

**Mobile applications in Afghanistan:
Mainstreaming across Government and developing the
ecosystem**

*A report for the
Government of the Islamic Republic of Afghanistan*

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Table of contents

Glossary and abbreviations	ii
Executive summary.....	iii
What are m-apps?	1
Why are m-apps relevant for Afghanistan?	2
Implementing m-apps in Afghanistan: An assessment of the ecosystem	7
Risks and challenges	9
Case study: Possible m-apps for rural livelihoods	12
Approaches to mainstreaming applications	14
Actions towards the coordinated approach	16
Implementation considerations	22
Annex A: The m-apps ecosystem	26
Annex B: Indicative costs	29
Annex C: Indicative terms of reference for the m-applications advisory team	30
Notes	31

Glossary and abbreviations

<i>3G</i>	Third-generation mobile telecommunications. 3G enables high-speed data mobile communication, including voice, video, and data services
<i>ANDS</i>	Afghanistan National Development Strategy
<i>C2G</i>	Citizen to Government
<i>G2C</i>	Government to citizen
<i>G2G</i>	Government to Government, or intra-Government
<i>GSM</i>	Global System for Mobile. A widely used mobile telephone technology. The other technology used in Afghanistan is CDMA or Code Division Multiple Access
<i>GSMA</i>	The GSM Association. A global association of GSM manufacturers and mobile telephone companies
<i>ISP</i>	Internet service provider
<i>ICT</i>	Information and communication technology
<i>IT</i>	Information technology
<i>IVR</i>	Interactive voice response. A menu based system that uses voice to read out the options and accepts inputs from the user through the key pad of the phone
<i>m-apps</i>	Mobile applications. The software and services that enable users to perform a range of tasks on their mobile telephones other than traditional voice calls
<i>MCIT</i>	Ministry of Communications and IT
<i>MNO</i>	Mobile network operator. The MNOs in Afghanistan are Afghan Telecom, AWCC, Etisalat, MTN, and Roshan
<i>MoE</i>	Ministry of Education
<i>MoPH</i>	Ministry of Public Health
<i>MSMEs</i>	Micro, Small, and Medium sized Enterprises
<i>SMS</i>	Short messaging service. This standard feature of all mobile telephones allows users to communicate with each other using short text messages of up to 160 characters (in English) or 80 characters (in the Arabic script)
<i>USSD</i>	Unstructured Supplementary Service Data. A capability of all GSM phones, and is generally associated with real-time or instant messaging type phone services. However, there is no store-and-forward capability, such as is typical of other short-message protocols and response times for interactive USSD-based services are generally quicker than those used for SMS. An important consideration is that not all MNOs enable USSD on their networks, and hence it might not be available to all subscribers
<i>VAS</i>	Value added service. Services other than traditional voice telephony that are provided over the telephone network. M-apps are a major component of VAS
<i>WAP</i>	Wireless Access Protocol. A standard available on a majority of mobile handsets that allows the basic level of a computer-based Internet browser but simplified to operate within the restrictions of a mobile phone, such as its smaller view screen

Executive summary

The wide reach and use of mobile telephones in Afghanistan creates an opportunity for the Government to mainstream the use of mobile telephone-based applications (mobile applications or m-apps) across its ministries, agencies, and programs. This will help expand the reach of public services and strengthen program management through improved supervision and data collection.

The success of m-apps in conflict and post-conflict economies such as Rwanda and West Bank & Gaza suggest that there is scope for success in Afghanistan. Discussions with MNOs in Afghanistan also suggest that the local m-apps market has the potential to grow five times by 2015. This creates an opportunity for the Government: as m-apps become popular among Afghans, it will be possible to ‘ride the wave’ and build on citizens’ increasing familiarity with m-apps to develop this as a medium for communication between citizens and the Government.

The time to think about m-apps in Afghanistan is now. M-apps offer an opportunity to extend the reach of public services, improve the monitoring of Government programs, and connect more Afghans to finance, markets, and information. The prevalence of mobile telephones will allow the Government to embark on the path towards using ICT strategically even though the traditional computer-based platform is absent. M-apps will help the Government address specific challenges and create opportunities for citizens to interact with the Government at anytime and from anywhere. Finally, mainstreaming by the Government will also serve to develop the m-apps ecosystem in Afghanistan and jumpstart the growth of the local IT sector.

The applications to deliver public services and assist in program management are not technically complex and are similar to m-apps that have been developed or deployed in other countries. However, m-apps are not developed and deployed in isolation. Rather, they require the presence of a number of components in an ecosystem that includes various stakeholders.

The mobile application ecosystem is still incipient in Afghanistan. An assessment of the current state of the ecosystem in Afghanistan, and identifies the gaps that exist in implementing the identified applications. Key gaps include:

- An evolving regulatory environment, no clear security and privacy regulations that will be important for the health area, regulatory frameworks for mobile financial services are still developing;
- Limited local knowledge and content development in academic institutions and limited data sharing by Government agencies, almost no user-generated content;
- Some local software developers but little focus on m-apps; training programs exist but not evaluated for compliance with industry or global requirements and vary in quality;
- Potentially limited skills needed for m-apps design, development, and management within the Government; limited availability of highly skilled IT professionals within the Government;
- No Government-wide coordination of m-apps development—leading to the possibility of duplication in investments and increased costs of deployment; and
- Limited familiarity of users with services other than voice; literacy constraints on using SMS or other text-based m-apps.

Discussions with various ministries help to identify some of the possible m-apps that could be deployed in the near future in Afghanistan. These applications support rural livelihoods programs and include a voice hotline service to support Community Health Workers and Community Midwives, mobile telephone-based data collection and supervision systems for MoE and the National Solidarity Program—a national community development program—and an information system to support participants in the

Horticulture and Livestock Program. These are some of the possible applications and it is possible to identify many others that would support ANDS goals to improve delivery of public services, better government accountability, and stronger monitoring, evaluation, and reporting.

Recognizing the existing gaps in the ecosystem, the interest of various ministries to implement m-apps, and the risks and challenges to deploying m-apps, this report proposes that the Government will need to move towards a coordinated approach to mainstreaming mobile applications and ultimately moving towards mobile Government or mGovernment.

A coordinated approach to mGovernment has three clear benefits. First, it will involve the creation of shared resources to cut costs of designing, deploying, and operating applications. Second, it consolidates demand for communication services across the Government reducing the costs of each transaction. Finally, a coordinated approach could include focused actions to develop the ecosystem and the local IT sector.

As part of this coordinated approach, the Government would undertake a series of steps to cover two aspects: regulatory and strategic coordination to create an enabling environment for m-apps and coordination of applications development and delivery. This report includes a long list of these actions, which are in the following categories:

- Creating the enabling environment
 - Development of a regulatory framework for consumers and transactions
 - Creation of a regulatory framework for mobile payments
 - Development of associated telecommunications policies
 - Creating a mobile Government strategy
- Coordinating the development and deployment of m-apps
 - Creating shared resources for rapid design, development, and deployment of m-apps
 - Skills and capacity development to strengthen human capacity to sustain m-apps
 - Mechanisms to promote innovation in the public sector and encourage private sector involvement in mGovernment programs
 - Programs to ensure inclusion of all possible users including minorities, people with disabilities, and women

Three immediate actions that will need to be completed by December 2010 to promote m-apps are:

Action	Expected impact	Responsible agency
Establish <i>common national short codes</i> across all MNOs for citizens to easily reach the Government	Allows toll free C2G communication and bulk discounts for G2C communication, enables rapid deployment of m-apps; well recognized numbers generate also trust and “brand recognition”; common codes simplifies access to services for citizens	MCIT with ATRA and industry bodies
Set up a mobile applications <i>advisory team</i> under the MCIT	Creates a resource that will begin preparation of the mGovernment strategic plan, design the mobile applications delivery platform, and assist ministries and agencies to identify ways in which they might use applications	MCIT with support of industry bodies
Define competency matrix to <i>identify skills</i> needed for IT training programs that could be	Clarifies how IT skills and training programs of public or private organizations can gear students towards m-apps development; clarifies the skills	MCIT with MoE, MoHE, industry and

Action	Expected impact	Responsible agency
Government certified	roadmap for students based on industry needs	regional bodies

There are important implementation considerations. First, a major risk in any coordinated approach is the possibility of insufficient buy-in across Government, undermining the efforts at coordination. It is thus important for MCIT, as the ministry responsible for the ICT sector, to consider the range of coordination mechanisms that will function given the local circumstances. In any case MCIT should work to build support, beginning with some of the more interested ministries, agencies, or programs and move quickly towards implementing some ‘quick wins’ to demonstrate the validity of the approach and hence secure greater support among other participants. Underlying this should be a continuation of efforts to engage across Government through the National ICT Council and other venues.

Second, at no point should the approach or actions of the Government displace private sector innovation, investments, or initiatives. Rather, the principle should be to “crowd in” the private sector and create opportunities for partnerships and collaboration, creating jobs and increasing investments while serving the needs of the Government and the Afghan people.

Third, m-apps are not a “silver bullet” that can or will solve all of the Government’s challenges in serving its citizens or managing programs. These applications will require complementary physical access points where citizens can interact with Government and receive services that are beyond the technical possibility of m-apps. Indeed, without the development of community access points for such services or follow up in response to data collected, there is a risk that citizens might find only limited utility in the mobile based services and even ‘drop out’ after using it a few times.

And finally, even though this report has focused on mobile applications and on mGovernment, it closes on the note that mGovernment is one part of the larger effort to make Government services ubiquitous and use multiple channels to transform the relationships among Government, businesses, and citizens. Such alignment or fit will be needed to ensure that the services and technologies deployed as part of the mGovernment effort can work seamlessly with the planned eGovernment services and technologies, creating a unified platform for delivery of services and program management.

What are m-apps?

Since 2005, more than a million people have messaged in to vote for their favorite singer on *Afghan Star*, the musical talent television show.¹ The success of the SMS voting service during *Afghan Star* highlights the opportunity inherent with the mobile telephone in Afghanistan.

The message is clear: the mobile telephone has gone beyond being a voice telephony device to a tool for social mobilization, empowerment, and expression. It is extremely popular as a communication tool. The equivalent of half of Afghan households having at least one mobile telephone,² there are over 13 million mobile telephone subscriptions across Afghanistan, and over 80 percent of the country covered by five mobile telephone networks.³ Its nationwide use creates new opportunities for the Government to reach and communicate with its citizens. Experiences from other conflict and post-conflict countries suggest that the time is right for Afghanistan to begin thinking about m-apps.⁴

There is significant scope to use this platform for service delivery, information exchange, commercial transactions, media services, data collection, and other services. Indeed, with over 4.6 billion mobile telephone subscriptions worldwide, they create the world’s largest electronic distribution platform. And such services have become extremely popular across much of the world.

The applications of the mobile telephone network beyond traditional voice telephony are *mobile applications* (or m-apps). In the broadest terms, m-apps are software that either run on a mobile device such as a mobile telephone or that can be accessed by such a device through different communication services. They are similar to Internet applications such as e-Mail or search engines, but are specifically designed for use on mobile devices.⁵ M-apps include communications services, games, text or video information services, and in some cases, more advanced multimedia services. Table 1 summarizes the most popular types of m-apps currently in use.

