private sector investment, but while it waited for a licence Infraco could not keep the interest of its target clients. It fell victim to a lack of coordination between its shareholder, the Department of Public Enterprises, and its license issuer, the Department of Communications, which was responsible for locating its license in the liberalized competitive market into which it was inserted. The delays in the much-awaited low-cost access network caused MTN, Neotel and Vodacom to co-build an alternative national infrastructure network, which undermined the viability of their business models.

They also now face competition from Dark Fibre Africa, which has installed a carrier-neutral, open-access ducting infrastructure in South Africa. Through this underground infrastructure, any operator with a communications license can run a fiber-optic network.

Meanwhile, some provincial governments, such as Gauteng and the Western Cape, have instituted their own broadband plans and government e-services, as have their major cities, Johannesburg and Cape Town. Ethekwini municipality in KwaZulu Natal has also proceeded with metropolitan networks and services.
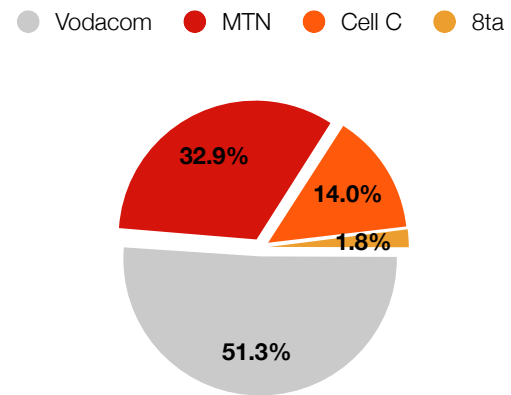
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[3] As part of this agreement Infraco, which will remain wholly owned by the state in terms of the broadband Infraco Act, was to provide wholesale bandwidth exclusively to Neotel, selling it on a cost-plus basis for its first three years.

The result has been significant duplication in metropolitan areas where multiple cables (including non-licensed cable company Dark Fibre Africa) have been laid, some duplication on the main intercity routes, and very little extension of the network to smaller towns and villages.

The mobile market has four mobile operators and one mobile virtual network operator (MVNO), but is dominated by two incumbents, MTN and Vodacom, which jointly command a market share of more than 80 percent. Cell C successfully established a niche market segment by targeting lower-income subscribers. More recently, it adopted a more aggressive pricing strategy and tried to erode the incumbents' share of the contract market. In 2006, Cell C entered into a partnership with Virgin as an MVNO. Virgin focused on the high-end youth market, hoping to capitalize on its global brand position. Even after several years of operation, Cell C and Virgin have secured less than 15 percent of the market.

In 2009, Telkom sold its share of Vodacom. Before the Vodafone transaction, the South African government owned 37.7 percent of Telkom, which in turn owned 50 percent of Vodacom. The government now has a 14 percent direct shareholding in Vodacom (Vodacom Annual Report, 2009). Having sold its share in the dominant operator, Telkom launched a fourth mobile operator, 8ta, in October 2010. Despite benefiting from its parent's physical and retail network, and some excellent data offerings, 8ta has not priced its voice calls competitively enough for long enough, and has only managed to secure a fraction of the market.

Pricing

Pricing, itself an indicator of the effectiveness of the market structure and regulation of the sector, also provides the best indicator of the competitiveness of a market. With high prices across services, South Africa's poor showing in a year-long prepaid mobile pricing study in 46 African countries during 2011–2012 is a reflection of its lack of competitiveness. South Africa ranked 30th. Its high-prepaid retail prices are a result of interconnection charges in South Africa, which are still high despite the fact that the country is in the third year of a regulatory glide path to reducing termination rates over three years (www.researchictafrica.net/docs/SA_Mobile_Prepaid_policy_brief.pdf).

In South Africa, even the modest reductions imposed on termination rates have generally not been passed on to end users. The two later market entrants, Cell C and 8ta, have attempted to introduce cheaper mobile prepaid products, but these products have not forced down prices. This is because the relatively small reductions in termination rates has not given new entrants the margin to really undercut dominant players in the market and attract those subscribers to their networks.

As long as termination rates remain significantly above the costs of an efficient operator, termination rate reductions are unlikely to lead to the positive outcomes evidenced in Namibia and Kenya, for example. In those countries, following significant reductions in termination rates over the last few years, prices plummeted to among the lowest on the continent (See Gillwald & Stork 2012). International bandwidth is, however, no longer the major constraint on usage of data services it was only a few years ago. The monopoly held by the SAT3 undersea cable ended in 2009 when Seacom came into the market, followed by EASSy in 2010 and WACS in 2011. While this has had a positive effect on international wholesale prices, the benefits were not passed on entirely to end-users. Service providers tended to increase the bandwidth limits of existing subscribers, rather than bring prices low enough to induce the kind of take-up by new users that policy makers would like to see.

Mobile data prepaid pricing pressure does, however, seem to be having an impact on large usage/package discounts. 8ta offers the best price with its 120GIGS BIG product, which offers 60GB anytime data for R 1,800 ($.03 /MB) and 60GB night surfer (between 11 pm and 5 am) for free, while Cell C, in line with its overall policy of flat-rate simplicity, offers the Smartdata 24GB product for R 1,299 ($.05/MB), aimed at the less sophisticated end of the market. Virgin does not offer a data package. By contrast, Vodacom and MTN do not compete on price, since their data packages are still relatively expensive compared to the small operators. Their tariffs are three to four times higher than those of Cell C, which has the second cheapest data package after 8ta. MTN offers MTN2GB for R 398 (19 cents/MB) and Vodacom

has MyGig 10 for R 1,449 (14 cents/MB). Most of the cost-effective bundles are still largely unavailable to those at the BoP, since they are targeted for large data volume and high-speed Internet devices. These packages are more suitable for top-end consumers, who have high disposable incomes and can afford one-time payments for large volumes of data.
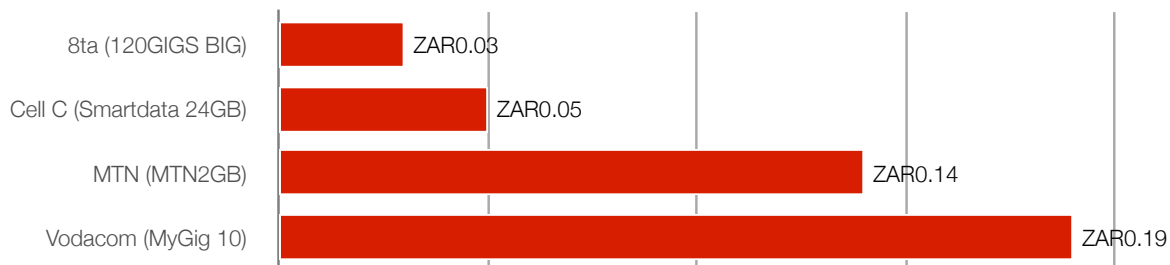
Figure 2: Cost of 1 MB in bundle in rand (Source: Research ICT Africa 2012)

When analyzing unbundled data prices, a more likely scenario for mobile Internet connectivity at the BoP, the cost for 1 MB of data is commonly significantly higher if purchased alone than as part of a bundle. Cell C charges $.15/MB, three time higher than the cost of 1 MB of the Smartdata 24GB package. Virgin's price is even higher, $.60/MB. The cost of 1 MB from 8ta R 1, almost 34 times higher than the cost for 1 MB in its cheapest bundle. The two dominant operators, MTN and Vodacom, are similarly priced, the only difference being that MTN charges per KB instead of per MB. Their prices are two times higher than 8ta. MTN costs $.02/KB (2 R/MB), and Vodacom also charges R 2/MB.
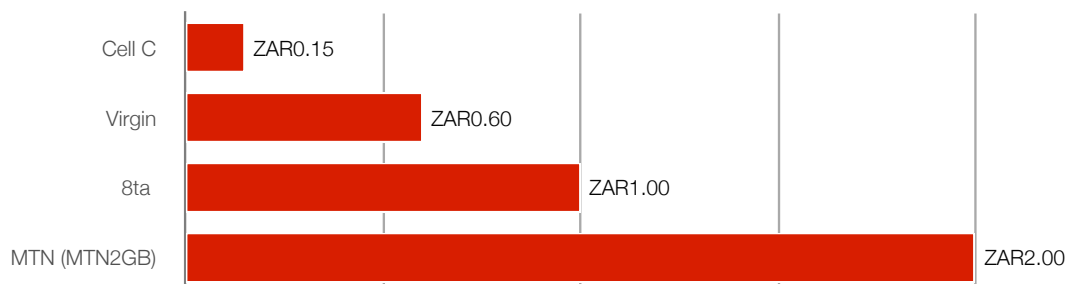
Figure 3: Cost of 1 MB out of bundle in ZAR (Source: Research ICT Africa 2012)

These prices increase the input cost of experimentation in the m-apps space. Further, the high cost of access for would-be users constrains the ability of innovations to scale once they come to market—and scale is the critical factor in the success of m-apps.

3 Conceptual Framework

This report understands mobile applications (m-apps), mobile operating systems (m-OS) and platforms as part of the wider ICT ecosystem—networks of elements with varied functions that contribute to sustainability of the whole. A number of authors have begun to re-conceptualize ICTs and broadband in particular as a more organic network than the hierarchical layered models used to describe communication systems in the past (Fransman, 2006, Smith and Elder, 2010, Kaplan, 2005). This more organic, ecological approach captures the adaptive nature of the IP environment, with its properties of self-organization, scalability and sustainability, in which new communication systems operate. The technological dimensions of this approach can be adapted to the entire system of governance and regulation, which we contend needs to transform into an equally dynamic and flexible yet robust part of the ecosystem if it is to be both sustainable and innovative (Gillwald 2012). This mindset is captured by Kaplan (2005), who says: "An ICT ecosystem encompasses the policies, strategies, processes, information, technologies, applications and stakeholders that together make up a technology environment for a country, government or an enterprise. Most importantly, an ICT ecosystem includes people—diverse individuals—who create, buy, sell, regulate, manage and use technology." (Kaplan, 2005).

The comment is illustrated by Figure 4, which provides a conceptual framework through which to analyze the relationships between different elements and the outcomes resulting from their interactions. It places users, citizens and consumers (who can be further disaggregated into those at the BoP), at the center of the system. These users' access, and their ability to afford the networks, services, applications, and content, determines the degree of their inclusion in the ecosystem or their exclusion from it. The factors that link these elements and affect access and affordability are pricing and quality of service (QoS). These, in turn, are an outcome of market structure and regulation, which are themselves determined by the policy and legal framework. The framework is the product of the state at the national level, and increasingly of international governance institutions such as the Internet Corporation for Assigned Names and Numbers (ICANN), the International Telecommunications Union and the World Trade Organisation.

The environment created by these elements, and the nature of the relationships and process between and within them, determines how conducive they are to the essential (technology) investment that is required to drive the growth of the sector and economy. Whether there is enough efficiency and innovation to enable the ecosystem to evolve depends on whether the people and institutions at each node within the ecosystem have the skills and competencies to harness the benefits associated with integrated networks for economic development, and for social and political engagement (Gillwald 2012).
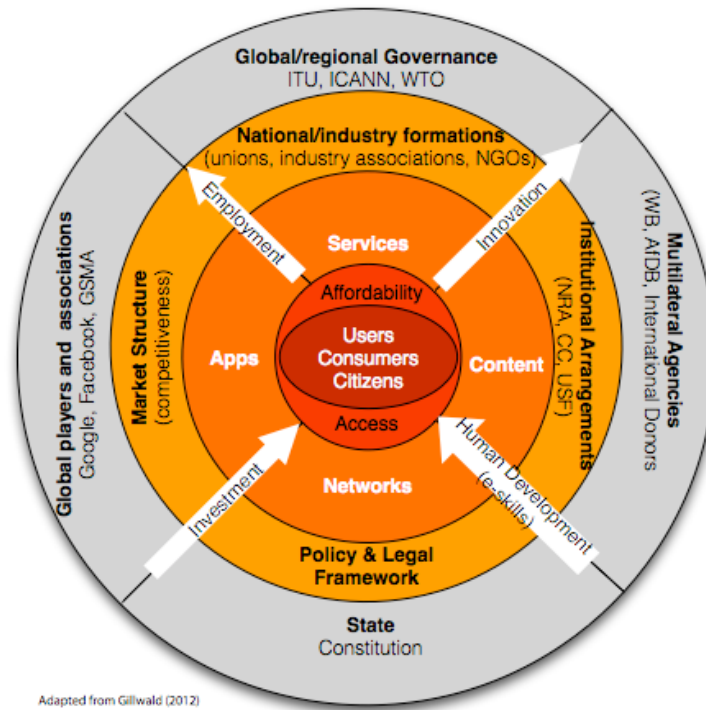
Figure 4: ICT Ecosystem

Within this broader ICT ecosystem is a mobile subsystem (m-ecosystem), the potential of which to meet the needs of the BoP can be assessed. The more technical aspects of this system are defined and described below in order to understand how the m-ecosystem operates, and where and how it interfaces with other parts of the wider ecosystem.

Technical Dimensions of the M-App Ecosystem

Mobile Operating Systems include an application programming interface (API), which is a software specification used as an interface between different software components. For example, the latest version of the Android operating system, Jellybean, provides several public APIs that allow developers to integrate their applications with the operating system.

Platforms allow other software to be built on top of them. Examples of platforms include Facebook and emerging-market social networking platforms such as Mxit. A platform provides uniform standards and payment mechanisms, which are used by developers to develop and sell applications. A platform sits on top of an operating system.

Mobile Applications run on mobile phones, either on the operating system or on a platform such as Mxit or Facebook, that themselves run on an operating system like Apple's iOS, Android or Nokia's Symbian OS.

Table 1. Definitions and Concepts of M-apps ecosystem	
Mobile Operating System (m-OS)	Software that manages mobile phone hardware resources and provides common services for mobile applications.
Platforms	A platform is the infrastructure that allows other products to be 'built on top.' Examples of platforms include Facebook and emerging market social networking platforms such as Mxit.
Mobile Applications (m-apps)	A mobile application is software that runs on a mobile phone or on a server and interacts with mobile phones. Mobile applications can sit either on top of an operating system or on top of a platform. Server-based applications that provide services to mobile users, such as Kenya's MPESA, are included in this definition.
Mobile Application Ecosystem	The mobile application ecosystem can be seen as a subsystem in the wider ICT ecosystem that specifically includes developers, users, content and platform providers.

Functions and audiences for a mobile application should be based on the general ICT ecosystem and on the various mobile application ecosystems[4] available. For example, Apple and Google created their own m-app ecosystems. So did Mxit and Facebook.

Several interlinked decisions need to be made regarding hardware, operating system, payment facilities and distribution channels. Together, these describe an m-app ecosystem where developers and customers meet. The general ICT ecosystem determines prices for mobile voice, text (SMS) and data, as well as handset prices and availability (Figure 5). The m-app ecosystem is a substructure linking developers, hardware manufactures, distribution and payment systems and consumers (Figure 6).
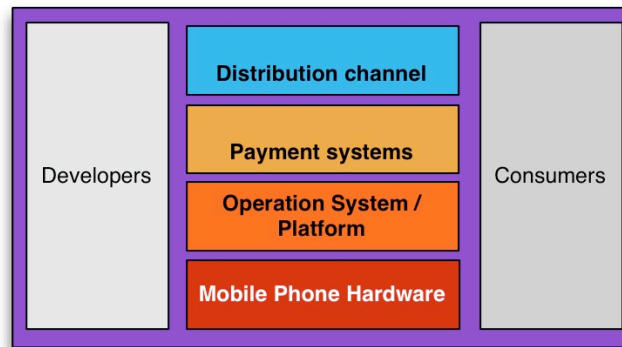
Figure 5: Mobile Application Ecosystem

A framework is displayed in Figure 6 that allows the classification and analysis of m-app ecosystems. The analysis begins with the configurations chosen by Apple, Google, Mxit and Facebook as examples.

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[4] See, for example, Yongsoo et al (2010) for an example of a broadband ecosystem.

Generic Framework	Apple's Model	Google's Model	Mxit model	Facebook	Blackberry
API, Software development kits, (SDK), certification	Public API, iOS SDK, Apple stores, certification programme	Public API, Android SDK, 3rd party academies and forums	Public API, MXit SDK	Public API, Facebook SDK for iOS, Android, Java, PHP	Public API, BlackBerry SDK and JDE
Training & Support	**Training & Support**	**Training & Support**	**Training & Support**	**Training & Support**	**Training & Support**
3rd Party / OS app store / Operator app store	Itunes	Google Play	Mxit App store	Facebook app store	Blackberry App World
Distribution channel	**Distribution channel**	**Distribution channel**	**Distribution channel**	**Distribution channel**	**Distribution channel**
Credit Card / Mobile Money / Air time / Platform currency	Credit Card	Credit Card / Google Wallet	Standard Bank / FNB Mobile Money / Air time / Moola	Credit Card / Local currency / Airtime / PayPal	Credit Card / Airtime / PayPal
Payment systems	**Payment systems**	**Payment systems**	**Payment systems**	**Payment systems**	**Payment systems**
Apple iOS / Android / Java / Symbian / Windows mobile / Other	Apple iOS	Android	Apple iOS / Android / Java / Symbian / Windows mobile	Apple iOS / Android / Java / Symbian / Windows mobile / Other	BlackBerry OS
Operation System / Platform	**Operation System / Platform**	**Operation System / Platform**	**Operation System / Platform**	**Operation System / Platform**	**Operation System / Platform**
Mobile Phone Hardware	**iPhone**	**Android Phones**	**Feature or smart phone**	**Feature or smart phone**	**BlackBerry**

Figure 6: Conceptual framework for business modeling

Apple relies on its own hardware and operating system as well as its own application store. A credit card is required to register for iTunes, which disqualifies this configuration for the BoP. The price of an iPhone includes the operating system. Operating upgrades are free, unlike those for computers and laptops. Apple takes a 30 percent cut of applications sold in its App Store.

