Royal Government of Bhutan

Strategic Framework for Delivery of Services through Mobile Technologies in Bhutan

Volume 1: Main Report

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Sources

In assembling this report the team has drawn on many published sources, as well as on the team's own resources. To keep the report readable, references to sources have not been provided at every occurrence; our main sources are identified in the bibliography (Annex L). Figures without specific attribution can be assumed to be the team's own creation. We thank all authors of sources.

Disclaimer

The views expressed in this report are those of the consultancy team. They do not commit either SDC or MoIC in any way.

Executive Summary

This report assesses the existing situation around mobile government services (m-government services) in Bhutan and proposes ways to greatly grow such activities over the coming five years. It is based on a short intensive study which included interviews with both demand-side and supply-side actors and operators of Community Centres, as well as reviews of Bhutanese and international literature, other desk research and analysis, and two stakeholder workshops.

The introductory part of the report provides an overview of the meaning of "G2C" and related common m-service ideas, with examples, and discusses the meaning and relevance of mobile ecosystems.

Mobile communications in Bhutan started in November 2003. After this late start, roll-out and take-up have been rapid and use has now spread to all sections of society, with all villages having 2G (voice) network coverage and 93% of households having at least one mobile phone in 2012. Users are attracted by non-communications features of phones including radios and MP3 players, but smart phones have not yet achieved a majority take-up, and the 3G mobile coverage needed to use smart phones is restricted to main towns. Prices have been falling in real terms, and Bhutan ranks well on a regional price comparison and moderately on a regional affordability comparison.

Overall, we find that Bhutanese people of all classes and groups have taken very readily to using mobile phones. However, they have certain capacity limitations, in particular, that Short Messaging Services (SMS) are only useful for people who can read and write in English. This excludes 37% of the population who are illiterate in any language plus 8% who are literate in Dzongkha but not in English. Some people will also feel constrained by cost. The most significant constraint on use of new services is, however, probably neither literacy nor cost, but simply personal preferences for the familiar.

Existing policy frameworks, in particular those concerning the telecommunication sector, e-government, good governance and licensing, are generally favourable to the expansion of m-government services. There are some gaps in the legal and regulatory frameworks, and the main ordinance is already slated for review in the next year. We highlight some areas for special attention in this review, in particular related to data protection and privacy, and to the suitability of content that may become accessible to minors. Regulations on competition should be expedited and those on the Universal Service Fund should be reviewed; the numbering plan and associated regulations may also benefit from review to give users a coherent experience.

The technical component of this project carried out a comprehensive review of 14 available technologies which could support mobile services delivery in Bhutan. We recommend developing a shared (Whole-of-Government) Mobile Service Delivery Gateway (MSDG), based on the existing SMS Gateway. As well as encompassing most of the technologies reviewed, it will include a payment gateway and authentication and signature checking. A year-by-year schedule is proposed for enhancing the capabilities of the MSDG. Other technical recommendations include making all government websites mobile compliant, exploring possibilities of consolidating and expanding existing contact centres, evolving the eGovernment Interoperability Framework (eGIF) to cover mobile platforms, and pooling and developing existing skilled human resources.

As well as speeding up the roll-out of broadband wireless infrastructure, improvements will be needed in agency backend systems , internal infrastructure, and human resources as well as in private sector human resources, if they are to support the desired m-service expansion. The scale of improvements required appears to be stretching but feasible. Device and content localisation (for example, to use Dzongkha script) are desirable for cultural reasons although they are not clearly economically viable.

Two major banks in conjunction with the largest network operator are introducing B-Wallet services, seen as first steps towards mobile money. Universal mobile money (usable by people without bank accounts) is essential to implementing any m-government services which involve payment, and will also be of much broader support to the economy and to making rural people's lives easier. We strongly recommend speeding up progress towards universal m-money, in the first instance by achieving an appropriate regulatory balance so that the market can be commercially attractive, as it is in many other countries.

The project examined the existing G2C services project, and found that many existing services are directed at people in their business rather than in their citizen capacities; also, they mainly avoid negative results (such as penalties for unauthorised activities) rather than providing positively wanted results (such as better crops through agricultural advice). Their online presence also leaves room for improvement in both content and presentation. In the circumstances it is not surprising if take-up of many services has been disappointing. Some online services are however well used and appreciated, for example security clearance, which is now much faster and easier than before.

There is potential for using the mobile channel to enhance delivery of many of these existing services, for example providing SMS renewal alerts and SMS/USSD (Unstructured Supplementary Service Data) dialogues enabling citizens to update information provided previously. However many procedures still require large attachments to be submitted, and until these procedures can be re-engineered to eliminate such requirements they will not be suited to the mobile channel. We recommend leaving mobile implementation of many such procedures until after they have been processed in accordance with the new (currently draft) licensing policy, which involves reviewing all licences with a view to rationalising and amalgamating them and streamlining relevant procedures. We also recommend minimising the need for legal stamps.

The evolving network of Community Centres could be a considerable asset to the roll-out of m-government services, as their operators could help rural people use new types of phone and new procedures, and could become focal points for information in the locality. Equally, equipping Community Centre Operators with official mobile phones could help them to do their jobs better.

Outside the formal G2C framework, significant numbers of m-government services are already in operation and there are many ideas for more. From the user side, there is keenness to use such services, as they would save time and cost. From the supply side, there are mixed feelings across a cross-section of agencies around security and privacy issues, change management, loss of power and influence, cultural aspects, confidence and trust. However, most agencies generally support the initiative to facilitate as many services as possible on the mobile platform, as ultimately going mobile will reduce their workload and increase efficiency and effectiveness of service delivery to citizens.

Overall, our assessment of strengths, weaknesses, opportunities, risks and challenges is positive: there are significant weaknesses and difficulties ahead, but the strengths and opportunities are sufficient to make these problems well worth tackling. Like any innovation, mobile has its downsides; but international experience as reflected in copious literature strongly suggests that overall Bhutan will benefit both economically and socially from the growing use of mobiles, and that mobiles are also very positive from a gender perspective.

The condensed nature of this assignment did not allow detailed estimates of the costs and benefits of the various proposals. However, we have provided high-level indicative costs for an MSDG. We are confident that the mobile channel provides government with a very cost-effective way of contacting its citizens, and that our proposals as a package are economically sound as well as socially desirable. A full sustainability assessment would take account of benefits as well as costs, and it is clear that some potential benefits (for example of improved health) are very substantial yet hard to quantify.

Within the existing Information and Communications Technology (ICT) vision, the proposed m-government services strategic framework adds this new element:

> Bhutan will become a leader in demonstrating how mobile communications can help to improve the quality of life of poor people living in remote mountain regions. The Bhutanese Government will lead this development through imaginative yet practical use of the mobile channel for delivering services to citizens and engaging with citizens.

and takes as its goal for the 11th Five Year Plan:

> Greatly improve the speed, effectiveness and efficiency of service delivery, and extend citizen engagement, by making the mobile channel a known, valued and used medium for bothway communication between government and citizens.

Its pillars are:

- Build on existing relevant strategies, policies and good practices (e-government, licensing, information and infrastructure sharing, ICT, broadband, media, good governance, social and economic inclusion).
- Work towards universal wireless broadband connectivity.
- Work towards universally available mobile money.
- Continue educational programmes including ICT awareness and literacy as needed as all levels, leading to enlightened leadership and capable citizenry.
- Continue simplification of government requirements and processes.
- Design all new services from a user viewpoint.
- Promote and engage private sector participation in these developments.

The high-level strategy is to prepare to exploit in a few years' time the huge potential that smart phones can offer to all citizens, including those who are poor, uneducated, and differently abled, by:

- Rolling out to all gewogs and villages wireless networks capable of carrying high-speed data;
- Developing appealing smartphone applications that can be used by people who are not literate in English;
- Introducing simple voice and SMS/USSD m-government applications for use in the near future, to accustom both citizens and officials to this new way of getting things done.

A full set of detailed recommendations also covers:

- The need for high-level Government commitment and inspirational leadership for multi stakeholder co-operation;
- Support for the mobile ecosystem generally, including private sector skills development;
- Appropriate governance arrangements to supervise a full-scale m-government programme;
- The launch of pilot services, monitored to ensure maximum learning;
- Mobile enhancements to existing G2C services;
- Working with the Community Centres to mutual advantage;
- Strengthened legal and regulatory provisions.

PART I: INTRODUCTION

Bhutan-Switzerland model Friendship Bridge at the Ministry of Works and Human Settlement

1 Scope and purpose of the study

This study came about through a recognition of the great potential of mobile technology in Bhutan for public service delivery, and a desire to transform that potential into reality during the coming 11th Five Year Plan (FYP) period (2013-2018).

To quote from the terms of reference for this study:

> This tremendous increase of mobile ownership provides a stronger case for leveraging mobile services to significantly improve access to public services and in transforming government, making it easily accessible to the citizens.
>
> Mobile technology also allows developing countries to leapfrog in adopting new technologies. Realising the benefits of mobile and wireless technologies, many countries are now implementing and developing solutions to better deliver government services to public. Despite significant progress Bhutan has made in using information and communication technology (ICT), Bhutan has yet to fully utilise ICT services due to a number of factors. The rugged geographical terrain characterized by scattered and sparsely populated settlements coupled with technological and infrastructure limitations has always been a challenge when taking public services closer to the rural communities. Even if resources are available, establishment of independent facilities for offering public services are hard to sustain and may not even meet operating cost. The issue of sustainability and the role of state in providing equitable public services to all rural communities will continue so long as the equity is achieved. Therefore there is a need to find a medium and a methodology which may address both equity and sustainability issues in the long run.
>
> Considering all these limitations, service delivery through mobile technology is an option worth exploring. Concerted efforts and initiatives have already been made in G2C project whereby e-services are being provided and provisions for additional services are available. Broadly in line with the priority of the DITT, SDC shall support the introduction of mobile services that target the real needs of the rural population and complement existing service delivery initiatives in a meaningful way. Therefore a conscious choice about synergy between electronic and mobile services is critical for meeting diverse citizen service demands and to avoid costly duplication. This is particularly important for Bhutan where 60% of its population resides in remote rural areas, where they risk being by-passed by digital government initiatives. If deployed with a vision, mobile services (and ultimately m-governance) have the potential to provide additional value to the citizens, expand socioeconomic development, and enhance citizen centred service delivery systems.

The terms of reference also stressed the need for a multi-disciplinary approach that would encompass both demand-side and supply-side perspectives, include technological requirements without being technologically driven, build on relevant international experience and result in a practical, implementable outline plan for the next five years.

The terms of reference required the team to pay attention to, and where appropriate to build on, two inked initiatives in Bhutan:

- The Government to Citizens (G2C) project which has been making certain government services more accessible online (at www.citizenservices.gov.bt), and
- The Community Centres (CC) project which is setting up attended local internet access points in each of Bhutan's 205 gewogs.

2 Methodology and processes

The project has been an ambitious undertaking, which had to be completed within a very short time in order to feed in to the 11th Five Year Plan, whose period already started on 1 July 2013, while the project was under way. Preparations for the General Election on 13 July 2013 also posed logistic constraints. The project methodology therefore had to be both flexible and condensed. Ultimately, it has consisted of the following components:

- Four days of demand-side fieldwork outside Thimphu (in Western and Central Regions), aiming to visit Community Centres and interview local people, some individually and some in small discussion groups. The findings of this fieldwork are summarised in Annex C.
- Around 25 supply-side interviews in Thimphu with the staff of service-providing government agencies, banks, telephone companies and other interested parties. The findings of this fieldwork are summarised in Annex D.
- Three discussion groups with Community Centre Operators who had gathered in Thimphu for training. The findings of this fieldwork are summarised in Annex E.
- Two stakeholder workshops held in Thimphu on 21 June and 8 July, at which the study findings so far were exposed and feedback garnered. Participants in these workshops are identified in Annex A.
- An expert workshop on 22 June and a series of meetings with associates of K-Hint in Kathmandu. Again contributors are identified in Annex A.
- A considerable amount of background reading, desk research and analysis, feeding in to team discussions either in person or through email. Annex L provides a bibliography of published reports and other sources which have fed in to the study or may prove value for further reading.
- The drafting of this report, which has been circulated for comment before finalisation.

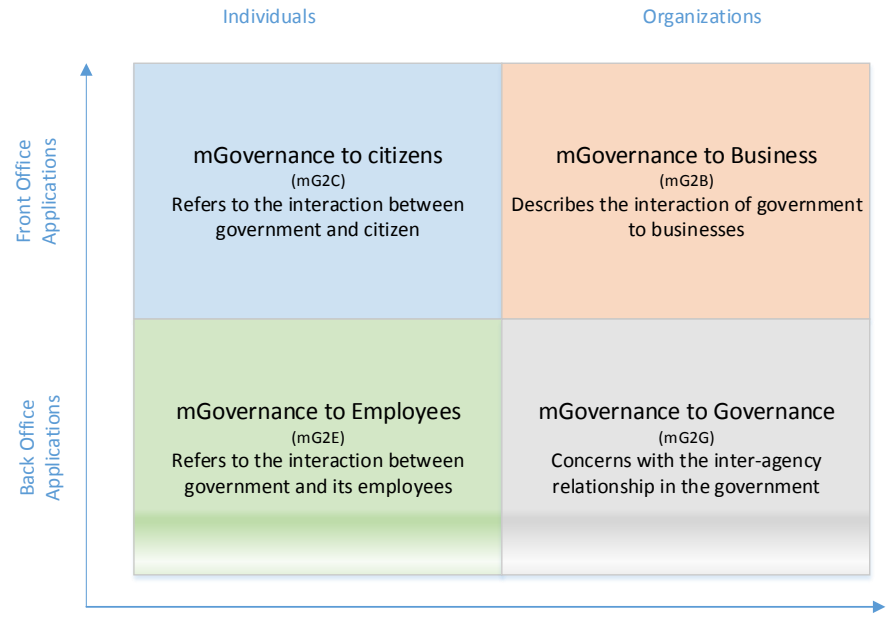
Although the project as commissioned is now complete, the core team remains committed to the topic area. We welcome comments on the final report, will do our best to handle any queries, and hope to see progress in implementing the strategy and recommendations.

The next two sections contain general introductory material to set the scene, before we provide our findings and recommendations in Part II onwards.

3 Mobile in Service Delivery

Throughout the world, mobile technology is significantly expanding the capacity of governments to deliver citizen and business centric services. We term such activities *mobile government*, often abbreviated to *m-government*, with the services in question being known as *m-government services* or simply *m-services.* Use of mobile platforms for service delivery allows increasingly active citizen participation in government operations, enabling a shift from the initial concentration of e-governance on commerce and e-taxation, as well as improving internal operations. It also fosters citizen engagement and transparent democracy, as well as educational advancement and innovative health services. The amalgamation of mobile devices and new media applications, which support quick access to integrated data and location-based services, empowers citizens by anywhere-anytime access to services and engagement activities.

Figure 1: Mobile Service Delivery Models



Source: Oui-Suk, Uhm (2010), Introduction of m-government & IT Convergence Technology, KAIST Institute for IT Convergence

Figure 1 illustrates four common types of mobile government service by the group addressed, which are now discussed in turn. A further categorisation is by service types as shown below, which may correspond with the technology used, who initiates communication and the direction of information flow:

- Informational and educational services
- Interactive services
- Transactional services
- Engagement services.

3.1 Government to Citizen (G2C) Services

3.1.1 Informational and Educational Services

This type of mobile service involves dissemination of information to citizens (*e.g.* related to services, schedules, education, emergencies, regulations and any other static content). The government service mainly consists of pushing information through SMS, for example, or making it available on a Web or Wireless Application Protocol (WAP) site. Much of the information is static and there is very limited interaction with citizens. Most inquiries to government from citizens are for basic service information, and providing push services both enables real-time communications to citizens, and creates cost savings for government agencies.

Typical types of information provided by government agencies are:

- General information for citizens (e.g. weather, tourism, recreation, health, public safety, contact information, services, regulations);
- Specific information (e.g. exchange rates, market rates, exam results, events and programmes, news, road closures, holiday schedules, public hearing/consultation schedules, service or fee changes information);
- Emergency alerts (e.g. severe weather, terrorism, fires, accidents, health risks);
- Health and safety education (prevention and preparedness);
- Educational programmes (e.g. daily course on Dzongkha, English, etc. prevention advices for accidents);
- Notifications (e.g. library book deadlines, security notifications, social media posts, RSS feeds for news and updates).

3.1.2 Interactive Services

Through interactive mobile services, citizens can engage in interaction with governments and send inquiries, problems, comments, or service requests to specific agencies. Citizens also can access forms, applications, and databases. In this stage, the interaction becomes more personalized, detailed and targeted to specific citizen interests and service needs, and specific agency divisions and service areas. The communication becomes one-to-one, rather than one-to-many. The focus is on citizen convenience and increased participation, with citizens choosing to receive specific notifications, such as neighbourhood crime reports, exam results or the availability of a special library book. Mapping, location-based services and audio/photo/video capabilities enhance the functionality of SMS and mobile applications. Examples include:

- Health services (e.g. screening and tests, monitoring, health forms);
- Education services (e.g. grades, admissions, exam results);
- Security services (e.g. crime reporting, service requests, law enforcement, and emergency assistance requests);
- Filing claims and reporting problems (e.g. service interruptions, suspicious activity, voting issues, complaints about government officials);
- Information inquiry services (e.g. account information, traffic and transportation availability, service request status); and schedules (airline flights, field crew locations, etc.).

3.1.3 Transactional Services

With transactional mobile services, governments begin to transform themselves by expanding two-way interactions between citizens and government to new levels. In this stage, citizens can complete their transactions with government electronically and at their convenience. This includes self-service options for paying taxes, making payments, lodging tax returns, applying for services and grants, as

well as other similar G2C interactions, allowing the citizen to access these services 24/7. Examples include:

- Seeking employment (*e.g.* job postings, applications, matching services, interviews);
- Government transfer programmes (*e.g.* food coupons, relief compensation, basic income grants, social benefits);
- Paying taxes (*e.g.* income, real estate, etc.);
- Booking appointments (*e.g.* officials, inspections);
- Transportation services (*e.g.* buying train tickets, parking, bus tickets, airline flights);
- Signing a transaction with mobile signature.

Transactional G2C services demand robust backend systems riding on a proper Business Process Management Suite (BPM) which would enable fast and easy execution process modifications and workflow re-orientation.

3.1.4 Engagement Services

Mobile technologies facilitate achievement of goals of engagement by increasing ease of access and participation. SMS has become a powerful and prevalent communication channel for governments and citizens, and a fundamental foundation of effective m-governance strategies, positively impacting the democratic process. Examples include:

- Citizen engagement (to strengthen a citizen-centred approach to government and to involve citizens in policy development and decision making)
- Elections and voting
- Send discussion agenda to parliamentarians, SMS polls on issues of national concerns
- Participation in reality shows by voting for candidates of interest

3.2 Government to Employee (G2E) Services

With Government to Employees (G2E) services, government agencies provide tools, training, and data access to their employees that not only assist those employees in their daily operations, but also improve organizational efficiencies and accountability, maximise limited resources and enhance the quality of service to citizens. Mobile technologies have substantial impact on improving G2E services, especially for field crews and staff who work in secondary or remote locations, enabling real-time access to enter, retrieve and share data. The real time capture and synch of data to central backend system allow decision making meaningful and timely.

Government agencies may provide mobile devices to employees or use the BYOD (Bring your own Device) approach. Most G2E services are based on smart apps as the requirement for capture and transfer of data is much more than the G2C services. Also, the users are more competent in case of G2E and are provided with adequate training to use the application, and the cost of the devices is easily justified.

One challenge in this case is Mobile Device Management (MDM), as a device may be used for other purposes than those it is intended for. Potential data leakages and security of the devices must be taken care of by the agencies.

3.3 Government to Business (G2B) Services

Government to Business (G2B) services include providing information regarding policies, regulations, forms, and applications related to procurement, licensing, permitting and payment of taxes, as well as support of small and medium enterprises and business development. With considerable value for rural businesses, government agencies are providing support including accessible kiosks and low-cost

handsets, digital signature services, SMS weather and market updates, mobile wallets and maps for transport and tourist sites.

G2B services can be more sophisticated and may involve high end devices for transactional services and informational services can be based on the simple SMS or mass SMS channel. Transactional mobile G2B services requires robust backend systems optimized for data searching, adequate data indexing, and optimized for minimum data transfer.

3.4 Government to Government (G2G) Services

With G2G services, governments transform themselves into a connected entity that more effectively and efficiently responds to the needs of its citizens by developing an integrated back-office infrastructure. The service-delivering agencies and collaborating agencies should have adequate data sharing mechanisms and protocols established; single sources of truth for data need to be identified and internal data sharing and activity sharing should be in place. The citizen should have a single process experience even if the service delivery requires involvement of more than one agencies. Typical connections may be "horizontal" (among government agencies) or "vertical" (between central and local government agencies). Services can be related to, for example:

- Co-ordination of government activities for inspections, controls and supervisions
- Security services (law enforcement, citizens' security)
- Emergency management
- Access to knowledge bases and records (public safety, health, education, etc.).

4 Mobile ecosystems

Rapid and widespread take-up of mobile phones, in Bhutan as elsewhere, is the basis for the opportunity of m-government. The mobile phenomenon results mainly from technological progress meeting market forces, with governments generally playing only enabling roles. Correspondingly, m-government will be only one part of the evolving mobile scene, which includes many players with different interlinked roles. Analysts often refer to this as a *mobile ecosystem*. The analogy with natural ecosystems is significant: each part relies on all the other parts, and they flourish jointly. For the present study, the key point is that **we cannot consider m-government in isolation from its ecosystem**; some of our recommendations will aim to nourish the broader base for m-government.

This report focuses on G2C and related government services, all of which may happen in both directions (C2G etc), but we do not forget the importance of other types of service and interaction, including also B2C and even C2C.

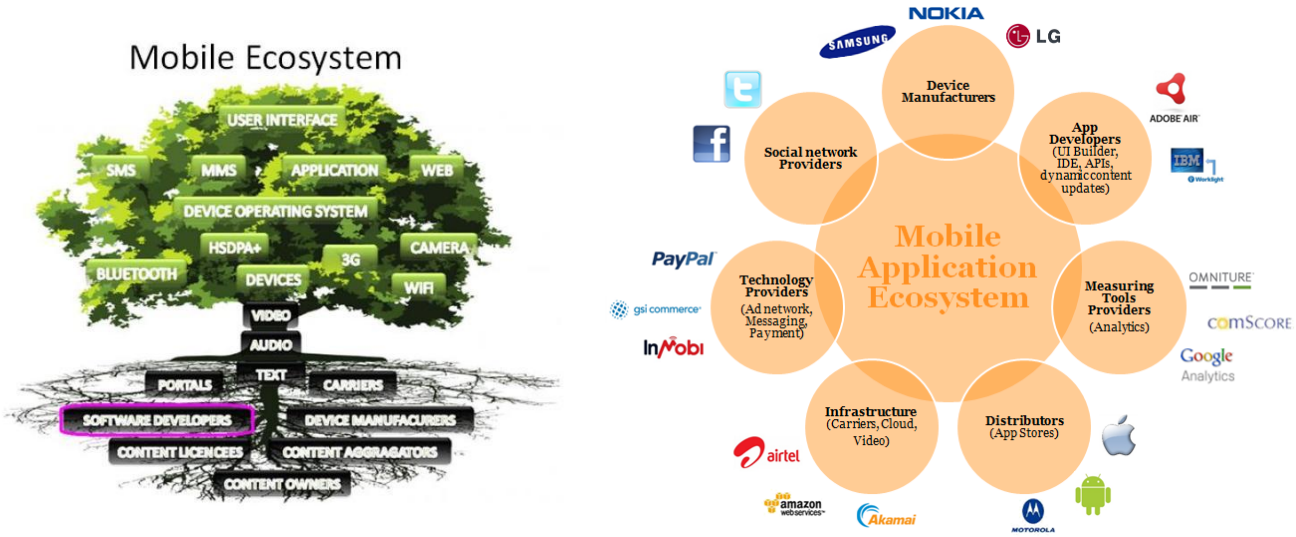
Mobile industry trends and ecosystems have been extensively written up elsewhere, for example in the International Telecommunication Union 2012 report on the Emerging Mobile Applications Opportunity in Bhutan which formed an immediate precursor to this project. The rest of this section summarises expert thinking on this subject to show more clearly how it applies to this project.

Mobile ecosystems generally

Efficient and vibrant working of any system depends on interrelations among various elements of the system, be it an economy, education, health, agriculture or information and communication system. Mobile services systems are no exception.

Common descriptions of mobile ecosystems focus on the device or application, which are illustrated respectively in the left and right parts of Figure 2 below.

Figure 2: Device-focused and application-focused mobile ecosystem depictions



Sources:
http://naveenmtech.files.wordpress.com/2011/04/echo13.jpg,
http://telecominfo.files.wordpress.com/2012/03/mobile-ecosystem.png

A Mobile Services Ecosystem at a given moment can be displayed as a matrix, such as that in Figure 3 below. The markings in this figure are only indicative of what can be done in Bhutan and do not represent the team's opinions. The current status in the matrix can then be translated into pointers for the five year strategic plan, which will eventually be represented by the specific services down the line. While apparently complex, this depiction is of course greatly simplified.

In this figure, key enabling factors are shown at the top of the matrix, and other enabling factors are at the bottom of the matrix. At the left of the matrix are potential service areas and at the right are stakeholders for the mobile services. A sustainable outcome of the mobile services strategy depends on the effectiveness of the enabling environment and the roles played by the stakeholders. In other words, sustainability is dependent on the effectiveness and contribution from each element of the mobile services ecosystem.

Figure 3: Sample gap matrix for Bhutan

		Regulation	Technology	HR	Critical Mass	Infrastructure		
Services	Voice	++	++	++	++	++	Telecom Operators	Stakeholders
	Data	+	-	++	-	-		
	G2C	++	+	+	+	-	Royal Government of Bhutan	
	Health	++	+	-	++	-		
	Agriculture	++	-	+	++	+		
	Disaster	++	++	++	++	++		
	Financial	-	-	+	-	-	Central Bank	
	Education	++	-	+	++	-	Academia	
	Business	-	-	-	+	-	BMAs	
	VAS	-	-	+	-	+	VAS Providers	
	Entertainment	+	+	+	+	+		
		Mobile Social Mobilisers - CCs						
		Mobile Application Developers						
		Handset Traders						
		Private Network Operators						

BMAs: Business Member Associations (e.g. Bhutan Chamber of Commerce and Industry)	
CCs: Community Centres	
HR: Human Resources	
G2C: Government to Citizen services	
VAS: Value Added Services	
++	Sufficient
+	Fair
-	Insufficient

Source: K-Hint consultant's visualisation

We provide some brief comments on the enabling factors.

