Royal Government of Bhutan

Strategic Framework for Delivery of Services through Mobile Technologies in Bhutan

Volume 2: Annexes

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Knowledge Holding International (K-Hint) Nepal

in association with

InfoAge Consulting (iAC) Bhutan

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Annex A   List of contributors to this project

A large number of people have contributed their time, expertise and enthusiasm to this project, and the consultancy team would like to thank them all. Some, but not all, of the respondents to our field research are identified in the relevant interview notes; we are indebted to everyone, whether or not identified. Those who took part in our two Thimphu workshops and the expert meetings hosted by Knowledge Holdings International (K-Hint) in Kathmandu are listed below.

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Annex B   Interview Guides

The interviews carried out for this project, both demand-side and supply-side, were free-form. Given that this was small-scale qualitative research, the intention was to engage respondents in naturally flowing conversation that encouraged them to express their own feelings and views, rather than to follow a set questionnaire. In order to achieve some consistency across the team, the interview guides below were shared. Naturally, not all topics would be raised with all respondents; but the guides indicate what the team were looking for.

Discussion areas for end users

1. The overall aim is to understand:

   - the place that mobile phones now occupy in people's lives;

   - how this recent adoption came about, so as to build the next set of changes using existing change mechanisms;

   - needs and desires that might be catered to by future mobile applications; this will be addressed indirectly as we cannot generally expect people to imagine such applications (that is our job);

   - the main difficulties that introducing such applications will need to overcome.

2. General information on respondent: Age, gender, occupation/education, household composition/description and respondent's position within household

3. Ownership/use of mobile phone:

   Non-users: interest in becoming a user; if none, why? If interested but not using, what are the barriers? What do you think about other people using mobile phones – are they a good idea? (why/why not)

   Users: history of use – when/how did you first use a phone? Whose was it? Any problems, if so how have they been handled? Have you had help, if so from whom? Do you help others? Current use frequency, type, budget. Type(s) of phone used, aspirations for change? Has the phone made your life easier? If so, how?

4. What three things would most help to make your life easier? [We then guide the conversation to help us identify mobile phone services that could help – e.g. if respondent says "better crops" we would explore why crops are sometimes poor and what might improve them – more reliable forecasts? New options for seeds that are expected to grow well in local conditions? Etc]

Discussion areas for Community Centre Operators

1. General personal information as for end users. Educational and occupational background. How long have you for doing this job? Full/part time? Did you come here to do the job or did you live here already? How's it going?

2. What services are proving most popular? What do people ask for that you can't give them? What do you think would be the most valuable extra information/communication services for people round here?

3. Same questions as end users about personal use of mobile phone. Your ideas on additional services that could be provided using mobile phones to people in this area. What problems do you foresee? How might these be solved?

Interviews with "supply side" officials

1. Introduce yourselves and the project, thank respondent for making time for us.

2. Name, position, contact details of respondent – may we contact you afterwards with any follow-up questions?

3. Actual role of respondent, and how it relates to mobile apps to serve people in rural areas.

4. Information on the recent transformation towards use of Technologies in the organization. Whether the adoption of such Technologies has been successful and ROI is justified.

5. Kind of services and LOBs that are enhanced with use of technologies. The type of technologies used (integrated enterprise systems, silo systems for different functions/ business units / LOBs), whether the systems are exposed to consumers / channel partners / collaborating agencies with interfaces to interact with the system

6. What are the challenges to adopt any new channel for service delivery / execution of business functions? Are the consumers / channel partners / collaborating agencies forthcoming to accept the newly introduced channels?

7. What has this company [or department, or organisation, or whatever – as appropriate] been doing that is connected to our project?

    - What is the current position?

    - Is this according to plan/ahead of plan/behind plan? If ahead or behind, why?

    - What are your next steps?

    - What particular opportunities do you see at present?

    - And what problems do you foresee?

    - Technical details as appropriate.

    - Any legal aspects to note?

8. Is use of mobile platform for service delivery / business function execution in place? If yes what kind of services are delivered using mobile platform? Why not other services? Types of mobile services in place / planned:

    - Informational and educational services

    - Interactive Services

    - Transactional Services

    - Enabling engagement services

9. Are there plans to provision other services using mobile platforms? If yes, what kind of services? What are the challenges in providing services using mobile platforms?

10. Is Security and Privacy a major concern while planning for adoption of technologies for service delivery / execution of Business functions?

11. Are any of the services provided by your agency available through G2C initiated and accessed from CCs? Can we think of delivering same services using mobile platform?

12. Have you made use of CC? If so, draw out respondent's experience of doing so, if not, find out why not; is it likely in future?

13. Is your organisation keen to see new types of mobile application launched for people in rural areas?

    - If so, what would your top few priorities be and why?

- If not, why not?

14. From your personal knowledge of rural areas in Bhutan [this might be from previous residence, family/friends, travel or just hearsay], do you think mobile apps could make a positive difference to people's lives? Any specific ideas of worthwhile apps?

Annex C   Demand-side Fieldwork Notes

A four-day field trip aimed to visit Community Centres in four different districts and interact with groups of local people. These were primarily users.   We also spoke with a few supply-side representatives (e.g. telco regional managers); the following notes include all discussions in the order in which they took place.

 Day 1 Visited Community Centres in two adjoining gewogs, Phobjikha and Gangtey, in Wangdue Dzongkhag. Held separate discussions with:

A.   4 elected gewog leaders

B.   Gewog administrative official plus Community Centre Operator

C.   Two monks from nearby Buddhist College

D.   Two Community Centre Operators together

E.   A short discussion with two young female hotel staff at a stop on the way.

Observations

Though a long and rough drive from the main road, this is a fairly prosperous area, benefiting from tourism (to Black Crane Reserve) and potato crops. Many large, well-built houses, with electricity and piped water; three hotels; hospital, primary health centre, Renewable Natural Resources Centre; lower secondary school; 270 monks at Gangtey Monastery (Shedra), specialising in Buddhist studies. There are 330 households in Phobjikha, at distances taking 1.5 hours to 10 minutes to reach the gewog office. There is a daily bus to the nearest town (a 3 hour journey) which goes on at weekends to Thimphu (another 5 hours).

Neither CC is yet fully operational – in fact both are still being built. Equipment (photocopier, computer) has arrived and is housed in temporary offices. Fibre internet connection is planned as soon as possible, but is slow because cable must be buried as this is a special scenic area. Internet has already reached the school and health centre. At Phobjikha they are also trying to get wireless internet access from TashiCell (2,500 Nu a month) but this has not yet been implemented either. Once internet arrives they plan to advertise CC services, e.g. through monthly community gatherings.

Meanwhile the CC operators are doing odd jobs of photocopying, typing etc for Bhutan Post and occasional visitors (one a day would be a lot). They also sell legal stamps but not postage stamps. Both are young women in their early 20s who have done one month's basic computer and customer training offered by Bhutan Post, plus two weeks' basic computer training after leaving school on their own. One comes from the area and the other is her friend. They are getting 3,940 Nu a month during their six month probationary period (and one is paying 1,200 Nu a month rent). Pay after the probationary period will be 10,000 Nu. Each must bring in at least 1,500 Nu a month through the sales of stamps and services.

Everyone we spoke to had a mobile phone with them, except one of the monks. Group A all had well used basic models; the younger people nearly all had feature phones or smart phones. (One young lady en route preferred a basic model in case she lost it). Monks are not generally allowed mobile phones unless they have special responsibilities; these are available for the benefit of the whole monastery in case of emergency. From seeing other monks on the road, it seems that more phones may be used than are allowed. Group A explained that everyone in their households has their own mobile phone, except for young children and one grandfather. They thought that every household in the gewog would have at least one mobile phone, and most would like theirs have several.

Apart from some reserve on the part of the monks (who must avoid distractions), mobiles were warmly welcomed by all. One of Group A gave them 100%. Use is mainly voice and some SMS (less in

Group A who do not speak English); younger people (monks included) also download music, take photos, record material to be learned, and more. Generally agreed that young people learn how to use mobiles with great ease and often help their elders. SMS little used because of language/literacy problems; some illiterate people have been helped to recognise numbers by use of images (organised for them by young family members). Service quality generally satisfactory, though some problems in bad weather. Group A all have Bank of Bhutan accounts and could get SMS balance reports but haven't bothered to sign up for them.

Apart from distraction, only disadvantage mentioned was receipt by one person of repeated crank calls. (Crank calls and possible repercussions for personal relationships were also mentioned by a couple of later respondents).

Positive mentions

1. New ability to call people together at short notice – much valued for funerals and also for local meetings (saving a messenger). The gewog appears to operate a sort of cascade system, with the administrator calling the elected leaders, who in turn call others whose numbers they have, who call others…

2. Saving of time and cost when you can phone ahead before making a long journey, making arrangements and checking on conditions.

3. Getting to hospital in time for the delivery of a baby, and otherwise calling for help in emergencies.

4. Getting exam results by SMS.

5. Keeping in touch with friends and family.

6. Sharing information.

Suggestions for future

1. Gewog needs internet (several mentions) and it should also reach the villages.

2. Internet should help with getting Citizen ID cards (several mentions); birth registration; land transfer; security clearance.

3. Phones need Dzongkha keyboard, language option and alphabetic display, for the significant section of the population who are literate in Dzongkha but not in English.

4. It would be nice to get a greater variety of TV channels over the internet, for general interest (e.g. Discovery channel) and language learning.

5. Equivalent of a bank branch at CC, which could accept and dispense cash and help people carry out transactions (e.g. pay utility bills) without further travel.

6. CC operators could provide basic computer/internet courses for some (literate) community members at a nominal fee.

Day 2 Travelled from Phobjikha to Bumthang via Trongsa. Tried to contact Community Centres but all staff away on training course in Thimphu. Instead, carried out discussions with:

F. Three schoolgirls in Chumey Domkhar

G. Lady running teashop in Chumey Domkhar

H. Farmer near Jampa Lhakang

I. Rinzin Wangpo, Regional Manager for TashiCell (Bumthang and Trongsa Districts).

Group F, schoolgirls: In final year of high school, aged 19-20. Two studying arts want to be teachers, one studying commerce wants to be an accountant. All come from far away and their parents are farmers. All got their mobile phones (which they can use for Facebook but without touch screens) two years ago. They like to use them for taking and sharing photos, listening to music, and SMS as well as voice. But at this boarding school, Matron takes their phones away until they go home. If they want to phone home they can use the GSM fixed wireless phone in their hostel. They agree that it's a good rule to have no mobile phones in school. Their parents have simple phones which they use for voice only – they can't manage SMS because they lack education. One of the three (from Punakha) also accesses internet from home using her older sister's laptop and a B-Mobile data connection.

Group G, teashop proprietor: Small business woman (takings 250-2500 Nu/day) with lower high school education, uses simple mobile for voice and SMS. Does not want a more expensive model because she sometimes loses her phone. Useful for keeping in touch, for emergencies (keeps phone under her pillow just in case) and for renewing her trade licence. Gets messages also from Bhutan Chamber of Commerce and Industry. Her husband (a craftsman earning about 500 Nu/day) has a loan from Bhutan Development Bank and they get information on the loan (amounts payable/outstanding?) through the mobile. Brothers and sisters all use mobiles.

Group H, farmer: Simple phone only 2 weeks old; he has had a mobile for 2 years now, and this is the third – one was lost and one he gave to his nephew. His wife also has one, but their children are still too young. Neighbours are similarly placed. He finds the phone very useful for keeping in touch with friends and for emergencies. Not really useful for work as he sells only to an agent who collects goods from him, so he has no need to compare prices. Some other farmers might find price information useful. The only other thing he would like is television, which some of the better-off households nearby now have; a shared community television would be good.

Group I, TashiCell Regional Manager: 8 staff to look after area with around 10,000 customers and 17 towers. He is one of 11 regional managers with similar jobs. Revenues from this region are around 4th of the 11, and are that high mainly because of his success in attracting many Indian workers from local hydro schemes (maybe 25% of his customer base, and they make a lot of calls, including calls to India – especially those with company phones). Average Revenue per User (ARPU) around 400 Nu a month; around 7000 prepaid customers (of which 5000 are active) and ~200 postpaid (contributing a lot to ARPU).

Generally Indians are more cautious spenders on their mobiles than Bhutanese. Maybe this is because the many labourers have low incomes, may be because Bhutanese prices seem high compared to Indian prices.

TashiCell is not offering 3G in this region and won't for some time – it's starting in the 4 western districts.

They are now selling a mid-range Lava phone with camera, memory card, radio and torch for 1,500 Nu, in place of an earlier simple Huawei model for 750 Nu. He has sold about 1,000 of these, but still most of his user base have only low end phones.

Popular special services: Caller Ring Back Tunes (CRBT) (around 90% of users pay 5 Nu per tune plus 1 Nu/day rental); prize draw for topping up (prize was a restaurant dinner); family and friends/closed user group (reduced rate or free calls within the group – 200 Nu/month for corporates, free for general public.

Less successful special services: etopup (voucher free in shops) – in spite of 5% bonus, not much used except by Indians (people like to "touch and feel" recharge vouchers); pushmail, MMS, both withdrawn; balance transfer, mainly used to correct recharge errors.

IVR is available in English only. Should be extended to Dzongkha, and low end phones need Dzongkha alphabet/language capability.

Possible future services: banking and/or money transfer (with T_Bank Ltd?); agri price SMS; village family and friends type service; directory enquiries.

Day 3 Travelled from Bumthang to Trongsa. Again, Community Centres unavailable as all staff away on training course in Thimphu. Instead, carried out discussions with:

J. Two young police constables

K. Mr Leela Dhar Upreti, Trongsa Area Manager for Bhutan Telecom

L. Mr Gunja Raj Gurung, Dzongkhag Health Officer

Group J, police constables: Both speak good English; one aged 23, completed 10th grade, other aged 27, completed 12th grade. Have official private mobile radio handsets with 40km range for work and fairly simple mobiles (one has camera, the other with radio and memory card) for personal use. They started using mobiles in 8th or 9th grade. They would like more up-market handsets, e.g. Samsung Galaxy, especially for the games, but don't foresee being able to afford this given their pay of around 5,000 Nu a month, and not much prospect of increases. They use their phones for voice and SMS (the latter mainly with friends, including group SMS to organise getting together).

Their parents are poor farmers and do not use mobiles, except in one case only to receive calls – they don't know how to make calls. But their brothers and sisters who are still at home do use mobiles. They use internet in the office when the boss isn't around, and look at other people's Facebook pages, but don't have their own; also look at the news online (e.g. relating to the election) – both are things they would like to access on mobile phones.

To contact the police, the public dial 113 (whether or not the situation is an emergency) and officers get alerted as necessary on their official handsets.