Google has a different combination. It offers an open-source operating system, leaving hardware development, production and sales to companies like HTC and Samsung. Some apps can be downloaded simply by registering (i.e., without requiring a credit card as iTunes does), which makes the Google configuration a potential candidate for the BoP. Some applications require payment through Google wallet, which can be loaded via credit card but also may be loaded by other forms of payment. Google has several revenue sources: paid applications, advertising and in-app purchases (Google charges app developers 30 percent of the revenues from in-app purchases, like Apple).

Facebook, like Mxit, has a platform that sits on top of operating systems such as iOS and Android. Unlike Mxit, however, Facebook is only available on computers and smart phones. (Facebook does have a product called Facebook Zero that works on feature phones, but this scaled-down version of Facebook does not offer app purchases). In South Africa, Facebook allows app purchases by charging a user's prepaid airtime account. This is available with Cell C, Vodacom and MTN.

The Mxit model is also different in that it is available across all hardware and operating system combinations, from basic phones (via Unstructured Supplementary Service Data, or USSD) through smart phones (via an Android and an iOS App). Mxit also offers its own currency called Moola, which users can purchase with airtime or through their accounts with First National Bank or Standard Bank. Though Mxit has more users at the BoP at present, Facebook is relatively popular among the BoP, and many who cannot access it aspire to do so.

The ideal configuration for successful BoP m-apps would be OS-agnostic (i.e., it would work regardless of the operating system) and would not require a bank account or credit card to purchase apps. Both Facebook and Mxit are closest to this ideal because they cover all operating systems and offer apps that are supported on basic, feature and smart phones, allowing BoP users to evolve up the value chain as hardware becomes cheaper or as they become more affluent.

The BlackBerry model, which uses its own operating system for its smart phones, also has been very successful, and South Africa is one of its fastest-growing markets. Although the cost of the device is high for the BoP population and most of the South African BlackBerry users are on a contract, the BBM messaging platform and special offers for data browsing are low enough in price to be accessible to some BoP users.[5] At a global level, BlackBerry is in decline compared to Apple and Google. However, according to World Wide Worx, "it is thriving locally, with market share rising from 4 percent to 18 percent" over an 18-month period (*Sunday Times,* 2012). The BlackBerry model is similar to the Apple model: It is based on a proprietary mobile operating system developed by Research In Motion (RIM) that runs only on the BlackBerry line of smart phones. Apps can be purchased or downloaded free from BlackBerry App World.[6] Research In Motion has opened an apps laboratory in Cape Town to boost the development of "Made in South Africa" mobile apps.

The key challenge facing mobile application developers who target the BoP in South Africa is volume. That's because sustainability without volume is only possible if an app is a niche product that can demand premium rates. This is not possible if the target market is the BoP. Without volume, the likelihood of an app's sustainability in the BoP market is low. The trend, both internationally and locally, is to create critical mass by building a software-agnostic platform that acts as a funnel for the way users interact with the internet. Social media is a key driver of mobile Internet adoption, particularly in developing countries such as South Africa. Social media directly address the challenge of volume—millions of people in Africa use Twitter, Facebook and Mxit, and usage is growing fast. Social media platforms have addressed the volume challenge, but still have to be monetized. Facebook recognizes the challenge of moving advertising from the desktop to the mobile phone. In fact, its CEO has listed this as his central challenge.[7]

Mxit, which is already on a mobile platform, is trying to expand its current advertising revenue streams. This challenge needs to be placed in the context of a situation where traditional mobile ads don't work—that is, serving up mobile ads arbitrarily on a small screen has generally been unsustainable. The world's largest independent mobile ad-network company, InMobi, has exited Africa entirely, having found that it was not possible to sustain its business model (although InMobi remains active in developed markets). Despite the difficulty of successfully advertising on a mobile platform, the future business model for mobile applications—at least in the immediate future—will be embedding mobile applications into social media platforms such as Mxit and Facebook.

M-app ecosystems may be classified in various ways, but the most relevant consideration is the distinction between OS and platform-based ecosystems.

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[5] BBM is the BlackBerry chat service. It allows free chats with other BlackBerry users. Through BlackBerry Internet services, BlackBerry users have unlimited Internet usage for R 57 a month.
[6] The Lab is situated inside the Bandwidth Barn, an information and communications technology incubator owned by the Cape IT Initiative.
[7] BBM is the BlackBerry chat. It allows to chat for free with other BlackBerry users. Through the BlackBerry Internet Services, BlackBerry users have unlimited Internet usage for ZAR 57 per month.

Operating Systems versus Platform-Based Systems

Apple opened its App Store on July 10, 2008. Competitors such as Google entered the market a few months later. Prior to the launch of the Apple App Store, mobile applications were developed within a select community of developers. Getting an application onto a mobile phone usually required going through the mobile network operator. Apple in a sense democratized this process, providing an opportunity for anyone to develop a mobile application and sell it via the App Store. The Apple model had an important consequence: it transformed mobile operators from gatekeepers to communications channels and led to vendor-driven ecosystems. The iTunes store can be accessed from any network. The ecosystem surrounding Apple iOS and Google Android has exploded, with many thousands of application developers.

The community of developers is one of the key components of a mobile ecosystem. Apple's App Store and Google's Android Market are valuable because of the number of developers within each ecosystem. Another key component of an ecosystem is the number of consumers and thus the ability to reach a large number of people. A large number of developers and consumers signals ecosystem value.[8] The number of developers working in iOS and Android, as well as the number of applications being bought by consumers in the Apple App Store and on Android Market, indicate that at present these are the dominant m-app ecosystems globally.

In contrast to the OS-based ecosystem of Apple and Google, Facebook is both an m-app running on various operating systems and a platform that supports other m-apps. For apps that run on the Facebook platform, Facebook takes the same revenue share as Apple, i.e., the developer keeps 70 percent of the app price.[9] One of Facebook's innovations is to act as a gateway through which users experience the web. Via its Open Graph protocol,[10] Facebook ensures that interactions with the web or an app are shown in the News Feed, allowing applications to integrate with a user's activities. In this way, Facebook has become a gatekeeper for the Internet, filtering information to users based on their preferences. As Facebook's mobile strategy (i.e., its mobile business model) gains traction, its ecosystem will continue to expand, drawing in more developers and making the system increasingly valuable.
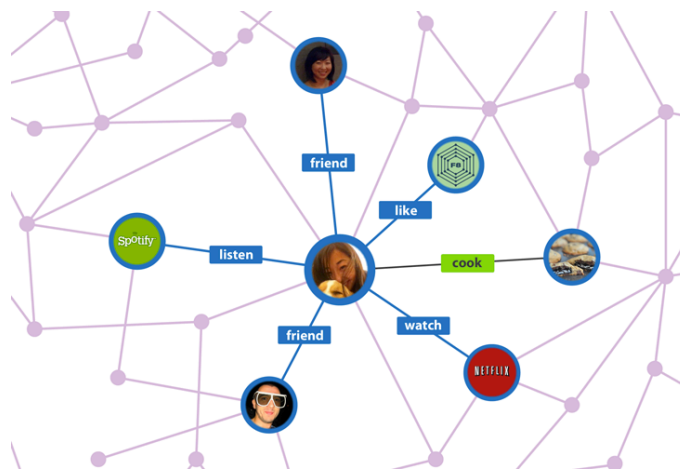
Figure 7: Facebook's Open Graph Protocol

8 Dediu, H. Of Platforms, Operating Systems and Ecosystems, available at http://www.asymco.com/2011/01/31/of-platforms-operating-systems-and-ecosystems/
9 Facebook takes 30% of developers revenues: http://www.facebook.com/help/100541576707483/.
10 See http://developers.facebook.com/docs/opengraph/

Level of Sophistication

M-app ecosystems may cater to different levels of sophistication and different segments of society. Three distinct levels can be identified by looking at the role of mobile operators, payment systems, revenue streams and hardware.

Table 2. Ecosystems through ICT Market Development Stages			
Features	Level 1	Level 2	Level 3
Key players	Mobile operator as gate-keeper (Safaricom / MPESA e.g.)	Mobile operator and application platform (Mxit e.g.) develop a relationship or rival	Mobile operator open / Vendor driven ecosystem (Google/Apple)
Payment systems	Closed m-Payment system (no public API)	Revenue sharing on data and or text messages (SMS), airtime as currency, possibly M-money integration (e.g. MPESA)	Full set of payment system in place including credit cards, Paypal and m-money
Revenue streams	Limited revenue streams: share of SMS or data revenues, membership fees, airtime	Expanded revenue streams: mobile money based transaction fees in addition to SMS and data revenue share, membership fees, airtime	Multiple revenue streams in place: advertising, once-off purchase of the app, in-app purchases, credit card and PayPal integration in app store
Hardware	Basic phones	Feature phones	Smartphone (e.g. Android, iPhone, BlackBerry)
Mobile applications	SMS and USSD dominate / server based applications	OS or platform based m-apps	OS or platform based m-apps
Network requirement	2G	2.5G or better	2.5G or better

These levels are applicable less to countries than to communities within countries. The BoP would use Levels 1 and 2, while the RoP would primarily use Level 3. Mxit straddles all three levels, Facebook serves only Levels 2 and 3, and Apple and Google cover only Level 3.

These three levels differ in the revenue streams they tap, ranging from Level 1, with a share of SMS or data fees, to Level 3, which consists of revenues mainly (but not exclusively) from advertising.

What really distinguishes each level is the type of payment mechanism available. In the developing world, the arrival of mobile money was the ingredient that kick-started the growth of m-apps. The success of Kenya's MPESA opened the door to innovation for m-apps—the range of m-apps is consequently greater than it would have been prior to mobile money. MPESA also opened the door to other payment system innovations, such as Mxit Moola or Facebook Credits (the latter were subsequently discontinued). These are parallel currencies that mimic cash and that are only available within the relevant ecosystem.

Mobile money exists in South Africa but is not widely used. Since some 60 percent of South Africans have a bank account, the potential for mobile money is limited. (About 80 percent of households have at least one household member with a bank account.) The South African financial sector is well developed and allows people with low incomes to open bank accounts.

However, while large numbers of people at the BOP are banked, they tend to be "underbanked," in terms of the kind of services they can get and the transaction costs of certain services. This means that being banked does not automatically reduce their need to use mobile phones for financial transactions. Further, although it has been argued that the challenge for those offering mobile money services in South Africa is compounded by alternative services that send money electronically, such as Shoprite[11] cash transfer (which allows users to transfer money in real time across different branches of Shoprite grocery stores) the R 10 charge for this service is relatively high. Mxit is exploring ways of bringing down its own R 6 charge for Moola, because it sees the fee has inhibited use of the service in its target market.

So, while mobile money is critical in the broader sense for fostering the development of m-apps, in highly banked South Africa it may not be as important as in other developing countries. One might therefore argue that its integration into existing payment systems (i.e., the formal banking sector) is vital. However, because those at the BoP who are banked may be underbanked, app developers in South Africa may still need to explore ways of enabling cheap mobile money systems. Even so, with a relatively high portion of the BOP banked (a number that is likely to grow) and in order to tap into the biggest spenders at the BOP, integration into the existing formal banking system is still a strategic advantage. Alternative payment systems such as airtime, data and SMS revenue share (Level 1) and innovations such as Moola also have considerable potential if they can be scaled.

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[11] One of the main super market chains in South Africa, which caters to the poorer segments of society.

3   Understanding Those at the BoP and How They Communicate

This section draws on a national household and individual ICT access and usage survey conducted by RIA in 2011–12 in South Africa. The only demand-side survey of its kind, it provides insights into levels of access to ICTs, as well as the nature of that usage and the amount spent on them. Importantly, the study also surveys those marginalized from services, the reasons for their non-usage and the willingness of these individuals to pay for services they would like to access. As the survey gathers extensive additional household information, including income and expenditure, data can be disaggregated into rural and urban, on gender lines, and into BoP and RoP.

As stated in the introduction, those in the BoP are defined for this report as individuals who live on less than R 432 a month. Those at the BOP have been disaggregated from the RoP.[12] As indicated in the introduction, the level of economic and social development in South Africa makes it significantly different from other sub-Saharan African countries. Electrification is widespread, even in informal settlements and rural areas, and basic education and health systems are extensive. The economy is relatively industrialized, with a sophisticated financial system. Levels of urbanization are high at over 50 percent and increasing (Census 2011). Despite the economic inequalities that persist in the country (which has a Gini coefficient[13] of 63.1, one of the highest in the world), there is an extensive social grant system in place, which provides poor households with some cash income. These combined factors make those at the BoP in South Africa somewhat different from the BoP in other African countries.

Mobile Use

Likewise, ICT access and usage by those at the BOP in South Africa differs significantly from the BOP in most of the other 12 countries surveyed in 2011/2012. For the reasons cited above, mobile ownership at the BoP level in South Africa is relatively high compared to other African countries and tracks RoP access and usage patterns very closely. Mobile networks cover about 90 percent of the land mass and over 75 percent of the population. More than 75 percent of those 15 years or older[14] in the BoP own a mobile phone, a rate only 14 percent lower than ownership at the RoP. Of those who own a mobile phone, 98.5 percent have a prepaid SIM card. However, there is a small percentage (1.5 percent) of the BoP mobile owners on postpaid contracts. Focus groups revealed that these are likely to be sponsored by

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[12] The RoP could be further disaggregated into middle of the pyramid and top of the pyramid. However the focus of this study was the BoP and the RoP is only used to characterised how the BoP is different from the rest. An alternative to displaying the RoP would have been to use nationally representative results as a reference.

[13] The Gini coefficient measures the inequality among values of a frequency distribution such as level of income. A Gini coefficient of zero expresses perfect equality, where everyone has an exactly equal income. A Gini coefficient of one (100 on the percentile scale) expresses maximal inequality, where only one person has all the income.

[14] As the survey uses the national census frame for sampling to ensure national representativeness, all data refers to those who are 15 years and older.

family members or friends, as postpaid products usually require salary slips and electricity or water bills as proof of residential address and to provide a credit history.

BOP want what ROP want, but more cheaply

The profile for RoP and BoP phone ownership and use is surprisingly similar. There are only a couple of percentage points difference between RoP and BoP in most areas other than in postpaid services and smart phone ownership, where the RoP's dominance is predictable. (However, an interesting finding of the survey is the high percentage of BoP mobile owners with an Internet-enabled phone: 33 percent have a mobile capable of browsing the Internet.)

Focus groups revealed that generally those at the BoP want the same things as the RoP, although they are generally prevented from realizing this ambition by the price of devices and services. Some assumptions about collective usage of phones at the BoP were also debunked. People across the income spectrum consider the mobile a personal device. A high percentage, 88 percent, of the RoP do not share their mobile phones with anyone, and the figure is also quite high, 79 percent, for those at the BoP. This finding was borne out in the focus groups, where respondents indicated they might allow their children or spouses to use their phones, but that use was restricted because of cost. As a respondent in a rural focus group in the Western Cape said: "*Ai, nee jong, ons is suinig met ons airtime!*" ("No man, we are stingy with our airtime!").

Table 3. Mobile Ownership and use		BoP	RoP	Difference
Mobile phone ownership		74.8%	88.7%	13.9%
More than 1 Active SIM Card		15.6%	14.2%	-1.4%
Is your Mobile Phone main SIM card…	Prepaid	98.5%	83.7%	-14.8%
	Postpaid	1.5%	16.3%	14.8%
Where do you charge your mobile phone mostly?	Home	82.6%	96.6%	14%
	Shop	15%	1.5%	-13.5%
	Work/School	0.2%	1.6%	1.4%
	Other	2.2%	0.3%	-1.9%
Is your mobile phone capable of browsing the Internet?		33.2%	57.7%	24.5%
Do you share your mobile phone with others?	No	79.1%	88.1%	9%
	Daily	8.1%	6.4%	-1.7%
	Once a week	2%	0.9%	-1.1%
	Several times a week	1.7%	1.1%	-0.6%
	Several times a month	0.5%	0.1%	-0.4%
	Occasionally	8.6%	3.3%	-5.3%

One of the more noticeable differences between the two groups is that just 1.5 percent of users in the RoP charge their phones at shops, while as many as 5 percent of BoP users do. This suggests that access to or affordability of power continues to be an issue for a significant number of those at the BoP, despite the widespread success of the electrification program.[15]

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[15] An innovative application that allows individuals facing electricity shortages to charge their mobile phones and other small appliances is Fairwind (www.fairwind.info). Fairwind is a simple wind power generator designed specifically for low power appliances, developed to meet the continued need for power in developing countries. Fairwind is a low cost windmill with DIY-blades made from plastic bottles. It is very simple to assemble and it comes with a construction manual that shows how to build a blade in a few seconds. The project has been launched by many operators in different countries and by Neotel and Vodacom in South Africa. It mainly targets rural areas and other areas that face electricity shortage.