Regulation: Regulation is not confined to mobile services regulation, but is also important in other sectors; for example, like business services, mobile is highly dependent on financial regulation.

Technology: Mobile technology is changing very fast; the enabling ecosystem is vastly dependent on the available technology within the ecosystem, which includes the generation of mobile technology (2G, 3G, etc) in place, supporting systems and their integration, interworking and so forth.

Human Resources: Human resources capacity in general (at both service production and delivery and recipient ends) includes the mobile application developers and mobile handset traders referred to below.

Critical Mass: A critical mass of users of services is vital to making business sense of specific mobile services.

Infrastructure: Infrastructure for access to broadband mobile networks is considered one of the five key factors in the mobile services ecosystem.

Mobile Social Mobilising / Social Networking: This is basically the process of creating critical mass for mobile service users (an example of this is MobileNepal.net). This also refers to building awareness in society for mobile technology adaptation.

Mobile Application Developers: This is the availability of skilled mobile application developers with adequate support systems in the local context.

Mobile Handset Traders: This includes not only the traders and their retail agents but also technicians for repair and maintenance, and anyone trading in accessories or secondhand handsets.

Private Network Operators: In additions, private network operators, ISPs, local internet hot spot creators, and free wifi zone providers are also considered as part of the mobile services ecosystem.

Mobile channels

Throughout this report we use the term *channels* to mean ways of reaching people, both through mobiles overall, and through specific ways of using mobiles, for example:

- Live voice
- Recorded voice, or voicemail (often incorporated into navigable automated systems called Interactive Voice Response (IVR) or variants of this)
- Text messages (SMS) and text dialogues
- Email; instant messaging and webchat (online text technologies which are available on mobiles that access the internet); online forums
- Social media like Facebook and Twitter (both now available in forms that are specially designed for use with mobiles)
- Video calling as enabled by utilities like Skype.

The report focuses on the earlier channels in this list because they are more immediately accessible to more people in Bhutan. But elsewhere a full range of channels is used for m-government, and with rapid ecosystem growth this could be appropriate before long in Bhutan too.

PART II: CURENT SITUATION

Rural Bhutan enjoys widespread cellular coverage

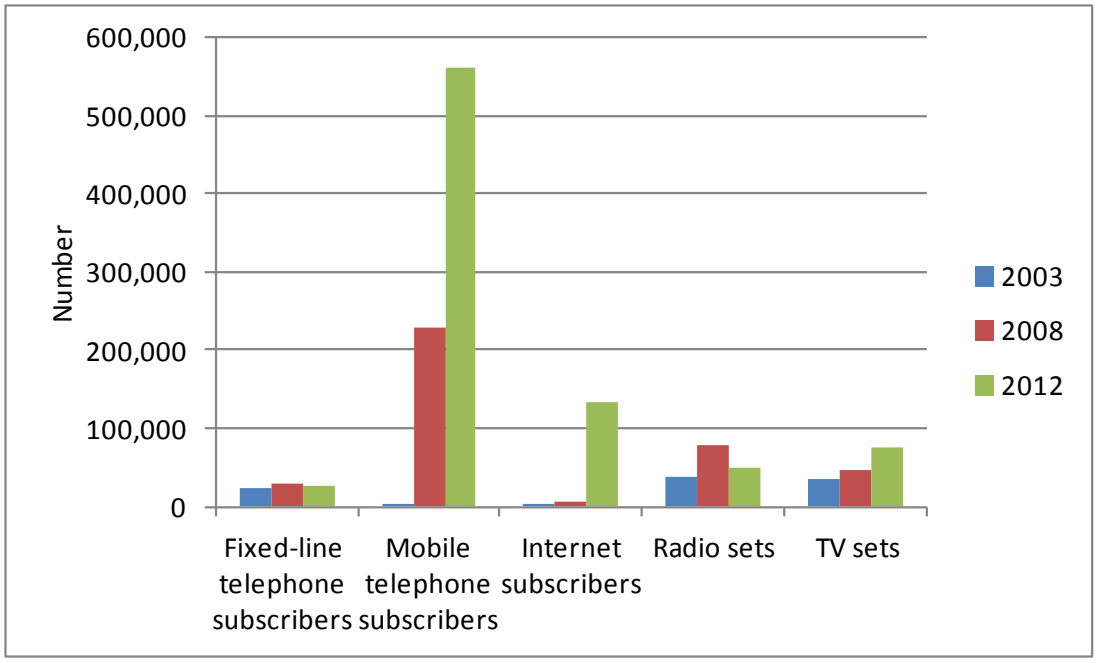
which people of all ages and occupations are happy to use.

5 Overview of current use of mobiles in Bhutan

5.1 Mobile phone take-up by region and income group

Mobile service started in Bhutan only in November 2003, and its growth has been very fast. Figure 4 (based on figures provided by the Bhutan Information and Media Impact Study (2013) survey, themselves taken from various official sources) shows how growth in take-up of mobile phones has far exceeded that of any other communication medium; in fact, at 93% of households, their take-up exceeded that of any other household durable measured by the 2012 Living Standards Survey (with rice-cookers coming in next, at 83% - up from 62% in 2003).

Figure 4: Take-up of communications media in Bhutan, 2003-2012



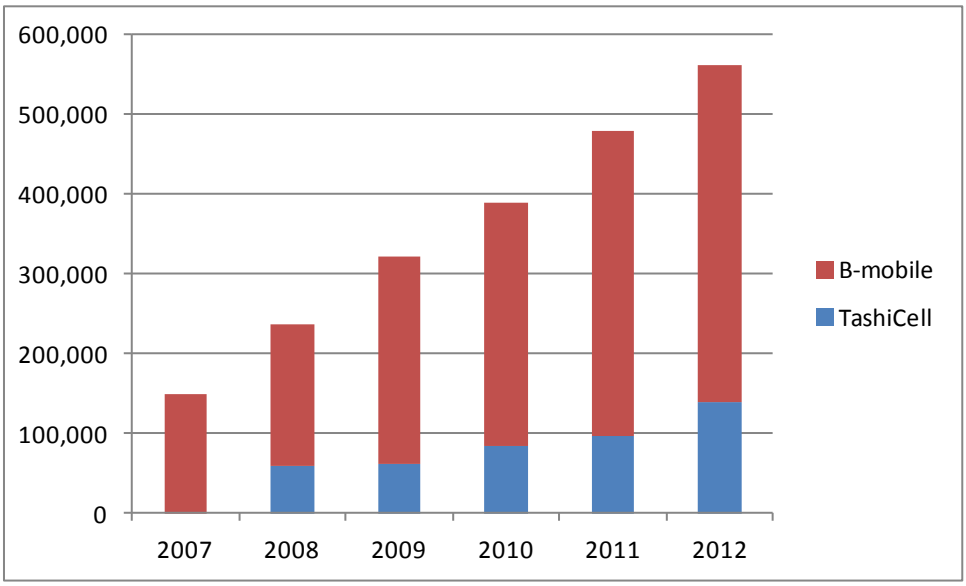
Source: BIMIS2013 report (based on successive Living Standards Surveys)

As would be expected, higher income groups acquired mobile phones sooner than lower income groups; but the 2012 Living Standards Survey found that lower income groups are rapidly catching up. Figure 6 below shows how between 2007 and 2012, mobile phones became available in a large majority of even the poorest households.

Figure 7 shows a rather even geographic spread, with no Dzongkhag falling below 80% of households.

The end 2012 figure for the total number of mobile phone subscriptions (or probably more accurately, SIM cards issued) is 560,890. Such figures are often expressed as a percentage of population (in this case, around 77%); but for Bhutan, it may be more meaningful to think in terms of the population excluding the very young and very old, who are said rarely to have mobile phones. This leads to an average estimate of about 1.2 phones per person aged between 15 and 64. Of course, this still does not mean that everyone in this age group has a mobile phone, as many people have two or more phones.

Figure 5: Market split between cellular operators

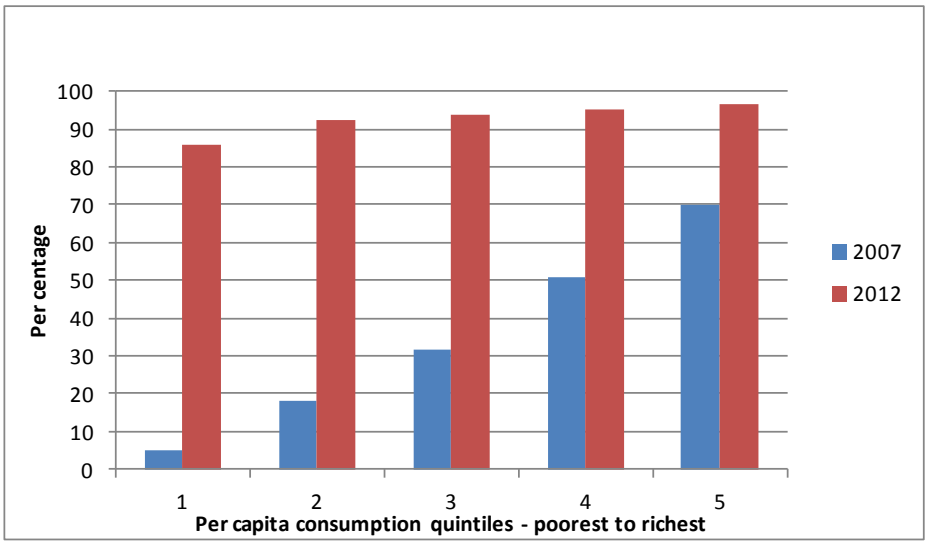


Source: MOIC Statistics 2013 and NSB Yearbook 2012

Figure 5 shows that B-Mobile remains by far the dominant operator; in fact TashiCell's market share of 25% in 2012, although higher than the year before, only returned it to the share it had in 2008.

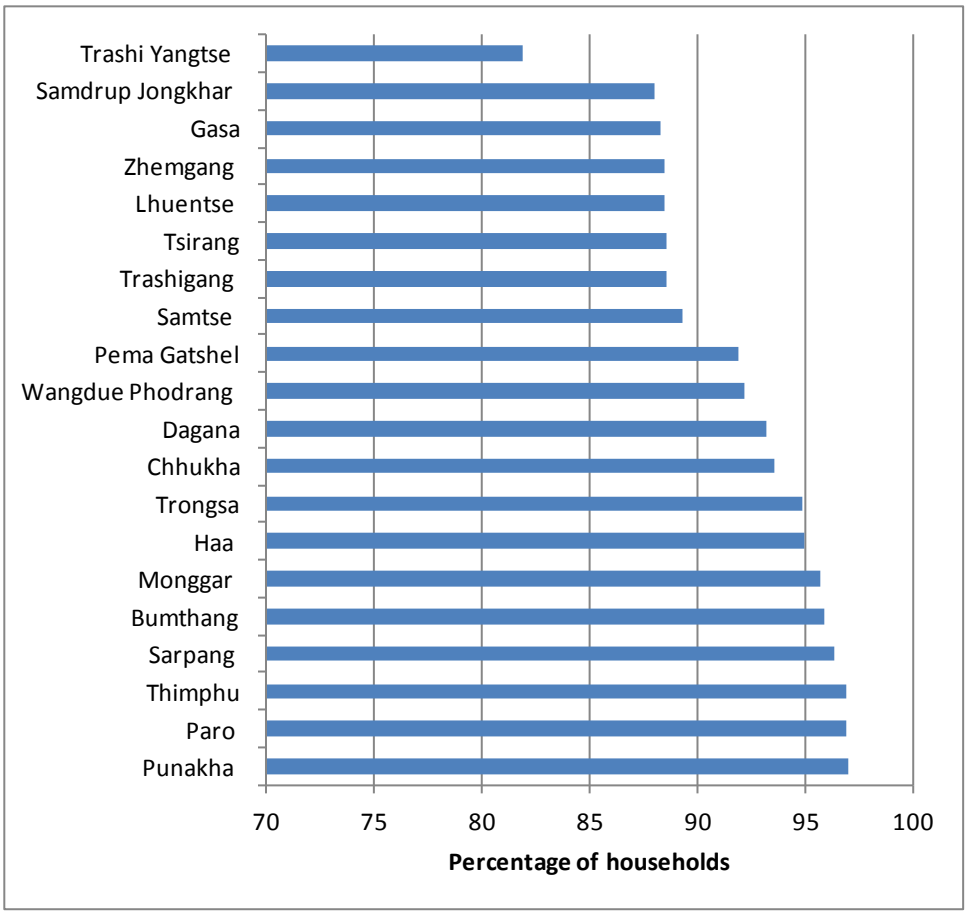
The 2013 Bhutan Information and Media Impact Study survey (which like the Living Standards Survey is nationally representative) also provides some information on how much households spend on their mobile phones. On average, this is around Nu 900 a month for urban households and around Nu 640 a month for rural households, in each case close to 4% of total expenditure. (For comparison, in 2011, the average percentage of total spending that goes on communications in OECD countries was measured at 2.7%, varying between about 1.9% in Denmark, and 4.5% in Mexico; unfortunately comparable figures outside the OECD are not easily available, but the mobile affordability comparison shown in Figure 9 is probably indicative of Bhutan's "middle of the road" standing.)

Figure 6: Percentage of households with at least one mobile phone, by consumption quintile



Source: Bhutan Living Standards Survey (BLSS) 2012

Figure 7: Percentage of households with at least one mobile phone, by Dzongkhag



Source: Bhutan Living Standards Survey (BLSS) 2012

5.2 Usage patterns and user capabilities

The 2013 BIMIS survey also provides the following information on how people use their mobile phones. Mobile phones were mostly used for:

- talking (voice communication) (100%),
- listening to music (65%),
- taking photos and videos (64%),
- SMS (49%),
- playing games (39%),
- viewing videos (38%),
- listening to radio (24%),
- Internet (22%),
- listening to news (17%).

On the other hand, only 1% said they used Multimedia Messaging Service (MMS).

The above findings suggest the switch from a purely functional use of the mobile phone to one that integrates convenience with fun. Interestingly, more of the rural population (12%) used mobile phones for entertainment than urban respondents (2%).

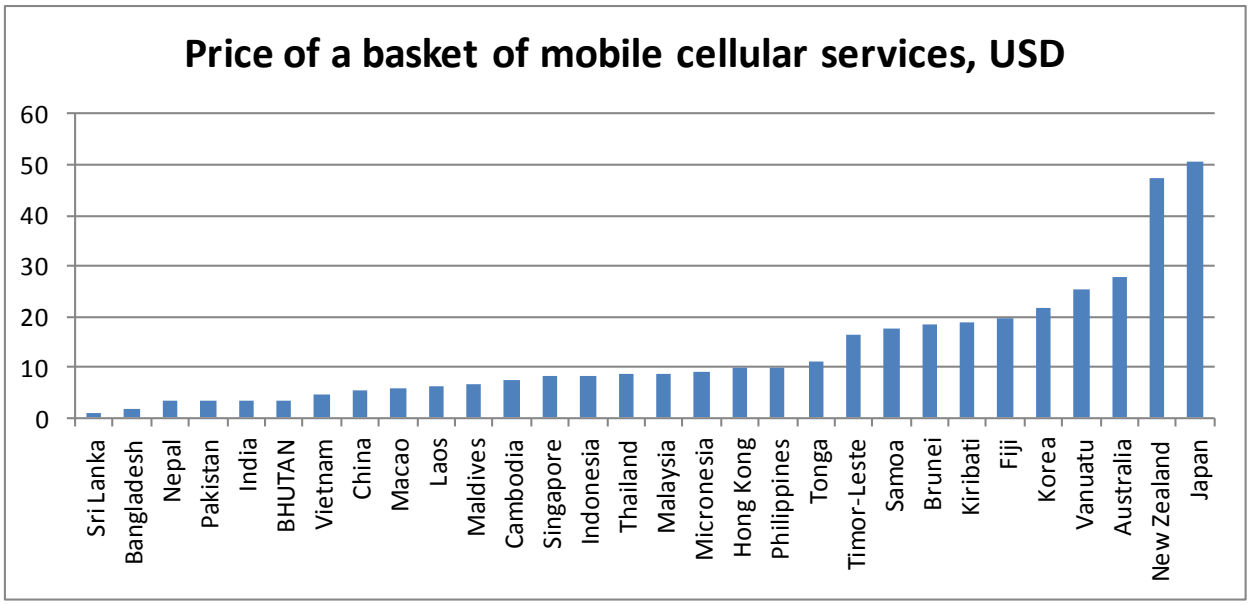
Our own qualitative research among rural mobile phone users (see Annex C) confirmed and extended these quantitative findings. Our respondents told us that:

- SMS are popular among young people, but are not used by older people who cannot read or write English;
- Younger people are much more likely to have feature phones or smart phones which permit the widest range of uses – and to use their full functionality;
- For users of all ages, the most important use of their phone is keeping in touch with family, friends, and work contacts. Users skilfully use mobile phones to save time and money, often by exploiting their existing social networks more intensively.

5.3 Pricing and affordability of mobile services

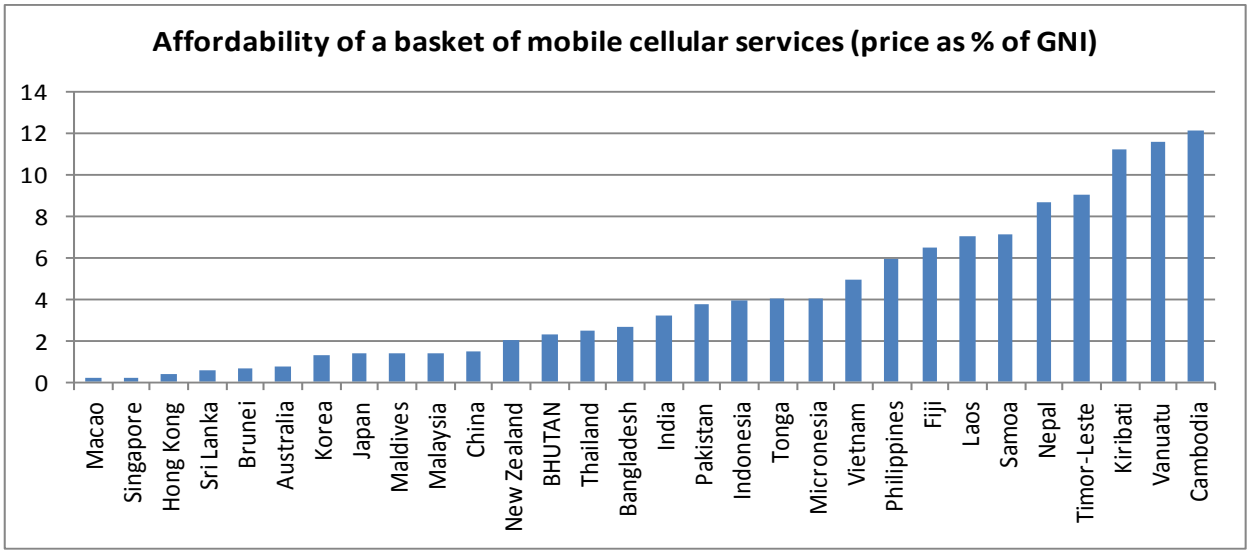
Prices for mobile communications services, and affordability (measured by dividing the price of a standard "basket" of services by Gross National Income (GNI) per capita, both compare quite well with other countries in the region. In *Measuring the Information Society 2012*, the ITU shows Bhutan in 6th place of 30 countries on the first measure (see Figure 8) and 13th on the second (see Figure 9).

Figure 8: Regional comparison of mobile cellular pricing



Source: ITU *Measuring the Information Society* 2012

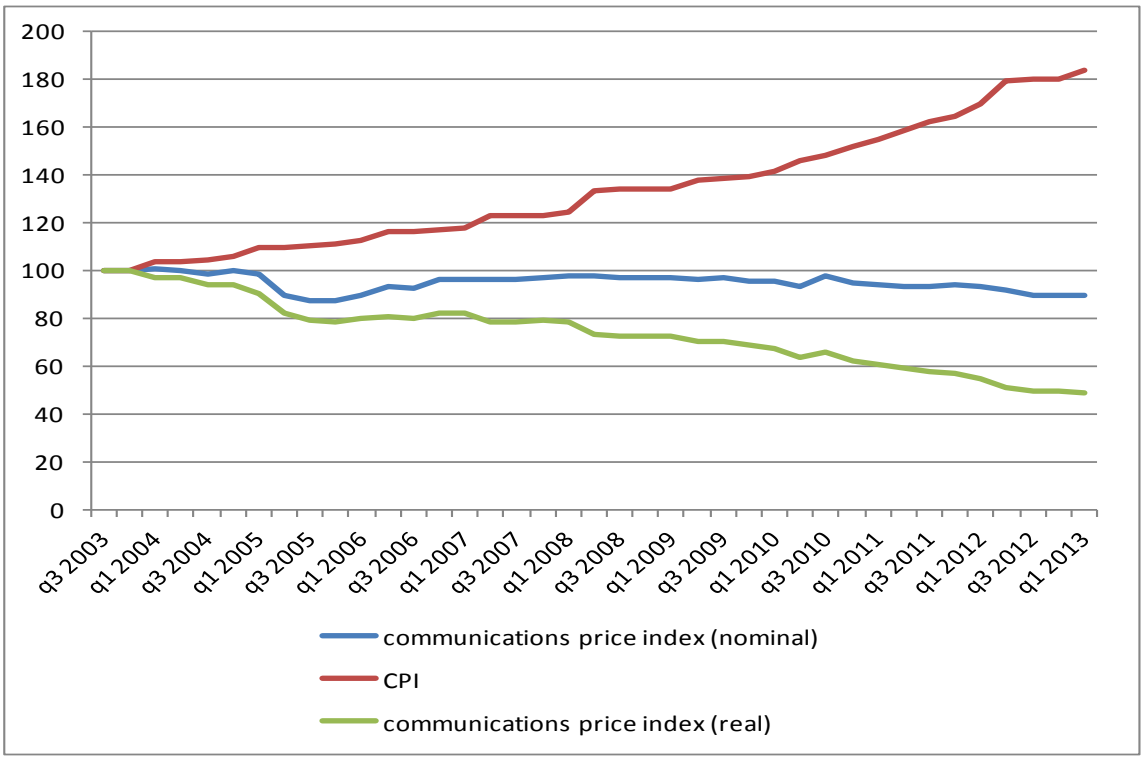
Figure 9: Regional comparison of affordability of mobile cellular service



Source: ITU *Measuring the Information Society* 2012

What is more, according to the National Statistics Bureau's periodic price measurements, communications prices have stayed fairly constant over the past decade while the consumer price index has almost doubled, meaning that communications prices (of which mobile will be the largest share) have almost halved in real terms – a sustained fall of around 7% per year over the period (see Figure 10).

Figure 10: Evolution of communications prices in Bhutan, 2003-2013



Source: National Statistics Bureau (NSB) price statistics

This should mean that people will become increasingly willing to use their phones, with the cost not being a severe disincentive. However, the rural population is clearly price sensitive – when the

Ministry of Agriculture and Forests made their information service free, instead of charged at normal rates, its usage doubled.

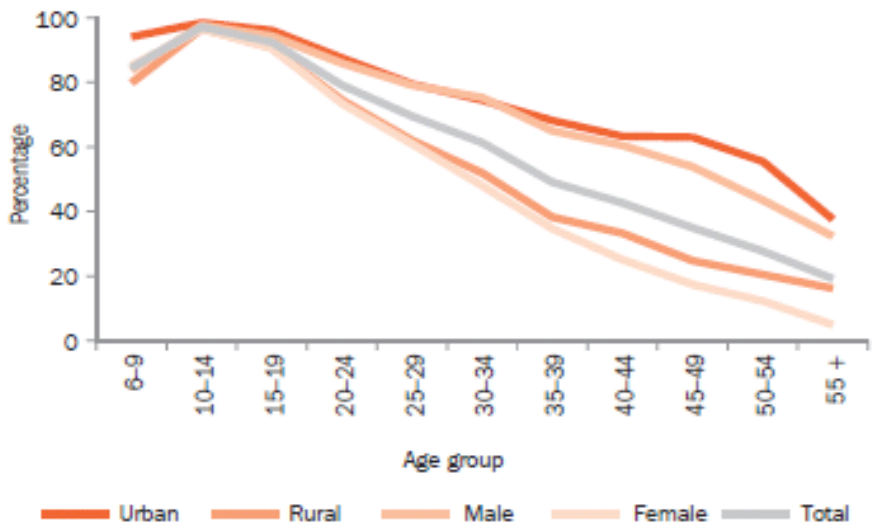
There do not appear to be systematic statistics on the type of phone used by Bhutanese consumers, but we have been told that smartphones now account for around 20% of the installed base. This estimate is consistent with our own observations.

5.4 Summary

Summing up, we find that Bhutanese people of all classes and groups have taken very readily to using mobile phones. This provides a firm basis for our assignment to propose how the mobile platform should be used for providing government to citizen (G2C) services. We must however remember certain limitations, in particular:

- SMS are only useful for people who can read and write in English. According to the 2012 Living Standards Survey, this excludes 37% of the population who are illiterate in any language plus 8% who are literate in Dzongkha but not in English. Illiteracy is more common in rural areas and among older people, especially older women: Figure 11 provides more detail. The Non-Formal Education (NFE) programme is doing good work to combat illiteracy, but we cannot be confident that illiteracy will be eliminated within the 11th Five Year Plan period, 2013-2018.

Figure 11 : Literacy rate by urban/rural, gender and age group



Source: 2012 Living Standards Survey Figure 3.1

- Still some 10% of rural households do not have mobile phones, and these very likely include the most deprived households. Although network coverage is now set to reach all villages, coverage may be poor or missing in remote areas where such people spend time. Households in the lowest quintile also may well feel seriously constrained by cost in how much they use their phones.
- The most significant constraint on use of new services is, however, probably neither literacy nor cost, but simply personal preferences for the familiar. A segment of the population may be adventurous and willing to experiment, but the majority generally prefer to stick to the tried and tested. This means that in general, voice services are more likely to be popular than SMS, and live conversation is likely to be preferred to automated Interactive Voice Response (IVR), which is often poorly designed and hard to navigate even for more experienced callers.