Group K, BT Regional Manager: 12 staff in the Trongsa area (one of 6 subdivisions of central region), mainly attending to plant and buildings – one engaged in marketing. Revenues are about 10% from fixed lines, 20% from broadband and over 60% from mobiles (the rest being leased lines etc). About 200 postpaid mobile customers; number of prepaid mobile customers is unknown. BT do not sell mobiles themselves, and sell recharge vouchers through two distributors, who pass them on to sub-dealers.

3G coming to the area next year, and 2G is too slow for practical internet use. 98.4% of the area's population is now within mobile coverage – the rest is 3 small villages which they are working out how to serve without excessive cost, and hope to reach by the end of 2013.

In spite of high penetration, there is still room for growth in the mobile market. Now only old and very young do not have their own handsets; more of these groups will get them, and existing users will upgrade to more expensive handsets (3,000-4,000 Nu) and more intensive use. Competition from TashiCell provides welcome stimulus, but it would be a mistake to have more than two operators – this would lead to prices falling too far, to the detriment of government revenues.

There are about 100 customers for B-wallet in the area (not many as BNB started late here); similar service with BoBL will be launched on 28 June. There are good margins for distributing among the various partners involved. Future new services are likely to follow developments in India etc (though notably, Bhutanese use SMS less than Filipinos – SMS use should be encouraged, to build loyalty). Security clearance in CCs would be really useful. BT provides technical support for CCs.

The directory is available free online and printed at a charge. Mobile numbers are not included.

BT is moving to soft switches which will give them more flexibility in service provision. Their existing switch in Trongsa is an NEC model dating from 1993.

Group L, Dzongkhag Health Officer: The Dzongkhag has pioneered the use of mobile phones by volunteer (little qualified) Village Health Workers (VHW). These people's job is to refer neighbours on to the right health services (hospital, health centre) and to note any problems. Since 2011 the Dzongkhag has equipped 35 of their 40 VHW with mobile phones (including 300 Nu credit). (Only 9 of the 40 are female – they would like to attract more women). The phones have two main functions:

- To improve communications between the VHW and their Basic Health Units (staffed by trained Health Workers). They have led to 3 or 4 calls a month per VHW, mainly calling for help at the time of a birth, making appointments for pap smears, and a few complaints about absent health workers.

- To motivate the VHWs. Other incentives have been tried (e.g. rainwear, bags) but still there are many drop-outs and more commitment is very desirable.

Other ways they are trying to improve services include:

- Increasing community involvement with the VHW. The communities choose the VHW from among their own people; the VHW should be included in local meetings.

- Three-monthly calls to the VHW from the Dzongkhag to check how things are going.

- A pilot in one gewog to keep an eye on elderly people living alone, especially to check that they have proper sanitation.

- More training for the VHWs. They are getting 200 Nu for spending a day with a trained Health Workers .

The hospital is now equipped with 6 internet-connected computers which are well used. Internet is now much used at Dzongkhag level and between them and central government. Email is normal in these circles (only a few older officers are reluctant, and they will soon retire), and internet used to find information. Dzongkhag officers are getting laptops and their old desktops will go to schools. All gewogs will also be connected within the next year. Project funded by Unicef.

Day 4 Travelled from Trongsa to Kuruthang, Punakha. Again no CC available, and also no government offices as today was a public holiday. Discussions held with:

M: three young female customer service representatives at TashiCell Regional Office;

N: a middle-aged male supplier to a local baker;

O: the elderly female proprietor of a general store with three friends.

Group M, TashiCell: These young ladies enjoy their jobs and like the company. While they would like higher pay, they are concerned about the company's ability to survive. The main customer issue that they have to handle is putting the correct internet settings into smartphones, and they wonder why the phones can't be set correctly to start with. Locally, it's mainly well-off Indians from the hydro project who use smartphones – other people can't afford them. Smartphones arrived only two months ago and they have not yet noticed an increase in usage. The office is open but not much used on Sundays (and while we were there, nobody else visited). They had no particular ideas about changes that would be good for staff or customers, but will pass on anything that they think of afterwards.

Group N, bakery supplier: This establishment was chosen because it had a mobile phone number in the window. This turned out to belong to the owner, who was absent; the gentleman who was minding the shop and spoke with us was his supplier, who was visiting for a couple of days from

Phuntsholing, and who has his own, different, number. (He spoke Lhotshamkha). His business is to provide bakery ingredients (e.g. yeast, margarine, cocoa powder, cherries) to a number of clients. Usually he sends the supplies by bus and uses his (old, battered) mobile phone to alert the intended recipient to meet the bus. Clients deposit amounts due into his bank account and he withdraws the cash at an ATM. The Kuruthang baker gives him the money to top up his mobile credit whenever he asks. He has been in this business for 15 years; before having the mobile he used to use fixed phones, but as not all his clients had them it was necessary to get clients to pass messages on to each other. He makes 15,000 to 20,000 R a month. He also uses his mobile for personal calls and playing games. He does not use internet and has no ideas for changes that might help him.

Group O, shopkeeper and friends: Again this establishment was chosen because it advertised a mobile phone number outside. This was the number of the clamshell phone of the owner, who was sitting inside with this phone and some friends. She advertises the number only outside the shop (it does get called quite a bit) and would be content for it to be also in a directory, although it is her only phone, which she uses for all purposes. The lady had no education and "learned everything she knows [about mobile phones?] from her children". Her daughter deals with suppliers, she deals with customers, which include some large ones with bulk orders, e.g. local hotels. The other ladies present all have their own mobile phones but did not have them to hand. The lady closed by remarking how important it is for older people to have mobile phones so that they can summon others to them without moving around themselves.

Annex D   Supply-side Fieldwork Notes

This annex provides short notes of the 25 interviews and discussions that the team held with various government departments and agencies, and with banks and telcos. Remarks in [square brackets] are thoughts from the team rather than from respondents.

Mobile service delivery in Bhutan

Interview 1: Bhutan National Bank (BNB)

Date: 15 June 2013

Met: Sonam Tobgay, Deputy Chief Executive Officer

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1. As a mobile apps service, BNB has started SMS Banking followed by the recent B-Wallet which is used for e-top up and transfer of money. For the provision of these services, BNB has signed an agreement with Bhutan Telecom.
2. The ceiling for Fund Transfer of B-Wallet is Nu. 50,000/-. BNB has plans to enable a feature in the B-Wallet to enable utilities payments by end of 2013 through mobile, including salary transfer.
3. BNB started SMS banking as informational services early.
4. Internet banking facility is available for customers. This allows money transfer from any BNB account to other BNB Account. As per BNB, the system is most secured, even though security is always a concern while using adopting technology in banking.
5. Bhutan National Bank is the first bank to use Core Banking Solution (CBS) in Bhutan The usage statistics of online banking are good and up to expectation. However, the inability of interbank online banking has impacted customer acquisition for internet banking.
6. Being a first mover in technology adoption in Bhutan, BNB had established itself as a customer friendly bank with adequate information systems in place to support the decision making process.
7. Currently the inability of providing interbank online transactions is not a limitation on the technology solution but from the perspective of agreement among the different banks in terms of investment sharing and revenue sharing.
8. BNB has no issues with adopting new technologies and channels and has been keeping pace with the use of technology.
9. With a secured system BNB has had only 4 cases of fraud in the last 20 years of its operations, which according to banking standards is a very good track record.
10. With limited number of branches across the country, BNB is open to adopting branchless banking / agent banking for which CC operators and CC managers could be a potential option, including shopkeepers in those areas for taking mobile banking services to the people.
11. BNB is also aware that there are no strong regulations governing online banking and mobile banking. However, products and services are developed within the provisions of FSA and the RMA Act. Channel selection will be done as per the industry practices to achieve better customer satisfactions, adding features as per demand in the market.
12. While transactions like fund transfer, bill payments in place there are no immediate plans for other services like account opening using mobile channel, money remittances, payment instructions and Mobile POS. Account opening is not done using mobile platform as the know your customer (KYC) process involves background checks and other information verifications. However, there is always scope for initiating account opening through mobile services.
13. On data usage like verification of personal information of potential customer, data fetching from civil registration would simplify the information verification. Currently data access from civil registration is not done. So the bank has invested in card readers and barcode scanners to read the information from CID cards to verify the information.
14. M-PESA case discussed in terms of technologies used and channel of service provision.
15. While providing services through mobile applications, the literacy rate of the people in those areas has to be considered and appropriate measures developed.

……………………………..

Interview 2: **Bhutan Post**

Date: 15 June 2013

Met: Norbu Zam, Senior Manager, Community Centres (CC)

1. CCs are required for physical access and to help the people at the grassroots level with provision of facilities available online and to assist with documentation.
2. CCs are established in all 205 gewogs.
3. CCs were setup with aim to provide several services to citizens including G2C services. Out of 135+ G2C Services, many services are not stabilised with backend systems. Very few of the G2C services are actually used by the citizens.
4. Keeping in mind the current state of G2C Services, it would be appropriate to think of porting the G2C services to mobile platform. However, the questions of backend system stability and mobile-readiness access need to be assessed and the M-platform readiness should be considered.
5. E-platform proposal for delivery of services to communities has also been submitted by Bhutan Post to United Nations Development Programme and SDC.
6. If mobile based services are established then the CCs would have greater role to play in providing content for the mobile based services to the community. Further CC Operators and CC Managers would assist the community with mobile based service access.
7. As of now, 23 CCs are online instead of 131 CCs which should have been online by March 2013.
8. 37 G2C services are available for CCs but only few are used.
9. Many of the G2C services involve nominal payments for their usage. Currently there is no e-Payment system or mobile payment systems. Therefore CC would remain as collection point for services even if the services are availed using mobile phones. Further, not all G2C services will be provided as mobile services. Therefore online G2C services will co-exist with the mobile platform.
10. One of the major issues faced by the CC operators is the instability of application processes, supporting documents upload requirements, turnaround time and proposed SLA for services. It could be difficult to move such services to mobile platform as there is bulk attachment of documents which would be too cumbersome for the mobile apps.
11. If mobile platform is provided as one of the options for service delivery and co-exist with the existing online format of G2C services delivery, success rate of G2C services might improve.
12. Bhutan Post has categorized services into G2C Services and Non- G2C Services. As Bhutan Post does not have strong Enterprise Information System for Non G2C services, it is planning to develop backend information system which can be leveraged for providing services on mobile platform.
13. Some examples of the Non-G2C Services which has scope in mobile platform are:
    i. Parcel tracking
    ii. Pension fund distribution
    iii. Ticketing
    iv. Stamp business
14. There are no other services in place, but as an agent of service providers, BP plans to diversify from the current business strategy to being an agent of provision of services where the banks

and the insurance companies do not reach but potential beneficiaries are present including BT services.

15. BP has established collaboration with BDBL for taking their services to rural areas.

16. BP has also discussed with TashiCell and BT for services like e-Wallet/e-payment system to be made available to all gewogs. Proposals have already been discussed.

17. However, BP feels that there are issues that need to be solved including the procedure of acceptance of forms. Many documents get rejected as there is no procedure in place to accept such submissions.

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Interview 3: **Ministry of Information and Communications, Department of Information Technology and Telecommunications**

Date: 17 June 2013

Met: Dechen Chhoden, Sanjay Gurung, Lobzang Jamtsho

1. Road map on what needs to be done and services required to be provided in rural areas should be identified by the team.
2. The roadmap should be rural focused.
3. Out of many mGov models (mG2C, mG2E, mG2B and mG2G), front end application (G2C) to be considered. The backend systems (for G2E and G2G) will be systems for computer.
4. Identification of about 30 % of G2C Services to be ported into Mobile Technology.
5. Categories of mobile applications in the five year plan.
   - Push based informational and educational Services
   - Pull based (interactive services)
   - Transactional Services
   - Engagement services
6. Location based services may not be feasible as telcos are just building infrastructure for location based services. For services like disaster early warning system, location based services and cell broadcast is useful.
7. Some of the Technologies which are useful for different services:
   - Simple SMS and MMS
   - SMS Gateways
   - IVRS Channel
   - IVVRS Channel
   - SIM menu options
   - USSD channel
   - WAP based Applications
   - Native Mobile Applications
   - HTML 5 based Mobile Application

8. Some applications are developed on the sectors identified in the ITU assessment.

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Mobile service delivery in Bhutan

Interview 4: **Policy and Planning Department (PPD), Ministry of Information and Communications**

Date: 17th June 2013

Met: Dorji Wangmo, Sonam Dendhup

1. Mobile development has been given prominence in the 11th Five Year Plan submitted by the MOIC.
2. 77% mobile penetration.
3. Mobile is seen as the best medium for the government to reach its citizens.
4. Low cost of device acquisition
5. Low cost connectivity
6. 135 services in G2C by the end of 2013. In the first phase 89 services started but only 37 services are working.
7. There are 119 G2B services.
8. Determination of criteria for selection of G2C Services to be ported to mobile platform with content language with IVRS.
9. Using mobile platform for service delivery and service access may include recurring cost for service providing agency and service consumers (citizens). It is important to identify and decide who will bear the recurring costs, but should start with basic needs first. The recurrent cost may be per transaction in mobile channel whereas recurring costs for online systems are monthly / yearly and not highly dependent on volume of transactions.
10. National eGov master plan has several activities which provide for establishment of regulations and policy documents within e-gov policy, with certain percentage of G2C services to be shifted to mobile platform.
11. Provisions for capacity development are kept.
12. Sectoral ICT master plan for critical sectors has been planned which will allow focus on the development of sector specific provisions in planning and conceptualising solutions.
13. Establishment of Data Hubs will ensure single point of truth for data. It will provide opportunity to use data from credible source and higher level of compliance will be achieved.
14. Following Data Hubs are identified:
    - People Data
    - Land Data
    - Vehicle Data
    - Business Data
15. For each service identified (within 30 %) possible solution will be identified along with resource requirement.
16. The requirement of having strong back end systems and databases is important for using mobile in service delivery.
17. Planning for service delivery would also entail proper assessment of operators' infrastructure, which is essential. The increased use as a result of G2C Service Delivery may require upgrade in telco infrastructure, introduction of facilities for recording transactions, security implementation, etc.
18. BICM Act is being replaced by new act which would include provisions for data security, data privacy, etc. Also the BICM Act is being condensed.
19. PPD feels that there is no need for digital signature authentication and a study has been initiated to confirm this with the study to start from July 2013 to July 2014.

Mobile service delivery in Bhutan

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Interview 5: Bhutan Information, Communications and Media Authority (BICMA)

Date: 17th June 2013

Met: Director Sonam Phuntsho, Gangaram Ghimirey and another official

1. There is enough legislation to take care of any developments in ICT industry including the mobile services.
2. Any agency should consider whether repealing the Act is a solution or a problem instead of blanket decision for repealing.
3. Repealing of laws should be done only if the laws are not enforced.
4. VAS should be encouraged and the legal provisions to regulate services are already contained in the BICM Act 2006.
5. With the initiation of services, solutions should also be included.
6. Too much regulation is not good for the growth of the industry and should be discouraged.
7. There is a requirement for human resources development in many entities including the G2C.
8. Strengthening of procurement rules and regulations needs to be assessed.
9. Well-planned initiatives are needed and there is a need to regulate the facilities which would automatically regulate the services.
10. The National Radio Rules of 2012 contain provisions for mobile application services.