Table 4. What mobiles are being used for	BoP	RoP	Difference
Making and receiving calls	99.4%	99.3%	-0.1%
Missed call/please call me etc.	96.8%	91.9%	-4.9%
Sending and receiving text messages (SMS)	96.6%	96.6%	0.0%
Personal Organizer/Diary/Notebook/Watch	66.8%	75.7%	8.9%
Playing games	42.8%	44.6%	1.8%
Listen to music/radio	37.5%	44.2%	6.7%
Taking photo/video clips	36.3%	61.7%	25.4%
Browsing the internet	13.6%	32.2%	18.6%
Facebook/Twitter/Mxit/other social networking	12.8%	29.3%	16.5%
Download applications to mobile phone	11.1%	26.3%	15.2%
Transfer airtime	10.2%	25.7%	15.5%
SMS to Radio or TV programs	6.1%	10.4%	4.3%
Reading and writing emails	5.2%	21.4%	16.2%
International calls	4.3%	18.1%	13.8%
Sending or receiving money	3.6%	9.9%	6.3%
Roaming when abroad	0.8%	6.3%	5.5%
Skype/VOIP	0.5%	3.9%	3.4%

Usage patterns are also similar between the RoP and the BoP population, except for smart phone features such as taking pictures and video, Internet access and emailing. The RoP, on average, had phones that better enabled these services than the BoP. In addition, there is a 10 percent difference between the RoP and the BoP in describing some benefits of a phone, with more at the RoP stating that their mobile phone "lets me get more done during the day" and that they "use it more for business than for social calls."

Urban/rural divide

While BoP users in general appear to be shadowing RoP users, focus groups revealed some distinctions between urban and rural BoP users. In urban areas, mobile applications users are knowledgeable about available applications and use social media and instant messaging to communicate with friends, watch videos and mix music. They micro-browse for job openings and information about school and about bursaries (educational grants). In rural areas, micro-browsing is a necessity for most users interviewed, because there is little personal Internet access, public access points are located far from where they live, and Internet cafes are generally expensive. Rural participants are also more skeptical about the value of mobile applications, sometimes even suspicious of them. Those mobile owners who don't use the Internet are unaware of the applications available. They rely on traditional media such as newspaper, TV and radio for information, and on voice and SMS text services to communicate.
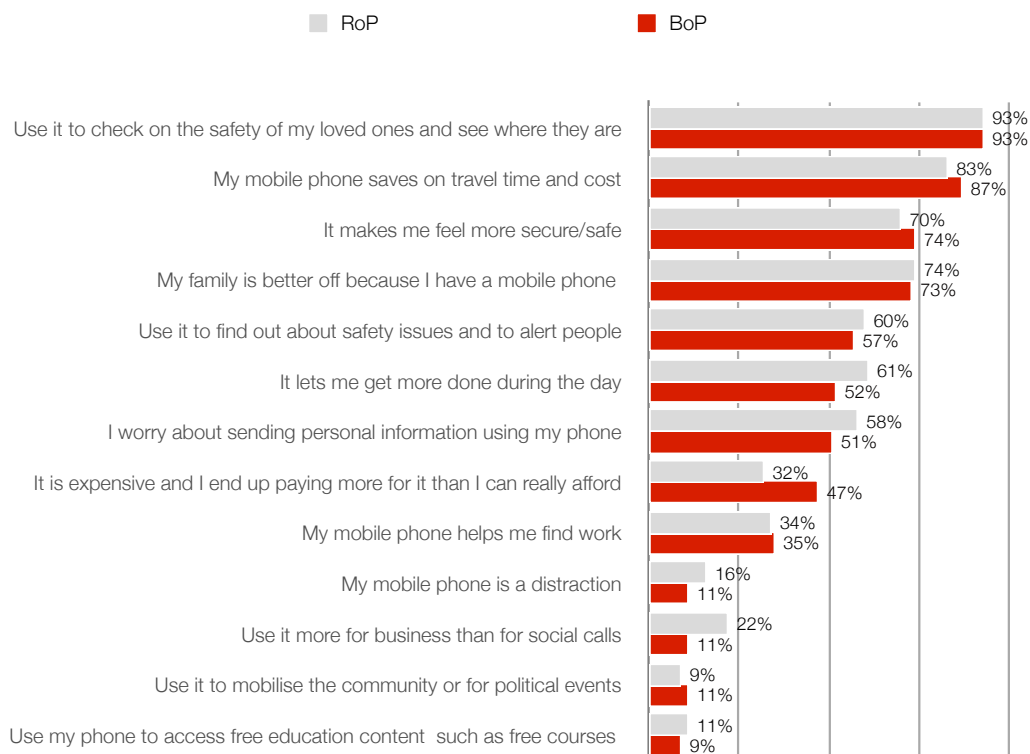
Figure 8: Mobile phone users that agreed with statements above

Safety

The mobile phone is considered an important device in terms of improving safety and security. Nearly three quarters of BoP mobile owners, 74.4 percent, feel more secure and safe thanks to their mobile phones. Further, almost all BoP mobile owners have used their phones to check on the safety of their loved ones, while 57 percent agreed that they have used a mobile phone to find out about safety issues and to alert people.

Table 5. Do you agree with the following statements based on your experience with having a mobile phone...?		RoP	BoP
It makes me feel more se-cure/safe	Do not agree	22.1%	15.7%
	Not sure	8.2%	9.9%
	Agree	**69.8%**	**74.4%**
Use it to check on the safety of my loved ones and see where they are	Do not agree	6.2%	2.5%
	Not sure	1.3%	4.8%
	Agree	**92.5%**	**92.7%**
Use it to find out about safety issues and to alert people	Do not agree	34.6%	34.5%
	Not sure	5.6%	8.7%
	Agree	**59.8%**	**56.8%**

Many focus group participants, both users and non-users of mobile applications, expressed interest in using apps for security issues, and also for applications to inform authorities about corruption and crime. Most of the participants revealed a strong interest in these kinds of applications, and would pay a small amount of money to download them.

Culture and tradition

During a focus group with non-users of mobile applications in Nchanga, a rural area deep in the Kwazulu-Natal province, several respondents appeared suspicious of mobile applications, saying they believed that the technology could damage their phones. One participant said that he had tried to download FIFA 12, a mobile version of the popular soccer video game, on the recommendation of a friend. But when he tried to run the app the mobile phone froze, and he became suspicious of gaming apps. Participants also feared that usage of mobile applications would erode the morals and values of the community. Some participants perceived Facebook users as addicted to the social network application. Others saw Facebook as a waste of time. One participant said, "*You have to hold your phone in your hand all the time, so if you live alone at home when will you clean or cook? Most of the people that have joined are just sitting looking at their phones.*"

It also emerged that social network platforms are considered inappropriate for women, as they could be harassed by strangers. One participant said, "*When you have a partner, using social networks causes conflicts. You end up not paying attention to him, he ends up being jealous that you are chatting to other people.*" Another participant declared, "*That thing [social network] is not right, being a woman and having these things. It has broken down many homes, and we have lost a lot of women to these things, and there are people who like it, but I tell her [the wife] that if you keep following this you will get lost!*" .

Affordability

Significantly, 70 percent of those at the BoP without a mobile phone stated that they could not afford one, compared to 54 percent at the RoP. However, half of the people at the BoP who do not own a mobile phone had used a mobile in the past three months—mostly those of family members. About 46 percent of people without a mobile phone at the BoP intend to get one within a year.

| Table 6. Of those that do not have a mobile phone		BoP	RoP	Difference
Why do you not have a mobile phone?	I cannot afford it	70.4%	54.4%	-16.0%
	No mobile coverage where I live	2.2%	1.1%	-1.1%
	No electricity at home to charge the mobile phone	12.6%	5.4%	-7.2%
	I don't have anyone to call	4.7%	7.7%	3.0%
	My phone is broken	29.3%	29.1%	-0.2%
	My phone got stolen	20.3%	15.9%	-4.4%
Did you use a mobile in the past three months?		48.8%	56.9%	8.1%
Whose mobile did you use?	Family Member	64.8%	67.5%	2.7%
	Friends/Colleague	26.1%	19.2%	-6.9%
	Public Phone on the Roadside	17.2%	18.1%	0.9%
Do you plan to get a mobile phone in the future? If yes, when?	No	44.1%	38.8%	-5.3%
	Within the next 6 months	20.3%	31.3%	11.0%
	Within the next year	26.9%	19.2%	-7.7%
	within the next 2 years	8.7%	10.6%	1.9%

Internet Use and Social Networking

A main finding of the survey that was confirmed in focus groups is that those at the BoP now predominantly access the Internet via mobile device. Among both the RoP and the BoP, the majority of Internet users go online with a mobile phone.

Table 7. Internet access and use		BoP	RoP	Difference
15+ using the Internet		18.4%	40.3%	21.9%
Used the Internet first on a computer		52.5%	70%	17.5%
Used the Internet first on a mobile		47.5%	30%	-17.5%
Where did you use the Internet in the last 12 months?	Any place via a mobile telephone	70.7%	68.7%	-2.0%
	Home	15.5%	48%	32.5%
	Work	6.5%	45.3%	38.8%
	Place of education	23.3%	17.6%	-5.7%
	Internet Café	40.5%	32.5%	-8.0%
Are you signed up for any online social network (Facebook, Mxit, Twitter etc.)?		52%	78%	26.0%
Share of those that are signed up for a social network, that are on Mxit		47.7%	26.2%	-21.5%
Share of those that are signed up for a social network, that are on Facebook		68.4%	88.9%	20.5%
Do you have an email address?		29.3%	75.9%	46.6%
How often on average have you used the internet in the last 3 months?	Every day or almost every day	44.6%	68.9%	24.3%
	At least once a week	28.3%	23%	-5.3%
	At least once a month	27.1%	5.8%	-21.3%
	Less than once a month	0%	2.2%	2.2%
What limits your use of the Internet?	There is no interesting content for me	30.5%	19.4%	-11.1%
	Lack of local language content	4.3%	9.3%	5.0%
	The Internet is very slow	20.8%	25.3%	4.5%
	To expensive to use	47.9%	36.1%	-11.8%
	Few people to communicate with via the Internet	21.8%	19.3%	-2.5%
How concerned would you be about security of your credit card or banking information when or if you ever bought something on the internet? Would you be:	Not at all concerned	7.3%	6.3%	-1.0%
	Somewhat concerned	11.3%	13.4%	2.1%
	Very concerned	49.3%	47.3%	-2.0%
	Extremely concerned	32.1%	33%	0.9%

The percentage of Internet users who access the Internet from their mobile phones is slightly higher at the BoP (71 percent) than at the RoP (69 percent). RoP users are more likely to have computer access to the Internet (48 percent of them accessed the Internet from home). Almost half of BoP Internet users first used it on a mobile phone, 38 percent in the last two years. This is a much higher share than the 30 percent of RoP Internet users who accessed the Internet first on a mobile phone.

More than 50 percent of Internet users at the BoP have signed up for a social network, while only 30 percent have an email address. In comparison, 76 percent of RoP Internet users have an email address. The substitution of email accounts for social media is similar to the pattern observed with regard to mobile Internet usage.

Among those who are signed up for an online social network, 48 percent use Mxit at the BOP, compared to only 26 percent for the ROP. Facebook, however, is more popular than Mxit in general, particularly for the RoP: 89 percent of those who use social networks have a Facebook account. So, while there are more users on Facebook than on Mxit, the BoP use Mxit the most. This is an indication of the success of Mxit's strategy to target the untapped BOP.
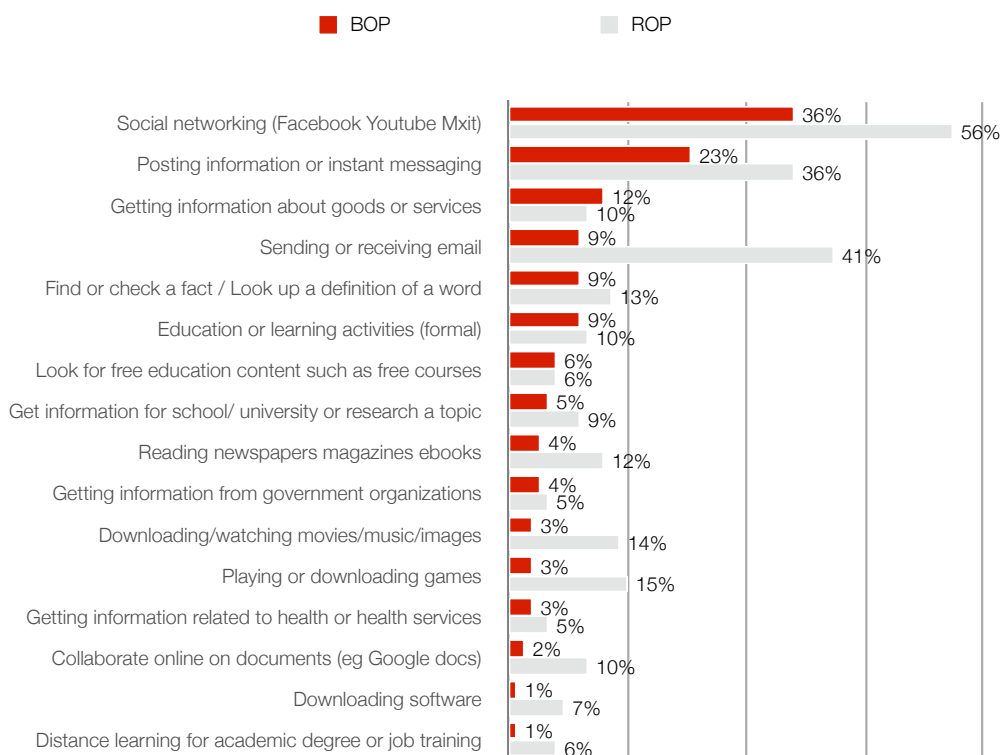
Figure 9: Daily Internet use, by activity

Social media is driving more frequent Internet activity for BoP Internet users. Sending or receiving an email is a daily activity for only 9.2 percent of BoP Internet users, compared to 23 percent who post instant messages or information every day. Among RoP Internet users, 41 percent send and receive emails daily.

Even as mobiles replace computers for the BoP, instant messaging and social networking are replacing emails. The logic behind this is simple: instant messaging is free, while sending and receiving emails is not. An SMS text may cost R 0.5 to 0.8, whereas one megabyte of data is nearly R 1. Text-based emails are thus much cheaper than an SMS. However, they are still more expensive than free instant messaging. The high cost of Internet services still represents a major obstacle to Internet usage and access for purposes other than messaging. For 48 percent of BoP Internet users, the Internet is too expensive, particularly when pictures and videos are shared, music is downloaded, or games are played. These activities are rare among BoP Internet users precisely because of the cost of data.

For the first time, instant messaging platforms have created an affordable and reliable way to communicate at the BoP level. A participant from a focus group in Evaton, a semi-urban area in the Gauteng province, stated, "*WhatsApp[16] is the best thing that has ever happened after Jesus Christ.*"

Furthermore, blogging and social networking applications have solved the technical challenges posed by language barriers, as they can support any language. Therefore, the lack of local content does not present an obstacle to Internet usage.

In particular, young participants in the focus groups who have a feature or smart phone seem to use social networks and instant messaging platforms such as WhatsApp or BBM rather than voice and SMS services. WhatsApp is considered to be very easy to use: it's always on, meaning that the user does not need to log in to use it, and it's real time, essentially working as a web chat. It is affordable for the BoP population. Users indicate that for as little as Rand 2, they can chat for more than a week. Having an airtime account balance as low as Rand 2 would result in their being cut off from voice and SMS services. Users usually keep a few rands in their accounts so that they can use social networks and instant messaging platforms, which have no airtime balance requirement.

Internet is expensive for entertainment such as watching video or downloading music, while it is cheap compared to sending SMS in South Africa when using Facebook Zero or other free instant messenger.

Entertainment applications such as video and music are also popular, particularly among young people in urban and semi-urban areas. During focus groups in the Western Cape, it emerged that social apps for chatting and making new acquaintances, such as Krymekaar (which enables users to find each other or arrange to get together), and Toilet (in which one can metaphorically flush someone down the toilet by revealing something he or she has done) are very popular, with people indicating that they check the site several times a day to see if they have been flushed.

In remote rural areas such as Nchanga in KwaZulu-Natal, and even semi-rural areas such as Evaton in Gauteng province, focus group discussions revealed that mobile phones, especially with mobile Internet, are a substitute for public Internet access points such as libraries and Internet cafes. Since some areas of the country are underserved with regard to public access points, and those points can be difficult or expensive to reach (even by public transport), the lowest-income bracket of the population relies on mobile phones to access the Internet. There is also a perception that an Internet-enabled phone can access the same services as an Internet-connected PC. Of course, the mobile web, including mobile browsing, social networking or instant messaging, is perceived as affordable, since it is not only cheaper than a computer and ADSL connection, but also cheaper than Internet cafe fees. Finally, mobile Internet also eliminates the cost of transport to a public access point, which may not be located in the user's neighborhood.[17]

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[16] WhatsApp is a cross-platform mobile messaging app that allows for the exchange of messages without the per-message fees of SMS. It works across feature and smart phones (see www.whatsapp.com) for a relatively small charge.