6 Policy, legal and regulatory frameworks

6.1 Policy framework

The foundation for all national policies in Bhutan is the pursuit of Gross National Happiness (GNH). M-government should support all four pillars of GNH in various ways:

- **Sustainable and equitable socio-economic development** – by making services more easily available to all, including the poor and rural residents.
- **Preservation and promotion of culture** – by providing spoken language and Dzongkha interfaces, and potentially access to online cultural resources and local content.
- **Conservation of environment** – by saving on travel, and providing services that are conducive to environmental conservation.
- **Good governance** – by permitting two-way interaction between government and people.

There is strong specific support for e-government and m-government from several official policy documents and similar sources. For example, in the March 2013 *State of the Nation Report* we read:

> In a rugged mountainous country, where communication and accessibility are the biggest development challenges, it was imperative that we find ways to deliver essential services to the citizens in the most efficient, cost-effective, and people friendly manner. The government saw the dire need to go beyond simply making services available to actually delivering them at minimal cost and effort on the part of the citizens to receive them….[People from some villages] endured arduous and time-consuming travel for forestry timber permits, business licences, civil registration updates, and other services. There was a lack of transparency, clarity in procedures, availability of dealing officials, and service delivery timelines. To add to these impediments, the delivery of such vital services was frequently duplicated due to lack of proper communication among various government agencies, leading to unnecessary costs for both the government and citizens.
>
> Therefore, the government has embarked upon an ambitious plan of action under ABSD (the Accelerating Bhutan Socio-Economic Development Project, http://www.gnhc.gov.bt/absd/) to identify the most commonly availed services and to deliver them through one window while making optimal use of ICT facilities.

The E-government Master Plan of MoIC is equally supportive and more detailed. It is built on earlier Bhutan ICT Policy and Strategies, which in turn reflect the ICT Vision. We read:

> As Bhutan will continue to experience even higher mobile penetration and usage in the coming years, Royal Government of Bhutan (RGoB) should tap on the potential that the mobile channel can offer and deliver as many public services as possible via the mobile channel. Based on information collated during the stock take and analysis of key findings, the execution of the following mechanisms will address the gaps that have been identified as incorporated in the Bhutan e-Government Masterplan 2013.
>
> - Align and re-validate the existing list of ICT strategies and initiatives to desired outcomes and goals for ICT;
> - Conceptualise impactful Whole-of-Government initiatives, be it in the areas of data, infrastructure or application systems;
> - Explore the use of the mobile platform for service delivery and support of dzongkha localisation. Initial implementation can include the use of SMS for notification and public announcement;

- Expand the existing limited 3G mobile infrastructure so that services delivery over mobile could be more effective;
- Establish governance structures to monitor and guide the successful implementation of the e-Government Masterplan; and
- Collect quality ICT statistics to establish baseline and Key Performance Indicators (KPIs) measurement and dissemination to regional and international bodies for benchmarking purposes.

….Key aspirations of the G2C project are to:

- Provide every citizen access to a variety of G2C services within a maximum of one day's reach of his/her location.
- Reduce the turnaround time by 70% for G2C services and allow citizens to file their complaints and issues.
- Achieve the best-in class ratio of civil servants employed in G2C services to population.

While the development of the remaining identified e-Services will continue, the focus will be to review the developed e-Services to ensure:

- Availability of e-Services (currently, less than 20 of the 89 deployed e- Services are functioning) and possibility of making it available in Dzongkha;
- Accessibility of e-Services anywhere, anytime (currently, e-Services are accessible only at Community Centres with the assistance of operators at the centres);
- Ease of use of e-Services;
- Consolidation of e-Services (where there is duplication across agencies);
- Extension from e-Services to m-Services, that is, from the web to the mobile platform, where feasible;
- Availability of maintenance services for e-Services; Inclusion of impactful e-Services omitted from the list e.g. Online Tax Filing.

DITT/MoIC has earmarked Nu. 100m for automation of G2C, G2B and G2G in the 11FYP (2013-2018).

….In the 11FYP, the focus for G2B will be on policy review and business process re-engineering (BPR) and extending the G2B portal to provide seamless online business licensing services. Policy review and BPR will be done concurrently. The former will establish the relevance, frequency of renewal and frequency for review for business licences. The latter will require the various business process owners to map out as-is licensing processes to check for bottlenecks, non-value-adding work, and irrelevance activities and tasks. Then, desired to-be processes will be designed based on the principles to:

- eliminate or collapse steps;
- rationalise the need for ‘in-person’ application;
- streamline requirements for supporting documents;
- re-sequence steps;
- simplify inter-dependency among agencies; and
- adopt relevant E-Government Interoperability Framework (e-GIF) standards.

The simplification referred to above is a key part of the draft Licensing Policy. This recognises that Bhutan rates poorly in the World Bank’s Doing Business assessment, and aims to improve conditions by:

- re-examining the rationale for each required licence (or permit, etc) in terms of the risk posed by the activity in question;

- abolishing, streamlining or amalgamating licences which do not meet specified standards of rationale, legality, necessity, and business-friendliness;
- keeping processes proportionate to risks and calculating fees on the basis of administrative costs.

The draft Bhutan Telecommunications and Broadband Policy 2013 recognises the importance of mobile development and plans to improve it, in the following terms:

> Telecommunications and ICT has been recognised by the Government as a key enabler for socio-economic development of the country. Benefits of these extend not just to the urban but also to the rural society. As acceptance of technology increases among society, the benefits to public in terms of increased productivity, competitive advantage as well as increased connectivity with the world outside cannot be denied. One of the major issues that the country faces today is the high cost of international connectivity and the unavailability of such options. To this end, goal of the Government is to provide good quality of such services at an affordable cost to the public. A competitive and innovative sector that will provide these services to the public at affordable prices is a must.
>
> With this view and as the exclusivity of the existing duopoly expires end of 2013, the Government shall license a third mobile operator via a competitive selection process. Priorities shall be given to 100% local bidders.

The Policy Guidelines on Information Sharing, which have been in place since 2006, are equally supportive of information sharing among government departments and between citizens and government.

6.2 Legal and regulatory framework

The law in Bhutan is already reasonably well adapted to the use of ICTs. For example, the law permits contracts to be made electronically. Annex I provides some passages of legal text which are particularly important in this context. However, some aspects of the law need further attention; and the expected rise in use of mobile phones and their applications (now known as *apps*) also raise issues of law enforcement and public education, so that people know their rights and obligations.

Mobile phones are powerful devices with inbuilt products and services, which bring the need for stronger legislation for a country that has not yet known cybercrime, or had any litigation on Intellectual Property Rights infringement by any international rights holder or privacy or data protection issues.

As the plans for mobile applications and offer of services have been initiated, the Ministry of Information and Communications has drafted an e-Governance master plan and policy slated for adoption by the first year of the 11th Five Year Plan. Aimed at providing guidelines for provision of services through mobile apps, the e-Governance master plan and policy has covered many aspects of regulating the mobile apps. A budget of Nu. 1m is proposed for revision of the Act, to include:

i. Further review/refine the Bhutan Information, Communications and Media (BICM) Act;

ii. Draft and include missing provisions to address cyber-security, data protection and privacy issues associated with spam, phishing, botnets, spyware etc that pose security risk to government, consumer and business users, especially Data Centres and Business Process Outsourcing;

iii. Make security provisions for mobile communications in view of Internet telephony and mobile services handling high volume of data and subjected to more frequent targets of cybercrime;

iv. Address issues concerning Voice over Internet Protocol (VoIP) infrastructure considering their increasing vulnerability to attacks that plague other networked computing architecture;

v. Provision for analogue to digital information migration;

vi. Remove repetitions and inconsistent provisions relating to the above provisions; and

vii. Present the revised draft to the stakeholders for feedback.

The major area that gives cause for concern is data protection. We discuss this more fully, along with other legislative needs, in section 12.2 below.

7 Infrastructure, platforms and technical requirements

7.1 Mobile handsets

The usual variety of handset types is available in Bhutan. Figure 12 clarifies capabilities of the different types and identifies models of each type that are available in Bhutan. Each type also has the capabilities of the phones which appear before it in the list (except for tablets, which have limited voice capability). Of course, exploiting the more advanced features depends on the network as well as on the handset.

Figure 12: Types of mobile handset available in Bhutan

Phone Type	Typical characteristics	Available Models / Brands	Service Channels
Basic phone	Call features, text features, small keypad, alarm clock, torch, calculator, Java ME OS, Symbian OS	Nokia 1100, Nokia 1200, Samsung, Spice, MicroMax	Voice and voicemail SMS USSD
Feature Phone	Multi-media features, still camera, music player. Some models support 2 G data services, Bluetooth, wi-fi, web browsers, social media apps, news apps	Nokia C-01, Samsung C-100, Lava Phones, Lepphone, Micromax x268, Nokia 100, Nokia C2-02, Nokia 105	Voice and voicemail SMS USSD MMS WAP
Low end smartphones	Simple QWERTY keypad, advanced browsers, 3 G data facilities, Bada OS, video playing	Nokia C3, Nokia X2, Samsung Galaxy Ace, Samsung Rex60, Samsung Champ, Nokia Asha 200, Samsung Guru 1200, Samsung Galaxy Y	Voice and voicemail SMS USSD MMS WAP
High end smartphones	Advanced QWERTY key pad with other characters and symbols, touch screen, advanced mobile browsers, email clients, 3G / 4G / LTE data facilities, Android OS, iOS, Windows Phone 7.5 /8	iPhone, Samsung Galaxy S Series, Galaxy Note Series, Blackberry Bold, Blackberry Touch, Samsung Mega	Voice and voicemail, SMS, Email, USSD, MMS, WAP, Smart Apps (Web applications, Native Phone Apps)
Tablets	All features of smartphone except voice (some support), larger display, touch screen, USB port, large memory	Samsung Galaxy Tab 10', Samsung Galaxy 7.0 Plus, Galaxy Tab 2, iPad 2, iPad mini, Acer Iconica	Smart Apps, responsive web applications, email, document storage

7.2 Technologies for Mobile Services Delivery

The technical component of this project has included a comprehensive review of 14 available technologies which could support mobile services delivery in Bhutan. The full review is provided as Annex F. Each technology is described and its advantages and disadvantages for Bhutan are assessed, along with a list of the types of services for which it could be suitable, the types of handsets with which it is compatible, and notes on relevant security features. Figure 13 shows which these technologies are and summarises some key points from the full review.

Figure 13: Summary of technologies for mobile services delivery

#	Technology	Used in Bhutan?	Suitability	On MSDG?
1	SMS and SMS Gateways	Yes	Literate	yes
2	IVRS / IVVRS /ITR and IVR / IVVR / ITR Service Delivery Platforms	Yes (some)	All	yes
3	Voice Messaging / Voice Mail	No	All	yes
4	Voice Recognition	No	All	yes
5	Contact Centres	Yes	All	no
6	Expert Systems / Advisory Systems	Yes	All	yes
7	SIM Tool Kit Applications	No	Can be all	yes
8	Cell Broadcasting	No	Literate	yes
9	Community Radio	One only	All	no
10	Smart Apps	Yes	Smart phones	yes
11	Location Based Services / Location Tracking	No	GPS phones	no
12	USSD (Unstructured Supplementary Service Data	Yes	Literate	yes
13	WAP (Wireless Application Protocol)	Yes	Literate	yes
14	Mobile Services Delivery Gateway (MSDG)	No	All	n/a

The existing G2C SMS Gateway already has the following features, which would be incorporated in a Mobile Services Delivery Gateway:

- Multiple database engine supported
- Send SMS to single mobile phone (web2mobile)
- Send SMS broadcasted to a group of mobile phones (web2mobiles, Bulk SMS)
- Support sending flash and unicode message
- Receive private SMS to Inbox (mobile2web)
- Forward single SMS from mobile to a group of mobile phones (mobile2mobiles)
- SMS autoreply, for easy autoreplying formatted incoming SMS
- SMS board, forward received SMS to email, html and/or xml page
- SMS custom, forward incoming SMS to custom SMS application
- SMS poll, manage polling system using SMS
- SMS quiz, served quizzes on SMS
- SMS subscribe, manage user subscribes to a service using SMS
- SMS auto send, automatically send SMS once or repeated
- Simple web services for sending SMS and retrieving delivery reports

The MSDG idea is already well under way in India, where it is planned to include a payment gateway and authentication and signature checking. Such a gateway has been launched in Goa, and implementation elsewhere is in progress; according to an independent mid-term evaluation the project appears to be going well. Figure 14 shows what was expected of it in 2011.

Figure 14: MSDG expectations in India

The mobile applications for Government services envisaged under the proposed policy framework will…offer an opportunity for "anytime, anywhere" service delivery to support the range of programs implemented by various Government departments, e.g. in health, education, agriculture, rural development, etc. It is therefore recommended that a Mobile Service Delivery Gateway (MSDG) be developed and maintained by a suitable agency under DIT in collaboration with a technical partner through an appropriate PPP/outsourcing model.

The Proposed MSDG will act as a managed technical infrastructure to accelerate rapid and low-cost development, testing, deployment, provisioning, and maintenance of various m-Governance applications. The objective of creating MSDG is to create a Government-wide shared infrastructure and services to enable the rapid and inexpensive development, mainstreaming and deployment of m-Gov services. It will enhance the interoperability among various government services as well as reduce the total cost of operation of m-Gov services by providing a common pool of resources, aggregating demand for communication and e-Gov services, and act as a platform for various Government departments and agencies to test, rapidly deploy, and easily maintain m-Gov applications and provide mobile based services across the country. Provided below is a list of key, but not exhaustive, functionalities of the proposed MSDG:

a) MSDG will serve as the managed technical infrastructure to support m-Gov applications across the Government agencies in India. It would include facilities such as hardware and software needed to test and deploy m-Gov applications, the connectivity options for the residents to apply for and receive Government services through the mobile devices irrespective of the mobile operator they are subscribed to.

b) MSDG will also have an integrated spoken web portal for delivering IVR based services to the residents who wish to access e-Government services through mobile and fixed line [voice] access modes.

c) The facility to use MSDG will be available for use to any Government ministry, department, agency or program that wishes to provide mobile based e-Gov services to its users, thus eliminating the need for individual Government agencies to develop their own mobile governance infrastructure.

d) MSDG infrastructure will support the delivery of both voice and data services and content in a network- and device-independent manner, reaching the largest number of potential users. In addition, MSDG will offer shared tools (data collection, helpdesk services, APIs, SDKs) to the agencies that wish to deploy mobile applications for public services.

e) The MSDG architecture will be modular and will have capabilities for secure service provision, controlled access and scalability. Special modules and development tools will be made available so that various Government agencies can add or remove their services, test new applications through a separate interface thus ensuring that the overall functionality of MSDG is not affected.

f) The MSDG will have a provision for metered access so that the various agencies and partners of MSDG can account for the 'for fee' services based upon the actual delivery of services.

g) The MSDG will be developed in such a manner that it readily connects to and integrates with the National Service Directory, NSDG, SSDGs and other existing IT systems and infrastructures deployed under NeGP, and have APIs to permit connection with the users' IT systems in the future.

h) MSDG will be integrated with the existing mobile payment systems currently prevailing in the country. Additionally, the feasibility of having a dedicated payment gateway to receive payments through mobile devices for Government services shall be examined for integration in the subsequent phase.

i) The MSDG will be primarily owned by DIT, its agencies or any other organization as may be decided by DIT and shall be managed in association with an entity through an appropriate PPP/outsourcing model to ensure the quality of services to residents as well as its sustainability in the long term.

Source: Government of India (MOIC/DIT), *Draft Consultation Paper on Mobile Governance Policy Framework*

7.3 Telco Core Infrastructure

Telecom infrastructure is available for a majority of the service channels. Bhutan Telecom has covered the whole country and has fixed connectivity in all gewogs, including optic fibre to almost all gewogs (using power grid infrastructure). However there is little prospect of fibre reaching the

villages, and it is much more likely that the crucial “last mile” (in practice, often many kilometres) will be provided by wireless technologies

Mobile connectivity has reached almost all the villages in the country. Bhutan Telecom Ltd and Tashi InfoComm Ltd have a combined subscriber base of 560,890 mobile users, i.e., 77.8 per 100 inhabitants as of December 2012. Given this high mobile penetration rate and the portability of mobile phones, low cost and high accessibility, the mobile platform is an effective medium for the Government to reach their citizens with services and important messages, and gather data and feedback.

Mobile internet is accessible in all urban areas with Enhanced Data Rates for GSM Evolution (EDGE) connectivity. General Packet Radio Service (GPRS) (2.5G) / EDGE (2.75G) service is available in the twenty Dzongkhag headquarters. Thimphu, Paro, Chukha, Wangduephodrang and Phuntsholing have 3G network and there are hundreds of mobile internet subscribers. Bhutan Telecom is pilot testing 4G / Long-Term Evolution (LTE) in Thimphu. Tashi Cell (TCell) is preparing to launch 3G services in some of the urban areas. TashiCell seems to adopt a follower strategy in adoption of technologies and service roll out.

All the services available on GPRS and EDGE are available on 3G, however the user experience on 3G will be different due to its higher speed. The uptake of 3G initially has been tepid due to high prices of devices and data services. But, over the years, the number of 3G subscribers has been growing steadily. Where 3G is unavailable, the services could be reached using the tools such as Short Messaging Services (SMS), Interactive Voice Response (IVR), and GPRS/mobile web.

On capacity expansion, if there is uptake of service delivery using mobile platform, operators are in a position to upgrade the infrastructure to cope with new service requirements and new levels of Service Level Agreement (SLA). Some of the clients of the operators seem to have some concerns on the quality of service provided by the operators, and the networks are not designed for resilience during major disasters like earthquakes.

DITT has deployed WiMAX in two locations, one in Phobjikha and another in Ura, Bumthang. Bhutan Telecom is currently implementing two pilot sites in Thimphu for exploring introduction and expansion of 4G/LTE in Bhutan.

7.4 Agency Backend Systems

Implementing a mobile based service delivery channel within an organisation should be viewed as adding a new channel to existing agency applications. Adding the mobile platform requires understanding what information can be obtained from which applications, and how it can all be integrated and tailored seamlessly for citizens. Adding the mobile channel typically means implementing a multi-channel service delivery gateway which interacts with the existing backend systems. At times existing backend systems may need modifications in terms of data storage, data fetching and data synchronization.

Ideally a multi-channel mobile delivery gateway should function in the following modes:

- Data is pre-fetched and aggregated on the service delivery gateway
- Data is fetched from agency service applications on demand
- Data is pushed to the citizen without any request
- Data exchange should take place with a data synchronization approach.

Government agencies own several information systems. Some of the systems are pure silo systems for particular services whereas some are systems that cater to more than one service and involve several

stakeholders. The systems are usually developed, owned, maintained and provisioned by the main agency.

The backend systems are custom developed as per the process requirements of manual systems. Limited process leaning and process optimization is carried out. The system interfaces have requirements for transfer of files as attachments. The workflows are custom codes where changes in the flows require code writing. The systems are not built on Workflow Management and Business Process Management (BPM) Tools. BPM tools allow for easier management of system workflow. Also introduction of mobile channel will entail plug in mobile channel into the system to make the channels complementary to each other. Therefore, backend systems will have to be modified and if possible transformed into workflow based systems riding on the BPM suites.

Currently there are lot of duplicate instances of data. For mobile service delivery it would be highly recommended to establish single sources of data which will be used by many systems. The systems are maintained by the in-house IT Team.

7.5 Agency Internal Infrastructure

A majority of the agencies are connected with leased line internet and own a pool of Global Static Internet Protocol version 4 (IPV4) IP Addresses. A majority of the agencies have websites hosted either at agency premises or at the hosting facility at Druknet.

Most of the Ministries own servers and have proper server rooms. The servers are used to host different software systems. Most of the agencies are also connected with Thimphu Wide Area Network (TWAN), the fibre backbone for Thimphu which also connects Bhutan Telecom and TashiCell.

At the current state there is no need to purchase new servers to port services using the existing backend system to mobile platform. The assumption is that the Mobile Service Delivery Gateway will be a shared system for all government agencies.

7.5.1 Human Resource Capability

7.5.1.1 Private Sector Human Resource Capability

Bhutanese private sector is at a nascent stage and the ICT sector is even smaller. It is difficult to find competent and skilled manpower to support the mobile service delivery initiatives. There are no training institutes to provide specialized training. Even if training is provided once, continuity of the skill development is difficult.

A few companies have started providing post roll-out support services for the backend systems that are developed by agencies. Some sort of support could be established to bring the private sector into the main stream of mobile service delivery channel development.

7.5.1.2 Agencies Human Resource Capability

Agencies have ICT professionals of different strength. However, these teams also have the following responsibilities:

- Daily troubleshooting and IT infrastructure management
- Assistance in procurement of ICT equipment, which includes paperwork on preparation of specification, and proposal evaluation

ICT personnel need to be provided with specialized training on application development, business process management, database management, and application maintenance.

7.5.2 SLAs and SLA Management

As service delivery moves to technology platforms, service level agreements (SLA) need to be drawn up. The SLA will have to be adhered to so that turnaround times are maintained. Operators provide SLAs to the clients but the service providing agencies do not draw up SLAs for service delivery. SLAs are derived with the following notion:

- SLA is a communication tool
- SLA is a conflict resolution tool
- SLA is a living document
- SLA is a method for gauging service effectiveness

7.5.3 Integration

Service delivery using the mobile platform should normally be considered as complementary to an online service delivery mechanism (some live voice services may be an exception). It is a primary requirement that service delivery using the mobile platform and online service delivery should co-exist. This requires proper thought processes on integration of service delivery channels through backend system to ensure that, irrespective of channels used, information should be available to the agencies from a single source. At this stage of technology advancement and adoption of open standards, any agency system should be designed and developed keeping in mind the requirement to integrate new service delivery channels.

Most of the technology stacks used in the market have Application Programming Interfaces (APIs) and built in libraries for developing interfaces for integrating the mobile platform. Enterprise system providers have evolved the systems with functionality for interfacing enterprise systems with the mobile platform. Web Services and SOAP (simple object application protocol) approaches are used by system developers to provide points of integration.

Agencies should be mindful of this trend while designing systems. Existing systems would need upgrades to establish co-existence with the mobile platform. Some systems may need a technology upgrade to make them suitable for the mobile channel.

7.5.4 Interoperability

Interoperability should be handled at both technical and organisational levels.

- **Technical Interoperability** deals with several systems sharing information and use of information that is being exchanged. The systems here would include software applications, hardware devices and storage devices. Technical interoperability is being addressed by using open standard based systems, using tools and techniques (Web Services, SOAP) and establishment of shared systems or common frameworks used by different channels of service delivery.
- **Organisational and Institutional Interoperability.** It is not enough to have technical systems capable of sharing data and re-use of data among different systems. Adequate organisational and institutional protocols need to be established so that the ecosystem creates a win-win situation for all participating parties. Interoperability should not result in litigations and breaches in integrity and privacy aspects.

A commendable initiative by the Royal Government of Bhutan, establishment of the eGovernment Interoperability Framework (eGIF), outlines guidelines with standards established in the form of four

reference models:

- Business Reference Model
- Application Reference Model
- Data Reference Model
- Technical Reference Model

It is recommended that eGIF be evolved to have appropriate provisions to cover mobile platforms.
The eGovernment Master Plan outlines establishment of common Data Hubs as single sources of truth for the following data categories:

- People Data
- Land Data
- Vehicle Data
- Business Data

7.5.5 Security and Identity Management

Offering services using the mobile platform entails making security and privacy a top priority. It is even more important to have strong security for transactional applications which would handle sensitive data, or to enable mobile voting (which would be a highly desirable application in Bhutan).

Strong legislation establishing credibility and validity of electronic signature is required. The Bhutan Information, Communications and Media Act provides legality of electronic signature. However, it is not popular practice in Bhutan to use electronic signature. Some countries provide electronic signature service and electronic Identification (eID) service through mobile applications. This approach would require establishment of an electronic signature verification agency, implementation of strong electronic signature algorithms and provision of signature services. Some best practices on security aspects are:

- Piggyback on existing web security mechanisms to prove mobile authorization and authentication
- An additional layer of interaction can be implemented to access back-end system servers
- Encrypt all sensitive data on the devices and make it accessible only through double-factor authentication
- Encrypt all communications between mobile devices and the back-end systems or cloud servers
- Ensure strong encryption algorithms and adequate key lengths

8 Mobile money

To foster transactional G2C Services, a payment channel must be activated. Many government services require payment of service fees or royalty fees. Travel costs to use services are usually much more than the actual fees and charges for the services. Therefore, enabling robust mobile payment services is needed for uptake of online G2C services and mobile services.

Due to lack of proper rules and regulations, banks and operators are rather slow in moving towards mobile payments. However, a good start has been already made through launch of the B-Wallet service which provides features for e-top up and inter-account intra-bank fund transfers. There are plans to start utility payment through B-Wallet.

Now that Bhutan National Bank and Bank of Bhutan have launched B-Wallet, inter-bank fund transfer should not be far distant. Also if utility bill payment is enabled in B-Wallet then appropriate institutional arrangements can be made to accept service charge payments for G2C Services.

Payment options using Point of Sale and SMS / USSD channel are being initiated. Once enabling regulations are established, other payment technologies could include Mobile Web Payments (WAP), QR Code Payments, and NFC (near-field communications) based applications.

8.1 Some indicators of demand

Village life in Bhutan often means long journeys to reach the nearest public facilities. According to the Bhutan Living Standards Survey 2012 (Table A3.79) 55% of rural households must make a journey of more than an hour (and often much more than an hour) to reach their Dzongkhag headquarters, 38% to reach their nearest post office or bank, 28% to reach their gewog headquarters, and 18% to reach a food market or shop. In these circumstances, it is not surprising that 63% of rural households have no bank account and only 0.7% have a current bank account (35% do, however, have a savings account) (Bhutan Living Standards Survey 2012 Table 8.13).

A recent World Bank study *Connecting the Disconnected: Coping Strategies of the Financially Excluded in Bhutan* carried out fieldwork in four representative area of Bhutan. It concluded:

- Bhutan is a cash-based economy where households have a vibrant, if informal, saving and lending culture.
- Rural areas are particularly underserved (by formal financial services).
- Women and youth represent an untapped market segment.
- There is a demand for financial services with less complex and time-consuming bank procedures, particularly in the following areas:
    - Small, periodic savings and loan services.
    - More accessible deposit and withdrawal services.
    - Flexible loan requirements.