Table 1: Categories and examples of m-apps⁶

<i>Entertainment</i>	<i>Alerts/News</i>	<i>Commerce</i>	<i>Social</i>	<i>Enterprise</i>
Ringtones, wallpapers, quizzes, religious chants, music on demand, mobile radio, games	News, banking info/travel alerts/security alerts	Mobile financial services including banking and payments, transport ticketing	Advertising, location search, social media, health services, agriculture information	Contests, surveys, voting, asset verification, employee communications

M-apps therefore represent a significant opportunity for Afghanistan. There is great potential for m-apps to connect more Afghans to information, finance, and markets than through traditional means, especially in rural and remote areas of the country. And the Government can use m-apps for program management and supervision. Furthermore, the development and provision of m-apps is itself a great opportunity for Afghanistan to jumpstart growth in the local IT services industry. The Government thereby can become a major demand facilitator for m-apps in Afghanistan and create opportunities for local entrepreneurs.

This report, for the Government of Afghanistan, proposes various measures that the Government could undertake to mainstream the use of mobile applications across Government ministries, agencies, and programs in Afghanistan. In doing so, the Government will create opportunities for growth in the local IT sector.

This report begins with a discussion of why the Government should consider mainstreaming m-apps across its ministries, agencies, and programs. It then evaluates the state of the m-apps ecosystem in

Box A: The use of m-apps in Rwanda and West Bank & Gaza

The proliferation of m-apps has touched almost every market, including conflict and post-conflict economies. As mobile telephone subscriptions have grown to reach 31 percent of the population in West Bank & Gaza, and the vibrant local IT industry grows, the number of applications will also increase. M-apps are being primarily deployed by NGOs or private organizations. Two interesting applications are Souktel, an SMS based job database, and a citizen event-reporting service launched by news channel Al Jazeera in Gaza. Souktel uses SMS to connect job seekers to employers and has an average of 2000 users a month; it helps about 500 people find jobs every year. Al Jazeera's mapping service that allows anyone to submit news of incidents in Gaza as they happen through a variety of channels including SMS.

Rwanda has the objective of becoming an ICT hub in Africa. Towards this end, the Government has embarked on a range of programs to enhance access to ICT for its citizens including in backbone connectivity and mobile telephony. Simultaneously, initial m-app programs promise to assist citizens to improve their access to markets and strengthen program management. TRACnet is a program management system that collects, stores, and disseminates program, drug, and patient information related to HIV/AIDS care and treatment. It uses multiple technologies including mobile telephones to collect and share information among health facilities, allowing over 6000 patients to be monitored. The eSoko program allows farmers in Rwanda to use ordinary cell phones to query up-to-date price databases run by the Ministry of Agriculture and receive relevant and updated information on market prices for agricultural goods.

Source: <http://mobileactive.org/case-studies/souktel>; <http://labs.aljazeera.net/warongaza/>
http://www.kiwanja.net/database/project/project_voxiva_hivaidsrelief.pdf; <http://allafrica.com/stories/201002040063.html>;
http://www.rwandagateway.org/article.php3?id_article=9669

Afghanistan to identify specific gaps that pose challenges to the quick and cost effective deployment of m-apps. To highlight the possibilities, the report presents some of the specific m-apps that various ministries involved in rural livelihoods programs have identified for deployment in the near future. In concluding, this report identifies three possible approaches that the Government could consider to mainstream applications. Each of these approaches includes a range of actions and will have differing ability to enable the development of the m-apps ecosystem.

The report is action oriented and has been prepared following close consultations between the World Bank and MCIT and various ministries between June 2009 and June 2010,⁷ and discussions with mobile networks and IT firms in Afghanistan, mobile networks and applications developers in other countries, and with international experts. A workshop was held in June 2010 to present the preliminary findings of the report to stakeholders, and their comments were incorporated into this final version.

Why are m-apps relevant for Afghanistan?

The prevalence of mobile telephones across Afghanistan creates an opportunity for the Government to embark on the path towards using ICT for service delivery and program management even though the traditional computer-based platform is absent. Furthermore, the success of m-apps in conflict and post-conflict economies such as Rwanda⁸ and West Bank and Gaza⁹ suggest that there is scope for success in Afghanistan. In both countries, the private sector and NGOs have led in deploying m-apps to address local issues and capture business opportunities (**Box A**).

Similarly, discussions with MNOs suggest that the Afghan m-apps market has the potential to grow about five times in revenue terms by 2015. Much of this will likely focus on media and infotainment applications and content, although mobile money transfer also seems to be an m-app that is attracting significant attention. This creates an opportunity for the Government: as m-apps become popular among Afghans, it will be possible to ‘ride the wave’ and use citizens’ increasing familiarity with m-apps to develop this as a medium for communication between citizens and the Government.

This section puts forward the four key reasons why the Government should mainstream m-apps across its ministries, agencies, and departments. A strategy to mainstream applications will have forward impacts. They offer a unique and significant opportunity to extend the reach of public services, improve the monitoring of Government programs, and connect more Afghans to finance, markets, and information. Such applications would support ANDS goals to improve delivery of public services, better government accountability, and stronger monitoring, evaluation, and reporting.

Furthermore, by generating demand for applications, the Government will encourage local IT firms to engage in applications development, growing the IT sector.

Improve data collection for and monitoring of Government programs

The widespread mobile network creates an opportunity for low cost and rapid data collection from a geographically dispersed set of individuals. The Government has been implementing a large number of programs towards the reconstruction and development of Afghanistan. The collection of accurate data quickly from the field—from officials, program staff, and citizens—at a low cost will strengthen the credibility of the state, allow beneficiary verification, and improve program management.

Mobile telephones offer a powerful means to collect data through voice, simple text messages (such as SMS), interactive text interfaces, and even web-based applications. The entire process is electronic and can be customized for each agency or program, making mobile telephone-based data collection faster and cheaper than traditional paper forms or surveys. Such systems have been used in the health sector, for example, for disease surveillance,¹⁰ to track pregnancies,¹¹ and for program management.¹²

Extending the reach of public services

M-apps can also extend the reach of a subset of public services and support others indirectly. For most Afghans, and especially those who live in rural or remote areas, access to Government services and information is limited. A simple task such as applying for a driver’s license or paying taxes might involve multi-day travel, queues, consequential lost wages and time, and even rent-seeking and corrupt behavior at the service center. In many cases, citizens have to make multiple trips to find basic information (such as required documentation), fix appointments or to collect documents.

Afghanistan’s mobile phone networks cover about 80 percent of the population, across difficult terrain, in remote areas, and through much of the rural areas. Social, economic, and technical factors make the mobile phone a useful device for the Government to reach its citizens (**Box B**). Consequently, in some cases, the mobile phone is a powerful means to extend the reach of public services. For instance, rural citizens can access medical help from specialists located in cities,¹³ while farmers can similarly connect with animal health or agricultural experts.¹⁴ In some cases, it is possible to undertake remote diagnostics,¹⁵ verify the authenticity of public supplies,¹⁶ receive Government subsidies or even salaries,¹⁷ and even insure crops.¹⁸

In other cases, the mobile phone can indirectly support service delivery. The mobile phone has been used to provide simple text or voice information on required documentation or fees,¹⁹ provide information on office times or fix up appointments,²⁰ provide document tracking services,²¹ or to alert citizens on when

Box B: The suitability of m-apps to support public service delivery

In Afghanistan and around the world, m-apps and the mobile telephone more broadly are a powerful means to support public service delivery for the following reasons:

1. Mobile telephone networks are typically the most widely available electronic service and information delivery platform, allowing for rapid and low cost transactions;
2. Even poor communities have widespread mobile phone use, and users are familiar and comfortable in using at least the basic functions such as voice calling and in many cases text messaging—although Afghan MNOs suggest that non-voice services are yet to become popular;
3. Members of traditionally underserved communities (women, people with disabilities, minorities) may still have a mobile telephone, allowing the Government to reach them privately;
4. M-apps can range from the simplest voice or text based interfaces to complex interfaces such including the multimedia Internet; in many cases all of these use the same back-office infrastructure, allows a level of qualitative scaling over time;
5. M-apps are cost effective because once services have been setup, they can be accessed by many people at low incremental cost; this makes surveys, information updates, and other small value transactions (such as domestic money transfers) less expensive to conduct;
6. Mobile telephone companies typically have widely distributed retail networks with strong brands, and with sophisticated user management and billing techniques, making them a possible channel to reach a large number of users for small commercial and information services; and
7. It is possible to have robust, even if simple means of authentication, making the mobile telephone a relatively safe services transaction medium.

Some risks and challenges exist and should also be considered. This report discusses these in a separate section (see page 9).

Source: Author's analysis.

their documents are ready for pickup.²² In each case, m-apps can assist improving citizens' experience when interacting with the Government.

However, it is important to recognize that m-apps are not a "silver bullet" that can or will solve all of the Government's challenges in serving its citizens or managing programs. They can help address these problems, but not always solve them; the Government cannot depend on m-apps alone. Rather, Government will need to make available complementary physical access points where citizens can interact with Government to continue interactions begun on the mobile platform. Moreover, some services are beyond the technical possibility of m-apps (e.g. complex forms, personalized health care) and require improvements in physical and human infrastructure.

Connecting more Afghans to finance, markets, and information

Mobile telephones have also been used for mobile commerce (mCommerce), which includes any type of financial transaction that uses the mobile telephone. While paid-for m-apps (including ringtones, music, or games) constitute one category of mCommerce,²³ there are also examples of mobile money transfer services, or the use of mobile phones to coordinate financial transactions.²⁴

The scope for growth in mobile money transfer services, for instance, is significant. The GSMA forecasts that formal global remittances could grow from around US\$300 billion currently to over US\$1 trillion by 2015 with the use of mobile money transfer given the reach of these networks and the resulting ability to "bank the unbanked."²⁵ A detailed discussion of this topic is out of the scope of this report. However,

Box C: The economic opportunity of applications

The experience of the applications development sector in neighboring countries is instructive on the potential to create jobs and grow the ICT industry. The value added services (VAS) industry in India, which includes mobile applications, is now about a US\$3 billion by revenues. Many domestic companies have also begun to expand abroad, and in some cases have grown from small teams to employing hundreds of young IT professionals. In China, the VAS market was valued at about US\$18 billion in 2008, and is expected to reach US\$34.5 billion by 2011. In some cases, specific devices drive significant growth in applications. For example, annual sales of applications for Apple's iPhone exceed \$2.4 billion.

But far removed from the sophistication of the iPhone, much of the VAS market in the developing world is focused on simple services based on SMS or IVR. For example, over 55 percent of India's VAS market was based on SMS services. In Brazil as well, SMS was used by almost 80 percent of subscribers, far ahead of music and games (about 40 percent each), and Internet (less than 5 percent). In Thailand, the market for IVR based services was about US\$3 million.

Afghanistan is seeing the deployment of an increasing number of VAS and MNOs also looking to grow their m-apps portfolio. Consequently, local stakeholders suggest that the m-apps market will grow from 2 percent of MNO revenues now to about 10 percent in 2015. Their conservative estimates point to an increase in m-apps revenue by more than US\$30 million, which will have significant impact on the development of ancillary firms such as local applications developers, platform providers, and system managers. This will lead to an associated increase in job creation and investments in ICT.

Sources: BDA Report; NetScribes, Mobile Value Added Services – China (Part I), January 2010; Om, Giga, 2009, "How Big Is the Apple iPhone App Economy? The Answer Might Surprise You", <http://gigaom.com/2009/08/27/how-big-is-apple-iphone-app-economy-the-answer-might-surprise-you>; Indian VAS Market is Resilient, 15 February 2010, Communications Today; Industry Trend Analysis - SMS Reigns Supreme In Brazil, 16 December 2009, BMI Industry Insights - Telecommunications, Americas; Mobile apps set for meteoric rise, 17 February 2010, Bangkok Post

following trials in Afghanistan with Roshan's mPaisa service,²⁶ there is a potential to boost financial inclusion as other MNOs are also looking to enter this market.

M-apps could also be used to connect Afghans with markets beyond their immediate vicinity. In some cases, text-based services are used to help youth find jobs,²⁷ or to support trading of goods and services.²⁸ Such services have also begun in Afghanistan, driven by MNOs and by local IT firms.