[17] See also Walton, M and Donner, J (forthcoming). *Public Access, Private Phone: The Interplay of Shared Access and the Mobile Internet for Teenagers in Cape Town* (Global Impact Study Research Report Series, University of Washington) which also identifies metered/pay-as-you-go pricing as a major bottleneck to mobile Internet use for low-income users.

Table 8. Profiling users of selected platforms				
	South Africa	Facebook users	Twitter users	Mxit users
Share Women	54%	47%	49%	44%
Average Age	36.39	29.11	26.71	22.83
Average years of schooling	10.23	13.48	13.71	11.38
Share with a National ID Card	90%	95%	95%	81%
Share with a Passport	18%	41%	46%	17%
Share with a bank account (bank or Post office)	59%	75%	78%	57%
Share of users that are BoP	41.8%	23.1%	21.4%	30.1%
Share living in rural areas	38%	19%	19%	27%
Average individual income in rands	3,081	8,765	7,738	1,102

Among BoP users connected to the Internet, almost half use it daily or almost daily. The same usage pattern is observed at the RoP, although the percentage of daily Internet users in the RoP income brackets is higher (69 percent).

In a June 2012 report, *The State of Mobile Web in Africa,* Facebook.com is the most visited website through the Opera browser in South Africa. (Opera, 2012). It is followed by Google.com, Zamob.com and Gumtree.[18] Mxit is in 7th position.

Figure 10 displays activities that Internet users do *not* use. Almost no BoP Internet user has ever used Internet banking, because most of the BoP do not have bank accounts. In addition, other than downloading ring tones or games (which can be purchased with airtime), ordering goods or services is difficult for a BoP Internet user. A majority, 62 percent, of BoP Internet users have never sent or received an email. At the RoP, a significant share (25 percent) have never sent or received emails, indicating a change in communication patterns even in the more affluent parts of society.

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[18] Zamob.com, a mobile content platform, is a repository of ring tones, music clips, short videos, wallpapers, animations and sound effects. See www.zamob.com. Gumtree is a classified ads website. It has both a web version and a mobile site. It is present in all major cities all around the world. See www.gumtree.co.za.
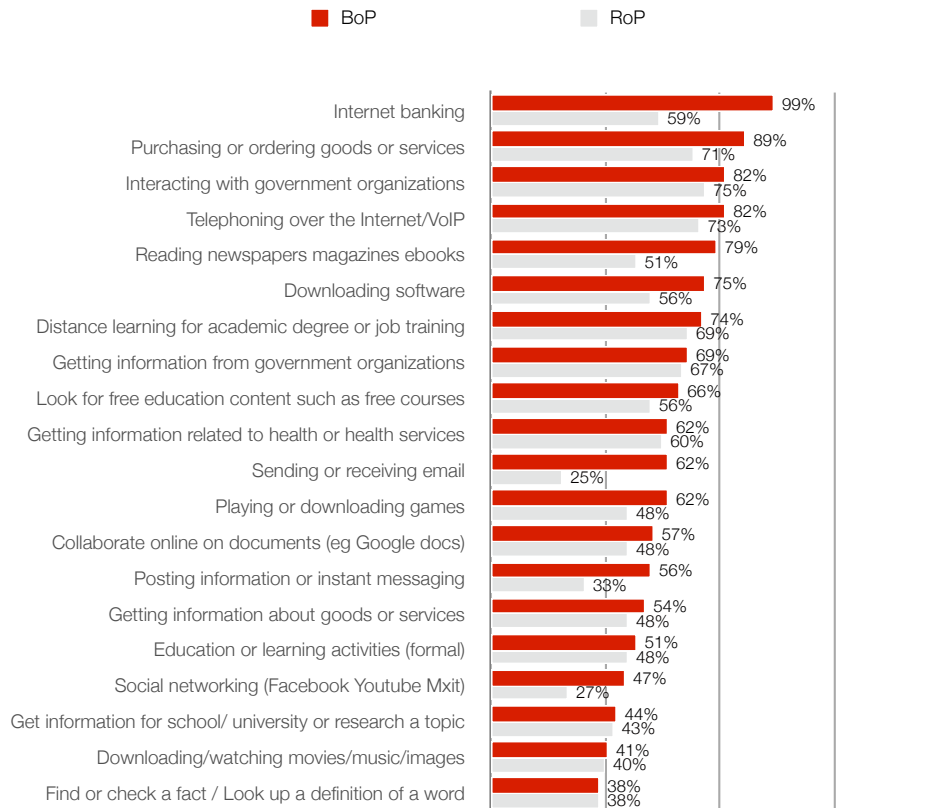
Figure 10: Never used the Internet for the activities above

Table 9. Reasons for not using the Internet of those that do not use the Internet	BoP	RoP	Difference
I don't know what the Internet is	65.2%	42.7%	-22.5%
No interest / not useful	34.1%	46.1%	12.0%
I don't know how to use it	85.8%	69.6%	-16.2%
No computer / internet connection	91.2%	83.8%	-7.4%
Too expensive	60.1%	59.1%	-1.0%
No time, too busy	20.1%	23.3%	3.2%
None of my friends use it	66%	50.7%	-15.3%
Is too slow, limited bandwidth	10%	9.8%	-0.2%

Although Internet users say it is expensive, this is not the main reason the majority of the BoP non-Internet users don't access it—65 percent did not know what the Internet is and 91 percent did not know how to use it.

Computer Use

Thirteen percent of the BoP use a laptop or computer, compared to 37 percent of the RoP. The majority of the population at the BoP rely on public-access computers: they use computers at Internet cafes (43 percent) or schools and universities (37 percent). Of computer users among the RoP, 70 percent use computers at home (69.9 percent). Ownership among computer users was much higher among the RoP than the BoP, as expected.

> *Of the few BoP computer users 64% are students or pupils.*

Table 10. Computer usage, RoP/BoP breakdown		BoP	RoP	Difference
15+ using a computer (Desktop or laptop)?		12.8%	36.8%	24.0%
Where computer is used	Work	1.7%	49.6%	47.9%
	School, University	36.7%	17.8%	-18.9%
	Library	5.7%	5.5%	-0.2%
	At home	34.7%	63.9%	29.2%
	Internet Café	43.4%	26.9%	-16.5%
	At a friends place	30.3%	19.8%	-10.5%
What the computer is used for	Writing letters, editing documents	62.2%	76.2%	14.0%
	Calculations using spreadsheets such as Excel: What do you use your computer for	53.4%	53.9%	0.5%
	Browsing the Internet: What do you use your computer for	57.4%	75.2%	17.8%
	Programming: What do you use your computer for	14.1%	39.1%	25.0%
	Remixing content found online: music, videos: What do you use your computer for	40.7%	35.6%	-5.1%
	Playing games: What do you use your computer for	72.3%	60.5%	-11.8%
Do you own A personal a computer or laptop	Desktop	20.9%	45.7%	24.8%
	Laptop	8.9%	41.1%	32.2%
Average age of computer user		24.57	33.22	
Main activity during past six month of computer users	Student / pupil	64%	15%	-49.0%
	Unpaid house work (e.g. housewife)	1%	2%	1.0%
	Retired	2%	3%	1.0%
	Unemployed	28%	14%	-14.0%
	Employed	5%	49%	44.0%

To a large extent, it is BoP youth who are using computers. BoP computer users have a lower average age compared to RoP computer users, and 64 percent of BoP computer users were students or pupils during the six-month period prior to the survey. This also partially explains the reason that 72 percent of BoP computer users use the computer to play games. Using the computer to browse the Internet is considerably more common among RoP computer users: 75 percent use it for this purpose, compared to 57 percent at the BoP.

From a focus group discussion held in a semi-rural area of the Western Cape, the mobile phone was found to be a substitute for the computer. One participant said, "Somebody said to me the other day that a phone and a computer are exactly the same thing nowadays. The phone is a great benefit—you can do absolutely everything on it."

ICT Access and Use by Informal Businesses

According to a national RIA business survey,[19] very few informal businesses in South Africa maintain a website (4.4 percent) or have employees with email addresses (2.9 percent). The rate of mobile ownership is slightly higher than ownership of other ICT devices among informal businesses, a finding confirmed in the focus groups. Participants indicated that they use SMS and voice on their mobile phones for business purposes.

Table 11. ICT access and banking		%
Mobile Phone use	Use private mobile phone for business purposes	27.7%
	Business has dedicated business mobile phone	5.2%
	Both a private and business mobile phone	14.7%
	Send text messages for business purposes	40.3%
	Receive text messages for business purposes	21.4%
	Does the business send or receive money via mobile phones	0.8%
Other ICT Owner-ship	Computers	11,6%
	Internet access	10.6%
Advertise via	Newspapers	4.4%
	Twitter Facebook	3.7%
	Mobile Phones SMS	2.6%
	Radio	2.2%
Of those that have Internet Access:	Received orders via the Internet	21.7%
	Purchased products/services via the Internet	27.1%
Access to bank account	Dedicated business account	20.5%
	Private account for business purposes	17.8%
Most common means of sending and receiving money	Pay myself (in person)	56.1%
	Bank	24.4%
	Send cash with someone	13.7%
	Western Union/Moneygram	5%
	Post Office	0.5%
	Mobile Money	0.4%

The few businesses that use the Internet to conduct business activities mainly access it through their mobile phones. Most do not know how to use a computer, and would rather use the Internet on their cell phones as they claim it is more convenient: "I do everything on my phone and I can take it anywhere." The only challenge for some is their lack of Internet-enabled mobile phones.

Informal businesses do most of their marketing and advertising through word of mouth, or direct it at people walking past their business locations. A few of the businesses in the focus group discussions indicated that they use mobile applications, namely WhatsApp, Mxit, BlackBerry Messaging, Twitter and Facebook, to communicate with their customers and suppliers and to advertise their products and services.

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[19] The RIA survey is nationally representative for informal businesses located in residential or semi-residential areas. Commercially zoned areas were not surveyed as they are not covered by the StatsSA census sample frame.

In fact, advertising was the most common business activity for which these applications were used, and a key area that those not using the Internet and mobile applications would like to pursue. One of the participants expressed the benefits of using the Internet as follows: "One can advertise on places like Facebook, where you can put pictures of your designs and have people comment if they like it." Another participant who currently distributes pamphlets as a way of advertising claims, "Facebook would also help you save on the money you would use on pamphlets."

The use of these applications was most common among participants engaged in hairdressing, design and dressmaking businesses, who use them as a platform to post photos of new hairstyles and designs. A few of the participants use Google extensively on their phones to search for the latest trends in relation to their businesses, and to check prices in factories outside the Eastern Cape.

According to the survey, informal businesses conduct most or all financial transactions in cash, with both customers and suppliers. Use of mobile money transfers is very limited. Most informal businesses do not have access to formal banking services and so would rather use cash. Some focus group participants had an account with First National Bank, while others save money weekly in accounts with the Post Office or Shoprite (supermarket chain), but this number was quite limited.

Table 12: How Businesses Transact Financially with…(multiple responses)		
	Suppliers	Customers
Cash	94.8%	96.8%
Check/Cheque	6.1%	4.4%
Credit Card	4.3%	3.4%
Bank Account Transfer	9.0%	5.5%
Online Banking	3.3%	4.2%
Mobile Money Transfers	1.0%	1.1%
Letter of Credit	2.2%	1.2%
Western Union or MoneyGram	0.1%	0.4%
Business sends money with someone	28.1%	25.8%

In communicating with suppliers and customers, over 90 percent of informal businesses prefer to do so in person. Mobile phones are the second most common means of communication, and informal-business owners who participated in the focus group discussions stated that they use voice and SMS texts to keep in contact with customers and suppliers, mainly to confirm appointments and place orders. Owners tend to use voice when they want to request payment for goods and services rendered on credit, and also to inform clients when they have completed a service or when a product is available. Voice calls give them an immediate response from their customers, but high costs prevent them from using voice at all times: "SMS is cheaper during the day, but then at night after 8 it's cheaper to call."
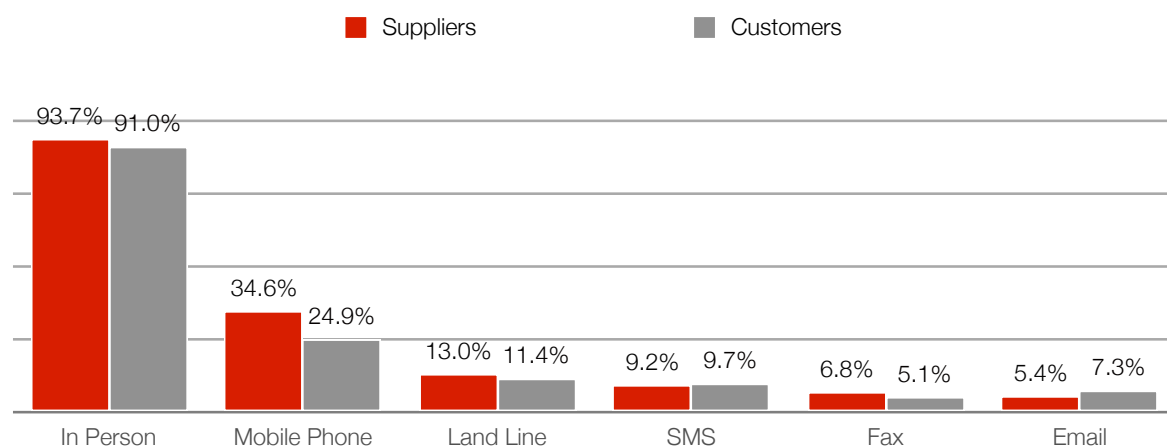
Figure 11: How informal businesses communicate with suppliers and customers

Stock-taking and record keeping is mostly done manually. Some of the participants find this a challenge as there can sometimes be discrepancies and loss of information. One participant stated, "Sometimes books are a problem because they get rained on and you lose your information."

Another said, "A small child can play with the book when placed carelessly, thereby destroying vital information."

Informal businesses make use of basic features on their phones, such as the calculator to calculate profit and make change for customers. Some of them also use the document feature on their phones as a backup, when taking orders. "When I have orders I place them in my phone so that if I were to lose my order book, I have a record in my phone."

An accounting application would assist businesses in generating and managing invoices and tracking expenses. Another possibly useful app would be an m-cash register that would allow products to be programmed into the system and maintain a sales record. Apps such as these would positively affect businesses' efficiency.

The informal sector is mainly a cash and face-to-face sector, and will remain so for the foreseeable future. Few informal business owners will move out of the sector to take up formal employment, and few businesses will grow to become formal businesses. Therefore, it is important to find ways to enhance these businesses in their current state.

Those who are not using their phones for business see advertising as a potential application because they find printing and distributing pamphlets costly and time-consuming. Most of the surveyed businesses would also like to source information from the Internet, learn how similar businesses operate, and to check and compare product prices. The lower cost of mobile applications compared to voice or SMS make them more attractive to informal businesses: "With 30 cents you can write everything you want to say and still have money left that you can use the following day."

Some of the surveyed businesses believe that they can increase their customer base through the judicious use of m-apps. While most participants prefer to use their phones, a small number prefer the computer, as they believe "it has a lot of information and [more] tools than a cell phone does."

Although most participants were enthusiastic about using their mobile phones and the Internet for business purposes, two key challenges remain: a lack of data storage capacity on mobile phones and a lack of knowledge about the capabilities of mobile phones.

Conclusions: Understanding Those at the BoP

Mobile phones are the prevailing technology for voice and data communication at the BoP and for informal businesses. The Internet is mostly accessed via mobile phone. Smart and feature phones have taken over functions that used to be done with a computer. While SMS and voice are expensive, users are finding innovative ways to bypass cell phone networks, using Facebook Zero or other free instant message services like WhatsApp. The key findings from the household surveys and the focus groups are summarized in Table 13.

Table 13. Key findings from household surveys and focus groups	
Social media is replacing traditional ways of communicating, including email, voice and SMS	• 36% of the BoP use social media • Mxit is the most used social media platform in South Africa by the BoP • Mobile phone's purpose is to maintain contact between friends and family
Cost is a major obstacle	• High prices for Internet services represent still a major obstacle for Internet usage and access. For 48% of the population at the BoP, Internet is too expensive.
Sensitivity to price changes	• Both people at the RoP and at the BoP are sensitive to a change in the cost of the mobile phone services
Mobile phones are replacing computers as the preferred means to access the Internet	• While earlier adopters of the Internet still rely on the email as a communications means of the Internet, late adopters of the Internet have been substituting the email with social media platforms as their main communications tool of the Internet. • The mobile phone is becoming a multi-media access channel and voice and SMS services are increasingly being replaced by a wide range of different multimedia services.
Distrust of m-apps	• Participants from rural focus groups were suspicious to use mobile applications as they thought that applications may damage their phones
Internet illiteracy a key obstacle	• As many as 86% of individuals at the BoP who do not use the Internet do not know how to use it • Among non-users, few individuals are aware of the function of the internet

4 Mobile Applications and Developers in South Africa

Interviews with key stakeholders in the mobile applications industry revealed a number of applications that have been locally produced and are available on the South African market. The applications identified have been classified in categories and are summarized in Table 14. Most of these applications target middle- to high-income groups, though there are some that cater for the BoP segment as well. The main challenge for mobile-apps developers has been the type of handsets used by individuals in the lower income group, as well as the challenge of reaping monetary benefits from the BoP in the absence of bank accounts and credit card facilities.