In addition, while there is a requirement on Bhutanese to purchase both life and home and insurance, the Bhutan Living Standards Survey 2012 (Table 8.15) tells us that 59% of households have no insurance. (Possibly some survey respondents were unaware that their local taxes include a nominal insurance premium). In any case, there is clearly room for far more insurance cover for low income households.

The World Bank report points to the potential offered by mobile phone and Internet technology, in particular the former, for greatly expanding access to financial services. It highlights that women tend to feel more comfortable than men with mobile phone and other technology-based solutions

(nearly half of the female focus group respondents, compared with a quarter of all focus group respondents). The survey findings suggest that branchless banking should include both bank-based and non-bank-based (mobile phone) models.

8.2 Supply side activities

In 2013, the two largest banks, Bank of Bhutan and Bhutan National Bank, both launched B-Wallet services in co-operation with B-Mobile. Account holders who register for the service can use a simple text dialogue on their mobile phones to transfer funds from their bank account to other accounts in the same bank, and to top up their mobile phone airtime credit. To date, the service appears to be performing up to both customers' and suppliers' expectations.

Both B-Mobile and TashiCell have large nationwide networks of airtime outlets, usually existing small shops. We estimate the total number of outlets at between 4,000 and 5,000. (The Bhutan Living Standards Survey did not ask about time taken to reach an airtime retailer, but it may well be similar to the time taken to reach a food market or shop). Both operators offer the facility to credit a top-up voucher to any phone on their own network. Both have growing numbers of e-top-up agents, who are equipped with special point-of-sale terminals enabling them to transform a customer's cash directly into airtime credit, on their own or someone else's phone, without the need for a paper voucher. In addition, both offer a balance transfer service whereby a customer can transfer part of his existing balance to another customer, for a charge (Nu 5 in the case of B-Mobile and Nu 7 in the case of TashiCell). These facilities are described in more detail in Annex K. They amount to a form of mobile money transfer, although they may not be widely perceived as such.

The Royal Monetary Authority (RMA) has issued Branchless Banking Regulations and is currently drafting E-money Issuer Regulations. Its draft Financial Inclusion Policy, at August 2012, included an objective to create an enabling regulatory environment for inclusive financial service providers, encompassing the operations of microfinance institutions, nonbanks such as mobile phone operators and branchless banking.

Figure 15 summarises the situation on remittances from both supply and demand perspectives, according to the World Bank report.

Figure 15: Remittance Patterns and Services

Outflows dominate in Bhutan's international remittances. Formal outflows amounted to 4.2 percent of GDP in 2010. Official international inflows remain small, though data show a steady increase between 2006 and 2010 to US$5.66 million—equivalent to 0.33 percent of GDP (World Bank 2011). Survey respondents reported using international remittance services to send money to children studying in India, though a few also use these services to make international business payments or to receive money from family members abroad.

Domestic remittance services are used for sending or receiving business payments or salaries or for transfers between family members (such as for consumption, housing construction, education, and pilgrimages). Field research found that informal flows remain dominant in domestic remittances between migrants and their family or friends within Bhutan. Informal remittances tend to be smaller and are sent with bus or taxi drivers and travellers. Family, friends, and neighbours may not charge for their help in delivering a remittance, but **bus and taxi drivers charge between Nu 50 and Nu 200 (US$0.90–4.00) per transfer**. One respondent who owns a taxi justified his rate by citing the time he spends looking for the recipient of the remittance and the risk he takes in handling the money.

Among formal providers of remittance services, commercial banks and Bhutan Post are the largest. Money transfer operators operate only through Bhutan Post (in the case of Western Union) and Bhutan National Bank Limited (BNB) (MoneyGram). All other banks in Bhutan also provide remittance services.

Convenience, cost, efficiency, safety, and speed were the most important characteristics respondents cited for choosing a remittance service provider, though people also tend to use the same bank for remittances as they use for saving and borrowing**. BNB, Bank of Bhutan Limited (BOB), and Bhutan Development Bank Limited (BDBL) offer free account-to-account transfers within the same bank and charge Nu 20–40 (US$0.36–0.72) for transfers between banks.**

Respondents who have children studying in India tend to use Druk Punjab National Bank Limited (Druk PNB), a joint venture of India's Punjab National Bank and local promoters, because it is cheaper and more convenient; the bank does not charge fees for remittances under Nu 30,000 (US$540) to India's Punjab National Bank. In areas where Druk PNB does not offer remittance services, respondents use BOB, BNB, and Western Union. Some respondents reported using Western Union because it is fast and safe but to a lesser extent than other service providers because it is also more expensive.

In urban areas people more frequently use formal remittance channels because they are safe and convenient. Rural residents resort to informal channels because formal providers are too far away and because these providers often use forms that are in English, which most rural residents are not comfortable with.

Source: World Bank, *Connecting the Disconnected* [emphases added by this study]

9 Government to citizen services

9.1 Context

In Bhutan the private sector is still relatively small, and citizens rely on government for a wide range of services that in other countries might be provided privately. For example, in a 2013 survey of citizens' perception of local governance in Bhutan, the services shown below were mentioned. In the survey, no distinction was drawn between physical and non-physical services, but Figure 16 below does make this distinction.

Figure 16: Physical and non-physical services in Citizen Perception survey

Physical services	Non-physical services
• implementation of development activities • organization of festivals and events • animal health services • provision of community facilities and amenities • construction of irrigation channels • land conversion services • community transport • keeping community clean • maintaining health standards • implementing plans • maintaining farm roads • supplying seeds and fertilisers • maintaining local market place	• issue and re-issue of citizen ID (CID) cards • life insurance claims • transfer of thrams • issue of rural timber permit • collecting taxes

Source: Project analysis of *Citizen Perception of Local Governance* survey

By "physical" services, we mean those which require the presence of people and/or objects in the area in question for their proper performance (for example, a sweeper with a broom for street cleaning). "Non-physical" services could in principle be carried out at a distance, through using information and communication technologies (ICTs), if money in bank accounts is accepted in place of cash. A concrete token of the service may be provided, such as an insurance certificate, but this is not the essence; the service itself (in this example, of being insured) does not depend on the token. These are the prime candidates for e-government (e for electronic) initiatives. Other examples of non-physical services include:

- issue of licenses
- grievance reporting
- advisory services
- data collection and surveys
- campaigning and marketing
- Information dissemination and education.

The survey related to local government, and this is just a sample of local government services. At national level there are ten ministries, plus a number of other agencies, engaged in a wide variety of activities whose ultimate purpose is to benefit citizens: health, education, housing, roads, agriculture, energy, employment, industry, culture and communications only start the list. The local priorities found in the survey quoted above are largely mirrored at national level. In the 2012 Living Standards

Survey, respondents were asked their priorities for government action to improve their lives. Top scoring areas (in order of rural priorities) were:

- Road infrastructure and bridges
- Water supply
- Commerce, transport, and communication
- Agriculture and extension facilities
- Health facilities and family planning
- Schooling facilities
- Electrification
- Housing
- Land and resettlement
- Credit and loan issues

This project is concerned with:

- those public services which are provided directly to citizens (as opposed to being provided to businesses or organisations which may in their turn serve citizens);
- and which are wholly or mainly non-physical, so that they can be provided using ICTs – and become part of e-government.

Physical services often have non-physical parts which fall into our category – for example, bus services are physical, but their timetables are non-physical and add a lot of value.

It is worth considering the satisfaction that citizens typically experience from using a government service. There is a big difference between services which are likely to provide positive satisfaction, such as prenatal health care or the provision of seeds (resulting respectively in a healthy baby and good crops), and those which simply help to avoid bad results (such as being fined for doing something without the correct permit). One reason for the lacklustre performance of the G2C project to date may be that the great majority of its services are of the latter kind, to do with getting necessary licences and keeping records up to date. Using such services is generally more of a duty than a pleasure.

Using ICTs has great potential for improving efficiency, speed and effectiveness of service provision. Bhutan's government has been aiming to make the most of the new availability of ICTs with its programmes of online "G2C" services. There is also a complementary programme of "G2B" services targeting businesses. The original terms of reference for this project involved choosing a subset of the services identified for the G2C programme, for implementation using mobile phones.

9.2 The PMO G2C project to date

We have two main sources of information on existing G2C services:

1. A spreadsheet called "updated list of G2C services 19.06.2013" received from the G2C project office http://www.g2c.gov.bt/ just before it closed in late June. This lists 148 services in two phases, by sponsoring department and name, showing which services are available and by what channel (CC, online or through Agency/Dzongkhag/Gewog). The number of services by phase and department is summarised in Figure 17 below.

2. The website www.citizenservices.gov.bt. This broadly corresponds with the services in Phase 1 of the spreadsheet, and contains fairly full information on how to use each service.

A third source is a printed list of service names, which adds the following "overall services":

- G2C delivery portal
- Voice of Customer portal
- Payment tracker
- Online service monitoring

According to the State of the Nation report, since these online services were made live, 41,481 applications across all agencies have so far been submitted and processed through the G2C system.

Figure 17: Summary of services listed in G2C spreadsheet

Sponsoring Departments Phase 1	**Services**
Ministry of Home and Cultural Affairs (MoHCA) (Department of Civil Registration and Census (DCRC), Department of Culture (DoC), Bureau of Law and Order (BLO))	27
Ministry of Foreign Affairs (MoFA) (Department of Protocol (DoP))	1
Ministry of Agriculture and Forest (MoAF) (Department of Agriculture (DoA), Department of Livestock (DoLS), Department of Forests and Park Services (DoFPS))	15
Ministry of Economic Affairs (MoEA) (Department of Cottage and Small Industries (DCSI), Department of Trade (DoT), Department of Industry (DoI))	37
Autonomous Agencies (Drug Regulatory Agency (DRA))	9
Sponsoring Departments Phase 2	
Royal Audit Authority	1
Royal Bhutan Police	1
National Pension & Provident Fund	6
Ministry of Education (Department of Adult & Higher Education)	12
Ministry of Works and Human Settlement (Construction Development Board)	12
Ministry of Labour and Human Resources (Department of Employment, Department of Labour)	6
Ministry of Works and Human Settlement (Thromde, Department of Engineering Services, National Housing Development)	21
Total number of services in G2C project	**148**

Based on looking at sample services from the website, and the names of the services provided in the spreadsheet, we offer the following provisional observations.

9.2.1 Service content and classification

The great majority of these "services" are applications for something; the desired outcome (which one might reasonably think of as the actual service) is only provided once the application has been properly submitted and approved.

The actual services fall into various categories:

- The majority are approvals, permits or licences to engage in certain activities, which (once approved and granted) are presumably registered on a departmental database, and evidence of the approval or grant provided to the applicant in the form of a paper certificate or other physical token – notably, a plastic citizen identity card (with machine-readable barcode), driving licence (a similar plastic card) or a passport.
- Certain others, notably support services from the Department of Agriculture, may lead to information or advice, or even a physical service like a visit from an extension worker.

Those services which do not require application are mainly registrations of personal information (for example of a change of name), which result simply in acknowledgement of updated central records, or sometimes in issuance of new related documents. For instance Name Change will result in issuance of a new CID with the new name.

Services from a single department are often variations on a theme, for example initial applications for a permit, renewals of that same permit, cancellation of the permit, or alterations to the details registered on the permit. While from the point of view of the department these may be separate procedures, for the public they may more naturally be viewed as different aspects of the same service. From this latter viewpoint (which is adopted by the G2B portal) the number of distinct services would be significantly reduced. The G2B site is based on an inventory of licences (including permits, registrations certificates, approvals, etc.) which was shared with the G2C project initially.

A significant part of the services, for example many of those from the Departments of Trade and Industry, appear to be addressed to proprietors of business undertakings and as such could be classified as G2B rather than G2C; in fact a number of these services also appear on the G2B business licensing portal at www.g2b.gov.bt (where 123 licences are listed). The boundary line is unclear. The G2B site is a result of the Licensing Simplification Project which was started in 2007.

Even the minority of services which are addressed to citizens as such (rather than in their business capacities), such as life event registrations, mainly relate to rather rare events. Birth and death, for example, each occur once for everybody. So, even if the new procedures make these services much easier, the total advantage to any citizen in using them in place of the old ones may not be very great.

9.2.2 Application procedures

Most of the services are accessed via a "service manual" tab which contains descriptions of the application procedure and requirements, in both Dzongkha and English.

Few of the applications can be completed online. Those that can are mainly accessed via a separate website tab, "apply online" (listed in Figure 18); links are also provided to some other online services, which appear to be:

- Security clearance by Royal Bhutan Police
- Job portal provided by Ministry of Labour and Human Resources
- Citizen registration form and “check citizen details”
- The Bhutan Schedule of Rates provided by the Ministry of Works and Human Settlement

- Application and licence trackers (both available by SMS query as well as online).

In most cases, an application form can be downloaded but this must then be printed out and completed manually, often including a legal stamp. Many applications must be accompanied by a payment, typically of some hundred Nu. Many others are free, apart from a possible service charge if carried out at a CC.

Those applications which can be completed online often require accompanying documents to be uploaded. It is common for an application to have security clearance as a prerequisite.

9.2.3 The citizenservices portal experience

The portal itself could be improved from a user viewpoint. For example:

- It might be clearer if related services were grouped together, instead of just being in one long list; indeed, in some cases, they might usefully be combined into variations on a single service. For example, if you had a permit which has now lapsed, it may not always be clear whether you should apply for a new permit or a renewal of the lapsed one - a single form which asks whether you had this sort of permit before, and if so when, would take care of that.
- The current arrangement assumes that the customer knows exactly what service he wants and which department takes care of that service, and recognises all the acronyms; if any of these conditions do not hold, it could be quite tricky to find the right service. There does not appear to be a search facility or a high level topic listing.
- Ideally it should include all government services that are available online, not just those that happened to be part of the original project. For example, the Royal Audit Authority appears to be offering online audit clearance and the Ministry of Finance personal income tax filing, and the Anti-Corruption Commission has an online asset declaration system (for civil servants and related groups), but these are not visible on the citizenservices portal.

9.3 Potential for using mobile channel for these services

Clearly the complete service (including both application and delivery) can only be provided via mobile, or indeed online, when there is no physical element. The services on the current website which appear to fall in this category are those where the citizen provides new information to an existing registration (e.g. a change of name or location), or information/advice services such as those provided by the Department of Agriculture. However, hybrid approaches are possible such as doing the application part using mobile and the rest of the processes (back office work and final delivery) using another channel, maybe online; this approach is adopted in our proposals.

Applications which can currently be carried out online may not be possible using mobiles where document upload is required. It may however ultimately be possible to simplify some of these procedures, maybe using direct citizen authentication through one or more data hub, so that the information required is sufficiently simple and lightweight for the mobile channel.

The legal stamp is an impediment to both online and mobile channels. We are unclear what if any useful purpose it serves, other than acting as a modest transaction tax.

A general service of application tracking is apparently already available (as "online service monitoring") and already uses or can use the mobile channel. For a "pull" service, it should be sufficient to quote an application ID by SMS, and receive a return SMS giving the application status.

Similarly, assuming a mobile number is included in an application, alerts on application status may be sent on a "push" basis when problems occur, or when milestones are reached (including alerts that desired outputs are ready for collection). **These alerts are commonly sent by SMS, and later in this report we refer to SMS alerts, but voice equivalents are also worth considering; for example**

automated voice alerts for people who have opted for them, or access to a text-to-voice interpreter (automated reading out loud).

Applications for renewal or amendment of existing licences etc should in principle be possible using simple SMS or USSD based query systems, as long as nothing of substance has changed, and that no fee is payable (see next).

Payment of application fees is currently an essential part of many of these procedures. Only when fee payment also happens via the mobile channel can the procedure be fully mobile.

The "voice of customer" online service could use the mobile channel via a 24/7 call centre/IVR system which recorded voice messages when no agent was available, for later call back. Subject to expected call volumes, agent expertise and agency ability to deliver, such a set-up could also extend to many more services, including the completion of forms through live conversation.

Figure 18: Summary of services on citizen services website

	Outline of services	**Remarks**
Apply online		
Department of Adult and Higher Education (DAHE)	Apply and register for scholarship or BSA, register as tertiary student.	Scholarship registration includes bank details for receipt of funds.
Bhutan Council for School Examination and Assessment (BCSEA)	Apply for duplicate or replacement documents, for English proficiency certificate or for exam paper recheck.	Original hard copy documents may also be required. English proficiency certificate fee is 7000 Nu.
National Housing Development Corporation Limited (NHDCL)	Apply for housing quarters or for housing maintenance.	Services wrongly labelled on website. For government employees rather than general public?
Voice of Customer	Enquire online about progress of applications, G2C or non-G2C.	Could be expanded to cover more general enquires and to use voice or SMS.
Service manual		All following services appear on separate drop-down menus classified by sponsoring ministry (as shown in Figure 17).
Department of Civil Registration and Census (DCRC)	CID issuance, replacement, amendment; birth/death registration; personal details amendment.	CID issue/renewal and birth registration are two of the most popular services.
Department of Culture (DoC)	Apply for permit to renovate or construct religious structures.	Relatively low frequency occurrence?
Bureau of Law and Order (BLO)	Apply for permit to acquire or transfer explosives; monthly explosives inventory report.	Relatively restricted interest?
Department of Protocol (Ministry of Foreign Affairs)	Apply for passport.	Requires security clearance, scanned photograph and scanned signature.
Department of Agriculture (DoA)	Apply for supply of lab services, various agricultural inputs, plant protection advice and	Lab services require soil sample. Inputs require physical service delivery. Some services appear to

	Outline of services	Remarks
	service, machinery inputs and advice.	be available only in certain areas.
Department of Forests and Park Services (DoFPS)	Apply for permits to collect and use 5 categories of forestry (wood/non-wood) products.	Timber permits are a well used service.
Department of Cottage and Small Industries (DCSI)	Apply for issue, renewal, duplicate, or cancellation of trade licence, or to change details on licence. Apply to renew environmental clearance.	More G2B than G2C?
Department of Trade (DoT)	Apply for company name clearance and registration, transfer and name change; FDI approval and licensing.	More G2B than G2C?
Department of Industry (DoI)	Apply for issue, renewal, duplicate and cancellation of trade licences (micro/retail/wholesale categories).	More G2B than G2C?
Drug Regulatory Agency (DRA)	Apply to register or renew status as competent person; for licensing as retailer/wholesaler; for registration, import and export of medicinal products.	More G2B than G2C?

According to an official account, which may err on the side of optimism:

> All the services have defined timelines and fee structures, and the entire database has been integrated through Citizenship ID card numbers. A central database registry for business licences, citizens' ID cards, vehicle information, and other data has been developed, and citizens are therefore no longer required to submit photocopies of documents as these can now be pulled from the system automatically. These services are being pooled in a common gateway portal which can be accessed only by authorized persons through user passwords. To ensure security, all approvals are routed through TWAN (Thimphu-wide area network).

9.4 Previous assessment of mobile for G2C services

A precursor to the current project was an assessment of mobile services in Bhutan carried out in collaboration with ITU in November 2011. Four application areas for mobile services were identified - Health, Disaster Management, Agriculture and Finance. The following mobile services were proposed:

1. **Health** - Mobile application for health workers to track mother and baby, for pre-natal and post-natal monitoring.
2. **Disaster** - Web interface for sending SMS alerts directly in case of natural disaster and emergency. With this application, the Department of Disaster Management will bypass the current practice of informing telcos for broadcasting, and will have greater control and freedom to create and send messages at time of urgency.
3. **Agriculture** – Interactive Voice Response (IVR) system with qualitative information that provides farmers with up-to-date price information on basic agricultural products. The Ministry of Agriculture already has this system, therefore the value addition expected is the option of adding more new products and enabling the service for Tashi Cell users.
4. **Finance -** Android based application that provides information on bank and banking services provided by the Bank of Bhutan. It also has the feature of balance inquiry through SMS pull

service. Some additional features are viewing exchange rates and getting details of Branch and ATM location throughout the country.

Of these four, it appears that the second and third are complete as applications, but deployment will take some time because the applications require integration with the telcos. The first remains an aspiration for the current project, and unfortunately has not yet progressed from the requirements gathering stage. The fourth is complete and now gaining awareness and use.

In the E-government Master Plan, MOIC proposes a continuation of the m-government services project, whose overall cost is estimated at Nu. 50m.

9.5 Role of Community Centres

In many countries, since early days of the internet, there have been initiatives to make internet available on a shared access basis to people who would otherwise have no access. Special centres housing internet-connected terminals, where the public can use them for modest or no payment, have had various names (most commonly *public telecentre*) and have offered a variety of ancillary services and management models. While success has been mixed, a general experience has been that achieving sustainability outside towns is a major challenge.

Since the year 2000, Bhutan has been experimenting with such initiatives, and has had its own series of names for the centres, including One-Stop Shops, Community Information Centres, and most recently Community Centres (CCs). In parallel with this project, a review of the Community Centres has been in progress, and we were asked to pay special attention to the relationship between CCs and mobile services.

Below we provide an account of the CC programme to date based on MOIC's E-Government Master Plan of May 2013, supplemented by its June 2013 Status Report.

Figure 19: The Community Centre Programme to date

Enabling access to information and electronic services anytime, anywhere is instrumental in achieving the visions of an Information society. Community Centre (CC) in the Gewog has been identified as one potential hub where communities can have access to information and government services.

The DITT/MoIC was mandated by the RGoB to establish one CC in every Gewog totalling 205 CCs in the country. The project was started in mid 2009 and in the first Phase, DITT with the financial assistance of Nu. 115m from Chiphen Rigphel established 100 CCs (25 co-located). With the financial assistance of Nu.112 m from SAARC Development Fund (SDF) and Nu. 40m from Gross National Happiness Commission (GNHC), DITT has completed establishment of 82 CCs. The remaining 23 CCs will be established in 11FYP due to unavailability of funds and absence of electricity in those Gewogs. The approximate cost of constructing and equipping 23 CCs is Nu. 57.50m.

The CCs are located in very remote areas and not able to sustain the services. Therefore, the Government approved a 5-year fund subsidy to Bhutan Post, for operation and management of the CCs. The subsidy is based on the business model developed by Bhutan Post and DITT/MoIC has been instructed by the Cabinet to maintain the subsidy in its annual budget. The subsidy is exclusive of recurrent Internet cost. DITT/MoIC has agreed to bear the recurrent Internet charges for the first 5 years. The recurrent cost incurred for the connectivity will be provisioned in DITT's annual budget for payment to Internet Service Providers as and when necessary.

Source: Bhutan E-Government Master Plan, May 2013

Figure 20: June 2013 Community Centre status update

Description	Number
Total CCs targeted	185
New structure	160
Co-located CC	25
Structure incomplete	4
CCs without electricity	9
CCs with Learning Station (hiWEL)	115
CCs with internet	89

Source: MOIC

The CCs have an important relationship with the G2C programme. Most G2C services have been delivered at dzongkhags, regional offices and numerous government offices. This model has been termed 'many doors, one service'. The aim is to supplement and eventually replace it by an alternative 'one door, many services' or one stop shop (OSS) model from where citizens will be able to access all kinds of public services. Among others, the CCs are intended to serve as OSS in communities across the country.

According to the G2C project office, applications for the top three G2C services used from the community centres in rural areas for the year to December 2012 were:

Timber permit issued - 493

Micro trade licence issued - 662

Birth registration - 10,266

Also, we are told that by April 2012 a total of 1,283 micro trade registration certificates had been issued through CCs.

Although they are growing, these figures are disappointingly low for those concerned with the project. Our investigations have revealed a range of challenges which help to explain why those G2C services at CCs which are of potential interest to ordinary citizens have not been more popular.

User factors:

- User attitude affects delivery of service. If the users do not receive a favourable first impression, they tend to give up using the service for good.
- People prefer to come in person to the usual office to use services.
- Offices are located adjacent to one another in some cases, so there is little or no saving in using the CC.
- People have time, especially civil servants, to come in person to use services.
- The services provided are not the ones that people want, which include land related issues, and insurance products.
- Family members living in Thimphu may help their relatives in the countryside to use services by visiting offices on their behalf.

Service implementation factors:

- Frequent change of focal persons by some agencies.
- Communication problems and slow implementation leading to more lead time.

- Services are mostly dependent upon IT focal persons of agencies. In their absence, services remain not used even if it is a minor problem.
- Systems testing did not adequately represent actual data. When launched, actual transaction issues surfaced.
- Absence of past data for services like renewal, duplicate issue and cancellation prevents the use of such services.

CC factors:

- Poor internet connectivity (if any).
- Frequent failure of power supply.
- Shortages of consumables like stationery and office supplies.
- Equipment malfunction and no servicing centres near the CCs.
- Meeting twin objective of public/social service and an entrepreneurial obligation.
- Linkage between CCs and local government is not clear.

CCO factors:

- Staff operating CCs are young and not adequately skilled, thus they might probably leave CCs if they get a better job elsewhere.
- CC operators will be doing same job over and over again and at some point in time they might get bored of doing the task, unless they have a career progression path.
- Two week training that CC Operators receive is not adequate to train them well, as most of them come with general background.

9.6 Other existing "G2C" initiatives using mobiles

As shown in section 9.2, the G2C project both included many services which would not normally concern ordinary citizens, and excluded some online services which do concern ordinary citizens. In addition, its notion of what constitutes a service may not match the expectations of potential users. These facts have led to misunderstandings for the project team, and there may be broader misunderstanding about the coverage of the G2C project. In this report we shall use the term “G2C” in a general sense, to mean communications between government and citizens (in either direction), unless we refer explicitly to the recently closed G2C project.

At the first workshop it was agreed that the team should study G2C services in this broader sense, and not be confined to those covered by the G2C project. This broadening constituted a significant expansion of the team’s terms of reference, but was welcomed as it should enable much more useful output. The people we spoke to in our fieldwork seemed naturally to take this point of view. In particular, we found that several agencies were already using the mobile channel to deliver services either directly to end users, or indirectly via their field workers. Such services that they told us about included:

- The Ministry of Agriculture and Forests (Department of Agricultural Marketing and Cooperatives) has enquiry lines for live advice, as well as their IVR market price and agricultural input information services which get 40,000 to 50,000 hits a month. They also have a pilot project in East Bhutan (Mountain Hazel Nuts Plantation Project) using Global Positioning System (GPS) to monitor the movements of field staff. Field staff may use their mobiles to access central databases on behalf of farmers.
- The Department of Forests and Park Services is piloting a Windows Mobile based system on a GPS handheld device to be used for establishing the National Forest Inventory. They are also planning to issue SMS forest fire alerts.