Further, the mobile phone is the most commonly available two-way electronic communications device in Afghanistan, and the second most prevalent communication technology after the radio. A survey in 2009 by the Asia Foundation found that 52 percent of surveyed households had mobile phones (compared to 81 percent for radio, 41 percent for television, and 6 percent for computers). Moreover, 44 percent of rural households reported having a mobile phone.²⁹

Interestingly, 11 percent of surveyed Afghans reported that they use SMS to get news and information about current events at least once a week.³⁰ There is thus potential to have the mobile phone to serve well as a means to strengthen information flows among Government agencies, businesses, and citizens. More Afghans could use the mobile phone to receive news or alerts (e.g. related to security, weather).³¹

Building the local IT sector

Box D: M-apps as a starting point for broader IT sector development in Afghanistan

M-apps development is especially attractive as a starting point for IT sector development for three reasons.

- *Start up costs and entry barriers are low.* The most expensive component, the distribution platform, has been developed by the MNOs and as long as access is available, it is possible for most m-apps companies to begin with small initial investments and a few employees. And investments typically focus on human capital and basic computing hardware and software infrastructure. Successful applications developers also may invest in consumer education and marketing. One caveat here is that MNOs have tended to take a majority of revenues generated by m-apps, which does put pressure on applications providers to build volumes relatively quickly if they are to be profitable.
- *Systems are globally standardized.* The IT skills include widely used computer programming languages, while the systems are similar globally. Hence, technical skills are highly standardized and translated elsewhere, creating opportunities for IT exports. One constraint here is the multiplicity of technologies used in mobile devices (e.g. Apple iPhone, Symbian, Windows Mobile, Android etc), especially for platforms and software hosted on these devices. This might limit scalability unless developers create multiple versions of the same application, a process that may increase costs and require partnerships among handset manufacturers, MNOs, and applications developers. Emerging tools that are globally standardized and often based on open source will help reduce such fragmentation; in the interim, however, customization might create opportunities for firms to translate m-apps from one to the other system.
- *Opportunities to expand into other sectors.* The low investment requirement, translatability of skills, ability to innovate quickly, and opportunity to build brands lets applications developers experiment with new services and products, making m-apps to be a useful entry point to larger IT markets.

Source: Author's analysis.

Mobile applications offer an opportunity to grow Afghanistan's local IT industry. The local IT sector is currently nascent and of limited size. It consists mainly of systems integrators, suppliers, and maintenance contractors, with almost all software and hardware being imported. Hence, until the time the traditional IT services sectors can develop, m-apps development and provisioning can become a major growth driver for local IT firms.

The experience in neighboring countries underscores that m-apps present a high growth opportunity (**Box C**). Indeed, the mobile application market in Afghanistan is at an early stage, and the growth of voice and data wireless services will be very high for some time to come. This creates an opportunity for the Government to ride the wave and undertake actions that will have a multiplied impact.

M-apps are especially useful as an early growth driver for the local IT industry for a range of reasons. First, the domestic IT market in Afghanistan in its traditional form—based on enterprise consumers using PC-based systems—is quite limited. The number of Internet users is estimated at 5 percent in 2010 while data suggests that PC penetration per 100 Afghans is 0.4.³² On the other hand, mobile telephone use is widespread, and creates an opportunity for software development that does not exist with traditional computing media.

Second, m-apps development offers a high potential entry point for smaller firms in the IT market (**Box D**). Given the relatively limited development of the private sector that would use IT based services for commercial purposes, the drivers for growth are limited to the retail market. It is also important to note

that entry barriers for m-apps developers are relatively low, which creates opportunities for MSMEs. And a focus on mobile applications fits well for the emerging trends in the ICT industry because technology and devices are converging to wireless.

Implementing m-apps in Afghanistan: An assessment of the ecosystem

The applications that will help with program management and service delivery are not technically complex and are similar to m-apps that have been developed or deployed in other countries. However, m-apps are not developed and deployed in isolation. Rather, they require the presence of a number of components in an ecosystem that includes various stakeholders. Consequently, mainstreaming m-apps across the Government will need an analysis of the ecosystem in Afghanistan and identification of any gaps or challenges that need to be addressed.

The mobile application ecosystem is still incipient in Afghanistan, raising four challenges for the Government in deploying these and other m-apps now and in the future. First, the lack of common platforms and services may lead each ministry or agency to develop its own stand-alone systems. This will lead to a considerable duplication of infrastructure and services while fragmenting demand.^a Hence, it might be useful to consider ways in which to develop the ecosystem to support a more efficient approach.

Second, there is limited applications development on going in Afghanistan right now, which limits the availability of such applications within the country.

Third, even if the m-app is sourced from outside the country, there is still a need to operate and manage the systems and applications within Afghanistan due to convenience, cost, or information sensitivity considerations. And even if development and operation are managed entirely by entities outside of Afghanistan, some level of local customization will be essential and the m-apps will need some local resources to function, such as connectivity with the MNOs.

Finally, if the Government looks at m-apps as not only a tool but also a means to develop the local IT industry then the local ecosystem will have to grow to support at least basic infrastructure and services.

Consequently, evaluating the m-apps ecosystem identifies areas where the Government could focus its attention to enable the m-apps identified in the previous section. This section introduces a generic m-apps ecosystem, similar to one that might develop in Afghanistan over the next few years. It is based on the ecosystems seen in other developing countries globally and in the South Asian region. It then assesses the current state of the ecosystem in Afghanistan, and identifies the gaps that exist in implementing the identified applications.

The ecosystem for m-apps

The m-apps ecosystem consists of the components represented in Figure 1. These components are described below, with their functions and typical examples of actors in Annex A.

^a For example, many ministries will be interested in mobile telephone based surveys or data collection. Consequently, creating common tools and platforms for such surveys will reduce costs while allowing rapid deployment.

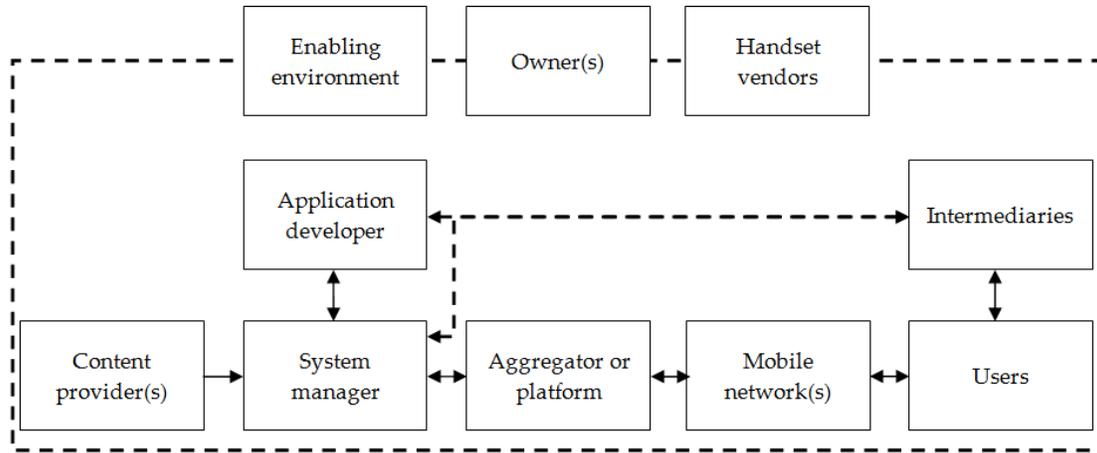


Figure 1: A schematic representation of the mobile applications ecosystem

To function, the m-apps ecosystem at least needs the enabling environment, applications owners (here Government ministries or agencies), content producers, applications developers, system managers, and the MNOs and users.

Other elements such as handset manufacturers might exist in other countries and have a limited presence in the specific ecosystem, while intermediaries might be created depending on the m-app being developed. In some cases, aggregators or platforms might offer a number of functionalities to simplify applications development and deployment. Some elements might also be the same entities (e.g. applications developers, aggregators, and system managers might be the same organization).

The state of the ecosystem in Afghanistan

Afghanistan has been a primarily voice telephony market, with very little by way of VAS or m-apps thus far. Apart from the success of SMS and IVR voting (e.g. for Afghan Star), some limited use of mobile money transfer for police salary payments (e.g. with the mPaisa system), ticketing with an airline, media and entertainment services, and some other simple services^b there has been little in terms of m-apps.

However, indications are that there will soon be significant activity in developing and provisioning of m-apps. For example, as has been mentioned earlier in this report, stakeholders suggest that the VAS market is set to grow at least five times over in the next five years (**Box C**).

The ecosystem should be well developed to support this growth and to simultaneously allow the rapid mainstreaming of m-apps across Government. Table 2 provides an overview of the ecosystem as it stands in mid-2010, and provides a graphical representation.

Table 2: State of the m-apps ecosystem in Afghanistan

<i>Component</i>	<i>State in Afghanistan</i>	<i>Some possible actors</i>
Enabling environment	An evolving regulatory environment, no clear security and privacy regulations that will be important for the health area, regulatory frameworks for mobile financial services are still developing	DAB, MoPH, MCIT

^b Including AWCC’s bank statement service, some use of mobile telephones to track the progress of elections, use of mobile telephones for status update for various services including for job postings, and planned mobile media services

Component	State in Afghanistan	Some possible actors
Owner	Growing interest among Government agencies to use m-apps, but few specific initiatives yet	Various ministries
Handsets	Large number of simple and inexpensive handsets with limited capabilities; the ability of handsets to receive Dari or Pashto SMS is unknown	Manufacturers' agents (e.g. Nokia, Samsung, Blackberry)
Content providers	A number of media and entertainment companies, limited local knowledge development in academic institutions and limited data sharing by Government agencies, scope for increase in user-generated content	Universities, Government ministries (e.g. MoE, MoPH)
Application developers	Some local software developers but little focus on m-apps; MNO's internal teams are active; training programs exist but not evaluated for compliance with industry or global requirements and vary in quality	Private firms; NGOs; universities, incubated firms, MNOs
System manager	Potentially limited skills needed for m-apps design, development, and management within the Government; there is limited availability of highly skilled IT professionals within the Government	Ministries, program staff, MNOs
Aggregators or platforms	Some non-MNO aggregators exist locally, some MNOs use platforms from neighboring countries, no Government-wide coordination of m-apps development—leading to the possibility of duplication in investments and increased costs of deployment	Private sector firms—local and international, MNOs
MNOs	Well developed, competitive, but tariffs are still relatively expensive to the income levels	Four private MNOs and Afghan Telecom
Intermediaries	A large number of program staff, trainers, community councils, etc. who are present in the field and trusted by citizens; their interest in promoting m-apps or using them as part of their work (e.g. for data collection) is uncertain	Many possibilities depending on the application
Users	Significant scope to develop the user base given wide reach of mobile telephony; limited familiarity of users with services other than voice; literacy constraints on using SMS or other text-based m-apps	Citizens, businesses, Government

Risks and challenges

Even as the Government moves forward towards deploying m-apps, it is useful to consider some risks and challenges that exist in the design, development, and deployment of applications. The risks and challenges identified in Table 3 have been compiled based on discussions with the ministries and on assessments of m-apps used in other countries. This analysis is not exhaustive, but it provides a starting point for a deeper analysis that the Government and others might consider.

It is important to note here that with most m-apps, and especially when using the coordinated approach, it is possible to quickly design and test many of the more common applications in the field. Costs are also relatively low, especially if shared services and platforms are used and duplication of resources is avoided (Annex B), even for applications that have specific back end systems that support them. Hence, there is a lower possibility of expensive mistakes with m-apps, and it is possible to “do-and-learn.” Risks might be mitigated further with careful analysis.