Most of the applications in the market cater to entry-level smart phones, or even iPhones. Smart phone penetration is still relatively limited at the BoP (although it is high by African standards: 33 percent of BoP phone owners have Internet-enabled phones).

Nevertheless, there are some applications that can be used on feature phones and even a few for basic phones. USSD or server-based applications such as Interactive Voice Response (IVR), for example, are being used to provide services to basic phones.

The relatively rapid increase of feature and smart phone users among the BoP means that the majority will be reachable with more complex apps within the next few years. However, at the moment the smart phone divide remains one of the

biggest obstacles to reaching the BoP. In urban focus groups, respondents often expressed the desire for a phone that would give them access to particular mobile applications.

Table 14. Various key applications and platforms by category		
Category	Application	Description
Employment /Job	Ummeli (originally conceived as "LinkedIn for the BoP")	Gateway for young people to enter the mainstream economy through a network of connections to community jobs. Allows communities to share and set goals and to initiate their own projects.
	Mobenzi	A software service designed to create work in impoverished communities. Mobenzi pays individuals to perform simple tasks via SMS on their phones.
Environmental	WaterReporter	Allows for results of field tests to be sent through mobile phones for analysis.
	Open Data Kit (runs on Android mobile operating system)	A data collection system (CyberTracker) in SA has used it to allow non-literate animal trackers to communicate their environmental observations.
Education /Learning	Mobile Learning for Mathematics	Provides learners and teachers with access to interactive mathematics learning materials, using a mobile delivery platform combined with a social media application for peer-to-peer support.
	M4Lit ("Yoza")	Used to support reading and writing by youth (hosted on the Mxit platform and on a mobisite). Provides a platform for publication of local content in local languages.
	Dr Math	Provides tutors to help with mathematics homework. Uses the Mxit platform.
	Voices of Africa Mobile Reporting	Enables users to make video reports and publish them on the training website for feedback.
	QuizMax	Easy, fun way to do exercises and to prepare students for exams.
Agricultural	Manobi	A mobile data services operator. Provides added-value corporate services that help small scale farmers play a more active role in the product value chain.
Financial /Transactional	Wizzit	Low-cost transactional bank account aimed at mobile phone customers who are unbanked or underbanked. Accessible by mobile phone and debit card.
	MTN MobileMoney	Offers MobileMoney transactional accounts for banking purposes.
	MPESA	Allows users to send and receive money. Can also buy Vodacom credit.
	Standard Bank Community Banking	A mobile banking account that allows clients to carry out affordable banking transactions in their communities.
Social	SocialTxt	A mobile messaging platform that uses the available advertising space on "please call me" messages to communicate selected information to a specific target audience.
	Mxit	Free instant messaging that runs on GPRS/3G mobile phones and PCs. Allows for one-on-one text, multimedia messages and general chat rooms.
Enhancing Communication for NGOs	FrontlineSMS	Turns a laptop or mobile phone into a central communications hub. Enables users to stay in touch through SMS. Enables instantaneous two-way communication on a large scale (ideal for grassroots NGOs). Downside is that it requires a PC.
	Mobilisr	An open-source enterprise-class mobile messaging platform for NGOs (for broadcasting and two-way communication).
Social Issues Application: Violence/Drug Addiction	Fahamu Umnyango Project	Promotes social justice issues in Africa. Uses SMS to report on acts of violence against women and on land rights.
	South African Depression and Anxiety Group (SADAG)	Suicide Crisis Line and Substance Abuse Line. A helpline that allows individuals to send queries or problems via SMS, which are entered into a computer database, and receive counseling.

Table 14. Various key applications and platforms by category		
Category	Application	Description
Health	Drug Advice Support	A cooperative counselling drug advisory service through instant messaging, supported by Mxit and JamiiX.
	JamiiX	Allows subscribers to engage in more than one conversation at a time, giving counsellors the opportunity to provide support to different people at the same time.
	HI4LIFE	A mobile service to allow South African women and their partners access to relevant up-to-date, health information on HIV, pregnancy and baby health.
	Eastern Cape Department of health Shared Call Centre	Provides a central point where all queries are received, processed and managed to provide value-added service and bridge the gap between health services and the communities that use the service.
	SIMpill	A medication adherence system that assists patients/carers in making sure that medication is taken as prescribed. It can detect non-compliance in real time.
	Cell-Life Communicate Services	Addresses health-related logistical challenges such as the provision and distribution of anti-retroviral treatments, continuous patient monitoring and evaluation, and collection and communication of relevant data.
	CommCare	Tracks activity and provides electronic job support during visits. Makes use of visual and audio clips to better communicate health messages.
	EMIT	Allows facilitators to capture field data on mobile devices and submit via GPRS to a central database. OneVoice uses it to capture data on their HIV and AIDS prevention program.
	Wisepill	Provides ways to help users take medicine on time. It is a portable medication dispenser with a GSM communication chip. The dispenser sends a message to a central management system whenever medication is taken.
	Babyinfo	Pregnancy advice service.
	MTN CareConnect	Healthcare nurses' advisory line.
	Dispense.iDart	To assist antiretroviral pharmacies in dispensing antiretroviral treatment. Currently used by 350,000 individuals and 300 clinics.
	Young Africa Live	A combination of regularly updated dynamic stories and live chats and a series of permanent content pieces. Facts on HIV and AIDS; daily news & celebrity stories.
	Bozza	Platform ranging from social issues such as HIV and sexual health to entertainment.

Several of these apps have been relatively successful, particularly the m-health applications, which were largely developed by NGOs. However, few are sustainable without long-term support from either government or donors. A relatively recent development has been the launch of m-apps through the social media site Mxit. For example, HelloDoctor.com was launched in South Africa through Mxit. The application (and website) offer free medical advice to all registered participants, with free registration. The advantage of launching through Mxit is access to its large subscriber base, as well as the marketing buzz that Mxit is able to generate.

Table 14 displays the diversity of mobile applications available. In order to make analysis simpler, the m-apps have been clustered into five broad categories: entertainment, safety, health, jobs and education and m-government.

Entertainment: Games, Videos and Music

The Internet provides daily entertainment for only 5 percent of BoP Internet users, though it is more common than reading and downloading online newspapers or magazines and e-books (4 percent). About half of mobile users both at the RoP and BoP rely on their mobile phones for gaming, listening to music, and taking photos and video clips. One reason may

be that games and radio are pre-installed applications in most mobile phones; thus users do not incur additional costs, such as data bandwidth, to use them.

During the focus group discussions, both mobile application users and non-users expressed a strong interest in entertainment applications such as music recording and music mixing applications, ring tones, songs and on-demand videos. Younger participants in particular indicated that they would be willing to pay up to R 5 for an entertainment application to mix music, and up to R 5 for a song. Younger participants (roughly those below the age of 25) also expressed interest in on-demand videos, and indicated a willingness to pay to watch videos, as long as they were not prohibitively expensive.

Text Box 2: be Bozza!

Bozza is a mobile application featuring videos, music, poetry etc. from around Africa. It offers a platform for artists/entrepreneurs to distribute content and earn revenue.

According to Bozza, there has been a shift both in user-generated content production and demand for mobile content. At an earlier stage of mobile adoption, production and demand were predominantly for musical content, including ring tones. Today the trend is for distribution between musical content, poetry and video to be about equal. Both the production of and the demand for content through the Bozza platform is increasing.

Bozza content mostly targets a middle-class market, since the BoP as defined by this study lack much disposable income and Internet-enabled mobile devices. According to Bozza, the main limitation is the handset, as BoP students usually have a disposable income and often spend half of it on airtime and mobile content.

According to be Bozza, the demand for applications, in particular poetry, among those who do not have a feature phone is very high. Poetries produced and distributed through the be Bozza platform range from social issues such as HIV, sexual health, to entertainment.

Health

About 14 percent of mobile owners at the BoP have used their phone alarms for clinic or doctor's appointments, while only 9 percent set an alarm for taking medicine. SMS-reminder services from clinics or doctors are not widely used by BoP mobile owners: only 6.8 percent have used them. This percentage is higher at the RoP: 15 percent of mobile owners have used the SMS reminder from clinics or doctors. Conversely, 74 percent of BoP mobile owners have used their phones to contact health care workers.

Table 15. Using the mobile phone for health purposes		RoP	BoP
		RoP	**BoP**
Have you ever used your mobile for health purposes?	Set an alarm for appointment at clinic or doctor	26.6%	14.1%
	Set an alarm for taking medicine	19.3%	8.9%
	SMS reminder from clinic or doctor	14.9%	6.8%
	Contact with health-care workers	78%	73.6%

In several of the focus groups, interest was shown by young mothers in mobile applications for health-related child care information, such as help in recognizing symptoms and providing first aid. Participants also said they have searched for

health-related information on Google through their mobile phones.

Among all the mobile applications identified, twelve were health-related applications. HI4LIFE and Babyinfo are mobile services that allow South African women and their partners access to relevant, up-to-date health information on pregnancy and baby health. Other applications such as Bozza, Young Africa Live, Dispense.iDart and EMIT provide information on HIV/AIDS and assist in dispensing anti-retroviral treatments.

Job Hunting and Education/Learning

The ICT access and usage survey found differences between RoP and the BoP responses to the question, "Does your phone let you get done more during the day?" For 61.1 percent of the RoP, the mobile phone is a tool that helps them accomplish more during the day, while only half of mobile owners at the BoP feel that way.

The mobile phone is generally used more for social calls than business, both at the BoP and in the RoP. However, the percentage of people at the BoP who never use a mobile phone for business is 10 percent higher than those in the RoP, possibly because significant numbers at the BoP are not engaged in any business activity.

The perceived usefulness of a mobile phone in finding a job was similar between the two groups. This was confirmed during focus groups, in which many participants showed a keen interest in job-hunting applications. By contrast, free educational content, such as free courses or book downloads, which is directed specifically at the BoP population since it has access to a lower quality schooling system, was not downloaded much by either the RoP or the BoP. Rather, focus groups showed that people, especially young people, use their mobile phones to find information such as how to apply for a degree or to look for bursaries (grants), rather than for actual learning. This was true even though some apps were free (such as Mxit's free math tutorial app, described below).

Five applications were identified as education/learning apps. Two of them, Mobile Learning for Mathematics and Dr Math, provide learners and teachers with mathematics help and homework. Dr Math is based on the Mxit platform. Mxit

also hosts another application that enables textbooks to be read on a mobile phone. Display resolution is reduced for the mobile web, and the application includes final tests and online tutors. QuizMax is an application on Mxit that prepares students for exams using easy, fun exercises. The distribution map below demonstrates that although QuizMax use is concentrated in major population centers, it is geographically distributed across the country.
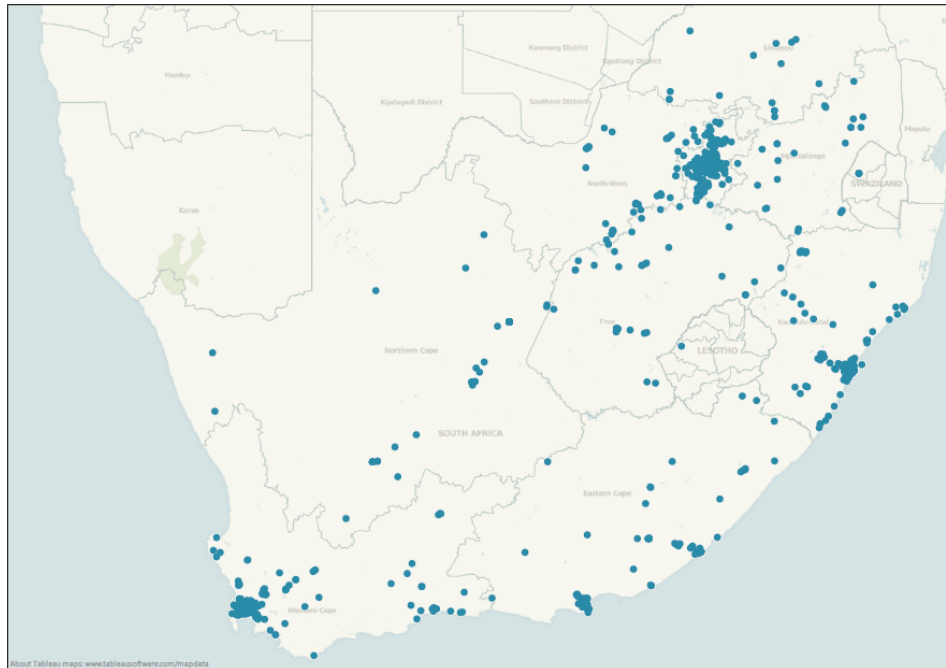
Figure 12: Geographic distribution of QuizMax users on Mxit.

Text Box 4: Ummeli

Ummeli is a career development application that operates through Vodacom. It is a mobile jobs and community portal hosted on Vodafone Live! Lauren Kotze, Ummeli project manager, stated that the mobile application can be accessed for free by Vodacom subscribers and that it targets the BoP market. It caters specifically for those whose education, skills, experience, and background limit their employment opportunities. This app therefore focuses on low- to middle-skill jobs.

Ummeli provides information on job opportunities to users, and also on institutions through which they can receive free skills training and further education, to give them to have the required skills for particular jobs. Ummeli works in particular with TISBA, which provides these learning and skill development opportunities.

Ummeli prides itself as being able to provide the opportunities relevant for individuals at the low-level income group. It provides a platform for them to receive guidance in building their CVs and makes them aware of the availability of low-level skilled jobs, internships, volunteer work, etc.

Ummeli also works closely with communities, providing them with the tools they need to carry out relevant projects. There is a community board where they decide what they would like to do to build their communities and create jobs locally. Ummeli only became operational in October 2011 and to date has 88,000 users. It is based within Young Africa Live (a social network for young people that deals with love, sex, and relationships), which currently has over a million users.

Ummeli has to date not carried out any formal marketing strategies and has develop this user base through Young Africa Live and mainly by word of mouth through existing users. Currently, the user base is mainly Vodacom subscribers but it recently launched a Mobi Site which will allow other network subscribers to access the app. Ummeli is also currently trying to get the operators MTN and 8.ta to come on board.

The major challenge that Ummeli faces is that of finding the available job opportunities which their users can benefit from. They currently have a very limited database of such opportunities and would like to find and work with more organisations and bigger cooperatives. Ummeli is trying to develop a web interface which will allow for advertising with the hope that this will make it easier for bigger cooperatives to get involved. It is also their intention to partner with government and NGOs.

Map based on average of Longitude and average of latitude. Details are shown for user ID.
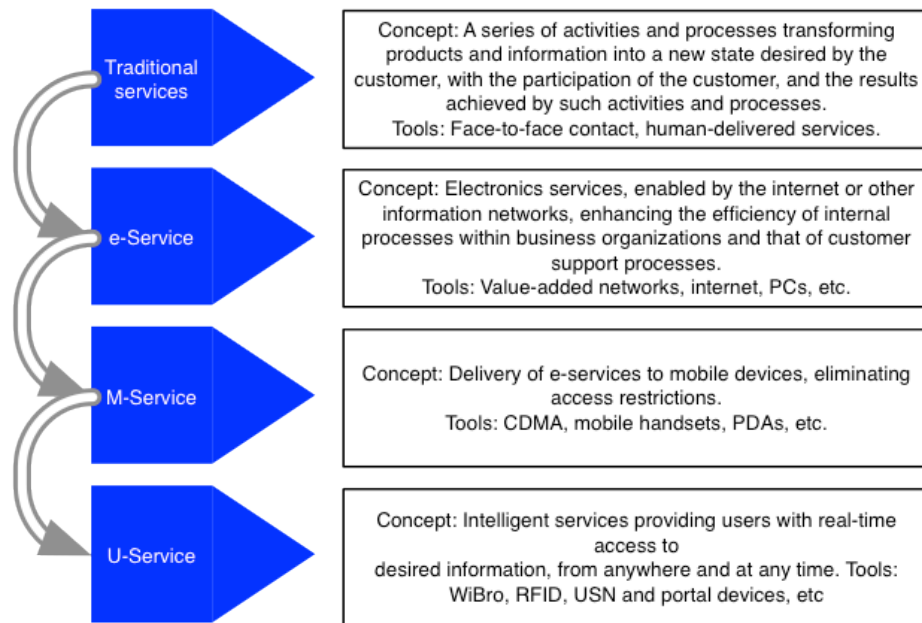
Figure 13: Source: OECD/International Telecommunication Union (2011), M-Government: Mobile Technologies for Responsive Governments and Connected Societies, OECD Publishing. http://dx.doi.org/10.1787/9789264118706-en

M-Government Services

M-Government is the use of mobile phones by government institutions to deliver services to the public electronically.[20] The OECD defines m-government as "an extension or evolution of e-government through utilization of mobile technologies for public service delivery."[21] In the OECD definition, m-Government is seen as a progression from traditional government towards ubiquitous government (u-Government), where government services are available on multiple platforms and can be accessed anytime, anywhere. However, these might better be viewed as an extension of commercial demand-driven services. There is little evidence of people purchasing phones, services or apps to access government information and services. If, however, m-gov apps are available on the platform or site of people's choice, they tend to utilize them.