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Interview 6: Royal Monetary Authority (RMA)

Date: 19th June 2013

Met: Officials from IT Department and Clearing

1. RMA's approach is reactive response to regulations. The players in the market can start playing with products and solutions. Based on the market reaction regulations will be formulated.
2. There are no regulations governing the electronic commerce, electronic payment, mobile commerce and mobile payment.
3. In order to strengthen the payment system, RMA has implemented Electronic Fund Transfer and Clearing System (EFTCS). EFTCS has following payment clearance options:
   - Bhutan Financial Switch (BFS) – an interbank payment gateway
   - National Electronic Fund Transfer (NEFT) System – interbank fund transfer
   - National Electronic Clearing System (NECS) – bulk transfer from one bank to many accounts in another bank and vice versa
     - NECS Debit
     - NECS Credit
   - Bhutan Financial Switch – ATM
   - Bhutan Financial Switch – POS

4. RMA is planning implementation of Interbank Mobile Payment System (IMPS) – IMPS will facilitate customers to use mobile instruments as a channel for accessing their bank accounts and put high interbank fund transfers in a secured manner with immediate confirmation features.

5. RMA is pacing with the market to facilitate mobile banking and mobile payment with implementation of IMPS.

6. Cheque Truncation System (CTS) -- CTS operates on the basis of cheque images and electronic data received from the service centres/regional Clearing House strategically located across the country, and is settled through a central Clearing House located in the RMA, Thimphu. The physical movement of cheques is restricted up to a designated service centre where the cheque is truncated and the corresponding electronically captured image is used as the substitute for processing clearing and settlement.

7. The IT Team felt that it may be appropriate to have Payment System Act.

8. Several initiatives are supported by Reserve Bank of India (RBI), Indian Central Bank through Technical Assistance, providing software system and implementation support. This is mainly due to the fact that RMA and RBI share similarities in operations.

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Interview 7: **Ministry of Education, Department of School Education**

Date: 19th June 2013

Met: Kinley Gyeltshen, Head of IT; Mr Rinchen, PPT

1. SMS could be very useful for announcements from the centre to schools (for example, severe weather warnings) or from schools to parents (for example, to warn of school closures owing to political meetings during the election campaign). Educational content already exists on some smart phones (e.g. Nokia) and mobile phones could be exploited for the delivery of simple courses, e.g. learning a language one word or phrase a day (this might also be useful for Non-Formal Education including teaching basic literacy).

2. There is an Education Management Information System (EMIS). [Presumably used at Ministry HQ and maybe also by school administrators but not by students or parents – what about teachers?] Teachers have personal cellphones; students are not allowed to take their cellphones to school, although in principle they could be valuable for contacting parents (for example about a late return) or in case of an accident going to or from school. Each school has a fixed phone which students may use in emergencies.

3. The most important existing use of mobiles is for delivery of exam results by SMS. At the college level, Moodle (an online educational content system) is used, which students can access fully via smartphones and in outline (receiving update alerts or other simple messages) via basic phones.

4. 268 of Bhutan's 553 schools have computer labs, and 95% of schools with electricity have at least one computer. Computer labs are designed to allow one period (40-50 minutes) a week of computer tuition for each student. The 11th FYP raises the availability of computers to 1 computer to 30 students at primary level and 1 computer to 10 students at secondary level. Around 75% of schools have internet access, with leased lines providing a better service than ADSL (all private schools have leased lines).

5. Computer labs are used for teaching computer/internet skills and also for computer-aided learning of other subjects like maths, science or English. Teachers usually like computer-aided

learning. Not all teachers yet have computer experience, but increasingly they are acquiring their own laptops and becoming more familiar with how computers can help in their work, and correspondingly keener to use the school facilities. 10-day computer training has helped many teachers to get and use laptops.

6. School computer labs are sometimes, though not often, made available to the public outside school hours – the keenest users being those school students who want to pursue their studies that way and have no facilities at home. There is no central institutional objection to the community use of school computer labs, though individual schools may have their own good reasons not to allow this (e.g. the need for longer hours from school caretaker).

7. The actual computers are often networked monitors, or Classmate PCs. Computer maintenance is a problem – although there are service contracts with vendors, and IT instructors have some relevant skills, still at any one time 29% of the school computers are out of order.

8. [MoE has 4 main departments:

   a. School Education (which we met); Bhutan Council for School Examination and Assessment (BCSEA) offers 6 online services at http://www.citizenservices.gov.bt/web/guest/bcseaservices, none of which appears to be delivering exam results

   b. Adult education, including both non-formal and higher education – this department (DAHE) already offers 5 online services at www.citizenservices.gov.bt

   c. Youth and sports

   d. Curriculum development.

There will undoubtedly be scope for other mobile-based services in these other departments, especially b) and c).]

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Interview 8: **Ministry of Agriculture and Forests, Department of Agricultural Marketing and Cooperatives**

Date: 19th June 2013

Met: Dorji Dhradhul, Director; Tashi, IT; Dorji, Marketing

1. This is the part of the Ministry which helps farmers to market their produce, so information services might relate to market prices for vegetables, for example. Another part of the Ministry helps with the production side, so information provided there might include prices of seeds or guidance on identifying and combating crop pests. The term "agriculture" is used broadly to include livestock and forestry. Agricultural extension officers (AEOs) (3 per gewog) work on the production side; these people spend much of their time in the countryside visiting farmers. A pilot project in East Bhutan is using GPS to monitor the movements of these field staff.

2. The production side has access to online databases on production techniques and international agricultural research findings. The content is all in English; it is mainly transmitted to farmers through AEOs.

3. Both branches of the Ministry have been providing recorded information services using IVR in 4 languages for some years (one started in 2009 uses the code 2009). These get 40,000 to 50,000 hits per month, which exceeds their target. Going tollfree (from 0.5 Nu per call) doubled usage. Price information is updated at least weekly.

4. Live advice is also available tollfree, but this service is not much publicised and is little used.

5. Problems with the IVR services include: a high proportion of "prank" calls or wrong numbers, and some users having difficulty navigating the menus.

6. Some possible new approaches arising in conversation:

   a. Enhance price information with analysis and forecasts

   b. Provide option to speak to an operator at start of IVR sequences

   c. Provide option of condensing IVR sequences for repeat callers (i.e. allow full set of choices made to be entered at the same time – this could be extended from voice to an SMS service)

   d. Allow registered middlemen to make their farm-gate prices known through a Ministry system

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Interview 9: **Bank of Bhutan**

Date: 19th June 2013

Met: Mr Manorath Gajmer, Deputy General Manager; Mr Dophu, Manager of Corporate Banking; Mr Sonam Tshering, General Manager Thimphu

1. BoB is the oldest and biggest bank in Bhutan. It has 28 branches and 12 extension counters, which provide a simple cash-in, cash-out service. A branch has at least 10 staff, and an extension counter 2. All professional staff are experienced or graduates, often both. ATMs are coming in fast – rising this year from 57 to 100.

2. BoB are already providing certain account notification services by SMS (e.g. large deposit or withdrawal, balance check). They are soon launching the mobile (USSD-based) B-Wallet with BT. This will permit bill payment and transfers to payees within BoB. Inter-bank transfers are problematic for the time being, for reasons associated with RMA's electronic funds transfer system.

3. BoB have no relationship with Bhutan Post and do not feel ready to broaden their network to include agents who are not Bank employees. Being Government-owned they do have a social mandate and may be seen as a cost centre; however Bhutan Development Bank, with its field agents who visit villages [maybe monthly] are probably better placed to serve rural residents.

4. At present, RMA rules prevent mobile operators from being banks. Detailed terms and conditions are necessary to protect both customers and the bank, and ensure each knows exactly where they stand.

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Interview 10: **Office of the Prime Minister, G2C project team**

Date: 20th June 2013

Met: Nim Tshering, Senior Program Officer; Tashi Daw, ICT Officer

1. The meeting started late and was short.

2. This project will end at the end of June. Documentation about it is at www.g2c.gov.bt. It has developed a list of 89 G2C services across 5 agencies to be implemented in Phase 1 (March 2011-March 2014 - these are the most critical and most used), to be followed by a further 58 services across 11 agencies in Phase 2 (July 2012-July 2015). A spreadsheet identifying these has now been provided.

3. CCs remain important for most of the services, largely because of the attachments that are needed. The CCO portal is a vital part of the service implementation – we will be given a soft copy of CCO training material which will show us how this works.

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Interview 11: **Ministry of Home and Cultural Affairs, Department of Local Governance**

Date: 20th June 2013

Met: Dorji Norbu, Director

1. The Director is an enthusiast for computerisation but does not have the detailed knowledge of his project manager for One-Stop Shops (now known as Community Centres), who could not join us for personal reasons. He is all for building the capacity of local governments and delivering the goods directly to citizens in the most efficient way – this could well mean via mobile phones.

2. He is aware of various problems with the CCs, not least that they are one-man shows, leading to difficulty in keeping them always open. The Public Private Partnership arrangement with Bhutan Post was not what his department, or their consultant (Alf Persson) originally favoured – they felt that the government-run model used in Mongolia had better chances of success.

3. There are at least 300 G2X services which could be made available faster and more efficiently with standardisation and streamlining.

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Interview 12: **Ministry of Health, Department of Medical Services, Emergency Medical Services Program**

Date: 20th June 2013

Met: Tashi Duba, Program Officer

Mobile service delivery in Bhutan

1. EMS is only one of 12 departments of MoH. Other departments may also have important applications for mobile technology.

2. For EMS, flash health hazard warnings would be especially valuable. These might be provided in association with disaster warnings from the Department of Disaster Management. These would be mass alerts for many people in affected areas.

3. There is a large back-end Hospital Information System. Personal alerts might include reminders when medication or treatment is due, test results are available, or a hospital bed becomes free. Group messages might target certain groups with health information, e.g. pregnant women.

4. Currently the emergency number 112 for summoning an ambulance also provides the option of basic live medical advice. They could reconsider whether combining the two on a single number is the best arrangement.

5. Ambulance staff are in constant touch with despatch and the hospital. A valuable enhancement would be maintaining emergency communication between ambulance staff and the people they are travelling to help, e.g. at the scene of an accident. Photos sent by MMS could help the ambulance team to advise on first-aid. Properly coded maps which could correctly reflect GPS co-ordinates would be very useful for tracking the progress of an ambulance.

6. The Hospital Information System is only a year old and so its content is still being built up, and it is still having teething troubles (it may be better to use a transcription company rather than have doctors entering information themselves). It's important to get people's consent to the sharing of any sensitive information on the system about themselves.

7. There are important questions to address about maintaining mobile communications in case of a major incident (e.g. earthquake). Techniques possibly worth considering include ad hoc networks and priority subscribers.

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Interview 13: **Bhutan Telecom**

Date: 20th June 2013

Met: Nidup Dorji, CEO; Pushpa, head of mobile; Norbu, head of data

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1. As the government-owned, and leading, telecom operator In Bhutan, BT are ready and willing to co-operate in any sensible venture to serve the people. However, they question whether there is yet a critical mass of sufficiently educated people for mobile G2C services to succeed.

2. 2G mobile service is available in all gewogs and fibre is on its way to nearly all (the remaining few will probably be served by satellite).

3. In principle, more widespread 3G service would be desirable; but to date it is not being well used even in the few places where BT has installed it. Nationwide expansion is not likely in the foreseeable future. GPRS (which is generally available) is not really adequate for transmitting files.

4. BT are already running a multilingual contact centre based in the IT Park on behalf of several large companies (DrukAir, BoB, BPC, NRDC) and would be interested in offering this service more widely. Location of call handling agents can be flexible with extension to suitable premises and local management. They would also like to provide datacentre (cloud) services.

5. In case new services should point to needing more network capacity, there is a 3-month lead time with their supplier (Ericsson).

6. There is not currently a voicemail option on B-Mobile – this was tried but was not popular.

7. The earthquake in September 2011 led to a tripling of normal network load. Government should pay for any additional costs of disaster preparedness, such as a redundant core system.

8. It is highly questionable whether a third network operator would on balance be good for Bhutan. It would very likely be foreign, as no Bhutanese company will invest in the sector (TashiCell is not yet profitable). A third operator would probably insist on mobile number portability, which would be resisted by both the existing operators. As the story of roaming charges in India shows, it is futile for regulators to try to impose developments which the market cannot support.

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Interview 14: **TashiCell**

Date: 20th June 2013

Met: Tashi Tshering, CEO

1. Pay in TashiCell is similar to BT's for technical staff, below it for support staff and above it for senior management. The company is operating on very tight margins and watches every Nu it spends. Any new services will tend to be a few years old so that the software is proven and has fallen in price. They pioneered both CRBT (Caller Ring Back Tone) and Family and Friends tariffs. TashiCell is no longer competing on price. It would love to find a killer app and compete on quality.

2. TashiCell would welcome more infrastructure sharing with BT, but the regulator is not strong enough to enforce this. One form of sharing that has worked on a commercial basis is power supply at off-grid base station sites.

3. There is only one point of interconnection between TashiCell and BT, in Thimphu.

4. The CC programme is over-ambitious. TashiCell customer-facing staff need to deal with only 12 services and that is already hard for them. How can CCOs be expected to handle dozens or even hundreds of services? In any case, many proposed services will fall down because they require payment. TashiCell is ahead with electronic payment, but RMA rules make inter-bank transfers impossible.

5. Views on a third operator are similar to BT's.

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Interview 15: Road Safety and Transport Authority

Date: 27 June 2013

Person Met: Mr. Tshering Nidup, head, IT

1. There are about 80,000 driving licence holders; 10,000 are non-literate. On average, there are 1000 applicants for new licences every month.

2. Mobile can be used for sending info on approval of new licence, vehicle registration, fitness renewal, road block, accidents and weather. Current system is now linked with SMS push facility for several triggers like renewal due, etc.
3. Option of online payment system to collect fines related to traffic offences. This would require closely working together with RBP. Total of fines collected in 2012 was reported about Nu 200m.