Table 3: Risks and challenges to be considered with m-apps

Component	Possible risks and challenges	Mitigation strategies
Enabling environment	<ul style="list-style-type: none"> • Policies and regulations for ICT and for the application sector (e.g. education, health, financial services) prevent certain services or are unclear about user rights, legal validity of mobile based transactions 	<ul style="list-style-type: none"> • Frameworks should be consistent and predictable and foster an environment for innovation, and should enable the widest possible range of m-apps
Owner	<ul style="list-style-type: none"> • Definition of application is too vague or does not address actual user needs, or do not improve processes 	<ul style="list-style-type: none"> • Generate or test ideas with NGOs, end-users, if possible, or through research • Run pilots and trials to test ideas and systems quickly and cheaply and discard those that do not work
	<ul style="list-style-type: none"> • Pilots do not scale, or are too expensive to sustain 	<ul style="list-style-type: none"> • Do a rigorous return-on-investment analysis for applications to ensure they are either cost-saving or revenue-generating • Encourage public private partnerships (PPPs) to design and manage systems • Use shared infrastructure or services across multiple Government agencies to reduce costs per application or system
	<ul style="list-style-type: none"> • Risk that mGovernment services are driven by the MCIT as opposed to the sector ministries 	<ul style="list-style-type: none"> • Important to have other relevant ministries on board to ensure buy-in and sustainable funding
Handsets	<ul style="list-style-type: none"> • Handsets are too complex for end-users or alternatively lack features 	<ul style="list-style-type: none"> • Design simple applications and test on a range of handsets • Use multiple channels to reach the entire range of end-users
	<ul style="list-style-type: none"> • Handsets are too expensive 	<ul style="list-style-type: none"> • Work with industry bodies to identify ways to reduce prices (e.g. lower duties, simplified import processes)
	<ul style="list-style-type: none"> • Multiple users share handsets, preventing identification of single users 	<ul style="list-style-type: none"> • Use simple authentication protocols to identify individuals • Provide controlled access to the databases and services of the planned national e-ID program to enable easy identification
	<ul style="list-style-type: none"> • Handsets are very simple and cannot host complex applications 	<ul style="list-style-type: none"> • Choose to deploy network and not device-hosted applications to minimize burden on the handset and to simplify design
Content providers	<ul style="list-style-type: none"> • Content is not relevant to end-users, or is not presented in an appropriate manner (e.g. too much text, with a parochial tone) 	<ul style="list-style-type: none"> • Design and test content with possible end-users to ensure relevance and presentation • Use local or user-generated content where possible • Use multimedia (e.g. audio + text) if possible

Component	Possible risks and challenges	Mitigation strategies
	<ul style="list-style-type: none"> • Content becomes stale or fails to keep users engaged 	<ul style="list-style-type: none"> • Create multiple mechanisms to generate content, including opening government content and translating it to digital formats, and promoting user-generated content; have private firms produce and manage content for applications that they develop for the Government
Application developers	<ul style="list-style-type: none"> • Applications are focused on technical superiority rather than utility or usefulness to end-users 	<ul style="list-style-type: none"> • Design the application to fit with the needs and capabilities of end-users
	<ul style="list-style-type: none"> • Development takes too much time or costs are high, especially given local security and lack of skilled IT professionals 	<ul style="list-style-type: none"> • Don't reinvent the wheel; many applications already exist, and might be easily repackaged for Afghanistan • Use shared resources to cut costs
System manager/Aggregators and platforms	<ul style="list-style-type: none"> • Systems management capacity does not exist locally, or is too expensive 	<ul style="list-style-type: none"> • Encourage international companies to work with local partners while designing and deploying applications • Use shared resources to minimize management requirements • Use remote system management with well defined service level agreements with the offshore system manager
	<ul style="list-style-type: none"> • Lack of shared infrastructure and services might lead to duplication of resources 	<ul style="list-style-type: none"> • Create a mobile applications platform for the Government with strong service standards and cost sharing among users
	<ul style="list-style-type: none"> • Difficult to retain skilled staff, which limits sustainability of created m-apps 	<ul style="list-style-type: none"> • Skilled workforce is always susceptible to being pulled to work in more lucrative private sector, but it is possible to improve retention by creating opportunities for high profile and cutting-edge work, and by increasing responsibility of high performing staff
MNOs	<ul style="list-style-type: none"> • Technical issues in the delivery of information or services to end-users • Incorrect billing 	<ul style="list-style-type: none"> • Clearly define the responsibility of addressing consumer problems including billing or technical issues
	<ul style="list-style-type: none"> • High level of complexity due to need to interact with five telecommunications companies 	<ul style="list-style-type: none"> • Use shared access points or infrastructures; develop common testing or compliance standards
Intermediaries	<ul style="list-style-type: none"> • End-users do not trust the intermediaries or do not understand their role 	<ul style="list-style-type: none"> • Look for pre-existing or trusted intermediaries; in some cases, allow entrepreneurs or emergent change-agents to take the lead

<i>Component</i>	<i>Possible risks and challenges</i>	<i>Mitigation strategies</i>
Users	<ul style="list-style-type: none"> Literacy concerns or social norms limit the access of women, minorities, or people with disabilities to services 	<ul style="list-style-type: none"> Design of the system, and testing and trials involving end-users are essential Map various user groups and skills to possible applications Design the m-app to use the widest possible range of channels, including voice, text, and Internet Design m-apps to fit with required cultural or social values and norms (e.g. if the system is to be used by women, it should present itself as a woman)³³
	<ul style="list-style-type: none"> Users do not understand or trust the system and hence do not use it 	<ul style="list-style-type: none"> Identify a wide range of intermediaries to ensure coverage of training or communication programs as part of m-apps deployment Engage intermediaries to educate users on the benefits of using specific applications, and to ensure wide usage across communities
	<ul style="list-style-type: none"> Consumer protection issues: prepaid subscribers might run out of cash quickly if they are not aware of charges or charges are too high 	<ul style="list-style-type: none"> Consumer protection measures should be in place (e.g. clearly displaying the price of accessing a service, or the number of a help line); need to educate users about the tariffs and differences between premium and public services
	<ul style="list-style-type: none"> Users are unfamiliar with non-voice telephony services 	<ul style="list-style-type: none"> Encourage MNOs to engage in strategic communications campaigns to educate them about services such as SMS and in the future, about Internet

In assessing risks, it is important to note that failures are also useful to understand users, technologies, or business models better. It is possible to learn from failures as newer projects are developed and implemented.

Case study: Possible m-apps for rural livelihoods

Discussions with the four focus ministries^c since February 2010 led to the identification of multiple m-apps that could support program management, public service delivery, and access to information and markets. The scope and level of interest in these and other applications indicates a strong latent demand for innovative solutions to challenges in program management and service delivery among ministries. Table 4 outlines some of the identified applications as examples of the types of services that could be deployed in Afghanistan in the near future.

Table 4: Possible m-apps for Afghanistan

Sector	Challenge	Possible m-app to respond to the challenge
Public health	Connecting rural populations and health workers in cases of emergencies to	A voice hotline service that connects Community Health Workers (CHWs) and Midwives (CMWs) located in rural areas to specialist medical professionals that are typically located in major urban centers. The service will provide on-demand

^c These ministries are Ministry of Public Health, Education, Rural Rehabilitation and Development, and Agriculture Irrigation and Livestock.

Sector	Challenge	Possible m-app to respond to the challenge
	specialists who are typically located in the major cities.	emergency advise to CHWs and CMWs regarding child birth, supporting Ministry of Public Health programs aimed at improving maternal and infant health outcomes. The hotline will have a single nationwide number.
Education	High cost of collecting recurring data for the education management information system (EMIS)	A text based data collection system that will allow designated officials or representatives (e.g. school <i>shuras</i> , principals, supervisors) to input numerical data and answer multiple-choice questions. The system will collect this data and input it automatically into the EMIS, while also generating required reports, exception warnings or generating maps if location information is also available. This text based system will allow rapid and regular collection of data from a large number of distributed officials at a much lower cost than traditional paper based surveys, and can integrate with Internet-based tools as required.
Agriculture and Rural development	Need to monitor progress of a large number of NSP sub-projects where paper based data collection is time consuming and expensive; desire to have accurate location data or photographic evidence of the actual status of work	A mobile telephone based system will assist NSP and FP engineers in collecting data from the field as they supervise various sub-projects. The system will use pre-programmed data-capable or “smart” mobile telephones to capture time- and location stamped photographs of a sample of sub-projects and to add text comments or complete more complex evaluation forms. The data will automatically transmit to a central database that analyzes the data, produces the required reports, and forwards data to the responsible program staff as needed. Gathering location information strengthens the supervision process and verifies that engineers visit the site to evaluate the sub-project.
	The Rural Enterprise Development Program (REDP) will have over 13,000 village facilitators (VFs); cost to coordinate a large number of staff is significant; desirable to have an efficient means to enable peer-to-peer or management-to-VF communication	A mobile telephone based VF network (VFN) will enable top-down and peer-to-peer communication, and also support the implementation of the program. Each VF team will use mobile phones to input data from the field and exchange information with each other and with the REDP management. The VFN will thus serve as both a monitoring and a communication platform. First, the VFN will allow constant communication among the AREDP management unit, provincial teams, and the VFs. This can help with monitoring and supervision of the VFs, helping different units to coordinate better. Second, the VFN can help different VF teams to communicate with each other, sharing ideas, problems and solutions, and even mentor younger or less experienced members. The VFN can be expanded in the future into a phone-based mentorship network for village producers.
	Demand for accurate and relevant information regarding the agriculture and livestock sectors and markets in rural areas to allow people to make better decisions	It is possible to use mobile telephone based system and the short-messaging service (SMS) and voice calling features to collect and disseminate information. Such systems would disseminate information on price, weather, animal health, farming strategies, or other relevant areas and send this information to users who sign up. Given that the system will allow broadcasting of text and voice messages to the village producers, it can also be used to send warnings about weather or other emergencies, or to inform them about animal health issues

Box E: The impact of mobile money transfer and banking

Mobile banking provides the unbanked with an opportunity to access formal financial services even when the reach of the bank branch network is limited. Every mobile phone could become a tool to access financial services. This will also help cut transaction costs by moving to electronic media and increasing competition in the market.

In the Philippines, for example, a typical transaction through a bank branch costs the bank US\$2.50; this would cost only US\$0.50 if it were automated by using a mobile phone. The cost reduction from using agents rather than banks for remote cash transactions is equally dramatic. Banco de Credito in Peru estimates that a cash transaction at a branch costs about US\$0.85, while the same transaction at an agent would cost US\$0.32.

Tameer Bank in Pakistan estimates that, in the Orangi slum of Karachi, the setup cost of a bank branch would be 30 times more than the setup cost per agent, which is about US\$1,400. Monthly running costs average about US\$28,000 for a branch, compared with US\$300 for an agent, but also, a much larger share of monthly running costs is variable for an agent than for a branch.

Source: Gautam Ivatury and Ignacio Mas, The Early Experience with Branchless Banking, Focus Note No. 46, April 2008, CGAP, <http://www.cgap.org/gm/document-1.9.2640/FN46.pdf>

Sector	Challenge	Possible m-app to respond to the challenge
		or Government programs, for example.

Other possible m-apps were discussed, but these did not have immediate application in Afghanistan due to regulatory or technical constraints or because of lack of clear demand. One such theme is the use of the mobile telephone as a money transfer device, falling within the broader area of mobile telephone enabled commerce. There is significant evidence of the transformational impact of mobile money transfer, for example (Box E). However, the financial regulatory environment is not yet clarified for these services to start in Afghanistan.²³

More complex or sophisticated applications (e.g. using multimedia content or involving filling of complex forms) need high capacity (broadband) networks that can support high quality video services. These networks have seen limited deployment in Afghanistan yet. However, the possibility of the introduction of broadband wireless services in the near future in Afghanistan opens the door to such applications developing in the medium term.