M-government is a key step along the path to u-government. The progression towards u-government is informed by several trends:

- Open data. Governments are putting their data online and making it available for public use.

- Financial inclusion. Increasing the number of citizens in the financial sector can allow for better public service delivery, such as government-to-person (G2P) payments.

- Authentication. In order to facilitate G2P payments, such as government pensions, systems to correctly and uniquely identify citizens are required.

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[20] Napoleon, A.E. & Bhuiyan, M.S.H. Contemporary Research on Mobile Government, p.2.
[21] OECD, 2011. M-Government: Mobile Technologies for Responsive Governments and Connected Societies.

- Citizen engagement. Trends such as open data mean that government must be more responsive, as citizens have more information at their disposal.

- Performance metrics. Measuring usage by citizens is a necessary feature of providing effective public service.

- Disaster preparedness. Emergency warnings can be more effective if they are based on GPS locations of citizens, as well as ensuring that all citizens are warned individually.

- Interoperability. Stakeholders in the mobile sector, such as the ITU and the Open Mobile Alliance, are developing global standards that will ensure interoperability and make it easier for governments to decide on the most effective m-government applications.

- Demand stimulation. Governments can stimulate demand for products and services and create local markets through m-government programs, such as G2P payments.

Text Box 5: National Planning Commission

The National Planning Commission has developed apps for the iPhone, iPad and Mxit to distribute and publicize the National Development Plan. The National Planning Commission has a presence on Mxit of 43,000 subscribers, vs. 1,900 likes on Facebook. A data visualization app for the iPhone and iPad was also used by the National Planning Commission to present the Census 2011 results. The customized app by US-based Roambi was used in partnership with the South African firm Dataways and Statistics South Africa. The app delivers interactive graphic displays of the 2011 census results, giving policymakers, business leaders and the public mobile access to census data via immersive analytics tools.

Roambi says the app is designed to help examine data from different perspectives, and view multiple levels and specific cross-sections of data using visual displays that enable more penetrating insights. The new census data is likely to guide policy decisions for years to come by shedding light on issues affecting South African communities and their diverse populations (See BiztechAfrica - Oct. 30, 2012 for more detail).

While technology has been progressing dramatically, and the trends identified are making access to government services and information easier, the range of services offered by government is generally limited to information requests, service requests and emergency assistance—in other words, the traditional business of government. The integration of technology and public services, especially in the developing world, has only recently become a focus. In this regard, cities are starting to drive technology and services integration. New York and Chicago [22] are leading the way by linking open data to 311 services, based on mobile applications that make use of GPS locations, phone cameras and social media tools. New York City offers dynamic feeds that deliver a range of services, such as the real-time status of alternate-side parking rules, public schools, and garbage removal.[23] More modestly, Cape Town City and the Johannesburg metropolitan government offer SMS service for prepaid electricity services, payments of licenses and fines, and reports of service faults, but these depend on traditional banking-based payment methods. The key question for m-government, especially for the BoP, is how to transform it from information-only services to interactive, transactional services, and ultimately create applications that encourage citizens to engage.

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[22] OECD, 2011. M-Government: Mobile Technologies for Responsive Governments and Connected Societies.
[23] OECD, 2011. M-Government: Mobile Technologies for Responsive Governments and Connected Societies.

Text Box 6: Political use of apps and platforms

The official opposition party, the Democratic Alliance, has 111,000 subscribers to their app on Mxit. Although it is the only party with an app, Mxit acting CEO Andrew Rudge said Mxit's policy is to promote transparency and open data and information, and all political parties, like any other entity that drives uptake, traffic and revenues, is welcome on the platform.

A high percentage of the Internet population at the BoP, 82.4 percent, has never interacted with government organizations electronically, and 69.2 percent has never received information from government organizations. This high percentage indicates a failure of both e-government and e-governance initiatives for the BoP in South Africa.

Text Box 7: LUNGISA

Lungisa is an innovative community monitoring and reporting application. The project's pilot was launched at the end of October 2012. The project was designed with two assumptions: first, townships and poor areas in South Africa do not receive the same level or quality of service from municipalities compared to other residential areas, which increases the level of frustration in those areas, sometimes spilling over into service delivery protests. Second, although the City of Cape Town has a sophisticated system for complaints management, the system has different numbers and email addresses for different service delivery issues, making it difficult to use and it is also expensive for the poor to use.

Lungisa therefore provides a mobile based system which makes it easier for people to report service delivery problems using a basic or feature phone, in this way covering some 90% of cell phone users in Cape Town townships. There are seven ways of submitting reports, though Lungisa is focusing its advertising on three of them, namely SMS, USSD and through Mxit. The user has to bear only the cost of an SMS or USSD connection while the Mxit version is free. In addition, Lungisa also provides a mini-call centre which will undertake basic verification before channelling the reports on to the correct officials in the City for remedying any particular issue. In this way, Lungisa will not be replicating the call centre set up by the City of Cape Town. The platform also implements a sophisticated tracking system which monitors whether a complaint has been solved.

The main risks identified by its project manager are related to how to reach the public (there is a risk of people not knowing about the platform) and the risk of the City of Cape Town not remedying the complaints collected. In order to address the first risk, Lungisa was recently launched in Khayelitsha, a township of Cape Town, and some training on how to use the platform will be provided to NGOs. Further, although Lungisa is an independent organisation, it is collaborating closely with the City of Cape Town and many meetings have been held with people working within the public organisation in order to receive a better response from the municipality once the platform becomes fully operational.

While there are several examples of some successful m-government mobile applications, m-government in South Africa is still struggling to clearly define the value it can add to public sector service delivery. The expectation that transferring public sector services to a mobile platform will result in high levels of usage by citizens has generally been found to be problematic. Rather, the approach for m-government is to "Position mobile devices as a complementary dissemination channel for e-government; both channels should be used to maximize service delivery to citizens[24]."

Conclusion: Mobile Applications and Developers in South Africa

As highlighted in the "Understanding Those at the BoP" section, one of the main findings of both the household and individual survey and focus groups is that Internet at the BoP is mostly accessed through mobile phones. Social media is a key entry point for mobile Internet usage at the BoP level, allowing people to communicate more cheaply compared to voice or SMS. Social media and instant messaging applications are substituting for email, SMS and voice as communication services.

While the Internet helps to save money on text-only communication (via Facebook Zero, WhatsApp or Mxit for example), it is still expensive for browsing and sharing of pictures and video clips. Table 16 lists the desirable characteristics of m-apps, based on analysis of the five broad categories of entertainment, safety, health, education and jobs, and m-government.

The potential market for mobile apps at the BoP is substantial, with 75 percent owning a mobile phone and 33 percent owning a low-budget feature or smart phone that is based on the Android or Symbian OS platforms. Price pressure on smart phones is expected to narrow the gap between the RoP and BoP over the next five years. Until then, the rest of the BoP may be served by USSD and server-based applications.[25]

An important issue to consider in choosing a distribution channel is the role of social networks. One reason for the speed of mobile money uptake was that it built on existing social networks. "These interpersonal transfers operate within social networks that involve relationships of 'give and take' that can operate over long periods of time and in which resource transfers may be given in one form, for example, cash and returned in other, for example, support with resources of many different kinds or social connections to a job and so on."[26]

Table 16. Desirable m-app characteristics	
Cost	• Up to R 5 to download the application • No subscription required • No additional costs required to use it except the paid for data-bandwidth
Pay-ment/Billing system	• Onetime payment for the application or mobile content • Airtime can be used to pay for the mobile application or mobile content
Technical characteristics	• Low data bandwidth usage by the applications • Optimized for micro-browsing • No need to log in to use it
Hardware	• Mostly basic phones • Growing demand fo • zr feature and smart phone-based applications

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[24] OECD, 2012. P. 68.

[25] Usually, server-side based applications for basic phones are subsidized by donors organizations or private entities, since BoP users cannot afford to pay to use those applications. This model increases dependency on third-party organizations and under-mines the sustainability of the mobile app once the developer runs out of third-party funds.

[26] Johnson, S. What does the Uptake ofin Kenya Mean for Financial Inclusion? Available at http://www.cgap.org/blog/what-does-uptake-mobile-money-kenya-mean-financial-inclusion

Table 16. Desirable m-app characteristics	
What for?	• Communicate with friends and family • Entertainment such as music, videos and gaming • Security and safety • Search for job and education opportunities • Health still relevant, but there are already many applications in the South African market related to health.
Distribution	• Word of mouth • Friends and family use the applications

The spread of mobile money in East Africa is a good example of this: someone who signs up for a mobile money service usually draws in friends and family members to exchange money with them.

Affordability represents an important element to be taken into account in the design and development of mobile applications for the BoP. Although it emerged from focus groups that members of the BoP are willing to pay up to R 5 for a mobile application, they are reluctant to subscribe to a service and to pay additional charges for data bandwidth. Further, since the majority of the BoP population does not have a credit card, using airtime to buy the application and to use it would be a better solution for this income bracket.

With regard to technical characteristics, mobile applications should be optimized to use as little data bandwidth as possible.

With regard to mobile applications for a smart phone, instant messaging platforms are very popular among this population for several reasons. They are very easy to use, always on (since the user does not need to log in to use them) and real-time, since they are essentially live web chats. In addition, the applications are affordable, since they require very little data bandwidth. Even more importantly, they reinforce existing relationships, ensuring that people are in contact with each other.

5   Systems, Platforms and m-App Development

The Apple, Google and Facebook ecosystems are global, with localized application stores and local currency use.[27] However, the ICT ecosystem and the policy and regulatory framework within it vary from country to country, leading to different prices and levels of access for voice calls, SMS and data usage, for example. The m-app ecosystem is directly linked to the wider ICT ecosystem and in South Africa, to an uncompetitive market that has not been effectively regulated.

There has been considerable innovation in response to these constraints. The rise of Mxit as an alternative social networking platform to Facebook is a case in point. Mxit allows instant messaging at a fraction of the cost of an SMS even for the most basic phones, and is targeted specifically at the BoP. However, Mxit has also been influenced by the global powerhouse that is Facebook, which has nearly a billion subscribers. Because of the similarities between the Facebook and Mxit business models, the Facebook business model is analyzed first, followed by Mxit and then other potential competitors, such as the Vodacom App Store.

Other potential ecosystems, such as Nokia Life Tools[28], were considered but ultimately discarded. While Nokia Life Tools was promising, Nokia has since divested itself from the Symbian operating system and handed over its management to Accenture.[29] It was renamed Nokia Life + and is available on Nokia's Windows phones. The cheapest Windows phone with Nokia Life + is about $199, substantially more than an equivalent Android phone and far out of reach for the typical BoP user. It is unclear what Nokia or Accenture's strategy is concerning existing Symbian phones, apart from moving them to the Windows platform, and it is unclear if there is any development of Nokia Life Tools running on Symbian phones (Accenture is committed, under an outsourcing agreement with Nokia, to support Symbian, but it is unknown if this includes Nokia Life Tools). Nokia is also under enormous financial pressure, and no countries have been added to Nokia Life + since 2010, when Nigeria was added.

Facebook

Facebook's attempt to be available on all platforms is driven by necessity: it has 488 million mobile users, out of a total of over 900 million subscribers.[30] As recently as June 2012, Facebook did not "directly generate any advertising revenue from the use of Facebook mobile products, and relies entirely on app sales."[31] Since its IPO, Facebook has

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[27] For a list of local currencies that Facebook credits can be purchased in:
http://www.facebook.com/help/?page=224696390875622.

[28] This is also the fourth name change: originally Nokia Life Tools, then Ovi Life Tools, then Nokia Life and finally Nokia Life +.

[29] See http://press.nokia.com/2011/06/22/nokia-and-accenture-finalize-symbian-software-development-and-support-services-outsourcing-agreement/

[30] Although getting onto mobile operator platforms often requires entering into exclusive deals with operators. Facebook Zero for example is only available on the MTN platform, while only CellC has a free fair-access usage agreement with Mxit. Telkom mobile subsidiary 8ta announced as recently as November 14, 2012 that it had entered into a deal with Google that would allow its 1.5 million subscribers free access to the Internet through the Google interface Free Zone.

[31] Facebook Prospectus, 2012, p.14, http://www.sec.gov/Archives/edgar/data/1326801/000119312512034517/d287954ds1.htm

focused heavily on monetizing mobile; in its third-quarter results for 2012, 14 percent of total ad revenue, roughly $140 million, came from mobile advertising.[32]

Still, monetizing mobile users remains Facebook's key challenge: 86 percent of its revenues still come from the desktop computer. As a result, Facebook's focus is on the development and support of its mobile products. Facebook's (and Mxit's) approach differs from the traditional mobile approach (as represented by firms such as InMobi) in that the advertising is conditional on the preferences of a person's social media circle, rather than randomly delivered.

For the BoP, the traditional payment mechanism is a critical bottleneck because of the low penetration of formal banking products. Facebook's solution was to allow users to pay for apps using prepaid airtime. In South Africa, Facebook users can purchase apps or make in-app purchases using prepaid airtime on Cell C, Vodacom and MTN.[33] This means that Facebook's business model can also target the BoP.

One of Facebook's approaches is to make Facebook the windowfrom which users access and use the web. The principle is that most people on Facebook filter their information needs through a web of friends who have "liked" a product, service or event. As people in your network like products, services or events, this is shown on your News Feed in Facebook, providing you with real-time insight into what they are currently doing. This could range from the movie someone is watching, to the education course that a person is taking online, to chatting with a friend. The point is that a community of users is created that filters relevant information. And, like mobile money, the key principle of social networks is that they reinforce reciprocity—they allow people to exchange ideas, support, news, information, contacts, etc. When mobile money is integrated into these social networks, "resource transfers may be given in one form, for example, cash and returned in other, for example, support with resources of many different kinds or social connections to a job and so on."[34]

By allowing the web or apps to integrate with Facebook, Facebook has moved towards becoming a "platform of platforms" that is agnostic as to how a mobile application has been developed. It doesn't matter if the person accessing Facebook is using an iPhone, an Android phone or a Windows phone: the content is the same across all three platforms.

Vodacom

The Vodacom App store has a catalogue of over 140,000 apps, available across multiple platforms including Android, Blackberry, Java and Symbian. There are a number of categories from which customers can choose, namely business, professional, education, entertainment, games and travel apps. The apps are developed independently by mobile application developers or commissioned by brands.

The Vodacom app store offers both free and premium apps. Vodacom's billing engine caters to the BoP by allowing them to purchase apps using prepaid airtime or charging apps to their monthly bills, if they are on contract. BoP-profile customers generally use feature phones, and popular application categories include games, social networking and productivity apps.

According to Vodacom, there is a large base of feature-phone users in South Africa. Vodacom statistics indicate that over 50 percent of the apps downloaded from its apps store are on the Java platform, followed by Blackberry, Symbian and Android.

The Vodacom App store's key advantage over Facebook is that it can provide hyper-local content that caters to specific groups within South Africa. Its disadvantages, however, are twofold: firstly, it does not create a community of users (i.e., there is no relationship of reciprocity with the Vodacom App Store, as there is with a social media network such as

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[32] CNET, 2012. Zuckerberg: People don't get how good mobile is for us, available at http://news.cnet.com/8301–1023_3–57538627–93/zuckerberg-people-dont-get-how-good-mobile-is-for-us/
33 http://zong.com/countries/mobile-payments-south-africa
[34] Johnshon, S. What does the Uptake of Mobile Money in Kenya Mean for Financial Inclusion? Available at http://www.cgap.org/blog/what-does-uptake-mobile-money-kenya-mean-financial-inclusion

Facebook or Mxit). It could easily be replaced by a platform such as Facebook, which is premised on the fact that people interact with each other, make recommendations, etc. Secondly, as smart phone penetration improves, the Vodacom app store will be in direct competition with international players such as Google's Android app store, and there is little that makes the Vodacom App store unique.

Mxit

Mxit is the biggest social media platform in South Africa. It grew from an instant-messaging and chat service for mobile to become, in less than a decade, the biggest social network in Africa (Knott-Craig, 2012). The platform has 44.8 million registered users and 10 million average active users (as measured over a 12-week period). Of these, 53 percent are male and 47 percent female. It has the potential to grow further since it is not geographically constrained. Its largest markets after South Africa are Zimbabwe—largely as a result of the flow of immigrants and temporary workers into South Africa—Nigeria, and Malawi. It recently picked up 20,000 unsolicited users in Syria, with the closure of Facebook and Google by authorities there.

More than 50 percent of Mxit users are 18 to 25 years old. The majority of Mxit users are located in Gauteng province (61.5 percent), followed by the Western Cape (19 percent) and KwaZulu-Natal (15 percent). Those areas are also the most densely populated provinces of the country.