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Interview 16: **Ministry of Health**

Date: 28 June 2013

Met: Mr. Tashi Dorji, ICT; Mr. Purna Chhetri, HIS; Mr. Bikash Gurung, HHC

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1. For any service delivery, there is a question of accessibility, acceptability, quality, and cost.
2. Two BHUs (Drukgyal and Bitekha) equipped with tablets to collect patient intake information through an Android based Mobile App. The information was to be updated in the system at MoH. The information update did not happen.
3. Started telemedicine, but did not pick up as there was resistance from specialists.
4. Sending alert information to patients on dialysis, break out of epidemics, disaster, from sites on real time basis.
5. There is online link between ambulance and site of accident, but there is no link between ambulance and doctors.
6. Technology for service and decision making.
7. Has so many stand alone expensive systems and powerful servers, but there is lack of motivated IT personnel.
8. For TV reporting system, each hospital was given a computer each.
9. Any service that can be executed by private sector needs to be out sourced - but the latter should be responsible for the delivery of services.
10. Connection between who is who plays against receiving quality service.
11. Mobile Apps can be used for making hospital appointments.
12. Ex-Country training cost is very heavy and even local travel cost comes very high. Reported a doctor visiting head office from Pemagatshel can cost Nu 28k in daily subsistence allowance alone.
13. MOH spent Nu 1000k for postage alone in 2012.
14. Mobile apps can be used to inform on non-communicable diseases.
15. No centralised data system between various departments such as HIS, HMIS, HHC
16. Ministry of Health does lots of data collection (like household information) which would be reasonable and cost effective to leverage mobile platform.
17. As there are many silos of information system, there is no single source of truth.

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Interview 17: **Ministry of Economic Affairs**

Date: 28 June 2013

Met: Mr. Zeko, Chief, Trade Division; Ms. Pem Bidha, Chief, Cottage Industries; Mr. Jit Bdr Gurung, IT, Mr. Chophel, Hydromet Services Department, Mr. Sangay Tashi, ICT division.

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1. Licences related to import of vehicles, furniture, restricted and banned items and non delegated items which require clearances from other line ministries (NEC, MoA, Medicines, etc) may not be possible through mobile apps.
2. Information sharing through SMS on licence renewal, non-operational licence, pickup, is possible. Same can be applied for LPG, Petrol and diesel prices.
3. Currently applying for new LPG cylinder requires application, CID copy, and remaining in line. (DITT, BICMA and DOT can work together to provide this service).
4. Having a trade statistic at MoEA can help provide efficient and fast information to the consumers. Same can be applied for tax clearance certificate and licence renewal. Currently it is being done manually.
5. Require online export sharing information between MoEA and Department of Revenue and Customs on export of items. It can help in forecasting of export items, such as apple and oranges.
6. Hydromet are responsible for providing daily forecasts of temperature, humidity and weather outlook and severe weather warnings, which is important for planning and implementing programs and services. Also to provide early warnings and alerts of extreme events including Glacier Lake Outburst Floods (GLOF) and forecasts and warnings of floods and related information both within the country and to neighbouring states. Finally, they provide Hydro-meteorological data for the country to all interested agencies for planning, development and monitoring.
7. An early warning system in place but is protected. The experts are supposed to validate the warnings/forecasts before informing the public.
8. Currently vulnerable areas like the Punkha-Wangduephodrang valley have a siren system in place for warning people before and during floods. Water levels in the rivers are monitored by the 15 flood warning stations across the country. Working to put in place an sms gateway to send alerts to station workers.
9. Weather forecasts for mobile through mobile web and sms are anticipated.

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Interview 18: **Bhutan Development Bank Limited (BDBL)**

Date: 29 June 2013

Met: Mr. MP Tiwari, IT; Mr. Tashi Tshering, Research

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1. No branches in Lingshi, Sombeykha, Thrimshing, Sakteng and Weringla. Two offline branches at Dorokha and Lhamoizingkha and 31 online branches.

2. Has 33 branches and about 400 staff, out of which 60% are in the field. Each branch office has about 4 project officers stationed in field offices and they move on a monthly basis for service delivery. The project officers report to the branch managers
3. Recently a Windows Phone based mobile app is being piloted used by the project officers while on field. The app is intended for replacing the register that is being used currently.
4. Initially the mobile app was heavy in terms of data transfer requirement and it was difficult to complete data transfer to central system. The app is refined and made light in terms of data transfer requirement.
5. The data synchronisation process requires manual intervention which will enable sync of 5 records batch. As they are dependent on the mobile internet connection, we suggested that they could consider using devices which can be plugged in into different networks (mobile connection, wi-fi network) and sync can be done without manual intervention as and when there is network.
6. Each gewog is reported to have 93 clients on average. However, there is a problem of connectivity which makes real time transaction not possible. Also it has to do with large data and compression is not easy.
7. Option is to save data while on move in the field and down or upload as soon as project officers have access to WIFI or WiMax facilities.
8. Use of smart phones started in June 2011 with window applications to disburse and collect repayments from rural clients in coordination with local administration. But there is no maker and checker in place. Smart phones were reported duplicated ones and they are now looking for branded ones.
9. Users are not accustomed to use touch screen based devices and facing problems while data capturing. Suggestion is to use devices with dockable keyboards with the devices.
10. There is provision of B-Wallet, eload and SMS services in their system, but there is a problem of software mismatch between BT and BDBL. The banking solution (ABS) does not provide data output in format required by B-Wallet and there are issues with updates to be done by the B-Wallet. There are also issues with SMS banking as the users are not provided with SMS origin information by one of the Telcos.
11. They want to revive present system, although it is staff centric and not customer facing channel.
12. A plan is afoot to link up with Bhutan Post to provide services through Community Centres.
13. Strongly want to go for ATM services (each ATM cost Nu 500,000).
14. SMS service can pick up due to increase in school going children as well as increase in NFE students. They can access information, if there is localized content.
15. Liability of security transaction can fall on user not on BDBL.
16. Has to ensure service with mobility and quality.
17. Changing core banking solution is difficult. They have to build on it to save cost.
18. To leverage on the mobile platform for both BDBL2E and BDBL2C, certain level of Business Process Reengineering (BPR) activities may need to be carried out.

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Interview 19: **Dzongkha Development Commission**

Date: 1 July 2013

Met: Dasho Secretary, Mr. Christopher Fynn

1. Discussion mainly focused on technical issues.

2. Localization is important from the perspective of promoting Dzongkha language.
3. Latest release of Android platform has fixed rendering issues.
4. Dzongkha works in iOS.
5. Linux based phones will be easy to include Dzongkha.
6. Some phones do have rendering features but fonts are not available.
7. Some of the options for using Dzongkha are as follows.
8. Some server based applications allow rendering of fonts which are transferred into the phones as graphics. If telcos can host such server applications then it would be ideal.
9. As the touch screen based smart phones are coming cheap, on screen keyboard app can be developed. DDC has developed fonts, there is need for developing the engine for the on screen keyboard.
10. Option of establishing keypad manufacturing Dzongkha and replace / assemble phones with Dzongkha keypad in Bhutan. However, there is no strong business case for such initiatives. It would require some sort of funding support from Government.
11. Rigsum Institute has developed some phones with Dzongkha language installed.
12. Majority of the agency websites in the country is in English and very few have bi-lingual website in Dzongkha and English. It would be appropriate to develop agency website as bi-lingual with default as Dzongkha and then option to select English.
13. Also agency website could be based on some standards which will be adopted by all agencies and should be responsive in design so that it will be uniform experience on different devices.

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Interview 20: **Ministry of Agriculture and Forests, Department of Forest and Park Services**

Date: 1 July 2013

Met: Mr. Arun Rai, CFO, NCD; Ms. Kinley Dem, FO

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1. Want to avail SMS services for forest fires. There is a plan for implementing a system through remote sensing of fires and they wanted to connect this system to fire SMS alerts (loss of forest cover through forest fire in 2012 was 10903 acres).
2. Issuance of timber permit is not done through CCs currently, but through their field offices. Permit is issued from March till October and thereafter it is a lean period. Initially, a household was issued 108 poles, but now it is being reduced to 36 poles along with drashing and others.
3. Current flow of timber permit is - dealing officer initiates task, then it goes to range office and thereafter to DFO. Once DFO approves, it comes back to the dealing officer. Only then marking of trees is done within 15 working days.
4. Timber permit is issued every 15-20 years for head of household.
5. Timber consumption was 25.28 m volume in cubic feet from 2008-June 2011. In terms of royalty, it was Nu 77.59 m (from-Forestry facts, figures and trends 2011)
6. Data ownership and security is with Information and Communication Services, MoAF and only the Director General has access to all the information.
7. Can use mobile services for anti-poaching and collecting information on national forest inventory from the field, information on social forestry day, and other forestry events.
8. Currently a Windows Mobile based system is being piloted to be used for establishing the National Forest Inventory. The system is on a GPS enabled handheld system. They are facing the same issue of data transfer issue. They seem to have devices with capability of multiple network plug in.

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Interview 21: **Thimphu Thromde**

Date: 2 July 2013

Met: Mr. Minjur Dorji, Executive Secretary; Garab Dorji, IT

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1. Possibilities to go on mobile for water meter reading in partnership with BPC, as they collect power bills and power reading. Reference spot billing by Bhutan Power Corporation and issuance of bills on the spot. Currently there are challenges like people need to go to distant location to carry out meter reading, then bills are generated at the Thromde and again people have to deliver the bills. In some case meter reading cannot be completed due to absence of building owners, etc.
2. Registration of students. Lot of transfers of students and teachers is handled by Thromde education office.
3. Online cataloguing for library books through bar code reading. Thromde runs a public library which has collection of publications and books which can be used by citizens. Public can check for the availability of book of interest using mobile technologies.
4. Parking fee collection. There is problem of revenue leakage from the parking fee collection. It is being outsourced to private collector. There is very little interest from the vendors to take up these jobs. Also, at times, parking space users are being made to pay hiked fees by the collectors. The idea is if it is possible to use mobile platform to collect parking fees or by establishing kiosks for top up of parking fee payment cards.
5. Bus ticketing. Currently the City Bus Service is being operated by Bhutan Post, but it may come under the Thromde. In the current mode of operation, there is revenue leakage. Idea is to establish something like that of Mass Transit System in Thailand or Metro system in India.
6. Land transaction in partnership with NLC.
7. Having online payment system can not only ease work, but can avoid tax evasion.
8. Service has to be user friendly and require acceptance by demand and supply sides.
9. Good to introduce new services, even if it fails, it is ok; otherwise, any agency would remain just a follower.
10. Service bottlenecks - people prefer to come personally to avail services, offices located nearby, people have time, especially civil servants.
11. G2C services strength - team was strong as there were focal people from the agencies while taking the services online. Process studies and process rationalization was done in consultation with the agencies.
12. G2C services weakness - focal person kept on changing in some agencies; there was communication gap affecting faster implementation (some agencies wasted five months out of 12 months while implementing programs), lack of dedicated staff, poor services, attitude in both demand and supply sides due to cultural aspects.
13. CCs can help communities in receiving services faster and save cost and time.
14. TCC is planning to start neighbourhood nodes in Dechencholing, Babesa, Sunday market, Motithang and gradually in satellite towns. They will be a one stop shop. Communities can clear utility bills as and when convenient to them.
15. System flow exists, but data integration from old to new system is a problem.
16. There was no back up whenever IT focal person was out of station.

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Interview 22: **Ministry of Home and Cultural Affairs, Department of Immigration**

Date: 3 July 2013

 Met: Director General Mr. Thinley Wangchuk

1. Department of Immigration has implemented web based system accessible from all immigration check posts across the country and do not see the need to use mobile platform to deliver its services. Further DoI is security agency and is not confident regarding the security of mobile platform. For those entered in the system, alerts and reminders are sent to email of the concerned people.
2. The current web based system is being upgraded to use bio-metric information. All visitors travelling to Bhutan (except Diplomatic and Official Passport holders) will have to provide bio-metric information while entering Bhutan from any entry points.
3. The existing system has interface for Hotels to capture the information of the guests during check in and check out time. This allows the Immigration Officials to trace travellers. However, hotels are not using the system as required.
4. During inspections, inspectors take laptops with mobile internet (Data Card). Initially the check post used mobile internet but now broadband internet is being used.
5. As security agency DoI is more interested in Location tracking services by the Telcos. Currently the Telcos can only provide the base station location only. Before starting with different services, Telcos should improve their core network strength. Also 3G services are expensive in Bhutan for citizen to access services using mobile platform.
6. As Civil Registration provides a database of Bhutanese Citizens, so DoI provides a database of visitors in Bhutan.

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Interview 23: **Ministry of Home and Cultural Affairs, Department of Disaster Management**

Date: 5 July 2013

Met: Mr. Pema Thinley, ICT Officer

1. Department of Disaster Management is mandated with delivery of the following services
    a. Information on disaster
    b. Situation reports
    c. Management of field workers
2. DDM functions with Dzongkhag Disaster Focal Person who work on voluntary basis. There are plans to appoint Dzongkhag Disaster Management Officers.
3. During disasters, issue of congestion has been a major problem and also location based SMS firing is not possible. Further it would be appropriate if SMS alerts / voice alerts can be sent to locations which could be affected.

4. ITU had assisted in development of SMS based application to be used for sending alerts. However it is not used till now.
5. A toll free number (233) is being used for reporting disaster. However, agent is available only from 9 AM to 5 PM. There is option to use BT contact centre or use HHC helpline system. For disaster reporting priority number can be used for reporting. However, Mobile Device Management could be an issue. Other solution option includes USSD Menu based reporting or smart app for disaster reporting
6. Proposal for Bhutan Emergency Government Integrated Network (BEGIN) is being forwarded to Ministry of Home and Cultural Affairs. The proposal is already approved by MoIC. BEGIN is based on TETRA Radio link which uses Telco Core network with certain level of QoS.
7. DDM has following Information Systems
   a. Disaster Management Information System – system developed inhouse in PHP-MySQL platform. It keeps inventory of all equipment, Human Resource, equipment issued to HR, infrastructure records (roads, schools, BHUs, etc.) and fleet information (vehicle owned by local people and potter pony information)
   b. Disinventor (an open source product) is used for keeping the records of disaster that has happened
   c. There are initiatives to work with ICIMOD towards establishing satellite based network on detection of disasters and integration with SMS system for alerting locality.

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Interview 24: **Ministry of Works and Human Settlements**

Date: 5 July 2013

Met: 14 people from Planning and Policy Division (5), Human Resources Division, ICT (4), Urban Planning and Development Dept/Human Settlement Dept, Construction Development Board, Engineering Services Dept, Administration and Finance Division led by Chief Planning Officer: Ms. Lhaden Pema

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1. Department of Roads not represented.
2. G2C Services – Bhutan Schedule of Rates, Building Approval System.
3. Approval of drawings for the Dzongkhag – SMS alerts sent to application about the application id which is used to check the application status on the web.
4. The requirement for sending the attachment file would be huge so this is not done. Scanned signatures are however accepted.
5. Department of Roads have plans (in the 11th FYP) to develop a road information system. Currently a file is uploaded to the website, which is too slow and does not keep up with developments in real time. Information on the road blocks status could be sent using SMS. Road block information capture feature in eRaLIS can be used for time being to manage the road information on blockages. eRaLIS is already connected to G2C SMS gateway.
6. Department of Human Settlement can use SMS to notify consultations on town planning to the public. The information is currently published in print media and broadcasting channels are also used. They would like to make available information on structure plans, so that people could query them, for example to find out what use an area has been allocated. But bulk SMS are still rather expensive.
7. The National Land Commission runs the Land Information System.