Approaches to mainstreaming applications

Recognizing the existing gaps in the ecosystem, the interest of various ministries to implement m-apps, and the risks and challenges to deploying m-apps, this report now turns its attention to the possible approaches that the Government could take to mainstream applications. Some of these actions will simultaneously develop the local ecosystem and creating the conditions to spur the growth of the local IT industry. Some of these actions will need partnerships among the Government, the telecommunications firms, and other stakeholders.

Need for a coordinated approach to making Government mobile

It is possible that the mainstreaming of m-apps in Government could happen in an *ad hoc* fashion, where each ministry, agency, or program will adopt m-apps independently of others. In some cases, such an approach might be valid, especially when sector-specific applications are involved. For example, it is

likely that only the police department will need an application that lets traffic police quickly access driver information from a database.

However, there are significant risks with an *ad hoc* approach. First, the adoption of applications in Government will depend on interest and capacity of individual ministries and agencies. Second, such an approach will miss the opportunity to use applications to strengthen Government programs in a strategic manner and to consolidate demand across Government to cut costs and simplify deployment. Third, it is unlikely that there would be a strategic promotion of local IT sector development. Fourth, creation of separate systems will lead to duplication of investments and the fragmentation of demand that will raise costs to use m-apps and a waste of resources. Finally, with the *ad hoc* approach, each ministry has to negotiate separately with the five MNOs for communication services, which again increases costs and adds to delays in deploying applications.

For example, many ministries will be interested in an m-app that collects numerical data from a large number of field agents. MoPH might want to collect data on vaccinations or births, while MoE might be interested in collecting the number of students in primary schools. In this case, both ministries could use the same underlying software and hardware to collect the data based on questions they provide from their agents. This simple customization process does not need duplication of hardware and software. Rather a common m-survey application can be developed that allows any agency to program its list of questions, the list of field agents, and do the data collection. Going for an *ad hoc* approach without any coordination of this demand will lead to doubling of the costs of hardware and software. Plus, the number of transactions—say through SMS—that each ministry will conduct will be less than the combined number, limiting the possibility for bulk discounts on communication services. Furthermore, each ministry has to engage with all the MNOs to secure these services, increasing coordination costs.

It is thus useful to consider a coordinated approach to mGovernment. This has three clear benefits. First, it will involve the creation of shared resources to cut costs of designing, deploying, and operating applications. Second, it consolidates demand for communication services across the Government reducing the costs of each transaction. Finally, a coordinated approach could include focused actions to develop the ecosystem and the local IT sector.

Managing risks in coordination

The coordinated approach has three key risks. It might create a top-down approach that impedes innovation and flexibility. And there might be a perception of loss of control over the application. It is possible to mitigate these risks by creating mechanisms for agencies to control the data generated, nature of services, and keep development processes open and consultative.

Indeed, it is useful to note that the coordinated approach to m-apps mainstreaming does not imply that some types of standalone systems should never exist. There are cases where content provision or the nature of intermediaries or users requires a separate system even if there is scope for use of some shared resources. For example, a health information hotline will likely need a call center that is staffed by doctors or medical professionals; this call center will likely be separate from one that serves a farmer hotline. The coordinated approach will make short code access easy for the hotline and likely benefit it with lower costs of call management, for instance; yet unique resources could also exist and plug into these shared systems.

A major risk in any coordinated approach, however, is that there is insufficient buy-in across Government, undermining the efforts at coordination. It is thus important for MCIT, as the ministry responsible for the ICT sector, to consider the range of coordination mechanisms that will function given the local circumstances. In any case MCIT should work to build support, beginning with some of the

more interested ministries, agencies, or programs and move quickly towards implementing some ‘quick wins’ to demonstrate the validity of the approach and hence secure greater support among other participants. Underlying this should be a continuation of efforts to engage across Government through the National ICT Council and other venues.

Actions towards the coordinated approach

The coordinated approach involves two aspects: regulatory and strategic coordination to create an enabling environment for m-apps and coordination of applications development and delivery (Figure 2).

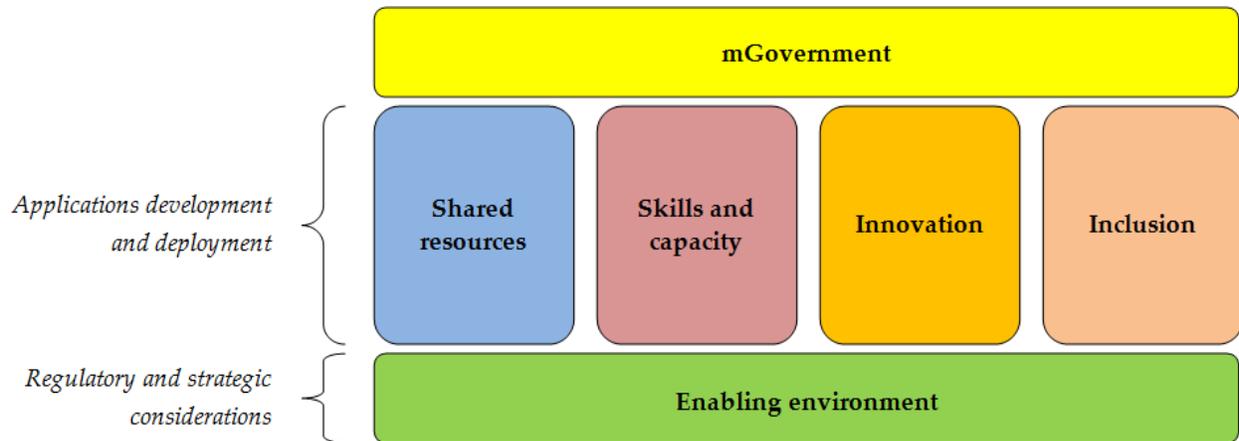


Figure 2: Towards a coordinated approach

Creating the enabling environment

Creating the enabling environment could involve the following four actions:

Development of a regulatory framework for consumers and transactions. Some level of consumer protection will be useful to ensure that mobile applications providers provide the required information on tariffs and other service conditions, and to protect private information through appropriate security protocols. One important area of discussion will have to be on how consumer complaints should be handled. It might be useful for the Government, MNOs, and applications providers to collaborate on the development of a content code and create a self-regulatory structure to enforce it.

Furthermore, the Government may have to develop or amend some of its existing administrative rules to allow documents such as surveys or information that are submitted through mobile applications to be considered as legal documents.

Creation of a regulatory framework for mobile payments. Mobile payments will allow the mobile phone to be used as a tool to allow transfers of small amounts of money from one user to another, or from a user to an agency. Given that many Government transactions involve the transfer of money to citizens (e.g. social protection payments, subsidies, small grants) or payment of some fees by citizens (e.g. applications for drivers licenses, certificates, health services), enabling mobile payments will allow citizens without bank accounts or who cannot carry cash due to security considerations to make payments

securely. Such a regulatory framework will also create the conditions to allow a wide range of mobile telephone based financial services and mobile commerce^d to develop.

It is important for Da Afghanistan Bank to create a regulatory framework for mobile payments that will enable innovation while protecting consumers and managing risk. Key issues that will also have to be addressed include managing agent liability in the field, cash float management, and ensuring strong measures to prevent money laundering. In this, it is possible to link money transfer with the e-ID program of the Government for verification purposes. The reader is directed to the literature on regulation of mobile money and branchless banking.³⁴

In the case of regulatory frameworks for consumer protection, transactions, and mobile payments, it is possible to use a “do-and-learn” approach to test the usefulness and validity of these frameworks rather than waiting for perfection.

Development of associated telecommunications policies. Finally, even though simple mobile applications are possible to deploy over existing 2G mobile networks in Afghanistan, the Government should in addition begin to consider policies to enable the introduction and spread of advanced 3G-and-beyond networks (that support mobile high-speed Internet access). These networks will enable the provision of more sophisticated applications allowing delivery of multimedia content and complex services (e.g. educational content to schools, videos on farming techniques).

Given the importance of ensuring the widest reach of such networks, policies for 3G-and-beyond networks need to balance the objectives of short-term revenues to the Government—derived through radio spectrum licensing—with the strategic objectives of improved Internet access and the development of the applications ecosystem.

Creating a mobile Government strategy. Even as it creates the enabling environment, the Government will need to develop a mobile Government strategy or strategic framework that could be part of or linked with the eGovernment strategic master plan being developed by MCIT. This strategy could be developed through a consultative process across Government, with MNOs, and local and international stakeholders. The development of this strategy will help the Government clearly identify gaps to be addressed, define mechanisms to address them, and prioritize the series of actions to implement the coordinated approach.

Furthermore, a strategic approach to m-apps in Government will need to include an analysis of how different groups of users (e.g. by gender, literacy, income) will use applications and address the widest range of needs. It should also look at how these applications might be integrated into organization workflow, especially in the case of m-apps used for program management. Finally, as infrastructure evolves and telecommunications networks in Afghanistan grow in reach and capacity, it will be necessary to evolve the Government’s use of mobile technologies.

Creation of a broadly understood and accepted strategy will help overcome the tendency for a fragmented approach to the use of ICT in government that has been seen world over. It will help secure broad consensus and buy-in from a range of stakeholders within the Government. In many cases, ministries or agencies are interested in developing their own infrastructures even when it might be possible to use shared resources. While in some cases this might be appropriate, especially in the case of highly specialized or unique applications, in most cases, there are general tools that could be developed on a

^d According to one definition of the OECD, mobile commerce (m-commerce) can be understood as a business model that allows a consumer to complete all steps of a commercial transaction using a mobile phone or personal digital assistant (PDA) rather than by going to a “bricks and mortar” store or making voice calls.

common platform that could be easily customized to suit specific needs. In these cases, to develop separate applications and platforms for each ministry or agency would lead to wasteful duplication.

One of the considerations as part of the development of strategic framework will be on the organization that actually coordinates mGovernment in Afghanistan. There are three options here. First, the Government could create a dedicated agency that undertakes the coordination function. This agency could be linked with or part of the planned eGovernment resource center that is being designed. It could also be a government-funded agency that is mandated to perform this function on behalf of the Government, and is supervised by MCIT. One example of such an agency is the ICT Agency of Sri Lanka, which is tasked with implementing the e-Sri Lanka program.³⁵ Finally, the MCIT could act as a coordination agency, using the National ICT Council as a means to build consensus and to engage with other ministries towards coordination of mGovernment programs.

Coordinating the development and deployment of m-apps

If the Government adopts a coordinated approach, it can take specific actions to mainstream m-apps across Government while also developing the ecosystem. The following first outlines the areas on which the Government will have to focus in this effort, and then provides some actions that may be considered for each area. The report ends with a discussion on how the coordinated approach might be implemented in Afghanistan.

Shared resources. A required part of the coordinated approach will be the development of at least some shared resources that various Government departments would use to develop, deploy, operate, and manage mobile applications. These resources include the hardware and software needed to run the applications, and the communication services to connect with users through the MNOs (e.g. text messages, voice minutes, data services). It will also include some commonly used tools to enable the simplified development and deployment of m-apps (e.g. survey tools, peer-to-peer communication tools).

One useful shared resource is unified short codes across Government that any citizen on any network can dial to access services. Short codes are easy to remember and present a common face of the Government to all citizens irrespective of which MNO they might subscribe to. For example, in the state of Kerala, the Government has reserved the short code of 537252 (which is “Kerala” on the phone key pad). Such short codes are commonly used for emergency services such as the police or fire department, but can also be identified for Government-to-citizen services.