- The National Plant Protection Centre is implementing mobile device (Android) based surveillance services and advisory services.
- The National Statistics Bureau uses smart phones to collect real time price information of essential commodities across main towns in all Dzongkhags in Bhutan.
- The Ministry of Health has a phone-in Health Help Centre, which combines the services of despatching and tracking ambulances in emergencies with those of a live advice line. Trongsa Dzongkhag is pioneering giving mobile phones to volunteer Village Health Workers, to help them to do their jobs more efficiently.
- The Moodle online educational content system (used in three higher education colleges) is fully accessible via smartphones. Update alerts could be available via basic phones.
- The Ministry of Education offers SMS exam result delivery.
- The Road Safety and Transport Authority issues SMS reminders about licence renewals.
- B-Wallet information and own-bank transaction services are now offered by two banks, in co-operation with B-Mobile. A third bank would like to offer similar services as soon as software compatibility issues can be resolved, and is already piloting giving its project officers in the field Windows Phone based mobile apps for replacing a manual register.

No doubt there are several other such services that we did not find. We also heard many ideas from these and other informants for new services using mobiles that they were interested in piloting or launching. In Figure 33 (section 16) there is a collection of these along with suggestions of how and when they could be implemented.

Overall, we concluded that in most parts of government there is plenty of enthusiasm and interest for using the mobile channel to serve citizens.

9.7 Summary: looking ahead

In Annex G (ordered by agency) and Figure 32 (ordered by implementation timing), we provide a long list, based on the complete list of Phase 1 and Phase 2 G2C services, of possibilities for using the mobile platform on a staggered basis to support or enhance these services. The likely timing of each support service type being available is summarised in Figure 31.

From the user side, there is keenness to use these services, as they would save time and cost. Some rural users even spoke of having connectivity at their homes to access these services at their convenience. However, there could well be problems from the supply side due to perceived dilution of authority, loss of jobs, fear of the unknown, and other social and cultural factors. Adoption by users will depend on the quality of service, cost and time it can save and being able to create an initial good impression. If they are disappointed in their early use, it may take time for users to regain trust.

From the supply side, there is a mixed feeling across a cross-section of agencies and government bodies around security and private issues, change management, loss of power and influence, cultural aspects, confidence, trust etc. However, many of these agencies generally support the initiative to facilitate as many services as possible on mobile platform, as ultimately going mobile will reduce their workload and increase efficiency and effectiveness of service delivery to citizens.

10 Summary of current situation

To sum up key points of the situation as presented so far, in Figure 21 we offer an assessment of relevant stakeholder groups with the nature of their involvement, showing what they have to gain or lose. Getting this complex picture to work positively will best be achieved by strong, inspiring leadership which makes clear to everyone that they stand to gain most by working together to achieve overall goals.

Figure 21: Stakeholder assessment

Stakeholders	Contribution / Roles	Interests and potential achievements
Contributors		
Content Providers	Develop content leveraging of the opportunities provided as a result of MSDG Implementation	Business case and profit making. Fosters innovation in content development.
Application Developers	Develop applications that can be provisioned using the MSDG.	Business opportunities and innovative culture among application developers.
MSDG Operator	Maintain and manage the MSDG. Add new features and channels as per market needs.	Centralized management of infrastructure and systems.
Beneficiaries		
Service providing agencies	Design services and provide multiple channels for service delivery.	Greater reach using mobile improving efficiency and citizen reach. Reduce logistical burden on citizen.
Financial Sector players	Provide services using channels available in the MSDG.	Improve access to finance and achieve financial inclusion. Increase reach to customers and save cost on establishing branches and recruiting agents.
NGOs/CSOs	Reach communities using mobile platform and service delivery channels in the MSDG	Improve linkages with communities and international NGOs / CSOs. Reach out to more communities and needy ones due to reduction of cost of operations using mobile technologies.
Business	Use the services launched through the MSDG	Improve reach to potential customers and larger audience by mobile marketing and mobile campaigning
Citizens	Use services provided through the MSDG and participate in policy making	Reduction in logistical burden while using services. Use services anywhere anytime. Improve participation in democratic process.
Local Operators	Become channel partner for service delivery with the government	Better business through use of mobile channels
Competitors		
Local MNOs	Development of new service delivery channels and MSDGs	Better profit by becoming efficient as operators
Cloud based Service Providers (like Skype, Google)	Provide voice and video services using cloud based solutions	Beneficiaries attrition and new business

Stakeholders	Contribution / Roles	Interests and potential achievements
Government		
Regulators (BICMA and RMA)	Support the initiatives with regulations.	New regulations which are in step with the advances in technologies and use of technologies to support economic activities
G2C Governance Office / DLG	Collaborate with service providing agencies and local governance officials in introducing service through mobile using MSDG. Identify mobile services projects	More services can be listed in mobile platform providing convenience to citizen
MoIC / DITT	Provide technical assistance, recommend favourable policies and strategy for transforming service delivery leveraging technology. Seek proposals from agencies, prioritise the projects and develop implementation plans and monitor project activities	Improve acceptance of technology in service delivery through policy recommendations, and technology vision development. Service selection criteria for porting to mobile platform. Promotion and development of private sector through policy interventions.
Ministry of Finance / Development Partners	Provide funding for priority projects and monitor investments	Proper utilization of budget allocated for service delivery projects.

Source: adapted by this project from a World Bank prototype

Figure 22 provides an analysis of Strengths, Weaknesses, Opportunities and Risks / Challenges. The last category seems more appropriate than the usual Threats to this enterprise, as it is of a co-operative rather than competitive nature. An earlier version of this analysis was presented at our second stakeholder workshop, and this version takes account of input received on that occasion. It is worth noting that some of the entries, while agreed to be key features of the situation in Bhutan, could be placed in different categories depending on different viewpoints. For example, the small population of Bhutan can be seen as a weakness from the point of view of its attractiveness as a market, but an opportunity when it comes to ensuring that all significant players are involved in a venture.

This analysis does not aim to be comprehensive, but rather to highlight the most important items in each category. **Overall, our assessment is positive: there are significant weaknesses and difficulties ahead, but the strengths and opportunities are sufficient to make these problems well worth tackling.**

Figure 22: Assessment of strengths, weaknesses, opportunities, risks and challenges

Strengths	**Weaknesses**
• Fast and wide take-up and use of mobiles. • Low cost mobile handsets available, with entertainment features. • Electricity now available to all villages. • Strong family and social ties. • Existing e-government initiatives are a good start. • Existing government field forces (e.g. education, health and agriculture) – close to rural people. • Large number of mobile airtime outlets, with existing agency agreements – close to rural people. • Relatively stable government policy (under GNH banner).	• Limited user capabilities, especially among non-literate; low security awareness and some lack of civic sense (e.g. misuse of toll free numbers). • Cumbersome government bureaucracy. • Small private sector. • Slow development of universal e-money. • Lack of clear laws on privacy, data protection and online content. • Unreliable connectivity, with low infrastructure resilience - limited redundancy. • Most handsets unable to support localized content. • Bhutan is a technology follower, e.g. GPS for location tracking is not yet available.
Opportunities	**Risks and challenges**
• Fast economic growth, leading to rising disposable incomes and possibility of reducing the digital divide. • Educated youth can assist elders with use. • IT graduates (maybe with additional local training) can improve systems infrastructure, innovate in mobile applications area, and provide localised content support. • Mobile sector policy review is working towards more competition and better service delivery. • Cheaper smartphones coming – could carry apps designed for use in Dzongkha or through universal symbols/pictures. • Community Centres and their operators can provide valuable user support for m-government initiatives. • Only two mobile operators and five banks – should make it easier to introduce workable e-money systems.	• Resistance to, or poor understanding of, e-government among officials can obstruct progress. • Mobile broadband may be slow to reach rural areas. • Limited availability of e-money (due to lack of enabling environment) may hold back both m-government and m-commerce. • Existing e-government systems are not sufficiently robust or stable for mobile use. • Lack of co-ordination among different arms of government may lead to system duplication, inconsistent user interfaces and excess cost. • Generation of e-waste. • Negative cultural and social impact.

PART III: DISCUSSION AND WAY FORWARD

Mobile phones provide valuable support to small businesses

but also bring their own problems.

Mobile phone top-ups are widely available…

while Community Centres are little used.

11 Lessons for Bhutan from international experience

There is a large and growing body of literature on mobile phones and their uses, referring to economic and social development in general and to m-government in particular. Here, we aim only to briefly summarise some of the key lessons for Bhutan of international experience, as reflected in this literature. The reader who wants more is invited to explore the papers identified in our (very selective) bibliography provided at Annex L.

11.1 The mobile phenomenon

Mobile phones can have negative as well as positive effects, but on balance their spread is positive for personal empowerment and national development. We discuss this further in 11.3 below.

Mobiles are most empowering for people who have previously had little opportunity to communicate outside their immediate circle. Women often represent just such a group; from a gender perspective, mobiles are particularly positive. This too is discussed further in 11.4 below.

If government creates an enabling market and regulatory environment for mobile network operators and mobile handset suppliers, then coverage, take-up and use will spread fast without the need for further action.

There are limits to commercial viability of mobile network operations, often beyond initial expectations, but still leaving some remote or sparsely populated regions without coverage. To go beyond these limits, governments typically use Universal Service Funds or issue licences subject to specific rollout obligations.

11.2 M-government

M-government can be:

- Complementary - adding a channel to existing eGovernment services and processes;
- Expansive - allowing conventional services to reach previously unserved or underserved constituents;
- Innovative - used to develop new services for service delivery and governance.

In high-income countries, it is largely complementary, as widespread take-up of internet and e-government (using computer terminals and fixed broadband connections) has preceded moves to m-government. In middle-income and low-income countries, the mobile channel is likely to come first, and indeed fixed internet may never become widely established. So moves to m-government can be part of a wider and further-reaching movement towards internet accessibility and use.

Different ways of accessing a government service (such as personal visits to offices, postal submissions and phone calls) should continue to exist in parallel for as long as significant segments of the public want to use them. Forcing people to use m-government services before they are ready can be counterproductive, creating resentment and possibly service drop-out.

The public may be slow to turn from old to new methods of service delivery, but if a new method is well designed, and provides real advantages for users over old methods, then it is likely to succeed. Take-up rates for new methods can be boosted by publicity, user education and user incentives.

Obstacles to progress towards m-government (or e-government) may well come from within the ranks of government officials, some of whom may themselves lack digital literacy or confidence, or feel that their position or influence is threatened. This situation is handled through continuing education and training, with job moves where needed.

Acceptance of new service delivery channels requires citizen-centric business management, customer management, channel management and technology management. Service designs must be thought out from the citizen's point of view rather than the government's point of view. Integrated common information Infrastructure and proper knowledge management approach are the way forward.

11.3 Mobiles: the balance of advantage

Most technologies are themselves neutral, but can have good or bad effects depending on how they are used. Motor vehicles are one example of this, giving rise both to greatly increased opportunities for mobility and economic growth, and to noise, pollution, and congestion. Mobile phones are another example. During this project, negative effects of mobile phones have been mentioned several times and the legitimate question has been raised of whether their spread may do more harm than good. Here we address this question.

Negative effects of mobile phones which have arisen in our discussions in Bhutan are

- Their association with misunderstandings within relationships, possibly leading to marital difficulties or even breakdown.
- Some telephone helpline services being plagued by "prank calls", which are do not reflect genuine service requirements but waste operators' time. These may be deliberate or accidental.
- Mobile phone use, especially recreational use, can waste users' time and distract them from their proper occupations. For these reasons mobile phones are often forbidden or restricted in schools and monasteries.
- Keeping in touch at a distance may lead to less direct personal contact. For example, visits to elderly parents in a village may be less frequent once they are available on the phone.
- Use of mobile phones while driving is dangerous and can lead to fatal accidents.
- Unsupervised use of mobiles, especially smart phones, by children can allow them access to unsuitable material online, which parents would not want them to see.

We may also mention some further potential ill-effects which did not arise in our discussions:

- Poor people may spend so much on using their mobile phones that they cut back on other spending, possibly to the overall detriment of the household. Evidence for this phenomenon is sparse and comes mainly from Africa, where spending on mobile phones appears to have led to less spending at first on alcoholic drinks and later also on food.
- Mobile phone users can be pestered by unwanted calls or messages with commercial intent, commonly known as "spam".
- For some personalities, smart phone use can ultimately become addictive.

Good effects of mobile phones are the main topic of this report, and we do not need to dwell on them at length here. At the individual level, they include:

- Maintaining personal contacts (with family, friends and colleagues) much more easily and cheaply than before.
- Conducting business more efficiently and intensively, through better contacts with customers and suppliers and smoother operations.
- Getting help in emergencies.

Such micro-effects add up to provide often-quoted boosts to national economic growth.

Informed opinion appears to be unanimous that taking both good and bad effects of mobiles together, although quantification is challenging, the overall balance is on average hugely positive. We quote from the distinguished economist Amartya Sen, who has specialised in development issues and poverty relief:

> "A telephone owned by a person helps others to call the person up, as well as to receive calls from him or her, and so the increased freedom of the phone owner adds to the freedom of others …. in general, the impact of more telephones is to make things more agreeable and more enabling for others. And if that is an explanation of why for profit initiatives in telephone activities tend to be supportive of other activities, it is also something of an explanation of why massive expansion of telephone networks—and they have typically tended to be mobile phone networks—have been, in general, a boon, rather than a curse, for societies."

At the same time, it is important to recognise that the new opportunities opened for ordinary people by electronic connectivity, especially to the internet and to social networks, can have profound impacts on society. Internet has been referred to as a disruptive technology.

11.4 A gender perspective

A GSMA report on women and mobiles outlines why women particularly benefit from mobile phone ownership under the following headings:

- I feel safer because I own a mobile phone
- I feel more connected because I own a mobile phone
- I feel more independent because I own a mobile phone
- Mobile phones unlock economic opportunities
- Mobile phones enable women's voices to be heard

Of course, all these benefits apply to men too; but because women are more likely to suffer deficits in all these areas, the benefits they may reap from the phones are correspondingly greater. And unlike certain potentially empowering possessions or status symbols (cars, forms of dress, even weapons), women can acquire mobile phones without great expense and without any perceived clash with their femininity. Indeed (unlike the four countries for which figures are given in the GSMA report) Bhutan's Living Standards Survey suggests gender parity has been achieved in mobile ownership.

Women and mobile phones fit together especially well, because:

- All over the world, women tend to have dual responsibilities, for their families and for work. Mobile phones help them to manage these in parallel – for example, receiving messages from customers while at home with children, or checking on family affairs while out at work.
- Women are often more communicative than men; they excel in social networking (of both traditional and modern varieties), and are often the ones who make sure that news is shared or who check up on the welfare of absent family members.

Mainly, men and women will benefit from the same citizen services. But there is a case for providing some services which are targeted at women, for example:

- Confidential helplines (answered by women) for women who have suffered or feel at risk of maltreatment, including discrimination, domestic violence or rape.

- Specifically female health advice and support services for sensitive topics like sexually transmitted diseases, contraception, and pregnancy.

Mobiles also provide scope for organising groups and movements of all kinds, some of which may be run by women and/or especially for women, such as:

- Parenting support groups
- Handicraft production and marketing co-operatives
- Savings circles.

We also know from World Bank research on financial inclusion (see 8.1) that women in Bhutan are more prepared than are men to carry out financial transactions using their mobile phones. In short, from a gender perspective, mobile offers great opportunities.

11.5 Service inspiration from other countries

Apart from the broad general lessons outlined above, there are many reports and online repositories of specific case studies, initiatives and services that could be of interest to Bhutan. Our challenge has not been to find such material, but to select from it a manageable number of items that seem especially relevant and likely to be useful or inspiring in the Bhutanese context. As the result of these efforts we offer:

- In Annex J, a specially commissioned collection of examples of services of interest from countries in the region. This collection was assembled by team members based in Nepal and provides an especially detailed picture of mobile services in Nepal, but also some services of interest from India, Bangladesh and the Philippines.
- In Annex L (the bibliography), references to useful reports or online sources. Of course when using these the source must be taken into account – for example the GSMA provides a rich collection of resources, but its commercial motivation should always be borne in mind.
- Here, a short list of services or facilities that we have come across that seem worth thinking about in Bhutan. An early version of this list was shared at our second workshop.

Not all of this list is suitable for government provision. Indeed**, one of the messages of this study is that mobile service provision needs to be open to private sector and civil society partnerships and initiatives, as well as to government.** Some "serious" services can very well be provided privately, and mobile usage is very likely to be fostered by there being some services that are simply entertaining.

Even "serious" services can usefully have entertaining elements – for example, the opportunity to enter a prize competition, or to listen to a song or a joke – to encourage usage where spontaneous take-up is not enough.

Some mobile services from other countries which may be relevant in Bhutan

- **Directory services**, where a caller can request the mobile number (and often other information such as address and opening hours) of a business or individual. A successful commercial example from India is illustrated in for the next general election.
- **Figure 23**, and a location-based app from Nepal called nlocate won the recent PivotNepal mobile app development competition. In many countries directory enquiry services are provided by telephone companies, who will have checked with customers (at the time of issuing their numbers) whether or not they want their number to be available to enquirers.

- **Confidential personal helplines** for vulnerable people, for example children or women (usually run by civil society rather than government). Child Helpline International (CHI), the global network of173 independent child helplines in 141 countries, helps in setting up new helplines.
- **Voice Notice Board**. As offered by Nepal Telecom, this is supplementary to Voice Mailbox Service, enabling the mailbox to be used as a Notice Board by the subscriber. It is suited for schools or colleges for emergency closure notices; and for travel agencies or airlines to keep their callers updated on recent information/updates. Government can also use this during emergency / disaster to get key information to people who still have access to telephones.
- **Extend reach of mobile information services** through community broadcasting or other local relay (even a loudspeaker, or just word of mouth). In Sri Lanka, community radio is well established and was used for this purpose before mobile phone ownership became very widespread. The sort of agricultural information offered by M-Farm (see Figure 24) could well be shared across a rural community in this way.
- **Courses.** An IVR based training course can be delivered anytime, anywhere, via mobile phones. In an example from Bihar in Annex J, Frontline Health Workers (FLWs), once registered, can access a 190-minute course via a shortcode. It refreshes knowledge of life saving health behaviour and enhances interpersonal communication skills. The complete cost is around $1.50 (INR 100). FLWs with pass marks get a certificate after completing the course. It is accessible across all major operators and being rolled out to 40,000 FLWs now - scaling to 200,000 by December 2015. Supported by the Bill and Melinda Gates Foundation and Government of Bihar, India – http://www.ananya.org.in
- **Voice authentication** using IVR and voice biometrics (recognising an individual through their "voiceprint") is already operational. For example, http://www.uniphore.com/ provides voice security applications for banking.
- **Information during power breakdowns or planned outages**. The Apple iOS based Batti Gayo application in Nepal shows the updated load shedding schedule. It is free, and has a torch option that turns the camera flash on if it exists on the phone.
- **Internet services via SMS** (see www.55444.in). The dialogue may become somewhat involved, but it shows what is possible on even a basic phone.
- **Apps that work on any type of phone or operating system** (such as are made available by Etisalat, one of the mobile operators in Sri Lanka, in its AppZone - see www.etisalat.lk).
- **"Call me" services** such as Zipdial in India – a (deliberately) missed call leaving its Calling Line Identity leads to a return SMS or callback, free to the original caller. This may be a good option where it is not feasible to make the whole service tollfree for all callers.
- **Religious messages**, recorded or live, are popular in many countries and could be of interest to Dratsang Lhentsog. They can include "prayer for the day", pointers to guidance for devotees in specific situations, live broadcasts of special services or inspirational messages from religious leaders – all in a language of the caller's choice. Callers will often willingly pay for such services and the resulting revenues can be dedicated to good causes, so that each call becomes a kind of offering.
- **Mobile voting**. Here we are speaking of serious voting in real elections such as are managed by the Election Commission of Bhutan, not popularity polls or other light applications which can well proceed using SMS or voice. Because serious mobile voting requires highly secure user authentication, and because it also raises various other issues – for example, the voter's trust in the system - it has been tried in rather few countries. Estonia is the leading example, and South

Korea another. Nonetheless Bhutan's special terrain could make mobile voting a worthwhile target for the next general election.

Figure 23: Justdial Facts

- Justdial search service is available to users across multiple platforms, such as the internet, mobile Internet, over the telephone (voice) and text (SMS).
- Justdial has 08888888888 as their operator assisted hotline number, across India, which is accessible 24 hours a day, 7 days a week with multi-lingual support.
- Justdial Apps are available for the Android, Blackberry and iOS platforms and we have location based service for our mobile Internet users.
- Justdial has a database of approximately 9.1 million listings as of March 31, 2013.
- Justdial users contribute reviews and ratings for various listings.
- Business owners have the option to list their business on Justdial's database for free.

Source: www.justdial.com

Figure 24: M-Farm Facts

M-Farm is a private company supported by social capital, connecting farmers in Kenya. Like many other m-agriculture services it provides market prices for agricultural inputs and outputs, and also information on current news and trends. But it goes further – to provide a direct seller-to-buyer service (rather like eBay) and itself to act as a middleman. Farmers can see farm gate prices, which helps them negotiate fair prices for their produce, even if they don't actually make deals online.

Source: m-farm.co.ke

12 Policy and legal frameworks

12.1 Sustainability considerations

As was noted above, existing policy frameworks in Bhutan are broadly supportive of these proposals. Mobile services are entirely in keeping with stresses on good governance and reducing inequalities. However, in the current difficult economic climate, issues of cost and sustainability must be addressed.

Annex F item T16 contains some provisional indicative estimates of costs for implementing our technical proposals, covering system/application cost, infrastructure cost, and capacity development for the agency or agencies concerned. The indicative costs of our proposed programme for setting up shared facilities and systems are summarised in Figure 25.

Figure 25: Summary of Indicative Costs of Shared Facilities

Year	Possible work in this year	Cost (USD 000)
1	Basic Framework, SMS Channel, Administration Function, MIS functions, Transactional functions for MoEA	525
2	USSD Channel, IVR, Voice Channel, Cell Broadcast application	430
3	SIM Toolkit and Integrated Payment system	290
4	SmartApp Store (just app registration and distribution)	205
5	New services and capacity upgrade of channels as per new services identified	240
	Total	**1,690**

Source: Hari Kafley of project team

Thus an indicative price tag for setting up the proposed basic shared facilities is around USD 1.7m or Nu 85m. This of course excludes running costs and agency system costs. It is a substantial amount, but in the context of the budgetary provisions of the E-government Master Plan, which already include among other things Nu 50m for mobile services, Nu 237m for CCs, and Nu 333m for Whole-of-Government shared services, it appears by no means disproportionate to the expected benefits.

The take-up of services will mainly depend upon their acceptance by both consumers and decision makers at various levels, appreciation and ease of use of service, quality of service, cost of handsets and their adaptability to receive any content. Once services are established, they may become financially self-sustaining. However, it would be short-sighted to charge users so much to start with that they are deterred from using the service, and the service takes too long to become established. The Ministry of Agriculture's experience of calls doubling when their information service became free is worth bearing in mind. Flexible tariffing arrangements may be required.

In any case, the business case for each service must take account not just of the direct costs of starting up and running the service, and any direct revenues received, but also:

- any savings that may be made by the sponsoring agency because of the service (for example, savings in postal costs);
- savings in time and effort to users;
- possibly increased use of the service because of its greater ease of access. Besides greater user benefits from the service (see next point), government may also get greater fee revenues, as some people who did not previously bother with certain permits may now get them.

- Additional economic activity stimulated in related sectors, especially apps development and content provision.
- the value to users and the country in providing the service in the first place, including both tangible and intangible aspects. For example, health services are of huge economic benefit, even if this is hard to quantify – and the added value of a new health information service will be harder still to pin down. Again, services in Dzongkha will strengthen not only inclusion of the non-English-speaking part of the population, but also Bhutanese national feeling and culture. Such benefits are strongly felt but cannot be measured.

The condensed nature of this assignment has not allowed us to provide detailed estimates of the costs and benefits of all the various proposals – these would require further study. However, experience elsewhere as well as our understanding of the situation in Bhutan give us confidence that the mobile channel provides government with a cost-effective way of contacting its citizens, and that our proposals as a package are economically sound as well as socially desirable.

12.2 Legal and regulatory framework

In section 6 above, we outlined the current state of the law and an immediate work programme to update the Bhutan Information, Communications and Media Act. Here we provide some further suggestions for changes to the law.

Bhutan InfoComm and Media Authority have informed us that any services offered through mobile have been adequately covered under the National Radio Rules (NRR) 2012. However, the NRR cover only spectrum management and not content provision, hence content needs to be defined and guidelines provided. Content regulations with regard to mobile apps need to be considered.

Further considering the implications of widespread use of mobile apps, regulatory guidance and proposed rules that apply to mobile apps/content regulations may be needed. In particular:

- The Bhutan Information, Communications and Media Act 2006 needs to be amended to include provisions on privacy, data protection and provisions on mobile applications.
- While providing services through mobile, the responsible authority should ensure that Intellectual Property Rights and Licences (including consumer-facing agreements) of the apps are secured to use the products and ensure the proprietary rights of the apps and designate the rights holder for the apps to be provided to users.
- Due to unrestricted availability of apps, greater concern for access by minors to age-restricted content should be considered.
- Mobile phones are tracking devices logging into every activity of the user and hence privacy is a great concern including data protection.
- There should be a guideline requiring the service providers collecting personal information through mobile devices to have policies in place to secure any data collected.

More generally, in relation to m-commerce, attention should be paid to:

- Prohibiting acts which affect commerce and which are unclear, covert or deceptive in their collection or use of personal information.
- Regulating payments. These are made through the banks, and actions or transactions carried out by mobile users are shared with the bank and the service providers; hence clear responsibilities of these agencies need to be set regarding the preparation and dissemination of personal information in individual transactions and in reports for credit or employment.

As regards the important area of privacy and data protection, we highlight the need to:

- set privacy standards for the protection of individually identifiable health information.
- set rules governing the online collection of information from children including restrictions on marketing to those children.
- set rules for financial institutions requiring disclosure of privacy policies, data protection and user opt-outs for the sharing of personal information, including free movement of data.

In light of the growing use of mobile phones and the usage of mobile apps, it may be appropriate to have in place a law covering 'Privacy and Data Protection in Electronic Communications.' In the absence of a statute granting the locus standi to issue either a Rule or Regulations, it would be ideal to enact a specific law on Privacy and Data Protection in electronic Communications. As an alternative, these provisions might be inserted in the amended Bhutan Information, Communications and Media Act. Either way, this law should have specific provisions for children as usage of mobile phones is not age-barred.