8. The National Environment Commission manages environmental clearances for construction projects.
9. Construction Development Board provides services like registration of construction and construction consultancy firms, architects. This is in the G2C pipeline. SMS channel can be used to send validity and expiry reminders, query qualification criteria, etc.
10. CDB also has e-Tool used for tender evaluation.
11. Informally, CCs are an excellent idea but they need connectivity, more experienced/ more qualified/better trained staff, and better publicity if they are to succeed. They will need a maintenance budget. It would be better to combine them with the Gup's office and make the CCO responsible to the Gup.

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Interview 25: **G2C Services Assessment (DITT Team)**

Date: 5 July 2013

Met: Mr. Karma Tshering, Ms. Pratima Pradhan

1. It seems line agencies do not trust the operator of CCs.
2. Some CCs cite connectivity issues, changes in the processes post implementation of G2C services, requirement for upload of documents which are sometimes heavy.
3. One of the main issues is that there is no data in the backend system. During the implementation of the G2C Service applications, data migration was not done. As actual data was not migrated, system with the data is not tested. Systems are just tested with junk data.

Annex E   Community Centre Operators Discussion Groups

On 21 June 2013 the team attended a gathering of around 100 Community Centre Operators (CCOs) in Thimphu. The CCOs had been attending a training course. We held three discussion groups of around 45 minutes, each with 8 to12 volunteer CCOs. Below are combined notes from these groups.

1. All the CC operators have mobile phones - mostly low end smart phones. They use them for making official and personal calls. These phones are their own property and they get no allowance in respect of work uses. The latter include:

- Calling clients to let them know when their applications have been approved so they can return to collect permits etc.

- Calling each other to share work-related problems, and to keep in touch with their team leader. (Team leaders are chosen from among the CCOs in a geographic area; they have extra responsibilities for oversight of all CCOs in that area, but no extra pay).

- Being called by others on work-related matters, e.g. gewog admin about local issues, (occasionally) potential clients with queries.

- Occasionally, leaving their number on the CC door if they are obliged to leave the office closed for a period during working hours. Those CCOs who are also engaged on postal duties are sometimes required to do this in order to deliver letters.

2. Many of these uses could be increased if they were allowed/encouraged to increase them, but given the very low level of their pay, an allowance to cover at least additional airtime would be needed.

3. Out of nine CCs in one group, four were offline and 5 online.

4. All of them sell G2C services along with non-G2C services. The latter includes Bhutan post products such as legal stamps, revenue stamps, etc. Most CC operators focus on non-G2C services, as they can generate more revenue out of them compared with G2C services. Most CC business is photocopying or processing applications for permits etc, especially timber permits. They receive these already completed on paper elsewhere, often as a batch, and just have to enter the data into the computer and send it off to the processing department – processing typically takes a month or so. If an application is rejected, it is usually because of some problem with the form-filling (information missing or does not match that previously supplied) and the application must be resubmitted. Some feel that their location is too near alternative facilities for photocopying etc to be used (their charges are perceived as uncompetitive); another group felt that having NIIT (National Institute for Information Technology) nearby was an advantage as it brings in potential custom. Average qualification of CC operators was class 12, except for one who was a graduate. The one with a graduate degree takes up the responsibility of CC as well as helps his father, chairperson of the local government. He is planning to join politics at some point in time.

5. Average age was 28 years - the oldest being 36 and the youngest, 21 years.
6. On average, 18 people make use of CC services in a month - highest was 50 and lowest 5 people. The CCOs who seemed to have a reasonable level of customers were those who were doing postal work too (and even they were idle much of the time, and might seek distraction by listening to the radio – another use of their mobile phones – or using the internet, especially Facebook, when that is available). One said, he mostly goes through websites looking for scholarships to enhance his career; another browses job portals.

7. Internet connections, even where they exist, often fail. Not being allowed to leave the office is a problem for many, but one CCO had an agreement with the gewog administrator to provide cover for his absences.

8. CCs were kept open most of the time, except when CC operators have to attend to an emergency in hospital and as and when they have to deliver parcels and letters to Bhutan Post clients.

9. Monthly revenue target for CCs is Nu 1,500 for offline and Nu 2,500 for online (initially it was Nu 750 for offline and Nu 1,500 for online). However, from the discussion with CC operators, they were able to generate only Nu 859 per month, with Nu 3,770 as the highest and Nu 200 as the lowest amount.

10. CC operators who are not able to meet their monthly targets have to explain to Bhutan Post in writing with reasons why were they not able to meet their target. However, none of them reported having gotten reprimanded or faced with any other action thus far.

11. CC operators maintain records to ensure proper reporting and tracking of services that have been delivered.

12. CC operators receive a basic salary of Nu 4,000 a month during probationary period, which is for six months. Thereafter, they receive Nu 9,000 per month; however, they said there was a change in policy and now they receive only Nu 6,000 a month and it makes their life more difficult and also reduces motivation to work.

13. All of them are contract employees; they renew their contract on a yearly basis.

14. When asked, what is their income/expenditure pattern, most of them said they spend 40% of their income on rent followed by food, clothing, utility and meeting unforeseen expenses.

15. Majority expressed not being happy with their job and would like to move out if they can get a better paying job. Only few (mainly women) said they would remain because they appreciate the safety and security of the CC position. Even this group cited not being able to get a job and do not want to risk what they currently have. All are enthusiastic about the social potential of the CCs, but are disappointed in the pay and conditions, and most feel they are not yet adequately trained.

16. There are 14 CCs who are co-located and operated by Postmasters, who are employees of Bhutan Post. They receive additional salary for taking up the job of CC operators at CCs.

17. A majority of CC operators aspire for advanced training opportunity. Main reason they cited was gaining more knowledge and skills which can enable them to deliver services more effectively and efficiently to clients.

18. Regarding work, they think it is challenging but it is not enough at times and they can take up additional responsibilities.

19. Majority of the CC operators are confident of effectively doing their work. Only two, said that they were somewhat confident and they attributed this to being new to their job.

20. CC operators maintain good relations with communities - rating not below very good.

21. When faced with equipment problem at CCs, CC operators take help of ICT officials of district administration. In some cases, the equipment is sent directly to Bhutan Post head office for repairs and maintenance.

22. During off hours, CC operators provide basic computer training or NFE for students at a nominal fee of Nu 300 for a 10 day training. On average, they had 10 students - highest 42 students and the lowest 2 students attending the training. But they let people attend without paying if they believe even this low charge is a barrier, as it sometimes is.

23. Some also try to use the CC as a centre for trade in local products [as a physical collection point, e.g. for sending a batch of handicrafts to market, or using the CC website to advertise such products?] Besides, some of them also take up weaving as a part-time activity.

24. When asked if they would like to operate CCs as their own, everyone agrees that they would, although the revenue they generate through CC is not significant.

Annex F   Technologies for Mobile Services Delivery

This Annex considers in turn the following 14 technologies which may be used for mobile service delivery, in the context of Bhutan. After these we provide some notes on potentially useful open source packages, indicative costs for various technologies, and the activities needed when adding a channel to the MSDG.

T 1   SMS and SMS Gateways

Short Message Service (SMS) messaging, also known as text messaging, has become an important communications medium in the mobile age. Using SMS, consumers can send messages, make purchases, and obtain content ranging from news headlines to movie show times, all on a mobile device. This functionality is of increasing interest to the financial services industry because it enables customers to use their mobile phones to interact with their banks or other financial services institutions from any location at any time using 160 or fewer characters. This channel is cost effective option for service-providing agencies as well as the consumers / citizens.

SMS has become more or less a universal data service in the mobile age. SMS channel is effectively used across the globe for informational and educational and interactive services.

SMS gateways are used for managing the SMS by the clients. SMS Gateways have features and functionalities to decide the bulk recipients, interfaces to interact with the agency back office systems, and define the content of the SMS. The content of SMS can be designed by concatenation of data from the information systems and joining static content.

Mobile service delivery in Bhutan

SMS gateway provides features for management of push SMS (one directional) and pull based SMS (bi-directional). The interactive aspect of service delivery by using SMS Channel is enhanced by use of SMS Gateways. The Gateways keep record of the delivery status of the SMS that are being fired using the SMS Gateways.

Advantages	Disadvantages
• Use of SMS lowers the communication cost as compared to other channels • SMS is sent in real time and is read immediately. This is perfect to communicate urgent and important information (appointments, crisis alerts, delivery info, etc.) • SMS Channel is a high impact channel as there is high chance of reading SMS • SMS is supported by technology of every mobile phone in existence • The electronic nature of SMS makes it much faster than traditional written communication methods like mail or e-mail because the message is sent directly to the recipient's mobile device rather than a physical or virtual mailbox • The store-and-forward feature of SMS messaging ensures message delivery, which cannot be guaranteed using other communication channels • The possibility to manage the service related SMS using SMS Gateways provides great flexibility in sending SMS and store the status records	• The cost of SMS is being borne by the customer (citizen or the service providing agencies). The cost is incurred even if the service delivery is not successful. • SMS does not guarantee speedy delivery of SMS messages. Delays may occur due to high traffic, low bandwidth, or a handset-related event. • One risk is that SMS messages can be intercepted by third parties because they are typically unencrypted and reside on the customer's Subscriber Identity Module (or SIM card) until deleted, making them accessible to anyone with physical possession of the device. • In case of interactive services, the user is required to remember the service seeking short codes. There can be several short codes for multiple services. It is therefore cumbersome to remember the codes and addresses. • One challenge is most of the phones lack localization, so localized SMS is difficult. The Gateways are built with English language menu, therefore support for local language in SMS Gateways is required.
Types of Services	
• Any kind of informational services, interactive services • Mass alerts during disasters, disease outbreaks, epidemics, • Personalized SMS to send service application ids • Status check transactions for service applications • SMS banking	
Handsets and Platform	
All handsets in any platform • Feature phones with all JAVA OS, Symbian OS, etc. • All types of smart phones	
Security	
The SMS gateways will provide security measure: • Use of Secure Socket Layer (SSL) during transmission of message • The contact list in the Gateways will be kept in encrypted form • SMS gateways are credential based systems	

T 2 IVRS / IVVRS /ITR and IVR / IVVR / ITR Service Delivery Platforms

Interactive Voice Response, or IVR, automates the interaction (retrieval and input of data) with databases and web services, typically through the use of telephone keypad inputs (touch-tone/DTMF). However, automated speech recognition (ASR) is quickly replacing the traditional telephone keypad inputs, as a more convenient and safer method, especially for mobile (wireless) applications. Once engaged, IVR systems then respond with pre-recorded or dynamically generated audio (text-to-speech/TTS) to further direct users on how to proceed.

Other channels are available these days: Interactive Voice and Video Response System and Interactive Text Response System, which function similar to IVRS. IVR systems can take care of most of the frequently asked questions that an organization receives (office hours, directions, phone directory, common tech support questions, etc.) and allow customer / citizen service representatives and tech support specialists to concentrate on the harder stuff. However, if all the menus available are not sufficient, the customer / citizen will have the option to speak to a live agent.

IVR /IVVR / ITR systems can be established on own premises or be cloud based. The systems are available to leverage on economies of scale achieved by other companies which is available as pay per use mode. The Service delivery platforms are available or can be developed using Open Source Technology Stack which will provide following features:

- Messaging
- Outbound Call
- Video
- Conferencing
- IVR
- Customer Care / CRM

Advantages	Disadvantages
- IVR systems have the advantage of making callers and customers feel like they're being attended to, even if it's just by a machine. If the question is simple then it's better to get a quick answer from a computerized operator than to wait ten minutes on hold before talking to a human being. - IVR Systems are always available. It serves as emergency helpdesk any time. - IVVR and ITR are enhancements of IVRS which are useful for people with hearing disabilities.	- One of the main disadvantages of the IVRS is the automated menus which may run for several levels. Citizens may tire of them - Voice prompts may be hard to understand. Also there is requirement of selecting the language of the voice. - Text – to –voice synthesis may result in inadequate translation. Requires complex scenarios to do the synthesis

Types of Services

- Emergency response system during disasters
- Teaching learning process – several topics can be selected
- Flight information check
- Agricultural information – product prices, fertilizers, advisory services for common issues
- Traffic information – traffic congestion, road information

Hand Sets and Platform

All kinds of mobile phones, land line phones

Security

The services provided are fairly informational, so security does not impact the establishment. The IVR software application should keep the audit log of all the calls.

T 3   Voice Messaging / Voice Mail

Voice messaging service enhances communication by delivering automated phone calls, within minutes, to any group, large or small, such as schools, congregations, sports teams, businesses and municipalities. A voice messaging service is the method in which one message is digitally recorded and sent to a list of phone numbers via telephone. The system sends the message out through thousands of channels and delivers the message to the phone numbers on your calling list. The computer dials the phone numbers and delivers the recorded message. Simple web based tools can be used to send voice messages to large audience.

In cases where it is difficult to establish IVR systems or contact centre with dedicated agents throughout the day, then is feasible to store the voice messages which can be attended to when the agents are available. Further when it is not possible to provide an answer instantly, the query can be recorded and forwarded to the domain expert. Once the domain expert provides feedback the caller can be contacted or updated into the voice mail box. The caller can access the voice mail any time.

Advantages	Disadvantages
• Mail box can be accessed from anywhere anytime • Possibility to send one message to multiple people at one go • Because voicemails may be accessed any time, citizens will likely be in a position to contact agency anytime they want	• Some voicemail systems are difficult and time-consuming to navigate. Callers must wade through a cumbersome phone tree to get to the proper extension • In case of query resolution requirement, citizen may not response on time
Types of Services	
• Voice message can be sent to rural people in local language regarding vegetable prices, food grain prices, cattle prices, farming techniques, fertilizers, etc. • Heath related information can be sent to citizens • Emergency and disaster information broadcast	
Handsets and Platform	
High end feature phones and smart phones (for changing the message)	
Security	
The security of the system is established at voice mail system level. Login credentials are required for changing the message in the voice mail box.	