In essence, this becomes a mobile applications delivery platform. Similar platforms have been developed elsewhere (**Box F**). This shared resource could be hosted by MCIT along with the national data center and other databases and registries, or through a PPP arrangement where a competent firm undertakes the platform management for the Government. Another option is to create a separate agency that manages the platform and works with ministries on design and deployment of specific m-apps.

One shared resource that might soon be available is the Internet Exchange Point (IXP) that will connect all interested MNOs, Internet service providers, and other parties to each other within Afghanistan. The IXP allow transmission of data among these various entities without having to leave the country, cutting the cost and increasing the speed of data services. The IXP might also be used as a way for the Government to reach the various communication service providers without having to connect with each one separately.

Box F: Mobile applications delivery platform

A coordinated strategy for the roll out of m-apps by Government will need the creation of a common m-apps delivery platform. This platform will be a government-wide shared infrastructure operated by MCIT and available for use to any Government ministry, department, agency, or program. In some cases, it might also be open to private applications developers.

This platform enables unified content delivery to various MNOs and will allow better management of government-related numbers and short codes, IVRs, SMS, and easier development of mobile applications through shared tools (e.g. for surveys, data collection, hotline management). The platform will allow any Government ministry, department, or agency to design, test, and deploy many mobile applications rapidly; minimizing the need for individual consultations with the MNOs each time a new application is developed. It will also include for example short codes (e.g. “6653682” for Moldova) that allow a unified government-to-citizen interface across all MNOs. Hand-holding support for government agencies to benefit from the proposed platform in the design and deployment of mobile services will be integrated as part of the procurement of the platform.

Such platforms have been deployed elsewhere. One recent example is in the state of Kerala in India, where a private firm that is also responsible for m-apps advisory work and development across the state government manages the platform.

Source: Authors’ analysis, Kerala state government IT mission:
http://www.itmission.kerala.gov.in/index.php?option=com_content&view=article&id=146:m-governance&catid=35:e-governance&Itemid=67

It is also possible to encourage innovation by opening up all possible Government data and making it available for public consumption and for use in various applications. For instance, private firms will be able to use public weather information to develop storm-warning systems, or integrate them with market information systems for farmers.

One challenge that needs to be resolved here is the need to ensure common standards for technical systems and for data (e.g. coding of locations, asset types, sectors) to enable sharing of data across ministries and users. There is an opportunity created by the ongoing development of the eGovernment interoperability framework—which defines the standards for technical interoperability—to move towards such standards. Ministries and agencies such as MCIT, the Ministry of Economy, and the Central Statistics Office could collaborate on a coding standardization effort.

Skills and capacity. Strengthening of human capacity is fundamental for developing and sustaining the created m-apps. And the technical skills needed to design, deploy, and operate m-apps are not complex. However, there is a shortage in Afghanistan of skilled IT labor who could perform these tasks in both the public and private sectors. Hence, the Government will need to consider ways in which it can build IT skills through educational institutions and within Government to create a pool of talented applications developers and managers. One powerful option is to create a skills and competency matrix that emphasizes on building a local talent pool of m-apps developers. Institutes that follow this matrix could be certified to provide students with reassurance of the quality of their education.

Furthermore, the public sector is only now beginning to consider the strategic uses of ICT and specifically mobile technologies. Hence, there will be a need to undertake some capacity building programs to develop these skills, or to create a mobile applications advisory team that would act as advisors across Government on how m-apps might be used to address various challenges facing ministries and programs. An indicative term of reference for this team, which could be hosted by MCIT, is provided

in Annex C. The team could work closely with some ministries based on level of demand and the potential for the strategic use of m-apps to support these ministries’ programs.

The private sector—especially MNOs and applications developers—are keen to expand their work in the m-apps space. This creates a unique opportunity for partnerships between the public and private sectors to design skills development programs, create m-apps through PPPs or through outsourcing arrangements. The Government can thus ride the wave of m-apps development in Afghanistan to realize significant benefits quickly.

Innovation. As has been discussed earlier, it is possible for the Government to use the mainstreaming of m-apps as a way to support the development of the local IT industry. Furthermore, it might also be possible for some applications to be developed or even managed by private IT players. In some cases, the entire application could be outsourced to a private firm, especially when there is a clear possibility of revenue generation (e.g. through advertising or subscription fees). In any case, the Government will be able to promote innovative approaches to applications development and operation through an innovation grant program, use of PPPs, or other mechanisms to encourage the private sector to provide solutions to challenges facing the Government.

Linked with the skills development agenda, another possibility is for the Government to set up an incubator that focuses on providing entrepreneurs a physical, social, and intellectual space to develop innovative m-apps. By linking these incubators with universities, MNOs, established applications developers, and aggregators, it will be possible to promote skilled individuals and innovation. This incubator could be associated with a university, or with the planned ICT Village. There are efforts underway to create such m-apps focused incubators globally.³⁶

Inclusion. It will be important to ensure that m-apps development remains focused on the beneficiaries of these applications, especially in the case of service delivery or information provision. It will be important to create or have locally relevant content, and to make sure that the content and the application fit the needs and ICT literacy levels of users. Furthermore, it is possible to use intermediaries to spur the adoption of m-apps, especially if these intermediaries are trusted members of the community. These intermediaries can play a vital role in educating users and driving adoption of applications. Finally, the Government could look for ways in which every application that is deployed is tested to ensure it works across networks and for a wide range of handsets.

In order to address these focus areas across the different components of the ecosystem as part of a coordinated approach, the Government can some of the possible actions listed in Table 5.

Table 5: Possible actions to build components of the ecosystem towards a coordinated approach

Component	Actions in relevant focus areas
Owners	<p>Shared resources</p> <ul style="list-style-type: none"> • Create common coding standards for locations, sectors and activities, etc. to enable easy information input and retrieval • Open access to as much Government data including statistics, weather data, commodity prices etc., including secure access to the e-ID database <p>Skills and capacity</p> <ul style="list-style-type: none"> • Create an advisory group to help various ministries identify possible m-apps and develop functional specifications • Programs to develop skills of public sector officials to understand how they can integrate m-apps in their programs

Component	Actions in relevant focus areas
	<p>Innovation</p> <ul style="list-style-type: none"> • Innovation grants to encourage Government agencies to test ideas for m-apps and involve the private sector in solutions; include demand-side identification of m-apps
Content providers	<p>Innovation</p> <ul style="list-style-type: none"> • Promote content development by communities and users <p>Inclusion</p> <ul style="list-style-type: none"> • Digitize available content and create content in focus areas (agriculture, health) • Create content based on user needs and relevant to local context
Application Developers	<p>Shared resources</p> <ul style="list-style-type: none"> • Design some commonly used apps such as surveys or program management tools that are portable across different ministries and could be quickly customized and deployed <p>Skills and capacity</p> <ul style="list-style-type: none"> • Define a competency matrix for IT skills training programs • Train students in the educational institutions to build programming skills to develop mobile applications <p>Innovation</p> <ul style="list-style-type: none"> • Incubation facilities to micro and small applications development firms
System manager	<p>Shared resources</p> <ul style="list-style-type: none"> • Create a common team that could manage various applications at a central location based on the service requirements of various ministries <p>Skills and capacity</p> <ul style="list-style-type: none"> • Use private local IT firms to manage these systems to help them build capacity
Aggregators	<p>Shared resources</p> <ul style="list-style-type: none"> • Create applications delivery platform with the hardware, software, and communication capacity to host m-apps across Government; this platform should allow quick and inexpensive design, testing, and deployment <p>Inclusion</p> <ul style="list-style-type: none"> • Standardize access and the compliance testing across mobile networks
MNOs	<p>Shared resources</p> <ul style="list-style-type: none"> • Provide location data through the mobile networks for location based services <p>Innovation</p> <ul style="list-style-type: none"> • Develop standards to allow quick design and deployment <p>Inclusion</p> <ul style="list-style-type: none"> • Co-branding of m-apps where appropriate to build trust and enhance take up among users • Marketing non-voice services (e.g. SMS and USSD) to a wider audience • Ensure transparency in charges
Intermediaries	<p>Skills and capacity</p> <ul style="list-style-type: none"> • Undertake training programs for intermediaries and incent their participation in m-apps programs <p>Inclusion</p> <ul style="list-style-type: none"> • Identify and train possible intermediaries who can support the take up of m-apps (e.g. community councils, village facilitators)
Users	<p>Shared resources</p> <ul style="list-style-type: none"> • Secure a common short code across all operators to allow all citizens to reach and use m-apps no matter their network

Component	Actions in relevant focus areas
	<p>Skills and capacity</p> <ul style="list-style-type: none"> • Communication campaigns to educate users on how to access and use m-apps <p>Innovation</p> <ul style="list-style-type: none"> • Look for opportunities to enable and encourage user generated content <p>Inclusion</p> <ul style="list-style-type: none"> • Ensure wide communication to users of various services, and communicate value proposition • Tailor applications to cultural and social norms of users to deepen acceptability

Short term actions

Of the many actions listed above, the Government can complete with the following short-term actions by end 2010 to promote mainstreaming of m-apps and to begin the development of the ecosystem:

Action	Expected impact	Responsible agency
Establish <i>common national short codes</i> across all MNOs for citizens to easily reach the Government	Allows toll free C2G communication and bulk discounts for G2C communication, enables rapid deployment of m-apps; well recognized numbers generate also trust and “brand recognition”; common codes simplifies access to services for citizens ³⁷	MCIT with ATRA and industry bodies
Set up a mobile applications <i>advisory team</i> under the MCIT	Creates a resource that will begin preparation of the mGovernment strategic plan, design the mobile applications delivery platform, and assist ministries and agencies to identify ways in which they might use applications	MCIT with support of industry bodies
Define competency matrix to <i>identify skills</i> needed for IT training programs that could be Government certified	Clarifies how IT skills and training programs of public or private organizations can gear students towards m-apps development; clarifies the skills roadmap for students based on industry needs	MCIT with MoE, MoHE, industry and regional bodies

Implementation considerations

This analysis exposes four important considerations as the Government moves towards implementing the coordinated approach to mainstreaming m-apps. In concluding the report, this section discusses these considerations.

Coordination considerations

As noted earlier, there are two aspects to the coordinated approach. First is the creation of the enabling policy and regulatory environment for m-apps. Second is the coordination to design, develop, and deploy m-apps across Government.

Regulatory coordination is useful because many of the applications for financial, health, or education services lie at the intersection of multiple agencies’ competencies. For instance, regulation of mobile financial services requires a discussion of consumer protection on the financial side (e.g. regarding deposit security) and on the telecommunication side (e.g. complaint handling, transaction fees). It is useful for the responsible agencies to coordinate their responses to these innovative services in order to strike a balance between innovation and consumer protection.

Seeking regulatory coordination might be a challenge. It is usually out of the remit of any one agency or body to coordinate across regulators—Parliament might be able to coordinate in some cases, as might the Cabinet of Ministers. Yet, there will be specific issues to which such high-level offices may not be able to attend. However, there might nevertheless be an opportunity to use the development of a strategic framework to encourage dialogue among ministries and agencies if not complete coordination. At the very least, it might be possible for MCIT to use the presence of the National ICT Council of Afghanistan as one mechanism to help in this dialogue or even in coordination.

On the other hand, it might be easier to coordinate the design, development, and deployment of applications, although this might also evolve over time—beginning with a few ministries and then expanding across Government. As has been discussed in the preceding section, one of the pillars of the coordinated approach will be to create shared resources—infrastructure, services, and skills—that could be used across Government to design, develop, and deploy m-apps. Given that MCIT is the responsible ministry for the ICT sector, it could lead in creating these resources and acting as a coordinator.