The legal stamp is an impediment to both online and mobile channels. We are unclear what if any useful purpose it serves, other than acting as a modest transaction tax. **We recommend that its necessity should be reviewed, and that the requirement for a legal stamp should be lifted wherever possible. In particular, sections 35(c) and 36(d) of the Evidence Act (which require legal stamps) should be revisited. If legal stamps are still thought necessary in some applications which could otherwise become fully electronic, an electronic alternative to the current legal stamp should be devised .**

The 2012 World Bank study of the telecommunications sector identified legal and regulatory actions, to be progressed in parallel with the main recommendations on a third mobile operator. The following actions are important for this project and appear not yet to have been completed:

- The **ICT and Media Advisory Committee** has been established pursuant to Section 10 of the BICM Act as a "think tank" and adviser to the Minister, but as far as we know has had only one meeting and has become invisible to the public. Now would be a good time to revitalise it as a forum for pubic engagement in strategy for mobile and m-government. Its "equitable representation to the providers and users of ICT and media services, public interest groups and appropriate Governmental agencies" sounds well suited to the scope of this report.
- Regulations pursuant to Section 53 of the BICM Act (**Prevention of monopolistic practices** & similar practices) are especially important given the lack of general competition law in Bhutan. Such regulations have apparently been discussed and planned but not yet implemented. We strongly recommend that their completion and issue be expedited through co-operation between BICMA and MOIC.
- The **policy and regulatory frameworks relating to FDI in the sector** should be clarified on a priority basis. Foreign participation in mobile developments could be really valuable, bringing new ideas, energy and technology access as well as foreign capital. It should not be restricted more than is felt to be necessary for achieving overriding national objectives, such as retaining overall Bhutanese control and cultural integrity.
- The **Universal Service Fund regulations** need revision so that their burdens are distributed equitably among sector participants, and universal service projects are undertaken in the most advantageous way.

We have also identified a need to look again at the regulations around telephone numbering and directories (see 13.2.2). This should be primarily a task for BICMA.

In addition, there are many laws and legal instruments which may need minor or consequential amendment in the light of the above or related changes. Annex I identifies some of these.

13 Technology and infrastructure use

Our central technology recommendation is to set up a Mobile Services Delivery Gateway, adapted to Bhutan from the proposals now being implemented in India. Complementing these implementation proposals we make recommendations around related technical and human resources.

13.1 Creation of Mobile Services Delivery Gateway (MSDG)

MSDG is proposed as the core infrastructure for enabling the availability of public services through mobile devices with minimum effort for the participating Government Departments and Agencies. MSDG incorporates various channels, such as voice, text (e-mail and SMS), GPRS, USSD, SIM Toolkit (STK), Cell Broadcast (CBC), and Interactive Voice Response System (IVRS) so as to ensure that all users are able to access and use the mobile based services. The Gateway will also provide a smart app store for apps related to service delivery.

The various delivery channels are expected to entail innovative ways of providing existing services as well as development of new services. The platform will be developed as an extension of the existing G2C Service SMS gateway and implemented using open standards so that addition of new services and flows will be easy in future.

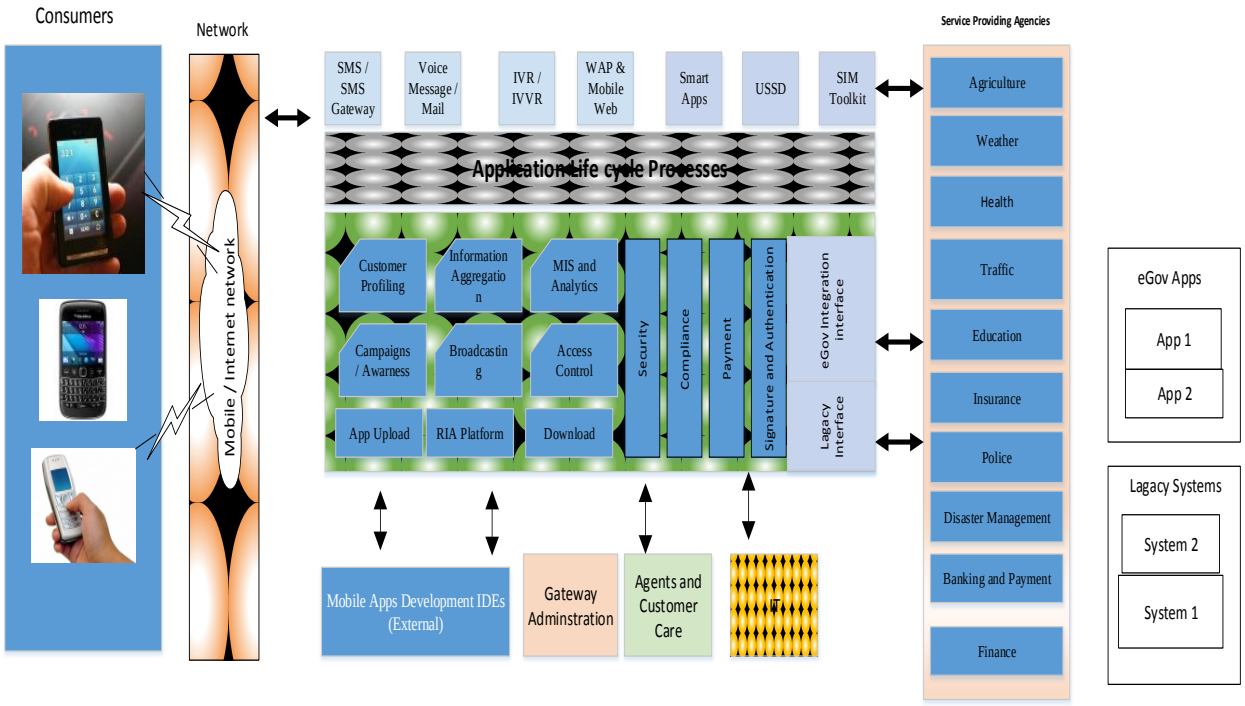
The MSDG architecture will be modular and will have capabilities for secure service provision, controlled access and scalability. Special modules for apps configuration and apps publication tools will be made available so that various government agencies can add or delete their services, and test new applications through a separate testing setup, thus ensuring that the overall functionality of MSDG is not disturbed. MSDG will also help in enhancing the interoperability of mobile-based services among various Government Departments. Its key features are summarised in Figure 26 and shown schematically in Figure 27.

For reasons of economy and co-ordination, a single shared Mobile service Delivery Gateway is proposed for all agencies in the government. It is therefore recommended that the Mobile Service Delivery Gateway be developed and maintained by a suitable agency under DITT in collaboration with a technical partner through an appropriate Public-Private Partnership (PPP) / outsourcing model.

Figure 26: Summary of key features of Mobile Service Delivery Gateway

Advantages	**Disadvantages**
• Single integrated system incorporating several channels. • Open Standard based system which will provide flexibility and scalability to include other services.	• Complex system which would require adequate support and maintenance staff. • Long development cycle risks leading to Inability to deliver results until enough of the system is in place.
Types of Services	
All categories of services: Informational, Interactive, Transactional and Engagement services. G2C Services, G2B Services, G2E Services and G2G Services	
Handsets and Platforms	
Compatible handsets for related services	
Security	
Individual channel will have related security implemented	
Service Delivery Channels	
• SMS (Short Message Service) • SMS Gateways • IVR (Interactive Voice Response) • WAP (Wireless Application Protocol) • USSD (Unstructured Supplementary Service Data) • CBC (Cell Broadcast) • SIM Toolkit (STK)/Dynamic STK • Voice mail and Voice recognition • Smart app store • Payment gateway • Authentication and signature	
Technology Stack	
• Open Source SMS Engine (Kannel and PlaySMS) • Asterisk Telephony • Custom Developed USSD and other Channels	

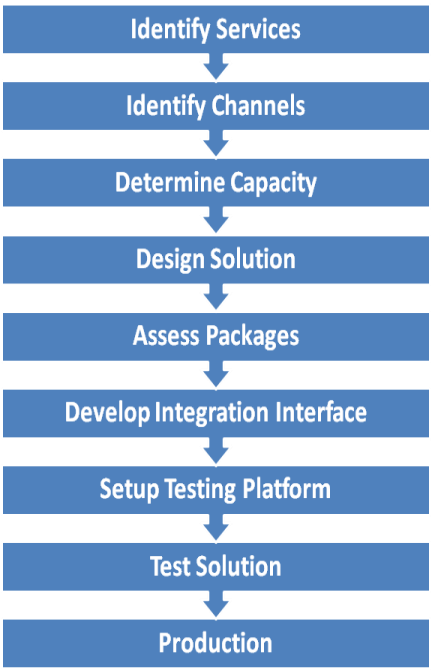
Figure 27: MSDG Framework



MSDG Service Channel Implementation Approach

The modular design of MSDG is proposed to achieve phased implementation. Addition of a new service channel in the MSDG should have no impact on other channels in the MSDG. For every channel addition the sequence of activities in Figure 28 is suggested. Descriptions of what is included in each activity are provided in Annex F.

Figure 28: MSDG channel addition activities



13.2 Other technical resources

13.2.1 Mobile Compliant Government Websites

In future, **all government websites should consistently enable mobile access** as new sites are designed and implemented or old ones reviewed. Mobile Web Best Practices for World Wide Web Consortium (W3C) can be found at http://www.w3.org.

All government agencies should use mobile optimised content as a primary method for device support, with device specific style sheets as appropriate. For some smartphones not much effort may be required to render a usable website on the device. Mobile website access should be supported by Cascading Style Sheet specific files for major smartphone devices using device detection methods.

13.2.2 Device and Content Localisation

Localisation of the mobile platform would be appropriate for the following reasons:

Promotion of Dzongkha Language – ubiquity of mobile devices will have great impact in promoting Dzongkha if mobile platform is localised.

Certain Percentage of Users are only Dzongkha literate: It will provide an option for people who are only Dzongkha literate (8% of the population according to Bhutan Living Standards Survey 2012) to access the services using mobile channel.

Localisation of all government agencies websites: In future, all government websites should be developed into bilingual websites, with Dzongkha as default and English as alternate.

Device Localisation

Localisation of devices can be considered with the following options:
Assembly of keypad with Dzongkha script: Import of handsets and assembly of keypads in Bhutan along with development of drivers for installing the fonts and keypad mapping.

On Screen Keyboard App for touch screen phones: An on screen keyboard app can be developed for touch screen phones, and training can be provided to dealers of mobile phones.

Neither of these is an attractive proposition for businesses, due to the small size of the market; but a joint project between DITT and Dzongkha Development Commission (DDC) may be feasible. Another option is to install Dzongkha fonts in a platform which has support for Dzongkha rendering.

Content Localisation

Once localisation of devices is achieved, bilingual content and applications need to be developed. The bilingual applications and content will be provisioned from servers at operators or the service providing agencies.

13.2.3 Telephone numbering

Expanding SMS/USSD and voice special services will call for a plentiful supply of suitable short codes and special service numbers, with the possibility of differential charging. There does not appear to be any immediate shortage of numbering resources, but without adequate care this can change. **We recommend reviewing available code capacity and also the way that numbers and codes are allocated to services, so that callers know what calls are likely to cost, and important services can get memorable codes. Regulations may also need review to ensure adequate tariff transparency.**

Under our proposals mobile telephone numbers will become key personal identifiers. **We recommend that the registration procedure for new SIM cards should invite the user to give or**

withhold consent to inclusion of the number in directories (for government or public use), and that a mobile service should be provided to allow users to register changes in consent and in the personal details associated with each number. A directory enquiry service would be of public value, but directories should not be available for direct marketing purposes.

13.2.4 Use of Contact Centres

We recommend exploring possibilities of expanding and rationalising use of contact centres, for example:

- Using the Health Help Centre for Disaster Management as well;
- Contracting existing one or more existing contact centre (e.g. Bhutan Telecom's) to provide first line services on behalf of government agencies;
- Allowing corruption reports to be made to a general call centre number as well as directly to the Anti Corruption Commission.

13.3 Human Resources

13.3.1 Pooling of Human Resources

Human Resources can be pooled to a central agency (DITT) and a resource development strategy should be prepared. The trained resources or resources with specific areas of expertise will be responsible for execution of similar services in many agencies. Further if the MSDG is established in shared mode, the pooled resources will be responsible for management of the MSDG.

Skill set requirements for managing proposed MSDG are:

- PHP frameworks like Cake PHP, Symphony
- Asterisk telephony packages
- Database Management (MySQL DBA)
- Telecom network operations, in terms of connectivity to telecom core network using HTTP and other protocols

Pooled resources should not be transferred so as to suddenly create a vacuum of required skill sets.

13.3.2 Development of In-Country Training

To maintain continuity to the skill sets, there is a need to support local training institutes to impart required quality training. It is also desirable to promote the formation of a professional group among the technical people (including both agency people and private sector people). The group can work toward design of courses for the training institutes.

Capacity development for the private sector falls mainly under technical capacity and project management.

Technical capacity

The young private sector lacks adequate technical skill sets. Capacity building activities should foster innovative culture and creativity. Most of the time external vendors take up projects, which has drawbacks:

- If systems are delivered by external vendors, no support is available.
- Even if local firms are involved, knowledge transfer is limited, and local counterparts are not able to fully support the systems implemented.

Therefore, some sort of capacity building initiative for private sector is essential to prepare the private sector to support evolution of service delivery.

Bhutan has a raw pool of talented workforce in the form of fresh graduates from universities, but the private sector lacks the financial capacity to invest in this pool. Targeted training to make this pool productive will help uplift the technical competency of the private sector.

Project management

The Bhutanese private sector lacks project management knowledge and is not able to adopt international best practices. Exposure is limited to Bhutan and internal processes are rather crude. Inadequate internal processes result in low quality deliverables. Therefore, the private sector requires uplift to international standards with adequate support from government and development partners.

Figure 29 provides additional detail on the training that is desirable for people within the agencies.

Figure 29: Agencies Human Resource Development

Area of Expertise	Description
Service Delivery Mechanism	Introduction of new service channel has its share of challenges, such as setting up the channel, management of internal and user expectations, management of channel partners and intermediaries. Agencies will have to be prepared for such challenges and ready with mechanisms to mitigate them. Agency administrators would need training on management of service delivery mechanism.
ICT Capacity Development	Introduction of new channel brings in new technologies and new sets of skill requirements arise. Introduction of mobile channel requires proper management of backend systems, and database tuning activities. New network components will be introduced in the infrastructure, which requires maintenance and troubleshooting. Even if the maintenance is outsourced, internal staff should be trained in issue / problem escalation methods.
Business Process Management	Mobile channel requires management of business processes by way of process re-engineering, process optimization and leaning. Current processes may not be best way of doing things using mobile. Ideally, business process management is best done using business process management suites. Adequate capacity building in business process management is essential.
Awareness and campaigning	Introduction of new channels requires creating awareness and campaigning by the service providing agencies and channels should be visible to citizens. Management of user sentiments during unsuccessful activity is important. If the sentiments are not managed adequately, users will develop negative attitudes towards the channel.
Program Management	The rolling out of mobile services is a medium- to long-term process and requires adequate project management practices. Capacity building with regard to program management would be appropriate. In addition, the channels evolve which means several projects being run as part of mobile service delivery roll out.

14 Develop mobile money

We showed in section 8 above that in Bhutan there is a clear need for universal mobile money services, but that progress towards providing them has so far been limited. For people who do not have bank accounts, existing money transfer services are slow, insecure and costly compared with mobile phone balance transfer services. People with bank accounts have more options, but they too may find payments outside their own bank awkward and expensive, and payees may have a long journey to collect cash from a bank branch.

Providing convenient payment facilities which any mobile phone user can access is vital for the development of m-G2C services, as many potential services need a fee to be paid. Such facilities would also make personal transfers easier and open the way for e-commerce. Given the current situation, two main approaches deserve consideration:

- Mobile phone airtime transfer services already exist; if payees could convert received airtime into cash at their local airtime outlet, this would appear to provide a relatively convenient remittance option at competitive prices. Such m-money services are already widely available, popular and commercially sustainable in many countries.
- With mobile transaction capabilities on the lines of B-wallet available, more people may decide to open bank accounts, particularly if they and their payees can reach a cash-in/cash-out point more easily than at present (for example, at Community Centres, which the figures above show are more accessible than either banks or post offices).

We believe that both these approaches should be pursued, as they are complementary. Ultimately, pure mobile balance transfers may come to be used for small transactions while bank transfers are used for larger ones. But it will take many years for the unbanked 63% of the rural population to open bank accounts, while cash-convertible mobile airtime transfer could be provided much sooner. **We therefore recommend the fastest possible implementation of m-money based on airtime-to-cash conversion.**

The mobile operators and banks have told us that such services must be covered by RMA's draft E-money Issuer Regulation, which is awaited. On the other hand, RMA has said that forms of e-money could go ahead on a trial basis before the regulation is finalised; but market participants would find this unacceptably risky. We have two comments on this tricky situation:

- As the World Bank study stresses, the relevant regulations need to be proportionate, so as to promote market entry while preserving adequate financial prudence and consumer protection. The service provider requirements in the current Branchless Banking Regulations, if applied to E-money Issuers, may not allow market entry to be commercially viable. We therefore recommend consideration of less stringent requirements on e-money issuers, which might be balanced by lower limits on permitted individual balances and transactions.
- As long as sender and recipient agree, mobile airtime can already be used as a form of currency. There is no clear reason why mobile operators should not, if they choose, provide cash refunds for surplus airtime through their dealer network, just as any merchant can refund money for unwanted goods. In fact, a form of m-payment is already taking place when users vote by SMS in TV programmes such as Druk Superstar, and the programme producers get a share of the revenues. So it would appear that m-payment could go ahead on a commercial basis, possibly without needing to be classified as e-money and covered by the regulation.

Of course, the sustainability of m-money depends on achieving a critical mass on both user and merchant sides, which may take several years. Given its social importance, there may be a case for government or donor support for the initial launch. The best-known and most successful example of m-money, M-Pesa in Kenya, might not have happened without such support in its early years.

As an interim (and possibly also more lasting) measure, Community Centres could provide payment facilities for unbanked people in each gewog centre. Each CC would have an official account with each bank, so as to be able to perform online transactions with customers of any bank on behalf of their clients. Relevant cash receipts from clients would need to be banked, as presumably are their takings under current arrangements. The security arrangements in CCs are already designed for cash holding. **Irrespective of other mobile money developments, we recommend developing a channel along these lines, as it should be cheap and effective.**

There is a large literature on international experience of mobile money, and at the time of writing this report, mobile money was much in the news. In Annex K, we reproduce an especially relevant news item on developments in Indonesia. Annex J includes a report on mobile money in a pioneering country, the Philippines. The bibliography in Annex L lists selected references covering regulatory, social, technical and commercial aspects of mobile money.

15 Future role of the Community Centres

From the point of view of providing mobile services, Community Centres are not essential. Indeed, mobile services could bypass the CCs and eventually undermine part of the case for CCs. However, given that the CCs are being set up, we see scope for significant synergy between them and mobile services. In particular:

- Officially provided mobile phones could make Community Centre Operators' (CCOs') lives easier and more effective; making these high-end phones or even tablets might provide incentives to the CCOs as well as demonstration models for local people. This requires adequate Mobile Device Management (MDM) guidelines and strategies.
- CCOs can help local people to learn to use mobile phones and the services available over them.
- Each CCO can become a focal person for the locality, providing liaison in disaster situations, reporting of events and activities, cell broadcast during emergencies, advice on local issues like pest control, livestock disease, or agricultural product pricing, communication to other locations, community radio operation, etc.

Therefore, based on what we have learned about the Community Centres (see discussion of Role of Community Centres in section 9 above, and Annex E) we have a range of suggestions for improving their operation.

Central management of the CCs:

- A formal contract including specified Service Levels between DITT, Department of Local Governance and Bhutan Post related to CCs needs to be put in place as quickly as possible.
- Physical infrastructure has been the first stage; now the focus must be on people, organization, content, and processes.
- Quarterly reporting on Operation and Management of CCs must be streamlined, to help in continuously monitoring and evaluating the CCs' performances. A formal reporting mechanism is needed through a committee composed of Ministry of Finance, DITT, DLG, and Bhutan Post. We enlarge on this below.
- Operations & maintenance methods and sustainability techniques should ensure CCs' continuity in existence and growth. These may best be achieved by nurturing and developing smart/innovative partnerships (government, corporate firms, Non-Governmental Organisations (NGO), cooperatives, community and individual) to strategise and translate CCs' vision and mission into action.

Local management of the CCs:

- Uninterrupted connectivity for all CCs is essential if they are to fulfil e-government functions.
- Create awareness amongst community on various services that CCs provide and establish a link with local government, garnering support from existing authorities at the dzongkhag and gewog levels. The different levels of authorization processes involved are not clear either to service providers or to users at the dzongkhag and gewog levels. This is a cause of concern that hinders citizens from seeing CCs as a first-stop centre.
- Provision of ICTs and services through the CCs should be relevant to community needs. Among other things, the CCs may be used as training centres for local people to learn computer and ICT skills, to provide access to distance education (e-learning), employment opportunities, human resource training, business ventures and renting of ICT facilities.
- Include Local Champions who can motivate and mobilise the community. The deployment of appropriate technology, ensuring community ownership through participatory development

approach, ensuring capability of community in the use of ICTs, and PPP model of operation can contribute to sustainability of the CCs.

The CC Operators:

- While investing in building the capacities of CC operators, there is a need to first look at roles of operators – are they to become 'business people' or better facilitators for different businesses? How are they to relate to traditional sources of expertise and authority? What ICT skills would they need? (trainers or in basic installation and repair, or both?) and so on.
- It is important for all CC recruits to undergo a basic induction course prior to being sent to the CCs. A module for such a course needs to be prepared encompassing operational skills, an orientation into soft skills (e.g. basics of customer service) but also an introduction into the concept of CCs within decentralization processes.
- A comprehensive manual for CC operators would be highly useful on procedures and standards of service delivery (e.g. inform citizens when a response can be expected), back-up support (whom to contact for specific needs and setbacks), protocol for receiving and responding to complaints etc.

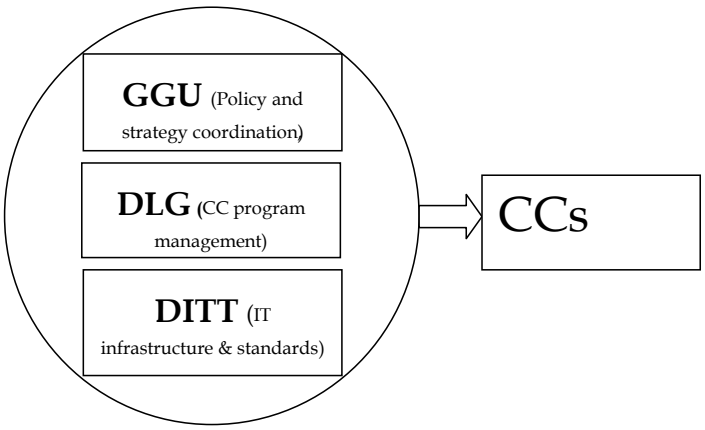
Central management of the CCs requires participation by:

- Good Governance Unit as the central coordinating agency, engaging at the policy level and providing guidance in setting service delivery standards and processes;
- the Department of Information Technology and Telecom (DITT) as the lead agency in setting and monitoring the IT architecture and standards for providing services online (for example, all government agencies would need DITT approval for online system development proposals);
- the Department of Local Governance as the focal agency for the implementation of one-stop-shops at the district and gewog level.

To make CCs relevant to communities, they would require frequent monitoring by responsible agencies as well as timely terminal evaluation. In this way, the CCs will become smoothly functional, with drawing up of best practices and set up of an institutional memory. Monitoring can be planned every three months, with direct reporting by CCs once they are all set up and functional nationwide.

Figure 30 below depicts these proposed Monitoring and Evaluation arrangements.

Figure 30: Central Management of the Community Centre Programme



Source: Adapted from One-Stop Shop Service Delivery 2009-2013

16 Types of services to be implemented in each phase

16.1 Phased technical implementation

Figure 31: Proposed implementation of technical facilities, by year

Year	Proposed activities
1	Develop the Existing G2C SMS Gateway to incorporate new services for SMS Alert. Add delivery status recording function in the Gateway. Prepare backend systems at MoEA for using SMS to apply for renewal of licences.
2	Add USSD Menu channel, Cell Broadcast, IVR and Voice Channel to the Gateway. Port related services to Mobile platform.
3	Add SIM (STK) application features, authentication and signature and mPayment application. Port relevant services to Mobile platform.
4	Smart App store establishment. Port relevant services to mobile platform.
5	Identify new services and port to Mobile platform.

Source: Hari Kafley of project team

Figure 31 proposes a timetable for implementing the technical facilities put forward in section 13. The approach is to build up a Mobile Services Delivery Gateway in stages, starting with the existing SMS Gateway and enhancing it with extra facilities in years 1, 2, 3 and 4. As soon as each set of enhancements has taken place, parts of certain existing services can be ported to the new platform.

16.2 Possible timing for enhancement of existing services

Figure 32 builds on this proposal by highlighting its implications for when existing services might be enhanced with mobile services. For the convenience of agencies, this table is also provided in Annex G in order of agency. As was discussed in section 9.3, these enhancements relate to adding mobile options like alerts and updates, rather than to providing complete mobile substitutes for existing services. **Another enhancement, not included in the figure, is using the phone for correction of any errors or gaps in forms that have been submitted – this could save a lot of time and cost.**

Since complete mobile versions of existing G2C services should depend, according to our recommendations, on a licensing review which has not yet been planned, we cannot say when these may become available. We hope the process will start well within the 11th Five Year Plan period.