T 4   Voice Recognition

Since speech is the most natural means of communication, linking a mobile phone to a VoiceXML gateway makes it possible to build voice enabled Government-to-Citizen (G2C) applications which are accessible ubiquitously by anyone, anytime. A voice gateway can successfully integrate the mobile telephone network with automatic speech recognition, text to speech synthesis for English and Dzongkha, and web navigation systems based on open standards and using open source software.
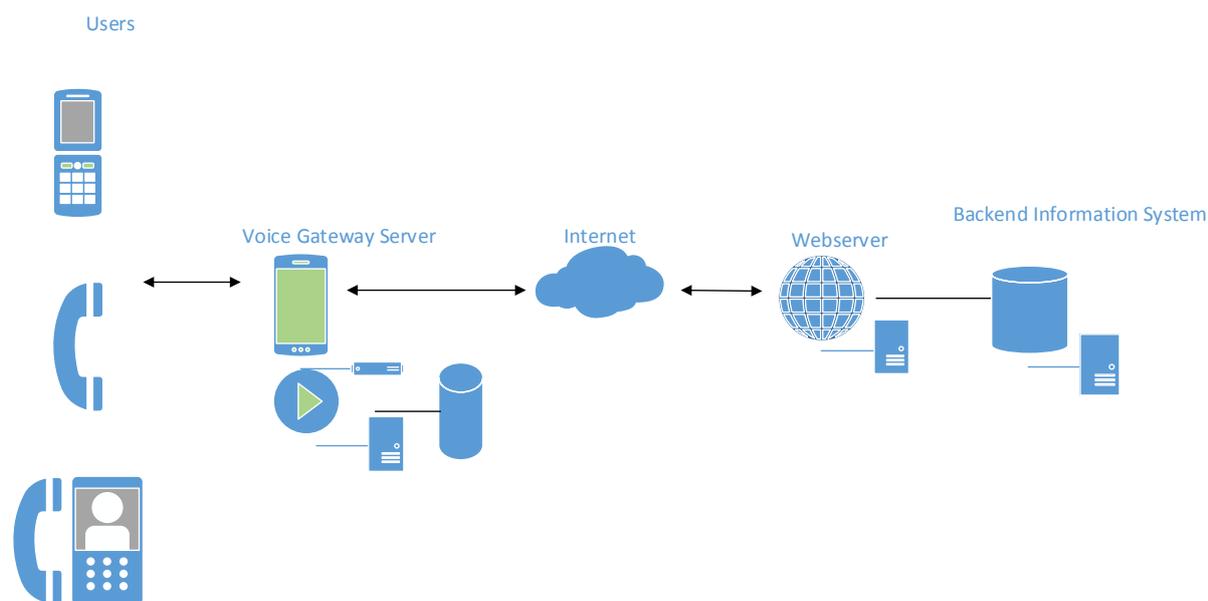
Voice recognition systems can overcome the issues of navigation of IVR Menu which may be cumbersome. People may not be able to understand the initial menu of language selection. Therefore based on the incoming voice service can be customized as per the recognized voice. Content selection can be based on the incoming voice to the extent of language of content.

Advantages	Disadvantages
• Helps users with physical disabilities • No need to navigate long menus in IVR systems / contact centres • User would get menu in language of his / her own	• The voice synthesis process may be a challenge due to lack of localization in Bhutan • Requirement to maintain large number of voice files which is to be used for matching • Telcos / service providing agency should have infrastructure for processing the voice and storing the sample voice
Types of Services	
• Health related information • Disaster reporting system • Agri-information • Language content for education • Payment services	
Handsets and Platform	
Any type of hand sets Land line phones	
Security	
The sample voice is secured within file systems at the storage and caller authentication and authorisation is based on the voice of the caller.	

T 5   Contact Centres

Predominantly contact centres are voice based solutions and provide the option to speak to a live agent at one point of time after a certain level of menu navigation. Contact centres are multi channel service delivery system with following channel options:

- o   Telephone
- o   Fax
- o   Email
- o   Live chat options

Contact centres usually form one stop information centres catering to several agencies. Information services are handled either through call routing or by the agents in the contact centres. Contact centre operations can be outsourced to operators as they have the infrastructure and as a result of economies of scale outsourcing becomes cost effective for service providing government agencies.

Advantages	Disadvantages
• Provides quick access to the information on several areas. • Helps to avoid making several calls or visit to several agencies • Call Centres have helped most organisations focus on growing their business. Call centres eliminate hiring heavy helpdesk operations and other menial tasks • Information available at one location and disseminated through single source	• Sometimes a long menu is irritating for citizens to navigate. There can be an option to directly contact an agent in the first level menu • As it is based on menu navigation, it may be hard for non-literate people to use. Voice recognition may be easier for people with a low level of literacy to use. • Collection of legitimate information is a challenge

Types of Services

- • Any type of informational services
- • Status check services
- • Ordering of products
- • Trouble shooting services
- • Disaster information services
- • Disaster reporting services

Handsets and Platform

Any type devices, soft phone, IM, emails

Security

For informational services security is not much of an issue. However, when the contact centres transform into call centres and start accessing enterprise and personal information, data security becomes a concern. The systems are developed based on access controls using passwords and biometric authentication. System access audit trails are maintained.

T 6   Expert Systems / Advisory Systems

Experts systems provide functionality for storing of knowledge in a central repository and can be accessed using web interface or other mobile channels like SMS, USSD or IVR systems. The domain experts can update the knowledge in the central repository. A typical expert system has a knowledge creation module, problem identification (query design) module, knowledge retrieval module, and information transfer channel module. Typically the expert systems are based on different layers viz. the knowledge based layer, the database layer, the reasoning engine for processing the incoming queries and process for output based on the query, server side application layer and client access layer (different channels).

Once the central repository is developed, different channels can be used to access the system and fetch knowledge.

Advantages	Disadvantages
• Not dependent on human beings which can ensure availability any time – anywhere access • Provides consistent answer for any question if asked repetitively • No limitation on the users asking questions whereas contact centre would have limited agents	• The disadvantages of using expert systems include that they usually only cover a narrow spectrum. Therefore expert systems can be used only for specific area • It is expensive to establish systems to cater to specific area. Also it requires continuous update of knowledge into the system which becomes recurring cost for the system owners • Expert system being based on menu and query resolution, the systems do not help resolve ambiguous issues
Types of Services	
• Farm advisory services • Health advisory services	
Handsets and Platform	
Smart phones with internet and basic feature phones can be used if SMS / USSD interface is developed for the expert system.	
Security	
Expert systems provide audit log of system access and is based on access control	

T 7   SIM Tool Kit Applications

The SIM Application Toolkit (STK) consists of a set of commands programmed into the SIM which define how the SIM should interact directly with the outside world and initiates commands independently of the handset and the network. This enables the SIM to build up an interactive exchange between a network application and the end user and access, or control access to, the network. The SIM also gives commands to the handset such as displaying menus and/or asking for user input.

- Operators can develop programs and embed in the SIM cards
- The application is available as phone menu once the SIM is inserted
- Easy to access as it will appear as phone menu which can be based on symbols

Advantages	Disadvantages
• STK enables higher levels of security through identity verification and encryption, which are necessary for secure electronic commerce • Everything runs on the SIM hence it is secure • Not dependent on the handset, hence exchange of handsets does not affect the application	• Updating STK applications and menus stored on the SIM can be difficult after the customer takes delivery of the SIM. To deliver updates, either the SIM must be returned and exchanged for a new one (which can be costly and inconvenient) or the application updates must be delivered over-the-air (OTA) • STK has essentially no support for multimedia, only basic pictures
Types of Services	
• Weather information menu • Agri-information menu • Disaster Reporting menu • M-money menu	
Handsets and Platform	
All kinds of handsets in any platform	
Security	
As the application is embedded in the SIM it is secure	

T 8   Cell Broadcasting

Cell Broadcast is designed for simultaneous delivery to multiple users in a specified area. A Cell Broadcast message is an unconfirmed push service, meaning that the originator of the message does not know who has received the message, allowing for services based on anonymity. Cell Broadcast can be used to send text messages depending on the location. The message can be used to send information about emergency situations or localized news, such as severe weather and other alarm messages, local weather forecasts and local traffic information.

Advantages	Disadvantages
• The advantage of this system is that it allows sending messages without having to know the phone numbers of the users in the region. Instead of sending a message to a specific known mobile phone you can send a text to all mobile phones in a specific zone. Mass communication, very fast, in case it really matters. • Regardless of network state (congested or not) CB is always available. As opposed to SMS, CB is part of the so-called 'low-level' signalling between handset and network • The CB is a mature system that has been around for over a decade and robust to support national public warning systems • Every handset including when roaming (example: foreign and national roaming) which is connected to the network receives the message • There is no cost for the subscriber to receive the message	• Cell Broadcast (CB) is a feature of the network, and some operators do not have the Cell Broadcast messaging function activated in their network yet. Every operator needs to have a CB Centre and CB functionality enabled in its network to use the service. • There are numerous handsets that do not have the capability to support the display of the cell broadcast message properly (see notes on handset support for CB) • The user can switch the receiving of Cell Broadcast messages option on or off. This means that the operator has no means of knowing who is receiving the message • Although sending of messages is free, there is an initial cost to the network operator for setting up a CB centre used to compose and deliver the messages onto the mobile network for delivery to the handsets • Enabling the CB functionality in a handset will lead to increased battery consumption

Types of Services
• Disaster information services • Emergency Services • Early Warning Services

Handsets and Platform
All GSM Handsets irrespective of platform

Security
The operator establishes the Cell Broadcast centre and messages are created and stored in the network

T 9   Community Radio

Community stations serve geographic communities and communities of interest. They broadcast content that is popular and relevant to a local, specific audience but is often overlooked by commercial or mass-media broadcasters. Two approaches are followed. One emphasizes service and community-mindedness, focusing on what the station can do for the community. The other stresses involvement and participation by the listener. A community radio is operated at Sherubtse College and there are plans to establish community radio at College of Science and Technology.

Advantages	Disadvantages
• The content is delivered in local language which becomes part of the community learning process. • Local participation allows for sharing of information among the local community • Linkages to regional, national and global level provides access to informational services for larger audience. • Marketing of local produce is possible among the community dwellers • Universal communication medium. People use radio one way or the other	• Local population may not be able to maintain the community radio stations • Content product and delivery may become challenging especially because majority of the community population has limited resources

Types of Services
• Local information centre • Agri-information • Community Advisory services • Market information services • Security Services

Handsets and Platforms
Any handset which has radio features

Security
Public content is provided to everyone else. Operator of the radio and information provider should be made accountable.

T 10   Smart Apps

One trend in mobile space is development and use of applications for smartphones. There is no end to the usage and purposes of the smartphone applications that can be downloaded; whether it is used for fun or for work, there are apps that can fit with all types of needs and wants. Which apps are available for any smartphone depends on the brand and model of phone; some apps are universal while others are specific to certain brands.

Enterprises and government agencies are embarking into mobility and are developing smart mobile applications for use within the organization or provided for download and usable by citizens to access some services.

Following different types of smart mobile applications are used by organizations:
- **Online Apps** – these apps access information directly from the content repository / backend system over the net. When it requires updates, the data is directly updates into the backend system
- **Offline Apps** – these apps have provision to store transactional data locally and can be updated into the backend systems by way of synchronization.

Smart phone applications are either platform specific (Android, iOS, Blackberry OS, Windows Phone, etc.) or cross platform (using HTML 5). Responsive web based applications are accessed using browsers in smartphones. The same systems are also accessed using browsers in PCs, Laptops and netbooks.

Advantages	Disadvantages
• The applications are highly intuitive and transactional in nature. • Usability of applications is high and form based information update is possible • HTML 5 is providing momentum towards consolidation and interoperability • Ubiquity of mobile phones and convergence of computing devices	• Requires smart phones • Fragmentation of platforms (Android, iOS, Blackberry, Windows Phone, etc) • Fragmentation within the platform with different releases and versions • Internet connection is required • Rural people would not be able to use • Internet connectivity in rural areas is not good as require by smart apps • Apps need to be downloaded and installed in the phone for every update and upgrade
Types of Services	
• G2E Services • G2B Services	
Handsets and Platforms	
Smart Phones, application platform should match the device platform	
Security	
Security implementation at application level	

T 11   Location Based Services / Location Tracking

Mobile phones are becoming more than just a way to call a friend, they are now allowing us to organize our lives, connect to the Internet, shop and take photos. Location Based Services is defined as the ability to locate a mobile user geographically and deliver services to the user based on his location. LBS has a variety of applications that can be offered to organizations such as government, emergency services, commercial and industrial organizations for example, breaking news, traffic information, tracking and way finding.

Operator Service Delivery Platform provides access to API which can be used to develop application for location based services.

Advantages	Disadvantages
• Location based services will allow tracking of individual connection	• Privacy concerns as information is collected and stored in the database of the operator
Types of Services	
• Security services • Emergency rescue services • Informational services (personalized) • Tracing people • Targeted communication – weather information, etc. • Location sensitive billing • Law enforcement services	
Handsets and Platforms	
All hand sets	
Security	
Strong privacy and security policy to be formulated and LBS can be used by predators	

T 12   USSD (Unstructured Supplementary Service Data)

Like SMS, USSD is a capability of all GSM phones. It enables users to send short commands from their mobile phone to the GSM network. USSD applications are accessed by calling a number that starts with the asterisk * or hash # characters, followed by three digits and another hash character. An example of USSD transaction would be dialling a short code such as *151# to access services such as balance enquiry, receive alerts, information services, voucher transactions and top-up prepay phones.

Unlike SMS, USSD (Phase 2) is session-based, allowing for text-based caller interactions ("text browsing"). SMS communication is asynchronous and persistent similar to email while USSD communication is synchronous and transient like Instant Messenger. USSD services are similar in concept to IVRS (Interactive Voice Response System) but access services using the keypad instead of voice. USSD services can be requested by the user (pull method) or broadcast by the network operator (push method). USSD allows users to interact with an automated system on a purely textual basis, but with the look and feel of SMS. The interactive nature of USSD allows an application to give a subscriber options in the form of menus with prompt/ answer sequences. The advantage of this

channel is its availability on all GSM-based handsets, the simplicity of the user interface, and the possibility to collect both numerical and alphanumerical input – which makes it more versatile than IVR for certain use cases such as address capture or entry of names. Response times for interactive USSD-based services are generally much quicker (i.e. 1-2 seconds) than those experienced with SMS.

USSD services have been widely adopted around the world (primarily in Europe, Middle East, Africa and Asia Pacific and Caribbean regions) by GSM-based mobile carriers, giving their prepaid and postpaid subscribers free and simple access to mobile services such as settings, rate information, call forwarding, and service status, as well as value-added services such as airtime top-up and call-back requests. Third party content such as weather forecasts, traffic, travel information, news, and directory services can also be offered to subscribers on a GSM network.