The coordination of m-apps has some precedents in other countries. In Kerala, the entire mGovernment platform is managed by a private firm on behalf of the state government and supervised by the Department of IT. In other countries, eGovernment resource centers coordinate broader eGovernment programs through a combination of advisory services and using shared infrastructure. There are plans to develop such a center in Afghanistan as well, and the mGovernment function could be included in this center once it is fully operational. In some cases, such as Sri Lanka, special bodies exist to undertake this function. These bodies are Government mandated and responsible to the line ministry or other supervisory body, but work closely with the private sector, NGOs, and across the public sector to mainstream e-services.

Rather than creating an entirely new body, however, it might be useful to begin in Afghanistan with the creation of a special department or group within MCIT. This department could create the shared infrastructure and services described above, and have the necessary staff that will work across Government. In order to accommodate the constantly evolving and dynamic nature of the industry, contracted advisors who serve for a definite term may staff this department. This ensures a constant upgrading of expertise and knowledge; advisors may be drawn from the private sector or other governments and would be familiar with emerging “next practice” rather than attempt to focus on traditional techniques. As noted earlier, MCIT, as the ministry responsible for the ICT sector, to consider the range of coordination mechanisms that will function given the local circumstances, and engage across Government through the National ICT Council and other venues.

The role of the public and private sector

At no point should this report be read as suggesting that the Government’s efforts to ‘become mobile’ should displace private sector efforts. Indeed, both private and public sector efforts will complement and strengthen each other. While the private sector will focus on commercially viable applications including media and infotainment, mCommerce, and advertizing or subscription based information services, the public sector will focus on deploying applications that serve public needs or support program management.

The push by private entities to increase the use of m-apps will have positive impacts for the mGovernment agenda as well—people will become more familiar with the variety of services and be able to use mGovernment services in a more sophisticated manner. Simultaneously, the demand for m-apps from the Government will help grow the local IT industry and support innovation based MSME development.

Given the potentially limited capacity within Government to design, deploy, and manage m-apps, it is possible to support or supplement the public sector with private sector capacity. It is possible, as the Kerala example shows, to outsource the entire development and management of the shared resources to the private sector, under the supervision of the coordinating body.³⁸ However, other arrangements might also be possible. For instance, the Government could call upon the private IT firms to provide interim support to manage m-apps even as their own staff are trained and become competent.

Deploying m-apps will in any case need intense and close collaboration with mobile network operators (MNOs), who are the channel to reach citizens. In addition, the Government could think about using PPPs where possible to design and develop m-apps to ensure sustainability and reduce the initial dependence on potentially limited internal IT skills within the Government.

Creating the “fixed” services to complement mobile applications

Finally, even though m-apps will help extend public services to remote and underserved areas of Afghanistan, it is essential that the Government continue its efforts to expand the reach of traditional modes of service delivery. Health information services, for example, can be effective up to a certain point, after which the person will have to visit a doctor or health worker. Similarly, complaint lines or surveys should also have follow up.

Indeed, without the development of community access points for such services or follow up in response to data collected, there is a risk that citizens might find only limited utility in the mobile based services and even ‘drop out’ after using it a few times.

The Government is undertaking a number of initiatives to create this ‘fixed’ network to improve citizens’ access to public services. For instance, the Community Health Workers and Midwives network includes over 27,000 employees across the country. This is a powerful first step. Other similar efforts in education, rural development, and agriculture will also take Afghanistan towards greater coverage of public services. It is also possible to link the efforts at mGovernment with other programs including the larger eGovernment program.

The links with eGovernment

Finally, even though this report has focused on mobile applications and on mGovernment, it closes on the note that mGovernment is one part of the larger effort to make Government services ubiquitous and use multiple channels to transform the relationships among Government, businesses, and citizens.

Hence, mGovernment should be seen as one part of the larger eGovernment effort in Afghanistan. The resources, skills, and innovations undertaken as part of the mGovernment program, and the enabling environment that is created for m-apps will have to thus fit within or at least align with the in-development e-Government Strategic Master Plan of the Government.

The Government has many opportunities to grow the reach of information services. For instance, it could use the widespread Community Development Councils created through the National Solidarity Program, or the planned Village Facilitators of the Rural Enterprise Development program as a network of community information providers. Similar programs in India and Africa have been successful.³⁹ It is also possible to use the already deployed Village Communications Network (VCN) and District Communications Network (DCN) in Afghanistan to create citizen service centers. Plans for e-society initiatives in Afghanistan include such Government-to-citizen service delivery programs.

Such alignment or fit will be needed to ensure that the services and technologies deployed as part of the mGovernment effort can work seamlessly with the planned eGovernment services and technologies, creating a unified platform for delivery of services and program management.

Annex A: The m-apps ecosystem

Table 6 provides a detailed look at the various components of the m-apps ecosystem and provides some examples of actors in each group. It is important to note that some actors work across components. For instance, the MNOs in Afghanistan develop applications, manage systems, provide platforms, and have their field agents act as intermediaries. Other actors are also similarly working across various components of the ecosystem.

Table 6: Components of the ecosystem for m-apps

Component	Function	Actors typically responsible
Enabling environment	Creating the policy and regulatory environment to encourage innovation in applications, entry of and competition between applications development firms, and the protection of consumers and users	Depending on the application, ICT policymakers, user ministries and regulators (e.g. MoPH, MoF, Da Afghanistan Bank)
“Owner”	Generating the ideas for and investing in m-apps, overall responsibility for the application	Government ministries and agencies, private firms, individuals
Handset vendors	Partnering with mobile networks and applications developers to share information on interfaces, standards, and to design handsets based on user demand	Telecommunications manufacturers, industry associations, mobile network operators
Content providers	Providing the underlying content (media, data, bulletins) that are to be formatted and delivered to the consumer	Government and public agencies, universities, research organizations, media companies, owners, telecommunications vendors
Application developers	Developing and deploying the application software and sometimes hardware to deliver the application and content to the user	Private applications development firms, Government IT departments, individuals, telecommunications vendors, MNOs, MSMEs
System manager	Responsible for the functioning of the application and managing users, upgrading and maintaining the systems and services	Private applications development firms, Government IT departments, individuals, MSMEs, MNOs
Aggregators or platforms	Providing shared infrastructure or services to deploy applications provided by developers, managing relationships between developers and the MNOs, in some cases managing billing and customer relationships	Private firms, a Government agency, MSMEs, MNOs
Mobile networks	Delivering the application to the user, in many cases managing the billing and customer relationships	Telecommunications companies
Intermediaries	Marketing applications, training users, acting as an alternate billing channel; very important for m-apps that need a field force e.g. for data collection, registration of farmers, beneficiaries	Individuals, franchises, retail distribution channels (e.g. shops)
Users	Use the application	Citizens, enterprise staff, businesses, government officials

The following details the important components of the ecosystem.

Enabling environment

Without a favorable policy and regulatory environment, m-apps cannot develop, or will face significant limitations. With m-apps the ICT policymaker or regulator that has a role to play and sometimes the policymaker or regulator for the sector in which the application is being used has to also develop the required frameworks. For example, mobile telephones are increasingly being used as a means to transfer small amounts of money between users. Such mobile money transfer services fall under the purview of the financial regulator such as central banks, which may develop the regulations for electronic money services or to ensure consumer protection and manage financial risks.⁴⁰ The role of the health ministry might be important to safeguard patient privacy, ensure high quality medical information services, and ensure adequate data security if health information is being transferred over mobile telephone networks.

ICT regulators and policymakers also have a role to play. They have to protect consumers from unsolicited sales of m-apps, inadequate disclosure of information, and protection of minors. Furthermore, they may have to strengthen the regulatory frameworks pertaining to quality of service over the mobile telephone networks, and to ensure that tariff regulations are in place to make all transactions transparent. They may also play the role of technical partner, assisting the various Government ministries and agencies in designing and implementing m-apps.

Application owners

The various Government ministries and agencies that mainstream m-apps in their programs are in this case the application owners. These owners will need to consider how m-apps may help them in achieving their program objectives, or how they could cut costs in areas such as program monitoring or coordination among geographically distributed staff.

This report has been prepared based on detailed discussions with possible application owners such as the Ministries of Education, Public Health, MRRD, or MAIL. These and other ministries might have very specific requirements or in some cases seek to use applications that might be common across a number of ministries (e.g. surveys, SMS based alert systems).

Content providers

In the case of information services for the public, the availability of accurate, relevant, and accessible content is critical. Such content could be sourced from existing databases or services (e.g. statistics, weather information), Government sources (e.g. health information, citizen databases), or from other electronic media (e.g. radio or television programs, academic literature), or even from user or locally generated content.

The most important feature of content provision, however, is that the content should be such that it generates a high level of trust among users and is locally relevant. Local relevance goes beyond language, and it includes developing content that addresses say social or health issues in a socially acceptable manner.

Application developers and system managers

On the technology front, there are two key players. The first are the application developers, who create the system, and the second are the system managers, who operate and manage the system once it is installed. In some cases, the same individual, firm, or entity might perform these two functions.

Most applications developers are individuals or relatively small, with a few employees, while some larger applications developers also exist and include some of the largest IT firms in the world. Nevertheless, application development should focus on the needs of users and hence the developer should work closely

with the application owner and if possible with end-users to understand what the system should do, and design it accordingly.

System managers could be members of existing IT departments in the ministries if they have the right skill sets, or could be sourced from local IT firms or even from the application developer. In any case, the system manager has a role that often goes beyond mere technical maintenance. It also includes understanding demand for additional services, upgrading the systems to match demand growth, and responding to the questions and problems of end-users.

Aggregators or platform providers

There are two possibilities to deploy m-apps. In the first case, each application has a separate set of software and hardware and is deployed through separate arrangements with MNOs and system managers. However, this approach might result in the unnecessary duplication of infrastructure, especially when many applications use similar tools (e.g. SMS based surveys or alerts, voice hotlines). This increases costs and the time for deployment of applications.

A second approach is to have an aggregator or platform provider who creates shared infrastructure (e.g. servers) and services (e.g. bulk SMS, connection to IVR services) and software (e.g. standard tools such as customizable surveys, alert system programs). Once this platform is created, it allows any agency connected with it to quickly call on these resources and develop new applications, and test and deploy them without having to pay for duplicate infrastructure in each case.

It is possible to create such a shared platform for the entire Government to which any ministry or agency could connect. In addition to the hardware, software, and services, such a platform provider could also provide the necessary human resources and skills to create and manage applications. This concept is discussed in detail later (page 14).

MNOs

The role of mobile networks is critical in the m-apps ecosystem. First, they are the basis of applications provision to the users. Without their support and involvement, m-apps cannot function effectively. And in many cases, operators develop and manage applications on behalf of other agencies. Hence, the MNOs are a key partner for the Government to deploy the identified applications, but also to develop the m-apps ecosystem.

Users

Without exception, users are the most important part of the m-apps ecosystem. It is necessary for any application owner, developer, and manager to understand their needs, address their specific demands and requirements, and to ensure that the m-apps developed are relevant and accessible to them.

In many cases, users quickly learn about the benefits of using specific m-apps, especially if these are economically or socially beneficial to them, or if they help reduce costs or complexity in their business or personal lives. Hence, m-apps can evolve very quickly from simple voice or SMS based systems to more complex interactive services or even, in the future, to multimedia Internet based services.

Annex B: Indicative costs

It is difficult to provide exact cost estimates for various mobile applications that have been identified or might be developed in the future. Especially important as a factor in determining costs is whether the Government will choose a coordinated approach or if it will go for an *ad hoc* approach; start up costs for the coordinated approach may be higher, but the long run costs in other approaches may likely be higher.