Table 17. Mxit Demographics Active users by age			
Age	% of Total	Male	Female
13–14	5%	48%	52%
15–17	18%	49%	51%
18–25	52%	54%	46%
26–35	14%	55%	45%
36–45	3%	50%	50%
46+	8%	55%	45%

Mxit's strategy (shared with CellC) of tapping into the unsaturated lower end of the market is reflected in the distribution of different network subscribers who are Mxit subscribers. Mxit has also exploited these synergies in the lower-end CellC market, entering into an agreement with CellC that allows its SIM card holders to access Mxit for free on a fair-usage basis (Rudge 2012).

Table 18. Operators market share on Mxit and of the total prepaid market		
Network	% Market share on Mxit	% Market share of total prepaid market
Vodacom	31.50%	46.90%
Cell C	25.40%	15.40%
MTN	37.50%	35.80%
8ta	0.60%	2.00%
Other	5.00%	0.00%

Vodacom	31.50%	46.90%
Cell C	25.40%	15.40%
MTN	37.50%	35.80%
8ta	0.60%	2.00%
Other	5.00%	0.00%

Mxit' ... its own economy, its own infrastructure, its own systems and its own apps. Mxit has its own specific applications as well as being a gateway to third-party applications such as Facebook, Yahoo and Gtalk, which can be accessed directly through Mxit. The most used of Mxit's own apps are chat apps such as globezone or luvnest.
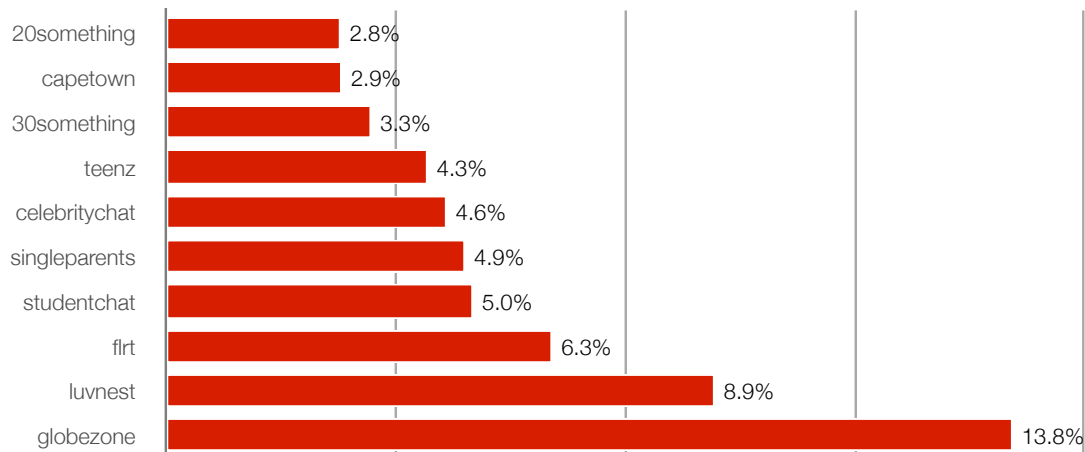

Figure 14: South Africa, Mxit top 20 Chatzone. Active users over a 12-week period.
Source: Mxit statistics, March 2012.

The Mxit platform was bought by holding company World of Avatar in September 2011. World of Avatar is an investment and venture-capital organization that invests in innovative start-ups and companies in the area of mobile services and applications. It holds 13 companies dealing with mobile websites, SMS, mobile surveys and social networking.[35] Mxit is not only a social media for the mobile platform, but also an innovative approach to the development of mobile applications. The platform is a sort of open infrastructure, which provides APIs for those who want to develop applications within Mxit. In that way, all applications developed within the Mxit ecosystem, such as games or m-learning applications, have a social networking component, allowing new app users to get connected with other users while using Mxit. For instance, Dr Math is an application that runs on Mxit and enables users to learn math while receiving support from others who are using the same application.

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[35] Under the new leadership of CEO Alan Knott-Craig Junior, Mxit opened up its previously proprietorial system, but in October 2012, this commitment to an open system, and his management style, seem to have come up against shareholders who were being asked to make further investments. He announced his retirement by indicating that while he and his two primary sharehold-ers shared a common vision, they disagree on how to get there. The news was met with concern within the industry, where he was believed to have breathed fresh air into the organization, which was stagnating when he took it over 18 months previously. See TechCentral Why Knott-Craig quit Mxit
http://www.techcentral.co.za/knott-craig-steps-down-at-mxit/35653/?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+co%2FUqJF+%28TechCentral%29
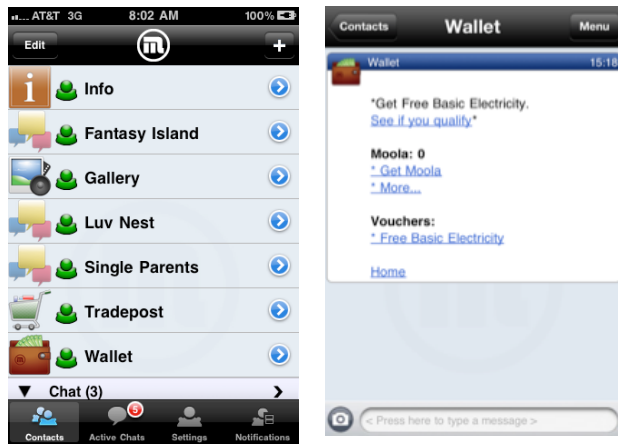
The company profit comes from two main sources: 50 percent from advertising, including splash screens and a "tradepost" that has short text advertisements, and 50 percent from services and digital gadgets, applications, games and the like bought by subscribers over the Mxit platform through its proprietary Moola currency.[36] Mxit apps developers receive the lion's share of profits from their sales, 70 percent, while Mxit takes 30 percent. Around 13 percent of active users are also buyers, who on average spend 62 Moola weekly.

A relatively small group of about 50,000 users account for around 50 percent of revenue from this source, a significant portion of which is from games. (Rudge 2012). As stated earlier, Facebook and Mxit have similar business models. Both want to make their respective platforms the avenue to access web resources. The difference between these social networks is twofold:

- Mxit's membership is skewed towards the BoP and people who cannot afford smart phones. In comparison, Facebook's membership has a higher income level.

- Mxit can drive local content in a way that Facebook is unable to do.

For example, Mxit is currently running a competition that gives away electricity (see the screenshot to the right). This type of hyper-local information is difficult for Facebook to replicate, because the company is not based in South Africa and has no corporate interest in driving local content. Facebook relies on its users to drive content. This means that Mxit is operating in a gap, attracting users who are mostly still using feature phones and who have low incomes but who want a social networking platform with a strong local footprint. However, findings from a focus group in Soweto, Gauteng suggest that some users perceive Mxit as a platform for teenagers. According to some of the participants, Mxit is used more by younger users, while Facebook has a wider public.

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[36] 3 Rand = 300 Moola; 5 Rand = 500 Moola (50 bonus); 10 Rand = 1,000 Moola (100 bonus); 25 Rand = 2,500 Moola (400 bonus)

Text Box 8: Reach

Reach is a registered charitable trust established to promote upward social mobility through Mxit. It is a developing tool which equips mobile applications developers to build their applications. It provides the services needed to drive transformation in Africa through the mobile phone. The project focuses on five areas: health, education, the empowerment of women, agriculture and economic development. The apps that are developed in these areas are mostly free unless there is a service attached, e.g., a medical response, when there may be a small charge. Many of the apps are linked to realtime human responses: students at the University of Pretoria are paid to respond to tutoring questions posed in the Dr Math app.

Mxit also recently announced the buyout of Motribe, another South African platform that has worked with Mxit on various applications over the past year, including MxPix, an image-alteration and sharing application similar to photo-sharing app Instagram, but designed for feature phones. MxPix attracted more than a million users within a little over a month of its launch.[37]

Conclusions: Systems, Platforms and m-Apps Development

The key challenge in building a mobile application for the BoP is its inevitable low margin. Any such app needs to be affordable, needs volume to be profitable, and needs to meet *local* demand. Peter Bruck, chair of the World Summit Award, said that the single most important factor in successful innovation is localization: "Being grounded in a community, in a culture and in the needs of the people is the only way to make innovation work," he stated in a panel discussion on the future of mobile services, applications, carrier and business models in the ICT sector at the ITU Telecom World conference.[38] Mxit meets all these requirements.

Integrating applications into platforms such as Mxit or Facebook addresses the challenges of affordability and volume by providing access to a large number of users (over 900 million in Facebook's case and 44 million in Mxit's), where an m-app can quickly "pick up speed" (gain user uptake) through viral marketing. It helps that these are platforms of platforms; thus, it does not matter which operating system a user has chosen. Because of this agnosticism, they have access to a greater number of users (and are, to some extent, future-proof, in that they don't have to worry about one

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[37] See TechCentral Motribe flipped to Mxit http://www.techcentral.co.za/motribe-flipped-to-mxit/35047/?utm_source=feedburner&utm_medium=email&utm_campaign=Feed:+co/UqJF+(TechCentral)
[38] ITU Telecom Daily News 18–10–2012, http://world2012.itu.int/daily4#1

OS becoming dominant over another). In its latest quarterly earnings conference call, Zuckerberg, the CEO of Facebook, dismissed concerns that iOS and Android could be a threat, stating that Facebook doesn't directly compete with either one. Zuckerberg sees the growth of iOS and Android helping to fuel Facebook usage.[39]

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[39] CNET, 2012: Zuckerberg: People don't get how good mobile is for us, available at http://news.cnet.com/8301–1023_3–57538627–93/zuckerberg-people-dont-get-how-good-mobile-is-for-us/

6   Conclusions and Recommendations

The ultimate purpose of this project is to identify areas for m-app development and assess the suitability of m-app ecosystems for the BoP. Existing ecosystems have been inappropriate for the BoP because they ignore several critical issues:

- The high cost of mobile vehicles such as SMS texting, which drives this target market to social media platforms where communication costs a fraction of the price

- The high cost of smart phones, lack of which prevents use of the latest apps

- App stores that don't integrate into existing online behaviors. Platforms such as Facebook and Mxit are becoming gateways to the web because they filter data and provide relevant information to users

- Suspicion of technology, specifically the Internet and mobile applications, which makes trust a critical issue

- The low number of users, which puts the sustainability of these m-apps in question (certainly in the long term)

- Lack of awareness of mobile applications.

Social media platforms address each of these issues. But most importantly, they provide access to a huge subscriber base and can quickly generate marketing buzz (i.e., awareness) of a particular mobile app. In short, social media platforms integrate m-apps into existing webs of online relationships. An education app, a health app, or a financial app can equally take advantage of the marketing power of this platform. The alternative approach, of building an app and trying to create buzz around it by targeting individuals, is not appropriate at the BoP.

Which M-app Ecosystem?

Mobile applications, particularly those aimed at the BoP, have struggled to achieve sustainability over the long term. Except for runaway successes such as Kenya's MPESA mobile money app, most mobile apps require donor or government funding. As a World Bank report on the agricultural sector states, most mobile applications are at the pilot stage, and few manage to reach the commercialization phase.[40] The challenge, simply, is to attract a sufficient volume of subscribers and to make them aware of the mobile app. The approach recommended in this report is based on two factors:

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[40] Qiang, Kuek, Dymond & Esselaar, 2011. Mobile Applications for Agriculture and Rural Development. World Bank.

- The online world is to a large extent filtered through the lens of social media platforms. News, activities, "likes," blogs—in fact, all forms of information—percolate through a web of online relationships.

- Part of the success of MPESA in Kenya was that mobile money was easily integrated into the existing system of resource transfers between people. These transfers included cash and non-cash resources, such as social connections who help one get a job. MPESA fulfilled one part of that need by providing an easy way to transfer cash. Social media networks, on the other hand, seek to recreate physical resource transfers online. This is the potential power of the social network, and this is the new business model that social media networks such as Facebook and Mxit are exploiting. Mxit, for example, is trying to build a social network that satisfies as many needs as possible within its community. It is launching health, education, finance and entertainment apps—the platform becomes more valuable the more people use it. Apps on platforms such as Mxit and Facebook gain speed through their social networking function: users generate marketing buzz about an m-app, and uptake can be exponentially fast.

In the model below, the various m-app ecosystems are outlined, moving from Apple to Google to Mxit to Facebook. The final ecosystem is the synthesis of these ecosystems as they apply to the BoP. The key components of each ecosystem are:

- **Revenue stream**. M-apps targeted at the BoP cannot rely upon advertising or a share of in-app purchases exclusively. While this may be a part of the revenue stream, platforms that target the BoP, such as Mxit, show that a share of SMS or data revenues is required.

- **Hardware.** Smart phones will eventually penetrate rural BoP markets. Even with the recent drop in price of smart phones, the likelihood is that this penetration will only occur in a few years' time. Therefore, m-apps currently targeted at the BoP need to be usable on basic phones (using USSD, for example), but also be able to expand by moving up the value chain to feature phones and smart phones.

- **Operating system.** The success of Android and iOS creates the impression that all m-apps must be developed using iOS or Android (especially as smart phone penetration increases). However, platforms such as Facebook are open to all operating systems, and can include anything from Java to Symbian to Android to iOS. For Facebook and Mxit, the operating system is less important than the fact that people can use multiple devices to access platform content.

- **Distribution channel.** The existing model, particularly in developed markets, is to distribute mobile apps via app stores such as Apple iTunes, Google Play, etc. However, this distribution method doesn't take advantage of how people are using the web: looking at Facebook newsfeeds, instant messaging, twittering, etc. Social media platforms are making themselves into distribution channels for both content and m-apps, which builds on the already high usage of social media at the BoP. "Facebook is far and away the most popular promotion channel employed by developers, utilized on average by 47 percent of developers across all platforms. Facebook claims to have sent over 160 million visitors to mobile app pages in March 2012 alone. Alongside app stores, Facebook emerges as the only global distribution channel."41

- **M-app type.** M-apps need to be based on multiple platforms if they are to capture as large a market as possible. The trend is for developers to design separate versions of an app for iOS, Windows and Android. However, for developers targeting the BoP, the m-app must integrate into the social media platform, e.g., Facebook's Newsfeed. So, while Android or iOS development is still critical, integration into social media has become a prerequisite.

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41 Visionmobile, 2012. Developer Economics: the new mobile app economy. Available at www.developereconomics.com

Generic Ecosystem	Apple's Model	Google's Model	Mxit model	Facebook	Bottom of BOP
M-app Type	OS based	OS based	Platform based	Platform based	Platform based
Distribution channel	iTunes	Google Play	Mxit App Store	App Center	Social Media
Payment systems	Credit Card or gift card	Credit Card or Google Wallet	Bank transfers airtime or platform currency Moola	Credit card, local currency	Airtime
Operation System	iOS	Android	OS agnostic	OS agnostic	OS agnostic
Hardware	iPhone	Android Phones	Feature / smart phone	Feature / smart phone	Basic, feature, smartphone
Revenue stream	30% of App & hardware sales	x% of App & advertising	Share of SMS and data revenue	30% of App & advertising	Share of SMS and data revenue
Key Players	Vendor	Vendor	Key Players	Key Players	Social media platform
Customers	400 million registered iTunes customers	+/- 350 million	45 million users, 10 million active	1 billion users	Facebook / Mxit
Number of Applications	635,000 225 billion downloads	450,000	+/- 700	9 million apps and websites integrated with Facebook	Unrestricted
Developer	43,185 iOS developer	10,199 Android developer	415	+/- 100,000	Unrestricted

Figure 15: Selected m-app Ecosystems[42]

To conclude, the fragmented approach to mobile application development, in which app developers work directly with operators or market their applications directly to users, is slow and inefficient. It doesn't take advantage of trends within the BoP around social media and the desire to maintain contact with family, friends and colleagues. In South Africa, the high cost of mobile communication has exacerbated the trend toward high usage of social media. The m-app ecosystem no longer consists simply of developers, users and the operating system, but must include platforms such as Facebook and Mxit.

Further, integration into social media can be even more powerful if existing data, content and resources are leveraged. In many developing countries, governments remain the primary source of data, ranging from agricultural to meteorological to health to financial data, and sometimes all electronic information and content. Many countries, including South Africa, have made commitments as part of the Open Government Partnership (www.opengovernmentpartnership.org) to greater public transparency and accountability. One of the most practical implications of the Open Government Partnership is making government data available via open-data initiatives. Kenya was one of the first countries in Africa to make government data accessible to all via its opendata.go.ke site. Data on the site can be used to create mobile applications that potentially provide easier access to government services. While South Africa is a founding member of the Open Government Partnership, it has not implemented any system that makes government data available in an easily accessible website.[43]

Open data initiatives even extend to cities such as New York, mentioned earlier on this report. In New York City's Big Apps 3.0 plan (2011.nycbigapps.com), software developers are invited to enter competitions to create applications that use city data (based on the New York City Open Data initiative) to make New York City better. The winning applications receive financial awards. In the South African context, this approach could be modified by holding competitive awards that recognize South African companies or individuals that have demonstrated the capacity to deliver targeted software applications that are used by people at the BOP.