Advantages	Disadvantages
- Low cost - Real time - Fast and responsive - Interactive navigation - Consumer driven - Can be used as payment channel - Automated response - Possibility of mass usage - The biggest advantage of USSD is the fact that there is no billing mechanism associated with USSD, and therefore, USSD services are free for the user	- Little in the way of aesthetics - Messages cannot be stored or forwarded - USSD codes aren't as memorable as other Common Short Codes (CSC) - Not always reliable due to session-based timeouts - USSD is impossible for a service developer to implement independently of the operator. The access to USSD platform, and the use of one specific code for the service, have to be dealt with the network operator - Due to the strong ties between USSD and network operators is the limited scope of one USSD service that can be associated with only one network operator
Types of Services	
- Query based informational services - Service application - Renewal of existing documents - Payment channel - Status check services	
Handsets and Platforms	
All GSM handsets	
Security	
- Validate all trusted (local data storage or server data storage) and not trusted (invalid user inputs e.g., special characters) inputs in the application. - Secure data storage on local handheld devices - Implement proper session management in the application - Implement a strong encryption mechanism to store sensitive data - Employ response and request messages encryption - Implement a proper message authentication mechanism to validate that requests/responses are generated through authenticated users	

T 13   WAP (Wireless Application Protocol)

The way in which mobile wireless devices are used differs dramatically from the way we use PCs. On a PC we may spend hours constantly connected to the Web hunting for information at work or playing complex, immersive games at home. On a wireless device, we tend to be away from home and "online" for relatively brief and unpredictable periods of time. WAP defines an alternative to the Web for content delivery networks. The WAP model is optimized for the following constraints that are very different from the constraints found on today's Web:

- Mobile phones have smaller displays and have different support level for graphics
- The input device is limited keypad only
- Less memory and processing power
- Unstable connectivity
- Limited bandwidth of wireless network

When we connect to a wireless network and request access to a Web site that supports WAP, our mobile phone sends the request via radio waves to the nearest cell, where it is routed through the Internet to a gateway server. The gateway server translates the request into the Web's standard HTTP format and sends it to the Web site.

Advantages	Disadvantages
• All the operators and manufacturers support WAP • WAP language supports positioning and personalization moving towards location based services • WAP languages are optimized for devices with small display and low processing power • Implementation near to the Internet model • Multiplatform functionality (little change is needed to run on any web site since XML is used)	• WAP application development should consider the limitation in network challenges and device challenges • Low speeds, security, and very small user interface • Business model is expensive • Forms are hard to design

Types of Services
• Intelligent transport services • Traffic management • SMS Push Services

Handsets and Platforms
Any handset manufactured after 2001

T 14   Mobile Services Delivery Gateway (MSDG)

MSDG is proposed as the core infrastructure for enabling the availability of public services through mobile devices. MSDG incorporates various channels, such as voice, text (e-mail and SMS), GPRS, USSD, SIM Toolkit (STK), Cell Broadcast (CBC), and IVRS so as to ensure that all users are able to access and use the mobile based services. The Gateway will also consist of smart app store for those 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 and implemented using open standards so that addition of new services and flows will be easy in future.

The purpose of setting up the MSDG is to provide a one-stop ecosystem for enabling the delivery of various electronic government services through mobile devices in an efficient manner with minimum effort for the participating Government Departments and Agencies. MSDG will also help in enhancing the interoperability of mobile-based services among various Government Departments.

The MSDG will be based on Open Standards to ensure interoperability and information exchange using standard protocols (HTTP, SMPP, and Web Services) with agency backend systems and telco networks. MSDG will have configuration and activation tools to configure channels for services. Another configuration management tool will allow addition of services and related configuration of services to existing channels. These tools will generate appropriate XML based configuration files, which will be used for resolution and establishment of connections with backend systems, allowing any backend system to provide information to the MSDG channels on demand, and to update the backend systems.

The MSDG will be able to generate usage statistics for different channels and services, and provide metered access to the agencies, to enable usage fees to be charged if desired at some stage.

Service delivery channels and MSDG core components will be developed based on the following mobile application development principles:

- Cross platform and cross handsets compatibility

- The channel apps should be multi-tenant apps, whereby multiple services can be configured for a channel

- Cross compilation of the apps before being provisioned through the MSDG

- The MSDG should provide specific commands / libraries for developers of service channels

- The MSDG should be able to verify the security based on the six layers below; guidelines and benchmarks will have to be developed:

    o   Authentication and authorization of mobile users

    o   Data at rest on the mobiles

    o   Application Code Security

    o   Data in motion over the network

    o   Data in mobile backend systems / MBaaS (Mobile Backend as a Service) / Data centres

    o   Application lifecycle management stages

- The MSDG and all the service channels will be developed using Java and PHP languages on MySQL Database.

Mobile service delivery in Bhutan

Advantages	Disadvantages
• Single integrated system incorporating several channels. This will create an ecosystem for mobile service delivery channel • Open Standard based system which will provide flexibility in 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 • Expert systems • 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

T 15   Useful Open Source Packages

Channel	Open Source Product	Description
USSD Gateway	TelScale USSD Gateway from Mobicents	TelScale USSD Gateway is a robust and carrier proven Open Source USSD Gateway built on a modern extensible middleware platform. TelScale USSD can be adapted to the needs of telecom service providers of different sizes in any country. TelScale USSD enables operators to rapidly create and deliver new value-added, dialogue-based services by providing an intermediary platform that links content providers to end users and provides subscribers with high-speed interactive access to a wide range of content.

TelScale USSD Gateway makes use of HTTP and SMPP protocol between gateway and Value Added Service Modules or any enterprise applications. It can be configured to serve any short codes and generates CDR for every transaction, including the response of users to menu passed allowing for 3rd party application to mine the data asynchronously. Gateway leverages enterprise system database to persist the CDR's.

The TelScale USSD Gateway receives USSD requests from subscriber handset/device via GSM Signalling network, these requests are translated to HTTP or SMPP depending on the rules set by the user and then routed to corresponding Value Added Service (VAS) or 3rd party application.

The TelScale USSD Gateway supports implementation of HTTP standards and acts as HTTP Client invoking (HTTP POST) the HTTP Application deployed on Enterprise Application Server. The HTTP Request carries XML payload with USSD specific information. |
| SMS and WAP Gateway | Kannel SMS and WAP Gateway

PlaySMS | Kannel is an advanced open-source SMS (Short Messaging Service) and WAP (Wireless Application Protocol) gateway.

PlaySMS is a flexible Web-based Mobile Portal System that it can be made to fit to various services such as an SMS gateway, personal messaging systems, corporate and group communication tools. |
| Cloud Based Communication Platform | RestComm from Mobicents | RestComm is a next generation Cloud Communications Platform to rapidly build voice and text messaging applications, using existing web development skills. The platform allows creation of IVR solutions, Conference Solutions, etc. |
| VoiceXML | | Voice XML (VXML) – voice based applications can be developed and deployed in the same way that html is for web applications using VoiceXML. Voicexml documents are interpreted by a voice browser, which allow people to access the web using speech synthesis, pre-recorded audio, and speech recognition and can be supplemented by keypads and small displays. |

Channel	Open Source Product	Description
Asterisk	Digium	Asterisk is an open source framework for building communications applications. Asterisk turns an ordinary computer into a communications server. Asterisk powers IP PBX systems, VoIP gateways, conference servers and other custom solutions. It is used by small businesses, large businesses, call centres, carriers and government agencies, worldwide. Asterisk's standard voicemail components make it trivial to assemble a world class messaging platform. With multiple message store options and support for multiple integration techniques, replacing an aging enterprise voicemail system with an Asterisk server is simple. Asterisk is a powerful tool for building call centre systems and solutions. With support for call queues, IVRs, outbound dialling, recording, live monitoring and reporting, Asterisk includes virtually everything that is needed to create a working call centre Asterisk includes a wealth of functions that make it a powerful IVR platform: audio playback and recording, digit collection, database and web service access, calendar integration, and optional speech recognition and synthesis. IVR applications can be build using the Dialplan language or through the Asterisk Gateway Interface and can integrate with virtually any external system.
MMS Gateway	Mbuni	Mbuni is a fully-fledged Free/Open Source Multimedia Messaging Service (MMS) gateway. It includes both core network MMS switching (i.e. MMSC) capabilities as well as messaging gateway (i.e. MMSC infrastructure integration) features, and is suitable for operators and MMS VAS providers.
SMS Banking	Cyclos	SMS banking module has proved to be a real breakthrough for branchless banking. Historically SMS messaging was not considered as a serious candidate for banking services, but with the improvements of technologies over the last years, like encryption and faster delivery times, many banks have adopted SMS messaging for mobile banking services. The structure of the SMS module is very flexible and can be deployed in different ways, according to the project requirements. For example, it could run as a standalone service on a laptop, connected to a mobile phone that serves as SMS gateway. Or it could be deployed in an enterprise environment with the objective to offer high service availability and be able to process very large volumes of concurrent users.

Mobile service delivery in Bhutan

Channel	Open Source Product	Description

Mobile Banking	Cyclos	The mobile banking system from Cyclos has following features:
		
		• Sign-up via mobile
		
		• Payment to other users or administrations
		
		• Payment request (two-way payment)
		
		• Retrieve account information / browse through transaction history
		
		• Info texts (texts managed in database can be retrieved by mobile)
		
		• Notifications & alerts (personal alerts and general alerts & notifications)
		
		• Mailings (from administration and agents)
		
		• Independent of bank and telecom provider
		
		• Optional One Time Password (OTP) for all commands
		
		• Custom operations (programming interface that allows adding new operations)
		
		• Following Channels of Mobile Banking are supported
		    o SMS Banking
		    o Smartphone App
		    o IVR
		    o USSD Module

Mobile service delivery in Bhutan

T 16 Indicative costs

Channel	System / Application Cost (USD)	Infrastructure Cost (USD)	Capacity Development (Agency) (USD)	Recurring Cost
IVR	20,000	20,000	5,000	Connectivity Cost
SMS Gateway	12,000	15,000	7,000	SMS Cost and Connectivity Cost
MMS Gateway	20,000	20,000	7,000	MMS Cost and Connectivity Cost
USSD Gateway	80,000	120,000	20,000	SMS Cost and Connectivity Cost
Voice Messaging	15,000	20,000	10,000	Storage Cost as per data growth and Connectivity Cost
SIM ToolKit	USD 20 per app per SIM			
Community Radio		10,000	1,000	Operator Cost
Contact Centres (10 Agents)	10,000	50,000	20,000	Connectivity Cost
Expert Systems (cost increases with complexity)	50,000	30,000	15,000	Connectivity Cost and Knowledge base update cost
WAP	10,000	40,000	10,000	
Location Based Services	Licence cost for APIs of Service Delivery Platform		50,000 (Operators)	
MSDG	800,000	700,000	50,000	Cost as per the service channel included
Mobile Payment (channel applications and Switch – excludes mobile operator costs)	500,000	400,000	100,000	

Notes on indicative costs

- Infrastructure Costs are derived from the cost of hardware equipment in local market and basic premise network in the operation centre.
- System / Application Costs are derived based on features in the systems FPA technique on initial requirements.
- For SMS Gateway and USSD Gateway, the costs are derived from implementation instances in Bhutan.
- It is assumed that open source packages will be used wherever appropriate.

The two last items in the table (MSDG and Mobile Payment) are enablers for all the rest, and only one of each is projected. Earlier items in the table are considered as decentralised set-ups and costed on a per set-up basis.

T 17   MSDG channel addition activities

#	Stage	Activities Description
1	Identify Services	Identification of services should prepare list of services, agencies providing the services, the preceding services and the follow up services.
		Study the service processes, carry out process re-engineering if required, study the backoffice systems for the services and identify modification requirement on backoffice system. The target audience for the service consumption and the data transfer requirement as part of service delivery should be studied as well.
		Collaborating agencies will be identified and proper task assignment between mobile system, online system and human being be completed.
2	Identify Channels	Based on the outcome of service identification and related assessment, identify the mobile channel. The channel identification is dependent on the complexity of the service processes, the target service consumers and technology status of the consumers and the assumption that the agency has internal back office systems.
3	Determine Capacity	Based on services identified, agencies involved and target consumers, capacity of each channel need to be determined. Channel capacity would enable determination of cost of service.
		Other requirements like shortcodes, and bandwidth requirement, will have to be negotiated with the operators or regulator.
		Institutional protocols will be established to facilitate information sharing among agencies and cost sharing agreement will be executed.
		Any upgrade in infrastructure will be identified and planned for infrastructure upgrade.
4	Design Solution	With processes optimized, back office systems prepared for mobile access, solution for each channel will be designed.
		The designed solution will consist of details with regard to integration of the channel with the Gateway and integration with backend system of the service providing agencies. Appropriate MIS will be added for the new service.
		Mechanism for data sharing will be designed as part of the solution.
5	Assess Packages	Based on the determined requirement and solution design, assess packages available in the market. Both proprietary solutions and open source solutions can be assessed.
		Select the package, determine the gaps between design and the product. Customization requirement will be studied and customization plan will be prepared.
		Cost benefit analysis of customization vs new product development should be done and appropriate option be selected.
6	Develop Integration Interface / Product	Once decision is made on customization vs product development, detailed plan will be prepared for development.
		If any package is to be used, customization will be done and integration interface will be developed. If bespoke development is chosen system development should commence.

#	Stage	Activities Description
7	Setup Testing Platform	As the new service will be incorporated with existing operational Gateway, testing of new channel cannot be done with product Gateway. Hence, a testing platform with limited capacity will have to be established. The testing setup should have all the provisions available in the production setup.
8	Solution Testing	The solution for new channel will be tested in the testing platform. The testing platform should have all the connectivity required for operations of the channel.
9	Production	Once the channel is satisfactorily tested, it will be integrated with the production setup of the MSDG and subsequently rolled out for use.

Annex G   M-service possibilities for existing or planned G2C services

This annex lists in agency order the same information that is listed in the main report (section 16.2) in order of implementation timing.

Agency	Services	Possible Mobile Solution	Y1	Y2	Y3	Y4	Y5
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			
	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			
Department of Protocol	Issuance of Passport	Application for passport after establishment of People Data Hub. Provide Application ID.			x		
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	
	Pest Reporting Service	USSD / Voice based pest reporting. SMS / Voice / Video based alert system.				x	x
	Soil Service	Voice / SMS based advisory services on soil					x
	Supply Seed Seedling Fertilizer Service	USSD based Seed, Seedling and Fertilizer requisition and shipment alert		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

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Agency	Services	Possible Mobile Solution	Y1	Y2	Y3	Y4	Y5
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 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			
Department of Small and Cottage Industry	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			
	Revoke Licence	licence revoke information to the owner through SMS	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		
	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	
	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
	Cancellation of Retail Trade licence	Application for cancellation of Retail trade licence. Cancellation status SMS. 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	
	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

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Agency	Services	Possible Mobile Solution	Y1	Y2	Y3	Y4	Y5
	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
Department of Industry	Duplicate Licence	USSD / SMS based channel to apply for duplicate licence	x		x	x	
	Change of Licence	USSD / SMS based channel to apply for change licence	x			x	
	Company Name Search	USSD menu (with option to select sectors) for searching company names	x				
	Company Name Reservation	SMS based / Voice recording based company name reservation	x		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	
Drug Regulatory Authority	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	
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			
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

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Agency	Services	Possible Mobile Solution	Y1	Y2	Y3	Y4	Y5
Bhutan Council of Examination and Assessment	Publishing class X and XII examination Results	Pull based result view system using SMS and short code	x				
	Clerical Re-check of papers	USSD Menu Based system for application for paper re-check			x	x	
Department of Adult and Higher Education	Payment of scholarship fees/ stipend	mPayment					x
	Reimbursement of fees	mPayment					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			
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	Online registration of job seeker and posting profiles	Smart App / WAP Gateway				x	x
	Issuance of work permit	Smart App / WAP Gateway				x	x
	Renewal of work permit	Renewal application using existing work permit (Simple SMS / USSD menu options			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		
	City Library	SMS Catalogue		x			
Bhutan Standards Bureau	Publishing of Bhutan Standard Rates	USSD Based Rates query system / smart app for Bhutan Standard Rates			x	x	
	Management of monthly rental remittance	Smart App					x

Annex H   Possible new m-services listed by agency

This annex contains the same information, listed in agency order, as appears in the main report (section 16.3) listed in order of implementation timing.