Figure 32: Possible timing for mobile enhancement of existing services

Agency	Services	Possible Mobile Solution	Y 1	Y 2	Y 3	Y 4	Y 5
Department of Small and Cottage Industry	Revoke Licence	Licence revoke information to the owner through SMS	x				
Department of Industry	Company Name Search	USSD menu (with option to select sectors) for searching company names	x				
Bhutan Council of Examination and Assessment	Publishing class X and XII examination Results	Pull based result view system using SMS and short code	x				

Agency	Services	Possible Mobile Solution	Y 1	Y 2	Y 3	Y 4	Y 5
Department of Small and Cottage Industry	Renewal of Small & Cottage Industrial licences for 42 location clearance exempted activities and other new activities.	Renewal application using licence number. Check list to be maintained in backoffice system. SMS / USSD menu	x	x			
	Issuance of Duplicate Industrial licence	Application for Duplicate Industrial Licence issue and print a copy online. SMS / USSD menu / Voice / Contact centre with Live Agent	x	x			
Department of Forest and Park Services	Rural Timber Permit	Application for these services and online status check / SMS with short code for verification. USSD / SIM application Menu.	x	x		x	
	Firewood Permit		x	x		x	
	Non-wood Forest Products Permit		x	x		x	
	Permit for Removal Of Forest Products from Private Land		x	x		x	
Department of Trade	Issuance of Duplicate Micro Trade Registration Certificate	Application for duplicate issue of micro trade registration, status check and get registration certificate online. SMS / USSD Menu / Voice / Contact centre	x		x	x	
	Wholesale Trade Licence Renewal	Application for renewal of whole sale trade licence, status check and get licence online. SMS / USSD Menu / Voice / Contact centre	x		x	x	
Department of Industry	Duplicate Licence	USSD / SMS based channel to apply for duplicate licence	x		x	x	
	Company Name Reservation	SMS based / Voice recording based company name reservation	x		x	x	
Department of Trade	Retail Trade Licence Renewal	Application for renewal retail trade licence, status check and get licence online. SMS / USSD Menu / Voice / Contact centre	x		x	x	x
Department of Industry	Change of Licence	USSD / SMS based channel to apply for change licence	x			x	
Department of Trade	Cancellation of Retail Trade licence	Application for cancellation of Retail trade licence. Cancellation status SMS. SMS / USSD Menu / Voice / Contact centre	x			x	x
	Cancellation of Wholesale Trade licence	Application for cancellation of whole sale trade licence. Cancellation status SMS. SMS / USSD Menu / Voice / Contact centre	x			x	x
	Issuance of Duplicate Wholesale Trade licence	Application for cancellation of whole sale trade licence. Cancellation status SMS. SMS / USSD Menu / Voice / Contact centre	x			x	x

Agency	Services	Possible Mobile Solution	Y 1	Y 2	Y 3	Y 4	Y 5
Department of Civil Registration and Census	Replacement of CID/SRP Card	As CID / SRP Card is already issued, details are available and simple SMS based service suffices		x			
	Death Registration	Existing information is available in the backend system of civil registration, so simple SMS will be sufficient to register the death.		x			
Department of Civil Registration and Census	Citizen Individual Info Request	USSD Menu Based Service		x			
	Household Information	USSD Menu Based Service		x			
	Change of Head of Household	USSD Menu Based Service		x			
Department of Culture	Search for Monument	USSD Menu Based Service to search the monuments		x			
Royal Audit Authority	Audit Clearance System	Application using SMS and Short code. Accessible through web application		x			
Royal Bhutan Police	Security Clearance system	Application using SMS and Short code. Accessible through web application		x			
Construction Development Board	Issuance of Duplicate CDB certificate	Application for issue of Duplicate using existing certificate no. using SMS with shortcode		x			
	Cancellation of CDB Certificate	Application for cancellation and information on cancellation through SMS		x			
Thromde	City Library	SMS Catalogue		x			
Department of Agriculture	Supply Seed Seedling Fertilizer Service	USSD based Seed, Seedling and Fertilizer requisition and shipment alert		x	x		
Department of Trade	Micro Trade Registration Renewal	Application for renewal retail trade licence, status check and get licence online. SMS / USSD Menu / Voice / Contact centre		x	x		
Thromde	Online grievance management	Contact centre / voice based grievance system. Voice recorded when agent is not available and redressal through call back system.		x	x		
	Management of personal grievances			x	x		
Department of Protocol	Issuance of Passport	Application for passport after establishment of People Data Hub. Provide Application ID.			x		
Department of Labour	Renewal of work permit	Renewal application using existing work permit (Simple SMS / USSD menu options			x		

Agency	Services	Possible Mobile Solution	Y 1	Y 2	Y 3	Y 4	Y 5
Department of Agriculture	Machine Repair and Maintenance Service	Problem reporting for machinery using SMS / Voice call and remedy advisory service with SMS response, voice call back			x	x	
	Plant Protection Service	SMS and Voice based Advisory service. Disease reporting services with SMS and voice message storage. Chemical inventory verification and alert system			x	x	
	Plant Protection On-demand Service	USSD with voice / sms based			x	x	
Bhutan Council of Examination and Assessment	Clerical Re-check of papers	USSD Menu Based system for application for paper re-check			x	x	
Bhutan Standards Bureau	Publishing of Bhutan Standard Rates	USSD Based Rates query system / smart app for Bhutan Standard Rates			x	x	
National Pension and Provident Fund	Pension Claims for Member Retirement	SMS alerts, mPayment			x		x
	Pension Claims for Member Disability	SMS alerts, mPayment			x		x
	Pension Claims for Surviving Family	SMS alerts, mPayment			x		x
	Pension Claims for Orphan	SMS alerts, mPayment			x		x
	Pension Claims for Dependent Parent	SMS alerts, mPayment			x		x
	Non-Remarriage Certificate/Others	SMS alerts, mPayment			x		x
Drug Regulatory Authority	Renewal of Competent Person	Application using SMS channel, assumption that the evaluation and any misconducts are being recorded. Checklist in the system being incorporated.			x	x	
	Renewal of Medical Products	Renewal application using SMS / USSD menu. All checklists maintained in the system			x	x	
	Renewal of Technical Authorization	Renewal application using SMS / USSD menu. All checklists maintained in the system			x	x	
	Import Authorization for Drug	Use business data Hub for application and use online channel to get the authorization. USSD Channel			x	x	
	Export Authorization for Drug	Use business data Hub for application and use online channel to get the authorization. USSD Channel			x	x	

Agency	Services	Possible Mobile Solution	Y 1	Y 2	Y 3	Y 4	Y 5
Department of Agriculture	Pest Reporting Service	USSD / Voice based pest reporting. SMS / Voice / Video based alert system.				x	x
Department of Labour	Online registration of job seeker and posting profiles	Smart App / WAP Gateway				x	x
Department of Employment	online registration of employers and publishing jobs	Smart App / WAP Gateway				x	x
	Online selection of potential employees	Smart App / WAP Gateway				x	x
Department of Labour	Issuance of work permit	Smart App / WAP Gateway				x	x
Department of Livestock	Input Supply of Livestock	Requisition to central agency by extension officers. USSD Menu / Smart App				x	x
	Input Supply of Feed & Fodder					x	x
Department of Agriculture	Soil Service	Voice / SMS based advisory services on soil					x
Department of Adult and Higher Education	Payment of scholarship fees/ stipend	mPayment					x
	Reimbursement of fees	mPayment					x
Bhutan Standards Bureau	Management of monthly rental remittance	Smart APP					x

Source: Hari Kafley of project team

16.3 Possible timing for new services

Figure 33 provides an indication of the sorts of new services which could be provided in each year of the 11th FYP, if our technical recommendations are adopted. This is offered in the spirit of a "menu" of options which may help agencies to decide on their plans. We are not recommending these services or suggesting an order of implementation, simply showing what may be feasible. Careful consideration and design of each and every service is essential – for example, health messages that are delivered using inappropriate language or not at the right moment could actually be counter-productive.

Within the overall framework of the two tables above and the one below, prioritisation among service proposals should take into account such factors as:

- the readiness of the agency, including
    - the state of its backend system,

- its capacity to maintain systems for anytime anywhere access (just hosting an app is not enough)

- complexity of the service process,
- acceptability of the service to the agency or agencies that consume the output of the services.

For the convenience of agencies, the same table is also provided in Annex H, ordered by agency.

Figure 33: Ideas for new m-government services which could be implemented in coming 5 years

Services	Agency	Possible Mobile Solution	Y 1	Y 2	Y 3	Y 4	Y 5
Tracking services for parcels and registered items	Bhutan Post	SMS based status query	x				
Information on weather conditions to teachers, students and parents	Ministry of Education	Cell Broadcast	x				
Exams results fetching		SMS based Query	x				
School Admission / placement status		SMS based Query	x				
Teacher Transfers, promotions, etc		SMS Information	x				
Road Block Reporting from block site	Road Safety and Transport Authority / Department of Roads	SMS / Contact Centre	x				
Road Block Information check		SMS Based Query	x				
Road Block clearance information		Cell Broadcast	x				
Local information in the form of voice message or video message	Department of Local Governance	Gateway push voice / video message	x	x			
Road Block status check along any routes	Road Safety and Transport Authority / Traffic Police	SMS / Contact Centre	x	x			
Disaster early warning and Weather Information services	Department of HydroMet Services	SMS, Cell Broadcast	x	x			
Petroleum Price Information push and pull	Ministry of Economic Affairs	SMS (Push and Pull)	x	x			
Tax Payer Registration and Tax Payer Number assignment	Department of Revenue and Customs	SMS	x	x			
Ticketing Services	Bhutan Post	SMS based ticketing and payment		x			
Application for renewal of more than 15 licences	Bhutan InfoComm and Media Authority	Application for renewal using SMS channel		x			
Exchange rates fetching	Royal Monetary Authority	SMS based query		x			
Contact number list for agriculture product dealers in communities	Department of Agricultural Marketing and Cooperatives	IVR		x			
Registration of contact number of a local dealer of agriculture		IVR		x			

Services	Agency	Possible Mobile Solution	Y 1	Y 2	Y 3	Y 4	Y 5
products							
Information on availability of particular physician during Offhour clinic	Jigme Dorji Wangchuck National Referral Hospital	SMS query		x			
Off hour clinic appointment		SMS / USSD based appointment schedule		x			
Traffic congestion information	Traffic Police	IVR / SMS / Community Radio		x			
Accident Reporting services from accident site	Road Safety and Transport Authority / Traffic Police	SMS / Contact Centre		x			
Road Block information update services (Road expansion)		SMS / Contact Centre		x			
General Information dissemination on events and issues	Royal Bhutan Police	Cell Broadcast		x			
Initial Disaster Reporting	Department of Disaster Management	Voice Recording / Contact Centre		x			
Contractor / Architect Registration and renewal application	Construction Development Board	SMS		x			
Registration validity reminder / status check		SMS		x			
Information on health status (individual and mass), disease outbreaks, parasite and disease prevention information, etc.	Ministry of Health	SMS Gateway (Target SMS based information in backend systems and SMS push from Gateway)		x	x		
Crime reporting services	Royal Bhutan Police	Contact Centre		x	x		
Tax Advisory services • HS Code Searching and applicable taxes • Personal Income Tax filing reminders • Customs Advisory Services	Department of Revenue and Customs	SMS (Push and Pull) / USSD / Contact Centre Smart App		x	x		
Land Information fetching: • Land Ownership information • Mortgage information • Thram No., Plot No. and related information Land Transaction initiation	National Land Commission	SMS (Pull) / USSD / Contact Centre		x	x		
Pension Distribution	Bhutan Post	Mobile Payment, USSD based solution			x		
Bed availability status and time communication for patients	Jigme Dorji Wangchuck National Referral Hospital	SMS push based on status in HIS			x		
Periodic check up reminders (dialysis, etc,)		SMS push based on status in HIS			x		

Services	Agency	Possible Mobile Solution	Y 1	Y 2	Y 3	Y 4	Y 5
Reminders for immunization schedules		SMS push based on status in HIS			x		
Form II Drug Order status check		SMS based query			x		
Public Consultation meeting announcements	Department of Housing Services	Cell Broadcast (SMS, MMS)			x		
Bhutanese Calendar	Any Agency / Dratshang Lenshog	Smart App			x		
Test result fetching from Public Health Lab	Department of Public Health	SMS based Query			x	x	
Disaster Reporting by Disaster Focal Person	Department of Disaster Management	Voice Recording / Smart App			x	x	
Informational services / Campaign / event marketing	Bhutan Chamber of Commerce & Industry	SMS (Push)			x	x	
Insurance Agent Services	Bhutan Post	Smart App				x	
Banking Agent (BDBL) Services		Smart App				x	
Health Hazards, Local Security, early warning	Department of Disaster Management	Cell Broadcast (SMS, MMS)				x	x
Parking Fee Payment	Thimphu Thromde	Mobile Payment				x	x
Personal Income Tax Filing and Payment	Department of Revenue and Customs	Smart App, mPayment				x	x
Learn Dzongkha in Mobile	Dzongkha Development Commission	Smart App / Expert System				x	x
Bhutanese Astrology Services	Any Agency / Dratshang Lenshog	SMS (Push and Pull) / USSD / Online Smart App				x	x
Public Transport Services • Bus Information with drivers' contact details • mTicketing • Payment for tickets	Road Safety and Transport Authority / Bus Operators	SMS USSD / Smart App/ mPayment				x	x
Data collection during surveys	Ministry of Health	Smart App / IVR Setup with few questions as IVR menu					x

Source: Hari Kafley of project team

16.4 Pilot service proposals

The project Terms of Reference asked the team to identify 3 to 5 mobile services for early piloting. We have found many promising candidates for this privileged status, and therefore put forward a longer list, trusting that the agencies concerned will agree on a suitable number of these or similar services. Each pilot should be kept to a limited scale, by telling only a selected user group about it. Criteria for choosing the first piloted services might be:

- (For information dissemination services), easy availability of the necessary information;
- Suitability or easy adaptability of existing back-end systems;

- Interest of service to potential users, and ease of use;
- Ability to identify groups of users to involve in service design and to feed back on the pilots;
- Enthusiasm within the sponsoring agency.

Ideally one or two services would be chosen from each of the categories shown below.

SMS information services for the general public

Anybody could sign up online, or by SMS to a specific short code, for information to be sent out on:

- Road block or traffic congestion reports;
- Petroleum and LPG prices;
- Timing of auctions for timber and agricultural products;
- Job fairs, civil service vacancies, business exhibitions.

Individual SMS alerts

Pre-registered individuals could receive personal SMS alerts related to:

- Availability of a trade licence or passport that person has applied for;
- Tax filing reminders;
- Reminders when insurance premiums are due.

Voice notice board applications

Interested people would be invited to phone in to a given number to hear recorded information, that would be frequently updated by the authority in question.

- Health information on vector borne diseases (malaria, dengue fever, etc);
- School information for parents on closures, special events, etc;
- State of the roads in a certain area.

Live contact centre applications

- Option to lodge Voice of Customer grievances (as currently shown on the www.citizenservices.gov.bt website) to a live operator speaking the citizen's own language;
- Citizen reporting-in service, where people are invited to phone in with non-urgent information that they feel should be drawn to the attention of the authorities.

In 17.1 we outline management arrangements which should apply not only to the mainstream development of m-government but also to the choice and oversight of pilots. We note especially:

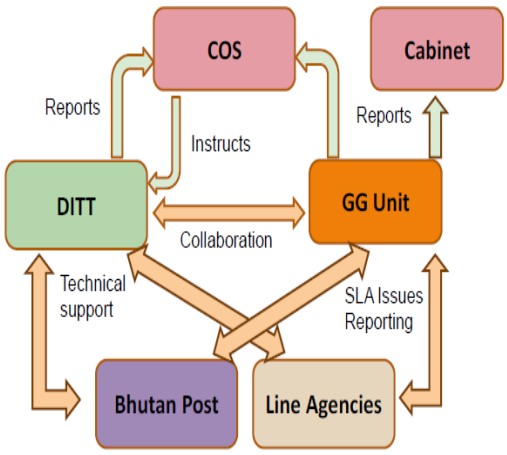
- **The useful role that citizen panels (possibly drawn from specific communities) can play in helping to design and feed back on pilot projects.**
- **The fact that early services may be most acceptable, as well as most easily realised, in a simple voice form – that is, a live conversation between the citizen and a human operator. Although ultimately automated services may become cheaper to run, the savings of moving away from live voice services should always be critically examined, remembering that automated services may work less well, as well as that they change the nature of related employment.**

17 Management and monitoring systems

17.1 Management arrangements

In the 11FYP, as reported in the E-Government Master Plan, for better oversight and coordination with other e-Government activities, the G2C project management will be handed over to DITT/MoIC, with the Committee of Secretaries still remaining as the Board for G2C project. The Good Governance (GG) Unit in the Cabinet Secretariat is to oversee performance of G2C services. DITT will provide technical support to all the Ministries and agencies. Critical members of the G2C project office will be retained with the DITT as deemed necessary to ensure continued support and ensure continuity of technical expertise. All Ministries/Agencies are to appoint a focal person each to ensure timely delivery of the services. Figure 34 illustrates the planned arrangements for G2C Governance and Reporting.

Figure 34: Proposed e-government governance arrangements



Source: E-government Master Plan

Parallel arrangements for monitoring and evaluation of the Community Centres were explained in section 15 above.

Development and implementation of MSDG is staged over 5 years and services will be added in a phased manner. This process requires management of:

- Delivery of new channels in the MSDG and addition of new services using those channels.
- Support to senior management of different agencies in managing the activities and changes within the agencies.
- Recognition and handling of risks.

In the opinion of the consultancy team, the management arrangements outlined above can be adapted to serve the new m-government services initiative, by adding individuals and groups with special expertise and/or interest in the mobile developments. One possible way of doing this is to:

- Appoint M-government champions with specific responsibility for promoting the mobile channel to every Committee, including the Council.

- Form a Mobile Industry Advisory Panel (including representatives of mobile operators, service providers, equipment vendors, application developers and financial institutions) to advise on technical progress in the industry. This could operate alongside or within the proposed Private Sector ICT Advisory Panel.
- Add a User Liaison Panel, to include representatives of business (e.g. Bhutan Chamber of Commerce and Industries, local government and administration at both Dzongkhag and Gewog levels, Community Centre operators, civil society/non-governmental organisations, and academics. This would input from a user perspective across the whole e-government agenda, with particular focus on m-government as this is what will bring government closest to most citizens.
- Institute a centralised programme management team to oversee and supervise the implementation of MSDG and service integration with the MSDG.

We would caution, however, against having too many committees or levels of management, with too many complex interactions. **We recommend that the Good Governance Unit should consider and ensure implementation of the best management arrangements for m-government services, bearing in mind the need for them to be influenced by the perspectives of users and civil society as well as service providers, and to keep up with the fast pace of change in the mobile market.**

17.2 Multi Stakeholder Partnership

Development and implementation of mobile channels in service delivery requires multi-sector ICT partnership, as presented in Figure 21 above. The establishment of mobile channels for public service delivery and related backoffice operations has in part a social mandate. Therefore a multi stakeholder partnership (MSP) approach is called for where businesses, government agencies and civil society pool resources and contribute to execution of processes so as to deliver benefits for all collaborating parties. Below we outline possible contributions from major stakeholders in Bhutan.

Government:

- Prepare and coordinate infrastructure strategy for m-government
- Provide access to development finance to sponsor the projects in the initial stage
- Promote positive investment climate for m-government
- Programme management for coordination, risk management, etc.
- Capacity development of internal teams
- Legal and regulatory framework for m-government, m-payment, etc.
- Management of subsidies for businesses and civil society organizations

Business:

- Infrastructure maintenance and operations
- Project management
- Design and implement technical solution
- Capacity development and knowledge transfer
- Sales, marketing and distribution of services
- Capital investment at later stage of operation and management of service systems
- Investment in R&D on smart apps to be provided through MSDG, with revenue sharing for apps download

Civil society organisations:

- Expertise in development of local content
- Organisational network and reach to community
- Knowledge of user demands and needs
- A voice of those unreached by formal governance
- App concepts based on local knowledge
- Community capacity development

17.3 Performance monitoring

As with managing any significant project, progress will be measured by indicators, with targets where appropriate. These should be decided on jointly by those responsible for implementation and for its oversight. Below we list some candidate indicators which may be considered. Note that targets are often better avoided because they can have perverse incentive effects, for example splitting down a service into many small components for reporting purposes, which might artificially raise a department's apparent performance.

- Achievement of milestones for completion of Whole-of-Government IT systems, and in particular for the Mobile Service Delivery Gateway recommended by this project.
- Percentage of public services that make use of the mobile platform, by department/agency. We recommend this for purposes of monitoring developments rather than for setting targets, because not all public services are suitable for the mobile platform.
- Percentage of user interactions that occur over the mobile platform, by service. Whether or not targets are appropriate will depend on the service in question.
- Achieved service delivery time, by service.
- User satisfaction with public service delivery in general and the mobile element in particular. This may be assessed through surveys (which may themselves use the mobile channel), or by soliciting feedback immediately after service use.
- Individual agencies will have ideas about indicators for their own mobile services reflecting their impact on desired outcomes. For example, the Department of Health may choose to assess public understanding of particular health issues, before and after publicising a relevant mobile information service. This may be related more to the quality and presentation of the service than to any quantitative usage measure.

User feedback

In addition to solicited user feedback on services, through surveys and immediate post-use comments as mentioned above, **we recommend expansion of the Voice of Customer service. As implemented at present on the citizenservices website, it is open to enquiries and grievances about service applications. We recommend expanding it over time to use the mobile channel as well as online, and to cover an increasing range of services. Ultimately it could be expanded to use other channels too, including social media.**

PART IV: STRATEGIC FRAMEWORK AND RECOMMENDATIONS

Progress will depend on many groups working together, including

local government,

central government , business people

Community Centre Operators,

mobile network operators

fixed network operators,

and both first and last, users.

18 Overall framework for implementing mobile services

This final Part restates and summarises our findings and key messages in the form of an overall strategic framework for implementing mobile services, followed by detailed recommendations.

Vision: The vision in the E-government Master Plan is *An ICT-enabled, knowledge-based society as a foundation for Gross National Happiness*. This leads to three desired outcomes:

- ICT for Good Governance
- ICT for a Bhutanese Information Society
- ICT as a key enabler for sustainable economic development.

The use of mobiles in society generally is a key contributor to realising this vision, and the use of mobiles for delivering government services to citizens supports especially the first and third of these outcomes.

We may add a mobile dimension to the ICT Vision:

> **Bhutan will become a leader in demonstrating how mobile communications can help to improve the quality of life of poor people living in remote mountain regions. The Bhutanese Government will lead this development through imaginative yet practical use of the mobile channel for delivering services to citizens and engaging with citizens.**

Goal (for end of 11th FYP):

Greatly improve the speed, effectiveness and efficiency of service delivery, and extend citizen engagement, by making the mobile channel a known, valued and used medium for bothway communication between government and citizens.

Core values: Embrace what is best of the new, preserve what is best of the old.

Pillars:

- Build on existing relevant strategies, policies and good practices (e-government, licensing, information and infrastructure sharing, ICT, broadband, media, good governance, social and economic inclusion).
- Work towards universal wireless broadband connectivity.
- Work towards universally available mobile money.
- Continue educational programmes including ICT awareness and literacy as needed as all levels, leading to enlightened leadership and capable citizenry.
- Continue simplification of government requirements and processes.
- Design all new services from a user viewpoint.
- Promote and engage private sector participation in these developments.

Elements of strategy:

Prepare to exploit in a few years' time the huge potential that smart phones can offer to all citizens, including those who are poor, uneducated, and differently abled, by:

- Rolling out to all gewogs and villages wireless networks capable of carrying high-speed data;
- Developing appealing smartphone applications that can be used by people who are not literate in English;
- Introducing simple voice and SMS/USSD m-government applications for use in the near future, to accustom both citizens and officials to this new way of getting things done.

First, provide necessary support systems:

1. Set up robust and proven Whole-of-Government IT systems, resources, standards and processes as needed for the efficient and consistent delivery of m-government services; a Mobile Services Delivery Gateway is recommended.
2. Strengthen the back-end systems of each participating department or agency so that they can fully support m-government services. This strengthening would also involve business process re-engineering and process leaning.
3. Establish institutional linkages among government agencies for data sharing and information consumption and plan to reduce data duplication.
4. Install new telecoms network infrastructure as needed to offer fast wireless services, capable of supporting smartphone and tablet applications, to the highest possible proportion of the population by the end of the plan period.
5. Facilitate agreement among the mobile operators, financial institutions and regulatory authorities on one or more approaches to making mobile payment facilities available to all mobile users as soon as possible.
6. Adapt the proposed e-government governance structure to include bodies with specific responsibilities for promotion and oversight of use of the mobile channel, and the ability to approve new service proposals fast.
7. Amend the legal framework as set out in the E-government Master Plan and in this document, with special attention to data protection and privacy.

And then provide actual m-government services:

8. Regard existing m-government services as pilots; accordingly, monitor their operations and feed back experience into their continuing improvement and the design of other services. Consider migrating existing services to Whole-of-Government shared infrastructure when practicable.
9. In the early years of this strategy, focus on voice services, supplemented by SMS/USSD, while preparing to launch smart apps in later years.
10. As soon as possible, improve existing G2C (and G2B) e-services by Introducing common supporting facilities using the mobile channel, for example tracking applications and updating registrations.
11. Make a few selected (much used) existing services available on the mobile channel; implement others only after they have been through the simplification and amalgamation processes of the Licensing Policy.
12. Encourage all government departments and agencies to come up with justified proposals for new m-government services, taking this report as a starting point.
13. Enlist typical users in the design of all services, and test service designs with other users before full launch.
14. Throughout, remain sensitive and flexible to the changing environment.

Key success factors

- Leadership
- User involvement in planning, designing and testing services
- Broad public targeting of services and publicity
- Services that provide positive satisfaction to users

19 Summary of conclusions and recommendations

The report builds on the foundations laid by the Bhutan E-Government Master Plan 2013. Some especially relevant parts of that Plan have been reproduced and discussed earlier in this report. In this section we indicate where we would stress, elaborate, add to (or in some minor respects differ from) particular aspects of the Master Plan.

Of course, as with any plan, timing can only be approximate, and later actions often depend on the successful completion of earlier actions.

1. In Bhutan as elsewhere, m-government can contribute significantly to:
    a. More efficient government operations
    b. Improved delivery of government and other public services
    c. Closer two-way contacts between government and citizens

    In Bhutan as elsewhere, market forces have led to a huge and rapid growth in take-up and use of mobile phones, which is expected to continue. Furthermore, several m-government initiatives are already under way. This means that the additional effort and cost needed to strengthen m-government are likely to be amply justified by the benefits already mentioned. **We therefore strongly recommend that the government make a commitment to m-government and provide the high-level inspirational leadership needed to make it a success, through multi stakeholder co-operation.**

2. M-government will be most successful as one element in a thriving overall mobile ecosystem. **We therefore recommend that government support the mobile industry and its widespread adoption by individuals and business.** Specific support actions may include:
    a. Reducing or removing import duty on mobile handsets
    b. Stimulating competition by introducing a third mobile operator and/or one or more Mobile Virtual Network Operators
    c. Judicious use of the Universal Service Fund, whose procedures should be reviewed in line with the recommendations of the 2012 World Bank Telecommunications Policy Report.
    d. Supporting the nascent private sector to serve mobile sub-markets, in particular by providing appropriate in-country training in necessary IT skills for both public and private sector employees.