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[42] Source for iTunes Store users and number of applications: http://en.wikipedia.org/wiki/ITunes_Store
Source for number of applications and developers for apple and Google: http://en.wikipedia.org/wiki/Google_Play and http://www.androidauthority.com/google-play-vs-apple-app-store-2012–76566/
Source Facebook user: http://investor.fb.com
Source Facebook apps: http://newsroom.fb.com/News/One-Billion-People-on-Facebook-1c9.aspx
[43] The South African Government did, however, make results and data from Census 2011 available on a new application for iPads and iPhones late in October 2012. The free Roambi application provides viewers with an interactive way of viewing the data. StatsSA also intends to use the platform to publish GDP, inflation and other information from the national accounts. See Business Day 31 October 2012.

For this reason it is also important to consider those linkages and constraints in the wider ICT ecosystem that inhibit optimal development and innovation (innovated that derives not only from overcoming constraints but also from seizing new opportunities) within the M-app ecosystem. The study will therefore end with policy recommendations to create a healthier ICT ecosystem in which sub-ecosystems may flourish.

Development of a Vibrant ICT Ecosystem in South Africa

Besides the challenges of constrained broadband availability and the high cost of the services identified above that are needed to expand mobile app development in South Africa, several policy and regulatory challenges face content and app developers. Indeed, Mxit is an innovation that seeks to leverage some these constraints, such the high cost of regular communication services and bandwidth-intensive platforms, through its platform and application innovations.

Although the long-term intergenerational issue of weak education, particularly in ICT skills, will need to be addressed outside of the sector, demand stimulation through ICT skills development is also a core policy issue within the sector. Likewise, funding to incentivize innovation and entrepreneurship in this sector needs to be addressed by a government department such as Trade and Industry. The need for the state to coordinate issues such as these that cut across sectors, as well as ICT-specific issues such as state-owned enterprises in this sector that are managed by different, siloed

Text Box 9: Ending policy and regulatory bottlenecks in ICT ecosystem

The following regulatory bottlenecks require urgent attention if the growth of the sector, particularly the mobile sector, the main conduit to services for the poor, is not to be stunted.

- *If backbone competition unfeasible, consolidate state-owned entities, unbundle backbone elements and create open access carrier network.*

- *Enable resale of fixed-broadband (ADSL), to make it cheaper and to compete with mobile broadband.*

- *Ensure access to facilities at cost (including reasonable ROR), with favorable terms for co-location.*

- *Coordinate and schedule right-of-way access at national, provincial and local levels.*

- *Free up and release critical spectrum for wireless broadband through competitive evaluation and allocation of spectrum, and coordinate spectrum refarming and migration.*

- *Encourage competition through service-neutral licensing and cost-based interconnection regime.*

- *Reduce costs and prevent unnecessary duplication through incentivising infrastructure sharing.*

- *Remove special taxes/duties on ICT equipment and services, bring down prices, grow services and general tax base.*

- *Use existing unused USF levies to build out network in underserved areas through reverse bidding to service areas and in support of demand stimulation strategies including e-skills development.*

departments, cannot be emphasized strongly enough.

Beyond these cross-sectoral issues, there are a number of policy and regulatory bottlenecks within the sector, particularly in the underlying networks and services, that impact negatively on the health and evolution of the entire ICT sector, particularly on innovation and entrepreneurialism in the applications and content area.

The National Development Plan has articulated a vision for the ICT sector as a critical economic infrastructure in South Africa; the country urgently needs to develop an integrated strategy for its successful implementation. A specific broadband strategy is required to address the low levels of broadband penetration and the future speed and quality of broadband access.

This strategy will require restructuring the market to promote competition; coordinating state enterprises and ICT across government; a targeted universal services strategy to deal not only with gaps in the broadband market, but also to address demand-side stimulation of the market, including e-literacy strategies.

Likewise, institutional arrangements for the sector must be reviewed to ensure the sector has the autonomy, competencies and resources to enable effective regulation of dominant players in the market, adjust anti-competitive behavior, and provide the regulatory certainty conducive to large investment in networks, services, and application and content development.

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Appendix: Methodology

The research project on which this report is based on has several parts. The first is an ICT household and individual survey conducted in South Africa in 2011/2012. Survey data on computer, Internet access and mobile usage has been analyzed, taking into account the individual income adjusted at a household level. The data described below highlight the main differences and findings between the population in an income bracket equal to or below R 432 per month per person, the so called "bottom of the pyramid" (BoP), and the rest of the population, which in this report is referred to as the "rest of the population" (RoP).[44] In addition, data related to ICT access and usage in the South African informal sector have been analysed.
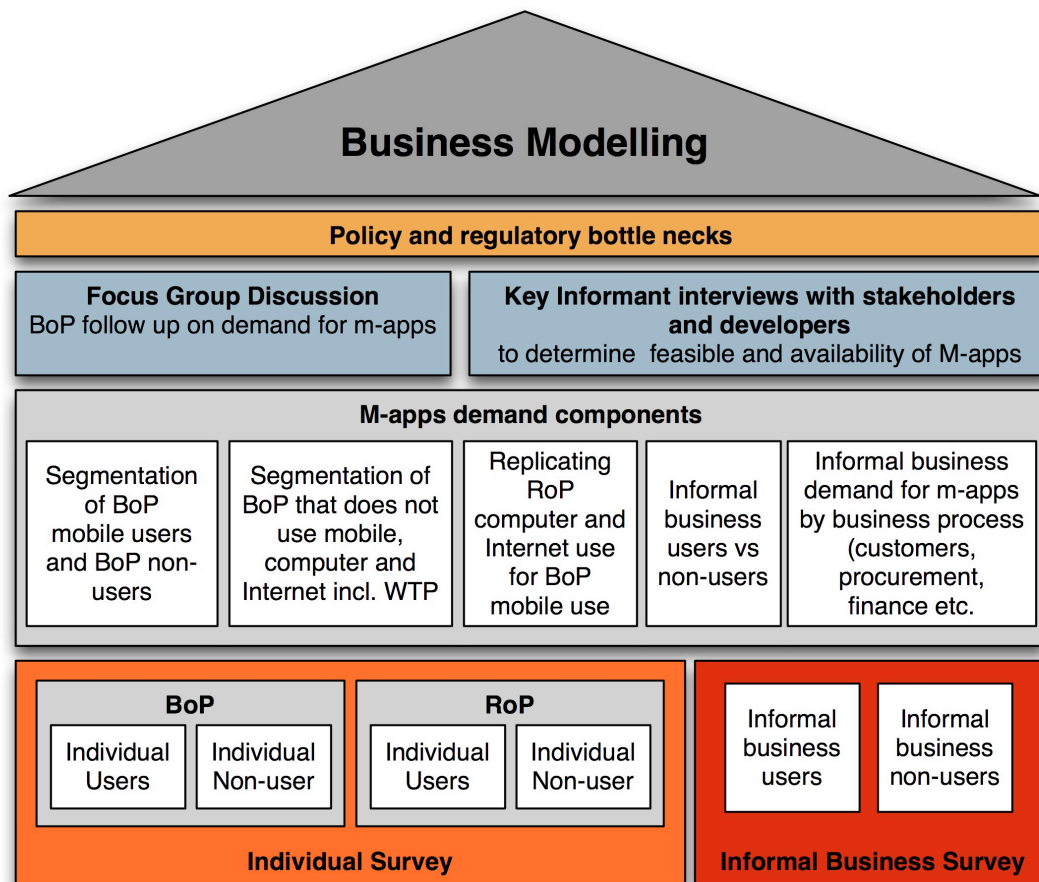
Figure 15: research approach, research components and methodology

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[44] The RoP could be further disaggregated into middle of the pyramid and top of the pyramid. However, the focus of this study was the BoP and the RoP is only used to characterised how the BoP is different from the rest. An alternative to displaying the RoP would have been to use nationally representative results as a reference.

The second research component is using the household and informal business survey data to segment users and non-users of mobile application. The data will also be used to estimate demand at the BoP by looking how RoP computer and Internet use can be replicated for BoP users on a mobile platform.

The third component is the identification of the main mobile applications available in South Africa, specifically for the BoP. Those applications have been identified through desk research and in-depth interviews with key stakeholders in the mobile applications sector. Key informant interviews with stakeholders and developers have also been conducted to determine feasibility and availability of M-apps. This qualitative research has been completed with focus group discussions, which have been conducted in order to explain mobile phone access and usage, in particular mobile applications, and to assess a potential demand for mobile applications at the BoP.

Fourth, policy and regulatory bottlenecks in the South African mobile market have been identified in order to improve the mobile sector performance in terms of accessibility and affordability of services from a policy and regulatory perspective.

Finally, based on the findings, a business model for the development of mobile applications at the BoP has been drawn in order to facilitate mLab in its delivery of services for developers.

Household & Business Survey

The RIA e-Access & Usage survey delivers nationally representative results for households, individuals and businesses. Using Enumerator Areas (EA) of national census sample frames as primary sampling units and sampling households and business from created listings simultaneously allows RIA to survey three very different user groups in a single survey at a minimal cost.

Table 19. Survey summary		
Survey Characteristics	Household & Individuals	Businesses
Target Population	All households and all Individuals 15 years or older.	all businesses
Domains	1 = national level	
Tabulation groups	Urban, Rural	national level
Oversampling	Urban 60% Rural 40%	
Clustering	Enumerator Areas (EA) national Census	
None Response	Random substitution	
Sample Frame	Census sample from NSO	
Confidence Level	95%	95%
Design Factor	2	1
Absolute precision	5%	5%
Population Proportion	0.5, for maximum sample size	
Minimum Sample Size	768	384

Sampling

The random sampling was performed in four steps for households and businesses, and five steps for individuals.

- Step 1: The national census sample frames was split into urban and rural Enumerator areas (EAs).

- Step 2: EAs were sampled for each stratum using probability proportional to size (PPS).

- Step 3: For each EA two listings were compiled, one for households and one for businesses. The listings served as sample frame for the simple random sections.

- Step 4: 24 Households and 10 businesses were sampled using simple random samples for each selected EA.

- Step 5: From all household members 15 years or older or visitor staying the night at the house one was randomly selected based on simple random sampling.

Sample Size

The desired level of accuracy for the survey was set to a confidence level of 95% and an absolute precision (relative margin of error) of 5%. The population proportion P was set conservatively to 0.5 which yields the largest sample size (Lwanga & Lemeshow, 1991). The minimum sample size was determined by the following equation (Rea & Parker, 1997):

$$n = \left(\frac{Z_a \sqrt{p(1-p)}}{C_p} \right)^2 = \left(\frac{1.96\sqrt{0.5(1-0.5)}}{0.05} \right)^2 = 384$$

Inserting the parameters for the survey yields the minimum sample size for simple random sampling. Due to the sampling method chosen for the survey the minimum sample size has to be multiplied by the design effect variable (Lwanga & Lemeshow, 1991). In the absence of empirical data from previous surveys that would have suggested a different value, the default value of two was chosen for the design effect (UNSD, 2005). This yields then a minimum sample size of 768 per country for households and individuals. The actual sample size for countries is slightly larger than the minimum requirement to compensate for clustering effects and have a wide enough spread of EAs throughout a country. For the businesses a design effect of 1 is assumed leading to a minimum sample of 384 businesses for each country.

Weighting

Four weights were be constructed, for households, individuals, small businesses and public institutions. The weights are based on the inverse selection probabilities[45] and gross up the data to national level when applied.

Household weight: $HH_w = DW \dfrac{1}{P_{HH} * P_{EA}}$

Individual weight: $IND_w = DW \dfrac{1}{P_{HH} * P_{EA} * P_I}$

Business Weight: $Bus_w = DW \dfrac{1}{P_{Bus} * P_{EA}}$

Household Selection Probability: $P_{HH} = \dfrac{n}{HH_{EA}}$

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[45] See UNSD (2005) page 119 for a detailed discussion on sampling weights.

EA Selection Probability: $P_{EA} = m \dfrac{HH_{EA}}{HH_{STRATA}}$

Individual selection Probability: $P_I = \dfrac{1}{HH_{m15+}}$

Business Selection Probability: $P_{Bus} = \dfrac{q}{Bus_{EA}}$

DW = design weight compensation for over-sampling of major urban and other urban EAs and under-sampling of rural EAs;

HH_{EA} = number of households in selected EA based on information of last census or updated listing by field team;

HH_{STRATA} =number of households in strata (major urban, other urban, rural);

HH_{m15+} =number of household members or visitors 15 years or older;

m = target number of EAs for each strata, (major urban, other urban, rural);

n = target number of households in EA;

q = target number of SMEs in EA;

i=number of household members interviewed.

The target number of households in each EA varied from country to country. Usually 24 households were to be selected from each EA. Some countries, like Tanzania, preferred to reduce it to 15 households in order to increase the spread of EAs across the country.

Table 20. Survey Definitions	
Household	Constitutes a person or group of persons, irrespective of whether related or not, who normally live together in the same housing unit or group of housing units and have common cooking arrangements.
Head of household	A head of a household is a person who economically supports or manages the household or, for reasons of age or respect, is considered as head by members of the household, or declares himself as head of a household. The head of a household could be male or female.
Member of a household	All persons who lived and ate with the household for at least six months including those who were not within the household at the time of the survey and were expected to be absent from the household for less than six months. All guests and visitors who ate and stayed with the household for six months and more. Housemaids, guards, baby-sitters, etc. who lived and ate with the household even for less than six months.
Businesses	Any business with a physical presence in the EA, the intent to make profit

Focus Groups

Participants in the focus groups were recruited according to the definition by the National Planning Commission of South African BoP, defined as individuals with an income equal of below of R432 per months. Participants were grouped according to whether they use or not use mobile applications. Table 21 depicts the composition of each group.

Table 21. Focus Group Description	
Mobile applications users	Non users of mobile applications
Monthly individual income of ZAR 500* or less	
Owning or frequently using a mobile phone	
Using mobile applications (e.g. Mxit, BBM, email, Facebook, USSD applications, voice applications, etc.)	Not using mobile applications
Balance between male and female	
Balance between students/non students	

A total of 14 focus groups were held in four South African provinces, in the Western Cape, Gauteng (the two wealthiest provinces in the country but which as a result have highest levels of urbanization and associated informal settlements), KwaZulu-Natal, and Eastern Cape (which have some of the deepest rural areas with Eastern Cape identified by Government as one of three crisis provinces with amongst the highest levels of poverty, unemployment and infrastructure shortfalls. In each province, two focus groups—one with mobile applications users and one with mobile applications non-users—were held in an urban area and two focus groups in a rural area. In the Western Cape, two focus groups were organised in urban and two in semi-rural areas. In the Gauteng province, two focus groups were held in urban areas and two in semi-urban areas. In KwaZulu Natal, two focus groups were in semi-urban areas and two in rural areas. In the Eastern Cape informal business was focused on in one semi-urban focus group and one in deep-rural areas.

Table 22. Focus group locations and types	
Western Cape Khayelitsha (urban)	2 focus groups (apps users / non apps)
Western Cape Grabouw (rural)	2 focus groups (apps users / non apps)
Gauteng Soweto (urban)	2 focus groups (apps users / non apps)
Gauteng Evaton (semi urban)	2 focus groups (apps users / non apps)
Kwazulu Natal Inanda (semi-urban)	2 focus groups (apps users / non apps)
Kwazulu Natal Nchanga (deep rural)	2 focus groups (apps users / non apps)
Eastern Cape Nxarhuni (deep rural)	1 focus groups (apps users / non apps)
Eastern Cape Duncan Village (urban/semi-urban)	1 focus groups (apps users / non apps)

The facilitator lead the focus groups discussion through two main areas of investigation: first, on the current usage of the mobile phone and in particular of mobile applications; second, on the demand for mobile applications, specifically on the needs that might be addressed through the usage of mobile applications, either already available on the market or not.

List of Interviewees

Table 23: List of in-depth interviews—Apps developers, aggregators and funders		
Interviewee	Organisation	Website
Johanna Kollar, Project manager	UMBONO	http://www.google.co.za/intl/en/umbono/index.html
Derrick Kotze, CEO	mLab	http://www.mlab.co.za
Alan Knott-Craig Jr, CEO/Andrew Rudge (acting CEO)	Mxit	http://site.mxit.com
Emma Kaye, CEO	be Bozza!	http://bozza.mobi
Wolfgang Fuerst, Project manager	Fairwind	http://www.fairwind.info/
Peter Benjamin, Managing director	Cell.Life	http://www.cell-life.org
Prins Mhlanga, Project manager	Vodacom mobile apps store	http://www.vodacom.co.za/personal/services/enterntainment/vodacomappstore/?pageUrl=/personal/services/enterntainment/vodacomappstore&firstLoad=true
Lauren Kotze, Project manager	Ummeli	http://www.ummeli.com
Project manager	LUNGISA	http://www.lungisa.org

Mobile phones are the primary means of accessing information or communicating for those who live at the base of the pyramid. This case study of mobile usage at the base of the pyramid in South Africa has been commissioned by *info*Dev, a global partnership program within the World Bank, and conducted by Research ICT Africa and Intelecon. It is part of a broader research project looking at how the poorest of the world's citizens use mobile phones to enhance their lifestyles and livelihoods. A parallel study for Kenya has been commissioned and other studies are planned as part of *info*Dev's Mobile Innovation program.

The purpose of the study is to investigate the demand for mobile applications, services and products, with a view to increasing economic opportunities and improving well-being for users at the base of the pyramid

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