Nonetheless, it is useful to break down the various cost components to provide an indicative cost of designing, developing, and operating an application. Most mobile applications involve a mix of the types of costs summarized in Table 7, which also provides an indication of the range of costs involved, based on discussions with applications developers in the region.

Table 7: The categories and range of costs for m-apps

Category	Description	Range of costs ⁴¹
<i>Design</i>	Work with end-users, ministries, and MNOs to define the specification of the application	US\$5-20K depending on the complexity of the application
<i>Development</i>	Create the software required to implement the application as defined	US\$1-50K depending on the complexity of the application
<i>Platforms</i>	Creation of a coordinated applications platform that connect with various agencies and networks and includes the tools, hardware, and software to allow a flexible and wide range of uses; other applications can be built on this	US\$50K-1M depending on the types of services and infrastructure deployed: <i>shared platforms will cut costs of development, deployment, operation, and management</i>
<i>Deployment</i>	Set up the hardware, install the software, train staff, test and remedy any problems with the system, run a pilot or initial phase of rollout, negotiate with MNOs for use of their network	US\$1-100K depending on complexity and required performance levels; costs increase if handsets are to be procured ⁴²
<i>Operation</i>	Recurring costs for communication services to reach end-users (e.g. via SMS, voice calls), to allow C2G communication (e.g. toll free SMS), and for connectivity from application to MNO systems	US\$0.05 per SMS; US\$0.1 per minute of voice call; US\$0.1 per MB data; connectivity negotiable
<i>Management</i>	Recurring costs associated with staff and expenses to maintain, upgrade, and manage the hardware and software; costs could increase if content development is needed	US\$1-10K per month depending on staff skills and number, performance levels required, and costs of electricity etc.
<i>Assessment</i>	Assess the functioning of the system satisfaction of end-users, scope for upgrades or improvements	US\$1-20K depending on the depth and extend of the assessment

Over the longer term, it will be possible to reduce costs as volumes increase (especially for operation), as technology prices reduce over time, and as the Government deploys and uses shared services and infrastructure to support m-apps development, deployment, operation, and management.

Annex C: Indicative terms of reference for the m-applications advisory team

These indicative terms of reference have been based on the document prepared by the Kerala state government in India as part of the process to create the delivery platform for mGovernment.⁴³

The consulting model has proved to be ideal to design m-applications, as it is a challenge to build solutions that are:

- Accessible to the masses, irrespective of their socio-cultural and educational background
- Scalable to such an extent that the entire population benefits from them
- Acceptable by and deployable across all the Telecom Operators
- Replicable and Deployable with minimal changes, for similar requirements

Hence, the team would initially establish contact with various ministries, agencies, and programs and discuss the possible applications of mobile and wireless technologies. After short-listing potential areas, field-studies would be conducted for a thorough as-is analysis. In the next stage, a detailed Functional Requirement Specification (FRS) would be prepared for the proposed solution. The project implementation would commence after the FRS has been approved by the project stakeholders.

All the solutions deployed should be based on Open Source systems.

General scope of work:

- Identifying the mobile application/service for at least ten ministries/agencies
- System study on how the existing backend database of those departments will be integrated with the proposed system and how integration will have to be done by the vendor regarding the services that will be offered to end users
- Validation of the application concept and design with users and ministries/agencies
- Development of the applications/ interfaces FRS based on the study
- Development of the scope of work for the application developers, content developers, and other responsible agencies

If this team is responsible for the shared platform:

- Establishing the common infrastructure and managing it
- Working with the applications and content developers to design the application to work on the platform
- Test services to be demonstrated to users and readied for launch with the approval of department head
- Launch of service
- Impact analysis and country-wide roll out plan

Notes

¹ BDA estimates suggest that the two finalists of Indian Idol Season 3 drew a combined tally of 70 million SMS votes. At an average cost of INR 3, the revenue generated reached around INR 210 million (US\$ 5.25 million). The volume averages to – 320,000 SMS per hour – 5,400 SMS per minute – 90 SMS per second. Similarly, in Bhutan, Druk Idol saw over 380,000 votes cast, of which about 70 percent were through SMS. This equates to about 40 percent of the population voting through SMS.

² The Asia Foundation, Afghanistan in 2009, pg. 137

³ Data provided by the Ministry of Communications and IT of Afghanistan

⁴ Countries such as Rwanda, Iraq, and the Palestinian Territories have seen a number of m-apps aimed at social and economic development programs or coordination. Some of these applications are discussed subsequently. See notes 8 and 9.

⁵ The difference between PC based Internet applications and m-apps are mainly due to two reasons: the lower computing power of the average mobile device and especially telephones; and the much smaller screen size of mobile devices. It is possible, hence, to have the same application available on the PC and mobile telephone, even if the look and some functionality vary.

⁶ M. Gundecha, T. Kosnik and K. Bajaj, “Future of Mobile VAS in India”, *BDA and Stanford University*, <http://www.bdconnect.com/WebUI/EventsInfo.aspx?id=200704260845264981&idIndex=82&child=1>

⁷ This includes initial discussions during Bank ICT team missions in June and October 2009, a workshop conducted in February 2010 in Kabul, a series of discussions with various ministries during missions in February, April, and June 2010.

⁸ eSoko: http://www.rwandagateway.org/article.php3?id_article=9669

⁹ SoukTel: <http://www.souktel.org/>

¹⁰ Handhelds for Health in India: <http://handheldsforhealth.org/>

¹¹ Mobile Walkie Talkies in Uganda: <http://info.worldbank.org/etools/docs/library/108549/IKN40jan02.pdf>, <http://unpan1.un.org/intradoc/groups/public/documents/un/unpan030003.pdf>

¹² VFs network for program management and M&E, which provide VFs with data and camera-equipped handsets to enable communication with the PIU. VF monitoring and evaluation is possible through the mobile phone (and hiring). VFs can create their own community of practice that will enable mentoring across regions and with experts.

¹³ Digital Inclusion Kit in Health:

<http://www.unpan.org/Library/KnowledgeBaseofICTforPublicService/tabid/826/ctl/ProductDetail/mid/2182/ProductID/30/language/en-US/Default.aspx>

¹⁴ Farmer’s Friend in Uganda: <http://www.itu.int/net/itunews/issues/2009/07/38.aspx>

¹⁵ Distance Diagnostics through Digital Imaging (DDDI): <http://www.dddi.org/index.cfm?show=impacts>

¹⁶ Disaster Early Warning Network (DEWN): <http://ict4d-in-srilanka.blogspot.com/2009/02/disaster-emergency-warning-network-dewn.html>

¹⁷ mPaisa and m-salary: http://www.roshan.af/web/?page_id=475

¹⁸ UAP Insurance and Safaricom: <http://www.alertnet.org/thenews/newsdesk/LDE62502R.htm>

¹⁹ KomKom, for example, is a simple m-application that allows craft artisans to manage their business better: it tracks their sales and personal and professional expenses, allowing artisans to be more aware of their earning and spending and make appropriate financial decisions

²⁰ T. E. Starner, C. M. Snoeck, B. A. Wong, and R. M. McGuire, “Use of Mobile Appointment Scheduling Devices”, *College of Computing and GVI Center* (Georgia Institute of Technology): citeseerx.ist.psu.edu

²¹ Westlaw Training by Phone: <http://unpan1.un.org/intradoc/groups/public/documents/un/unpan030003.pdf>

²² Clickatell: <http://mobilemoneyafrica.com/archives/category/news/global-news/page/4>

²³ Organization for Economic Cooperation and Development (OECD), Mobile commerce, January 2007: <http://www.oecd.org/dataoecd/22/52/38077227.pdf>

²⁴ See <http://www.cgap.org/p/site/c/template.rc/1.11.14910/>

²⁵ http://www.gsmworld.com/our-work/mobile_lifestyle/mobile_money/mobile_money_transfer/index.htm

²⁶ Roshan M-PAISA facilitating microfinance loan disbursements: <http://www.microcapital.org/press-release-vodafone-and-roshan-to-serve-microfinance-institution-customers-via-m-paisa-branchless-banking-the-first-mobile-money-transfer-service-in-afghanistan/>

²⁷ Souktel: <http://www.souktel.org/>

²⁸ Bangladesh CelBazar: <http://www.cellbazaar.com/web/>

²⁹ The Asia Foundation, Afghanistan in 2009, pg. 137

³⁰ The Asia Foundation, Afghanistan in 2009, pg. 145

³¹ Reuters Market Light (RML) which provides farmers in India with weather, market price, and agronomy information using SMS: <http://www.youtube.com/watch?v=0fMIWYg8NNS>

³² World Bank data

³³ For example, if the system functions using interactive voice menus, the voice should be of a woman; in the case of text based systems, the name of the system and grammar used in the messages should be formatted as if a woman has written them.

³⁴ For an introduction to regulatory issue regarding mobile banking, for instance, see note 40.

³⁵ The Information and Communication Technology Agency (ICTA) of Sri Lanka is the single apex body involved in ICT policy and direction for the nation. Wholly owned by the Government of Sri Lanka, ICTA is the implementing organization of the e-Sri Lanka Initiative. Major donors including the World Bank fund a number of the Agency's initiatives. <http://www.icta.lk/>

³⁶ See, for example, a recent initiative by infoDev: <http://www.infodev.org/en/Article.517.html>; see also the Grameen Foundation AppsLab in Uganda: <http://www.grameenfoundation.applab.org/section/index>

³⁷ ITU-T Study Group 2 has issued a number of international Recommendations in this area, such as the emergency information for next of kin, or international child helplines. More information is available at <http://www.itu.int/ITU-T/studygroups/com02/index.asp>

³⁸ MediaNama, Kerala Govt To Pilot 21 M-Governance Services With MobMe Wireless, November 2009, <http://www.medianama.com/2009/11/223-kerala-govt-to-pilot-21-m-governance-services-with-mobme-wireless/>

³⁹ See Grameen Foundation's Community Knowledge Worker initiative: <http://www.grameenfoundation.applab.org/section/community-knowledge-worker-project>; and the ITC e-Choupal initiative where village 'sanchalaks' or facilitators provide market information to farmers: <http://www.itcportal.com/rural-development/echoupal.htm>

⁴⁰ Timothy R. Lyman, Mark Pickens, David Porteous, Regulating Transformational Branchless Banking: Mobile Phones and Other Technology to Increase Access to Finance, CGAP, January 2008: <http://www.cgap.org/gm/document-1.9.2583/FN43.pdf>

⁴¹ These estimates are based on discussions with MNOs and with developers, and it is important to note that they are applicable in specific circumstances and that costs may vary depending on a variety of criteria. It is important to note that these costs are estimated for public service delivery and program management types of applications, and that the costs will vary significantly depending on how much an application could replicate other systems or use standardized technologies.

⁴² Cost of handsets vary from US\$20-500 depending on capabilities. Bulk purchase discounts are possible. However, programs should evaluate carefully the benefit of handset purchases, especially if large numbers or for simple functions (e.g. SMS, voice). The price of high end "smart phones" that have full Internet capability, GPS locators, and a camera have begun to reduce. Nokia, for instance, has now released a €100 smart phone, and other "semi-smart phones" are also available for as little as US\$200 in the retail market. See http://www.etaiwannews.com/etn/news_content.php?id=1226491&lang=eng_news&cate_img=35.jpg&cate_rss=news_Business

⁴³ The complete tender document is available at the State IT Mission website here: http://www.itmission.kerala.gov.in/index.php?option=com_content&view=article&id=302:rfp-for-setting-up-managed-mobile-service-delivery-platform-implementation-of-pilot-m-services-etc-tender-date--16062009&catid=72:tender-archives&Itemid=44