3. This report provides initial guidance on specific actions to strengthen m-government. Much further work will of course be needed to refine this guidance, and to oversee and steer its implementation. **We recommend that the Good Governance Unit should consider and institute the best management arrangements for m-government services, bearing in mind the need for them to be influenced by the perspectives of users and civil society as well as service providers, and to keep up with the fast pace of change in the mobile market.** The high-level Advisory Committee foreseen in the BICM Act should be re-activated as a means of driving the whole process, with quality public engagement.

4. As the E-government Master Plan says, it is most efficient to provide underlying systems and support on a Whole-of-Government basis. Our framework for developing m-government is constructed on that basis, and **recommends setting up a single Mobile Services Delivery Gateway.** However, Whole-of-Government systems inevitably take time to bring to fruition. **To build experience and momentum, we recommend that selected m-government initiatives should proceed on a pilot basis without waiting for completion of relevant Whole-of-Government systems.** Some such initiatives are already in progress (see section 9.6) and we have identified some further candidates for pilots (see 16.4); doubtless others will arise. Piloting will include user design input and study of user experience. The entire m-government pilot

programme should be overseen by the governance structure described above, which will keep track of pilot projects, receiving reports on their progress and sharing lessons learned. After defined periods, depending on their outcomes pilots should be closed, amended or expanded, and where appropriate they should be ported to Whole-of-Government infrastructure when this is ready.

5. Our study included the potential both for implementing existing G2C services on the mobile channel, and for new m-government applications. As regards the former, we note that a large majority of existing G2C services (some of which also feature as G2B services) are in fact applications for various licences or permits, and that rationalisation and simplification of the overall licensing framework are already in hand. A new Licensing Policy is on the way, and the E-government Master Plan includes provision for Business Process Re-engineering (BPR). We also note that for various reasons (e.g. size of necessary attachments), most existing G2C services could not be implemented on the mobile platform as they stand. **We therefore recommend that:**

a. **As a general rule, existing G2C services should be implemented on the mobile platform only after they emerge from the rationalisation and simplification process (when they may have been combined with others). The BPR process should include in its objectives making the procedures fit for mobile implementation.**
b. **A few existing G2C services, for which there is known demand, should be given priority treatment for mobile implementation.** We discuss these in section 9.2. Security clearance is already available online. Other candidates include birth registration, CID application, timber permit and micro trade licensing.
c. **A simple cross-cutting SMS application tracking and alerting service should be introduced soon** which would enable citizens who had already submitted applications (including their mobile phone number) to receive progress updates and alerts, on either a push or pull basis.
d. **A simple cross-cutting SMS/USSD updating application should be introduced soon** to enable citizens to submit changed information to existing registrations or activate straightforward renewals.

6. As regards specific new m-government (government to citizen) applications, we have provided lists of services which we have been told are already happening or projected, together with many further ideas based on experience in other countries or which have emerged from discussions in the course of this project. Some candidates which we feel hold particular promise for Bhutan are highlighted in sections 11.5 and 16. However, to recommend introducing specific new services would require more detailed study than has been possible during this brief project. Any given new service should be justified and sustainable, with its own business plan and cost-benefit analysis; and must be designed with due sensitivity to user factors. **We therefore recommend an open attitude towards new m-government services, within the governance and implementation frameworks already outlined, taking the output of this project as initial guidance.**

7. Smart phones are immensely versatile. They offer great opportunities for mobile applications of all kinds, including m-government applications; their interfaces can be made accessible in any language or script, and can include graphical presentations which are usable by people with little or no education, as well as people with restricted abilities. Smart phones are already being taken up with enthusiasm in Bhutan, especially by younger, better-off people and in towns. As their prices come down, we expect this take-up to spread (this movement could be further speeded up, if desired, by subsidies on low-end smartphones). However, their full functionality depends

on mobile broadband network capability which is currently confined to a few towns. **We strongly recommend opening Bhutan to the potential benefits offered by smart phones,** in particular by:

a. Stimulating investment in a rollout of wireless broadband infrastructure. We elaborate on this proposal below.
b. Opening an online showcase and market place for apps suited to the Bhutanese market, and stimulating the production of such apps, perhaps through competitions.
c. Supporting Dzongkha development training institutes and local cultural organisations in developing and making available both locally originated material and imported material adapted to local conditions.
d. Supporting the training and professionalization of Bhutanese apps programmers.

8. Throughout the world, broadband access is becoming essential to economic and social inclusion; in Bhutan's environment, in common with many others, this means wireless broadband. **We therefore recommend adding wireless broadband infrastructure to the basic services to be provided for everyone** (which currently includes roads, electricity, and mobile phone access, as well as improved education, health care, and safe drinking water). **We suggest a goal of bringing broadband to all gewog centres and as many villages as possible within the 11th FYP period.** This may be seen as an elaboration of the existing National Broadband Plan; with this viewpoint, new wireless infrastructure could share existing physical infrastructure (e.g. towers, with their associated power supplies, access tracks etc) and would in turn be made available on reasonable terms to all qualified Service Providers. **The goal could become one of the objectives of the current sector structure review, and be incorporated into any process for appointing a third mobile network operator or mobile infrastructure provider. Network resilience objectives (in case of major disasters) should also be built in to the infrastructure renewal programme.**

9. At least in the early years of m-government, we expect voice to remain the preferred communication medium for a majority of the Bhutanese public, and for many it will remain the only possible medium for the entire FYP period. SMS and USSD offer supplementary options for the 54% of the population who are literate in English. **We therefore recommend in the near future developing a modular MSDG with platforms to facilitate voice communications in both directions between government and citizens, supplemented by SMS/USSD options.** Specifically, we recommend including in the Mobile Services Delivery Gateway capabilities for Interactive Voice Response (IVR), Voicemail and Voice Recognition. We also recommend greater use of contact centres with both live agents and IVR options. Further important recommendations for technical development include:
    a. In later years, adding m-payment and smart apps capabilities to the MSDG.
    b. Making all government websites mobile-compliant, and also bilingual (in Dzongkha and English, with Dzongkha as the default).
    c. Reviewing and strengthening agency backend systems as necessary to ensure they will be able to handle both mobile and online services in an integrated way.
    d. Establishing single shared data repositories and sources across the whole of government.
    e. Evolving the eGovernment Interoperability Framework (eGIF) to cover mobile use.
    f. Adopting best practices in relation to security and privacy.
    g. Encouraging the availability of localised (Dzongkha-capable) mobile devices.

10. In many other countries, mobile money or m-money (the ability to transmit funds between mobile phones without using bank accounts, and to change received funds back into cash) has become very widespread. Mobile money makes remote transactions much easier for people who

live far from a bank branch or do not want a bank account, and usually brings a large slice of the informal economy into the formal economy. It has the potential to boost the overall economy as well as financial inclusion, and enables e-government transactions which require payment. Currently in Bhutan, m-money for all is within reach but progress towards it is slow. **We therefore strongly recommend implementing true m-money within the next year.** To this end, we propose:

a. **With support from the Ministry of Finance, the Royal Monetary Authority should adapt the requirements of its Branchless Banking regulations and E-money Issuer draft regulations in ways that make it commercially attractive to enter these markets.** The benefits as well as the risks of these developments need to be taken into account when deciding on the regulations. Adaptations might, for example, reduce initial capital requirements, while in parallel reducing the limits on balances and transactions for individual accounts, to keep risks in check.
b. **The mobile operators should set in train the practical steps that are needed for launching m-money.** For example, agreements with their dealer and agent network and associated cash float arrangements will need revision.
c. **Processes and publicity should be set in train to inform the public about the new facilities and prepare them to use it.** For example, there may be initial reservations about using mobile money transfer because of the risk of transferring money to the wrong person. These concerns are understandable, but can be overcome by properly designed systems (e.g. entering recipient numbers twice, or only using numbers that are already stored on the phone).

11. We see the growing network of operational Community Centres (CCs) as a national asset which can complement and strengthen the rollout of m-government. However we are aware that the CC programme itself is facing challenges and is under review. As input to the CC review we offer the following thoughts:
    a. CCOs can play a valuable role in educating and helping their local public in using m-government applications.
    b. Even without full e-money or m-money, CCs could effectively become "local extension counters" for all banks, offering cash in/out facilities, and online bill payment on behalf of clients to the extent permitted by each bank. They could also perform a wider range of functions on behalf of Bhutan Post itself, including issuing and cashing money orders, and selling postage stamps.
    c. CCOs themselves could make very good use of officially provided high-end mobile phones (preferably smart phones or even tablets), whose capabilities they could demonstrate to their clients. They could also use these to be in touch with their clients remotely, as well as with their CC colleagues. They could form the hub of a relay network of mobile phone contacts reaching all villages, which would enable even people without mobile phones to keep in touch (through face-to-face conversations with those who have the phones).
    d. CCOs are currently obliged to stay within their offices during official working hours, often alone for much of the time. Official mobile phones could allow them to make better use of this time, mixing with neighbours, and returning to the office when called to do so. A simple “doorbell” button (itself part of a wireless communication device) fixed by the office door which automatically dialled the CCO’s mobile phone should be cheap to install.
    e. More generally, a higher degree of autonomy for CCOs and flexibility to adapt to local conditions could help more CCs to become sustainable. A franchise model, whereby CCOs have control over and a financial stake in their own CCs, is well worth

consideration.

f. Use of government subsidy (DITT to Bhutan Post) needs to be streamlined for professional operations and management of the CCs across the country.

12. A legal framework for e-government is already in place, and the E-government Master Plan sets out additions and changes to that framework (through amendments to the Information, Communications and Media Act 2006) to be carried out during the first year of the 11th FYP, that is, by June 2014. We generally support those proposals. They include a mention of data protection and privacy issues. These have become particularly pressing given the growing use of mobile phones, together with continuing development of e-government with (for example) databases containing citizen information shared across government departments, and the absence of a clear data protection policy. **We therefore recommend that top priority be given to developing a clear data protection and privacy policy and legal framework.** In addition, we propose:
    a. Consideration for a separate Data Protection Act, which would set up a new authority to enact appropriate regulations, and to provide a focus for the necessary dedicated expertise for regulation and enforcement in this area.
    b. Attention to the fact that smart phones enable children to access online content that may be thought unsuitable. Parental guidelines and filtering may be considered.
    c. Mobile applications may raise new issues around intellectual property and security, and care will be needed in these areas, especially when framing user agreements.
    d. Attention to competition regulation in telecommunications.
    e. Reviewing the Universal Service Fund and numbering plan regulations.
    f. Enabling FDI in the sector through clear policies and regulations.
    g. Minimising the need for legal stamps.

20 Input to SDC's planning and related follow-up work

SDC have requested our views on ways in which they might support the proposed m-government programme during the next three years. This section identifies further work that either SDC or another agency may want to pursue and concludes with suggestions to SDC.

20.1 Follow-up work

Here we identify areas of study or work that arise from this project. SDC or other development and cooperation agencies may wish to support some of these, for implementation by government agencies with or without outside assistance.

Further study

- **Cost-benefit analyses** of our proposals, high-level and broad-brush for the whole concept of m-government in Bhutan, or more detailed for specific service proposals (where positive, these could lead in to full business cases for the services in question).
- **Follow-on study of B2C** and other categories of mobile service, whose growth could have significant synergy with the proposals of the current study.
- Full study of **user factors and potential user barriers** to adoption of m-government services, including proper consideration of **affordability** of both equipment and usage, including international comparisons. This could further analyse existing data from the BLSS 2012 and BIMIS 2013 surveys, and also usefully add to and draw on:
    - A new survey of **current internet uses**, both fixed and mobile (social media, web browsing, checking email etc) which would be useful indicators of which platforms to focus on.
    - A new survey of which **types of handset** are currently being sold, where and to whom, and their prevalence in the installed base. This would help to show how fast smart apps may become popular, if the network supports them.
- Devise a realistic plan for accelerated national roll-out of 3G or alternative **fast wireless data coverage**, together with **intensified mobile competition** - considering the options of a third network operator, mobile virtual network operators and number portability.
- Consideration of **telephone numbering-related issues**, including availability, suitability and allocation of short codes/special service numbers, and use of mobile numbers in directories and official government records (for example linking mobile numbers with Citizen Identity).

Early steps in implementation

- Assess and improve as necessary the **application status information** sent to the applicants through G2C Services.
- **Process study and process leaning** for services to advise agencies on preparing to move to m-platform. The shift requires some time so process study would help them understand the benefits of m-governance.
- Conduct system **audits of existing back end systems** on readiness to be used as backoffice systems for m-governance.
- Work towards consolidation of ICT infrastructure and **establishment of Government Cloud** to host MSDG and G2C Online service applications.

20.2 Proposals for SDC

We have proposed a Government management system for **the approval and launch of new mobile services**. SDC could usefully work alongside this in two different ways:

- As a source of **supplementary alternative finance**, for promising proposals that fail because of inadequate funding. Funding might be made available only on a matched basis, to ensure agency commitment.
- To help **"fast track" new service proposals** that deserve early implementation. SDC could help agencies to put together sound business cases, possibly by bringing in outside experts, and could also provide support during the approvals process.

SDC support could also **help the proposed MSDG to gain momentum**. We have proposed a programme for its development, but this needs elaboration and could be varied subject to agency preferences and priorities. DITT could solicit proposals from different departments, prioritise the proposals, and seek assistance from SDC to put in place some component of MSDG.

SDC support, in terms of both influence and if necessary funding, could also be valuable in **getting mobile money working**. In parallel with talking to the right people at senior levels, SDC could facilitate discussions among the main players on practical steps that are needed and identifying any barriers to progress.

Last but not least, SDC could stimulate interest in and debate about m-government in Bhutan by **making this report widely available**, and remaining open to comments on the approach. One possibility would be to support an online forum for discussing m-government in Bhutan.

List of abbreviations and technical terms

2G	Second Generation (cellular mobile)
3G	Third Generation (cellular mobile)
ABSD	Accelerating Bhutan Socio-economic Development project
ACC	Anti-Corruption Commission
AEO	Agricultural Extension Officers
AITM	Asian Institute of Technology and Management
API	Application Programming Interface
ASR	automated speech recognition
ATM	Automated Teller Machine
BAFRA	Bhutan Agriculture and Food Regulatory Authority
BCCI	Bhutan Chamber of Commerce and Industries
BCSEA	Bhutan Council for School Examinations and Assessment
BDBL	Bhutan Development Bank Limited
BEGIN	Bhutan Emergency Government Integrated Network
BFS	Bhutan Financial Switch
BHU	Basic Health Unit
BICM	Bhutan Information, Communications and Media
BICMA	Bhutan Information, Communications and Media Authority / Act
BIMIS	Bhutan Information and Media Impact Study
BLSS	Bhutan Living Standards Survey
BNBL	Bhutan National Bank Limited
BNCA	Bhutan Narcotic Control Agency
BoBL	Bank of Bhutan Limited
BP	Bhutan Post
BPC	Bhutan Power Corporation
BPO	Business Process Outsourcing
BPR	Business Process Re-engineering
BSB	Bhutan Standards Bureau
BT	Bhutan Telecom
BYOD	Bring-Your-Own-Device
CB	Cell Broadcast
CBC	Cell BroadCast
CBS	Core Banking Solution

CC	Community Centres
CCO	Community Centre Operator
CDB	Construction Development Board
CDR	Call Detail Records
CEO	Chief Executive Officer
CID	Citizen ID (identity)
COS	Committee of Secretaries
CRBT	Caller Ring Back Tones/Tunes
CRM	Customer Relationship Management
CSC	Common Short Codes
CSO	Civil Society Organisation
CSS	Cascading Style Sheet
CTS	Cheque Truncation System
DAHE	Department of Adult and Higher Education
DAMC	Department of Agricultural Marketing and Cooperatives
DCRC	Department of Civil Registration and Census
DDC	Dzongkha Development Commission
DDM	Department of Disaster Management
DFPS	Department of Forest and Park Services
DHI	Druk Holdings and Investment
DITT	Department of Information Technology and Telecommunications
DLG	Department of Local Governance
DMS	Department of Medical Services
DOA	Department of Agriculture
DOI	Department of Immigration
DOT	Department of Transport
DRA	Drug Regulatory Authority
DRC	Department of Revenue and Customs
DSE	Department of School Education
DTMF	Dial Tone Multi Frequency
ECB	Election Commission of Bhutan
EDGE	Enhanced Data rates for GSM Evolution
EFTCS	Electronic Fund Transfer and Clearing System
e-GIF	E-Government Interoperability Framework

eRaLIS	Electronic Vehicle Registration and Licensing Information Systems
EMIS	Education Management Information System
EMSP	Emergency Medical Services Program
FDI	Foreign Direct Investment
FLW	Front Line Worker
FNCCI	Federation of Nepalese Chamber of Commerce and Industries
FSA	Financial Services Act
FYP	Five-Year Plan
G2B	Government to Business
G2C	Government to Citizen
G2E	Government to Employee
G2X	Government to anything
GBP	British pound (currency unit, approximately Nu 75)
GGU	Good Governance Unit
GLOF	Glacier Lake Outburst Floods
GNH	Gross National Happiness
GNHC	Gross National Happiness Commission
GNI	Gross National Income
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile
GSMA	Global System for Mobile Association
HHC	Health Help Centre
HIS	Hospital Information System
HMIS	Health Management Information System
HR	Human Resources
HTML	Hypertext Markup Language
HTTP	Hypertext transfer protocol
ICIMOD	International Centre for Integrated Mountain Development
ICT	Information and Communications Technology
IMPS	Interbank Mobile Payment System
iOS	iPhone Operating System
IP	Internet Protocol
IPv4	Internet Protocol version 4

IPv6	Internet Protocol version 6
IT	Information Technology
ITPF	Information Technology Professional Forum
ITR	Interactive Text Response
ITU	International Telecommunication Union
IVR	Interactive Voice Response
IVRS	Interactive Voice Response System
IVVRS	Interactive Voice and Video Response System
KPIs	Key Performance Indicators
KYC	Know Your Customer
LBS	Location Based Services
LPG	Liquid Petroleum Gas
LTE	Long-Term Evolution (cellular mobile)
MDM	Mobile Device Management
MMS	Multimedia Messaging Service
MNO	Mobile Network Operator
MOAF	Ministry of Agriculture and Forests
MOE	Ministry of Education
MOEA	Ministry of Economic Affairs
MOF	Ministry of Finance
MOFA	Ministry of Foreign Affairs
MOH	Ministry of Health
MOHCA	Ministry of Home and Cultural Affairs
MOIC	Ministry of Information and Communications
MOLHR	Ministry of Labour and Human Resources
MOWHS	Ministry of Works and Human Settlement
MSDG	Mobile Service Delivery Gateway
MSP	Multi Stakeholder Partnership
MVNO	Mobile Virtual Network Operator
NEC	National Environment Commission
NECS	National Electronic Clearing System
NEFT	National Electronic Fund Transfer
NFC	Near Field Communications
NFE	Non Formal Education

NGO	Non-Governmental Organisation
NLCS	National Land Commission Secretariat
NPPF	National Pension & Provident Fund
NRDCL	Natural Resources Development Corporation Limited
NRR	National Radio Rules
NSB	National Statistics Bureau
Nu	Ngultrum (Bhutanese currency unit, pegged to Indian rupee)
OECD	Organisation for Economic Co-operation and Development
OS	Operating System
OTA	Over the Air
OTP	One Time Password
PC	Personal Computer
PIN	Personal Identification Number
PMO	Prime Minister's Office
POS	Point of Sale
PPD	Policy and Planning Division
PPP	Public-Private Partnership
PSTN	Public Switched Telephone Network
QoS	Quality of Service
RAA	Royal Audit Authority
RBI	Reserve Bank of India
RBP	Royal Bhutan Police
RGoB	Royal Government of Bhutan
RMA	Royal Monetary Authority
RML	Reuters Market Lite
RNR	Renewable Natural Resources
RSEBL	Royal Securities Exchange of Bhutan Limited
RSTA	Road Safety and Transport Authority
SDC	Swiss Agency for Development and Co-operation
SDF	South Asian Association for Regional Co-operation Development Fund
SDS	Service Delivery Standards
SIM	Subscriber Identification Module
SLA	Service Level Agreement
SLC	School Leaving Certificate

SMS	Short Messaging Service
SMPP	Short Message Peer to Peer (protocol)
SRP	Special Residence Permit
SSL	Secure Socket Layer
SOAP	Simple Object Access Protocol
STK	SIM ToolKit
TCB	Tourism Council of Bhutan
TCC	Thimphu City Corporation (Thromde)
Tcell	Tashi Cell
TV	television
TWAN	Thimphu Wide Area Network
USD	United States Dollar (approximately 50 Nu)
USSD	Unstructured Supplementary Service Data
VAS	Value Added Service
VHW	Village Health Workers
W3C	World Wide Web Consortium
WAP	Wireless Application Protocol
WiFi	Wireless Fidelity
WiMAX	Worldwide Interoperability for Microwave Access
XML	Extensible Markup Language

Explanations of some technical terms

2G - Second Generation	A mobile telecommunications capability that improves on 1G in enough ways to create a mass market. Three benefits of 2G over 1G are that telephone conversations are digitally encrypted, very much less spectrum is needed for a telephone call, and very many more people can use mobile telephones at once. 2G networks are usually limited in their capacity and capability to telephony (comprising voice calls and text messages) and narrowband.
3G - Third Generation	A mobile telecommunications capability that improves on 2G by offering reasonably high speed data transmission for broadband.
4G - Fourth Generation	A mobile telecommunications capability that improves on 3G by offering extremely high speed data transmission for broadband.
Alternative operator	An operator other than the incumbent operator.

Broadband	A data transmission service that offers speeds of at least 256 kb/s in one or both directions. Such speeds are sufficient for several applications, including IP telephony (voice over IP) and access to predominantly textual email and web pages. However, high definition television and standard definition television need speeds towards the subscriber premises of about 10 Mb/s and 2 Mb/s (respectively). If in the premises there are several simultaneous uses or poor connections the speeds must be correspondingly higher.
EDGE - Enhanced Data rates for GSM Evolution	A Second Generation (2G) standard for wireless communications that offers data transmission at higher speeds than GPRS.
GPRS - General Packet Radio Service	A Second Generation (2G) standard for wireless communications that offers data transmission at higher speeds than GSM.
GSM - Global Standard for Mobile tele-communications	A Second Generation (2G) standard for wireless communications that provides digital telephony but has fairly limited capacity and capability.
HSPA - High Speed Packet Access	A Third Generation (3G) standard for wireless communications that offers data transmission at higher speeds than UMTS.
ICT - Information & Communications Technology	Information technology and electronic communications.
Incumbent operator	The traditional operator in a market. Typically its position was established under monopoly conditions, so after a market review it would be designated as having significant market power.
IP - Internet Protocol	The main networking technology used in the Internet and increasingly in telecommunications more generally.
ISP - Internet Service Provider	A provider of communication over the Internet. It is often restricted in scope to providers that provide access to the Internet for end users, but it could relate to providers that provide connectivity between networks without having end users as customers.
IT - Information Technology	Electronic content invention, system integration and operation, program implementation and configuration, and equipment design and fabrication.
LTE - Long Term Evolution	A standard for wireless data communications that is related to the GSM and UMTS standards and is regarded as the 4G replacement for the cdmaOne and CDMA2000 standards. In its initial form it is not really a 4G standard, because, for example, its peak data rates are 100 Mb/s downstream and 50 Mb/s upstream (which are 10% of the 4G ones). It increases the capacity and speed of wireless networks using new techniques and simplifies the network architecture to support IP more effectively. It offers mobility for mobile speeds up to 350 Km/h (or perhaps 500 Km/h in some frequency bands).
MMS - Multimedia Message Service	A service for passing multimedia messages (including audio, video and text messages) between mobile telephones.
Mobile network	A telecommunications network that provides mobile services.
Mobile service	A telecommunications service to end users that are not necessarily at fixed locations.
MVNO - Mobile Virtual Network Operator	An operator that provides mobile telephony services without having its own radio network. It uses the radio network, and sometimes other facilities of a mobile network operator. Mobile network operators might accept such arrangements voluntarily or after being required by the regulator to do so.

NP - Number Portability	The ability of subscribers to change their operators without changing their telephone numbers.
Operator	An organisation that provides telecommunications services (whether retail or wholesale).
Postpaid service	A service that is paid for in arrears. Typically there is also a charge for subscribing to the service, which is paid in advance. Fixed telephony and broadband services are usually postpaid, though they can be prepaid in some countries.
Prepaid service	A service that is paid for in advance. Typically the subscriber has an account that can be topped up by telephone, over the Internet or in a shop; in some cases the credit in the account expires if it is not used soon enough. Mobile telephony and broadband services can be prepaid or postpaid; prepaid ones facilitate usage at levels matching intermittent or low incomes, and postpaid ones facilitate buying telephones through the contractual payments.
SIM - Subscriber Identity Module	A circuit that stores information on mobile telephony equipment, particularly for identifying and authenticating the subscriber.
SLA - Service Level Agreement	A formal agreement between operators that defines the levels of service that one provides for another.
SMS - Short Message Service	A service for passing short text messages between mobile telephones (and, in some countries, fixed telephones).
Spectrum	The radio frequency spectrum used by operators to provide services without wiring. The spectrum extends beyond the radio frequencies, and optical frequencies are sometimes used for wireless communications (without optical fibres). However, most wireless communications use radio frequencies.
Telecommunic-ations	Telephony and data transmission (including audio and video transmission) by broadband or narrowband.
UMTS - Universal Mobile Tele-communications Service	A Third Generation (3G) standard for wireless communications that offers data transmission at higher speeds than EDGE.
Universal access	A form of a service intended to be available, accessible and affordable to everyone, at least by providing it at community access points such as public payphones and Internet centres.
Universal service	A form of a service intended to be available, accessible and affordable to everyone, at least by providing it in every house.
USF - Universal Service Fund	A fund set up to subsidise the implementation of a universal service policy. It might receive contributions from operators or the state.
VOIP - Voice Over Internet Protocol	The use of an Internet service for making or receiving voice calls.
Wifi - Wireless Fidelity	A wireless technology that is typically used over short distances for low power operation using unlicensed frequencies.
Wimax - Worldwide inter-operability for Microwave access	A wireless technology that is typically used for fixed or mobile communications using licensed frequencies.