Agency	Services	Possible Mobile Solution	Y1	Y2	Y3	Y4	Y5
Bhutan Post	Pension Distribution	Mobile Payment, USSD based solution			x		
	Tracking services for parcels and registered items	SMS based status query	x				
	Ticketing Services	SMS based ticketing and payment		x			
	Insurance Agent Services	Smart App				x	
	Banking Agent (BDBL) Services	Smart App				x	
Bhutan InfoComm and Media Authority	Application for renewal of more than 15 licences	Application for renewal using SMS channel		x			
Royal Monetary Authority	Exchange rates fetching	SMS based query		x			
Ministry of Education	Information on weather conditions to teachers, students and parents	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				
Department of Agricultural Marketing and Cooperatives	Contact number list for agriculture product dealers in communities	IVR			x		
	Registration of contact number of a local dealer of agriculture products	IVR			x		
Department of Local Governance	Local information in the form of Voice message or video message	Gateway push voice / video message	x	x			
Ministry of Health	Data collection during surveys	Smart App / IVR Setup with few questions as IVR menu					x
	Information on health status (individual and mass), disease outbreaks, parasite and disease prevention information, etc.	SMS Gateway (Target SMS based information in backend systems and SMS push from Gateway)		x	x		
Jigme Dorji Wangchuck National Referral Hospital	Bed availability status and time communication for patients	SMS push based on status in HIS			x		
	Periodic check up reminders (dialysis, etc,)	SMS push based on status in HIS			x		

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Agency	Services	Possible Mobile Solution	Y1	Y2	Y3	Y4	Y5
	Reminders for immunization schedules	SMS push based on status in HIS			x		
	Information on availability of particular physician during Offhour clinic	SMS query		x			
	Off hour clinic appointment	SMS / USSD based appointment schedule		x			
	Form II Drug Order status check	SMS based query			x		
Department of Public Health	Test result fetching from Public Health Lab	SMS based Query			x	x	
Road Safety and Transport Authority/Department of Roads	Road Block Reporting from block site	SMS / Contact Centre	x				
	Road Block Information check	SMS Based Query	x				
	Road Block clearance information	Cell Broadcast	x				
Road Safety and Transport Authority / Traffic Police	Accident Reporting services from accident site	SMS / Contact Centre		x			
	Road Block information update services (Road expansion)	SMS / Contact Centre		x			
	Road Block status check along any routes	SMS / Contact Centre	x	x			
	Traffic congestion information	IVR / SMS / Community Radio		x			
Road Safety and Transport Authority / Bus Operators	Public Transport Services • Bus Information with drivers' contact details • mTicketing • Payment for tickets	SMS USSD / Smart App/ mPayment				x	x
Royal Bhutan Police	Crime reporting Services	Contact Centre		x	x		
	General Information dissemination on events and issues	Cell Broadcast		x			
Department of Disaster Management	Initial Disaster Reporting	Voice Recording / Contact Centre		x			
	Disaster Reporting by Disaster Focal Person	Voice Recording / Smart App			x	x	
	Health Hazards, Local Security, early warning	Cell Broadcast (SMS, MMS)				x	x
Department of Housing Services	Public Consultation meeting announcements	Cell Broadcast (SMS, MMS)			x		

Mobile service delivery in Bhutan

Agency	Services	Possible Mobile Solution	Y1	Y2	Y3	Y4	Y5
Construction Development Board	Contractor / Architect Registration and renewal application	SMS		x			
	Registration validity reminder / status check	SMS		x			
Thimphu Thromde	Parking Fee Payment	Mobile Payment				x	x
Department of HydroMet Services	Early warning and Weather Information services	SMS, Cell Broadcast	x	x			
Department of Revenue and Customs	Tax Advisory services • HS Code Searching and applicable taxes • PIT filing reminders • Custom Advisory Services	SMS (Push and Pull) / USSD / Contact Centre Smart App		x	x		
	Tax Payer Registration and TPN assignment	SMS	x	x			
	PIT Filing and Payment of PIT	Smart App, mPayment				x	x
National Land Commission	Land Information Fetching: • Land Ownership information • Mortgage information • Thram No., Plot No. and related information fetching • Land Transaction initiation	SMS (Pull) / USSD / Contact Centre		x	x		
Ministry of Economic Affairs	Petroleum Price Information push and pull	SMS (Push and Pull)	x	x			
Bhutanese Chamber of Commerce & Industry	Informational services / Campaign / event marketing	SMS (Push)			x	x	
Dzongkha Development Commission	Learn Dzongkha in Mobile	Smart App / Expert System				x	x
Any Agency / Dratshang Lenshog	Bhutanese Calendar	Smart App			x		
	Bhutanese Astrology Services	SMS (Push and Pull) / USSD / Online Smart App				x	x

Annex I   Legal provisions

1   Relevant extracts from existing legislative documents

- ### Constitution: Article 7: Fundamental Rights:

19. A person shall not be subjected to arbitrary or unlawful interference with his or her privacy, family, home or correspondence nor to unlawful attacks on the person's honour and reputation.

- ### Bhutan Information, Communications and Media Act 2006:

127. Each Governmental agency shall: (j) take appropriate actions, including conducting privacy impact assessments, to ensure sufficient controls are adopted to protect the privacy of personal information as it implements electronic Government programmes.

129. The High Court/Supreme Court of Bhutan may:

(a) subject to the security interests of the country, establish a website containing specified information on Court house locations, rules, and access to specified Court information; and

(b) make some documents, which it considers appropriate, that have been filed electronically with such Court publicly available online, but keeping in mind the necessary privacy and security requirements. However, each Court may submit a notification to the Minister to defer compliance with such requirements, under specified conditions.

ONLINE PRIVACY

157. (1) ICT facility providers, ICT service providers and vendors shall respect and protect the privacy of personal information they receive from their users or consumers.

(2) ICT facility providers, ICT service providers and vendors shall make their privacy policy easily accessible from their website and whenever personal information is either requested or collected. Information that must be disclosed as part of the privacy policy includes the following:

(a) the specific kinds and sources of information being received, collected and maintained online, the purposes for which the information is collected, how that information is being used, and to whom the information may be disclosed;

(b) the choices available to users or consumers regarding the collection, use and disclosure of their personal information, how they may exercise and change these choices, and the implications of such choices;

(c) how users or consumers may review and, when necessary, correct or remove such information; and

(d) when the website uses "cookies," how and why they are used and the consequences, if any, of user's or consumer's refusal to accept a cookie.

(3) ICT facility providers, ICT service providers and vendors shall limit their collection, use and disclosure of personal information to that which a reasonable person would consider appropriate in the circumstances.

(4) ICT facility providers, ICT service providers and vendors shall not require users or consumers to consent to the collection, use or disclosure of personal information beyond what is necessary to complete a transaction.

(5) ICT facility providers, ICT service providers and vendors shall not disclose personal information to affiliates or third parties for purposes other than the transactions unless specifically and expressly authorized by users or consumers in advance, through a clearly worded opt-in process.

(6) When ICT facility providers, ICT service providers and vendors transfer personal information to third parties, they shall remain responsible for the protection of that information. Accordingly, before any such transfer, the ICT facility providers, ICT service providers and vendors shall ensure, through contractual, legal or other means, that the third parties comply with the privacy provisions of Sections 157 to 161 of this chapter.

Security of Payment and Personal Information

158. (1) ICT facility providers, ICT service providers and vendors shall maintain effective controls to protect the integrity and confidentiality of payment and other personal information that users or consumers provide.

Security mechanisms shall be consistent with current global industry standards and appropriate to the type of information collected, maintained or transferred to third parties.

(2) ICT facility providers, ICT service providers and vendors shall ensure that third parties who are involved in transactions and have access to personal or payment information comply with Subsection (1).

2   Some other laws potentially needing review

1. Bhutan Telecommunications Act 1999

2. Contract Act of Bhutan 2013

3. Constitution of Bhutan 2008

4. Alternative Dispute Resolution Act 2013

5. Civil and Criminal Procedure Code of Bhutan 2001

6. Penal Code of Bhutan 2004

7. Election Act 2008

8. Commercial Sale of Goods Act 2001

9. Consumer Protection Act 2012

10. Copyright Act 2001

11. Financial Services Act 2011

12. Local Government Act 2009

13. Royal Monetary Authority Act 2010

Annex J   Relevant experience from elsewhere in the region

This annex was compiled especially for this project by Nayana Amatya of K-Hint. It consists of two parts:

- Descriptions of a few mobile applications from the Philippines, Bangladesh and India which seem to be of particular interest to Bhutan.

- A table giving brief details of many more mobile applications that are current in Nepal. Only a few of these are of particular interest to Bhutan, but the list as a whole illustrates the variety of services that can arise catering to different target markets, both urban and rural.

Philippines (M-Banking)

- The Philippines is one of the leading examples of successful implementations of m-banking and m-commerce.
- Refer to "The innovative use of mobile applications in the Philippines – lessons for Africa"
- The above report lists three main proponents to this success:
    - Government Policies that broke the monopoly of existing telecom provider opened the arena for many other players. Less stringent banking policies helped encourage usage of m-banking.
    - New Technologies that expanded the alternatives for users and brought innovative strategies for various providers.
    - New technologies also led to telecommunications services to go beyond just voice to other Value Added Services like SMS and other applications such as m-commerce.
- Brief background for the success
    - Rapid growth in mobile penetration. Mobile (pre-paid) considered cheaper in the long run and communication budget could be stretched longer with it. Landlines are subscription based with minimum monthly spends and installation charges making them virtually inaccessible to lower-income users.
    - Intensity of SMS use. SMS was free when it was first introduced. Approx. 6.5 SMS cost = 1 minute voice call. More people use SMS than voice calls. Even when fees introduces, pressure for lower costs have kept the charges to a minimum.
    - Local buying culture of "tingi" of incremental small purchases instead of wholesale. Prepaid cards in lower denominations. Sharing of phone credit as low as P2 ($0.05) allowed from one subscriber to another. People liked this.
- Where this could be replicated (Opportunity)
    - Similar market conditions as the Philippines. (small incremental buying cultures. Local shops = micro-retailers of phone credit)
    - Requires existing SMS habit. Similar SMS to voice cost ratio.
        - Similar m-commerce intensity may be difficult to replicate. SMS culture should first be encouraged and fostered to build on.
- Barriers
    - Need for proper legal identification (for banking) to deposit and withdraw cash into and from m-currency form. Banking regulations especially anti-laundering policies may be a barrier to m-banking. Less stringent policies should be introduced for lower volume transactions.
    - KYC (Know Your Customer) – Privacy issues. People may need to register their names to their phone numbers for proper identifications.
    - M-banking sustainability
        - Number of institutions, merchants and services willing to support / accept the m-currency determines the sustainability of m-banking.

Mobile service delivery in Bhutan

- Examples (Smart Money and G-Cash)

Table 11. Comparison of the Elements and Benefits of Cash, G-Cash and Smart Money

Criteria	Cash	G-Cash	Smart Money
Customer sign-up	Not needed	– Registration is required to activate account, over the air activation is possible – No charge for initial registration – Initial cash deposit not needed but necessary before transactions can be made	– go to Smart center to sign-up for the service – may involve SIM change – initial cash deposit not required, but cash balance needed to be able to make purchases and withdrawals – optional debt card for P220
Identification	n/a	– formal/acceptable IDs required for cash deposits and withdrawals as per Central Bank Policy	– formal/acceptable IDs required for cash deposits and withdrawals as per Central Bank Policy
Current Usage	100%	– Limited – Estimated 30% Globe penetration among rural poor – Faster growth in user base – 1.3M registered G-cash users; approx. PHP3m/daily – 400 accredited partners, 3,000+ outlets; also available in 16 countries	– Limited – Estimated 70% Smart penetration among rural poor – Almost flat growth in user base – 3million registered Smart Money subscribers

Criteria	Cash	G-Cash	Smart Money
Liquidity	100 % liquid – use it anywhere	– Low – need to go to Globe and other merchants to use it or to convert it to cash (Cash-out) – Use it for P2P (person-to-person) transactions	– Moderate – use it Megalink and ExpressNet ATMs – Use it at any MasterCard terminal – Use it for P2P transactions
Security	As secure as your wallet	– Uses an m-PIN in the message body of an SMS message. It is in clear view. – m-PIN needs to be erased from the mobile phone to ensure that a lost/snatched mobile phone does not have the m-PIN in the SMS messages archive	– Uses an STK menu where the m-PIN is never in clear view – Uses encryption when sending transaction commands

Adopted from Soriano and Barbin, 2007; and updated from Wishart, 2006.

Bangladesh (M-Education)

- BBC Media Action launched BBC Janala (meaning "window" in Bangla) in 2009.
- Part of English in Action initiative funded by UK Department for International Development.
- Turning mobile phones into low-cost educational device.
- Offering three-minute audio lessons (at 50paisa – 0.004 GBP /minute) and SMS quizzes.
- Lessons and quizzes can also be accessed through website (bbcjanall.com)
- Television shows complement the audio lessons
    - Weekly drama "Bishaash" (Believe) ran 24 episodes and reached an audience of 20 million.
    - Interactive game show "BBC Janala Mojay Mojay Shekha" (Learning with Fun) was also popular.
- Within 12 weeks of its launch, 1 million mobile lessons had been accessed, rising to over 10 million by August 2012
- http://www.bbc.co.uk/mediaaction/where_we_work/asia/bangladesh/bbcjanala.html
- http://www.bbc.co.uk/mediaaction/where_we_work/asia/bangladesh/bbcjanala_slideshow

India – Bihar (mHealth)

- Ananya Mobile Academy is an IVR based Training course.
- Anytime, anywhere, delivered via mobile phones
- Once registered, Frontline Health Workers (FLWs) can access the course via shortcode.
- Course is 190 minutes long.
- Refreshes knowledge of life saving health behaviour and enhances interpersonal communication skills.
- Low cost. Complete cost around $1.50 (INR 100)
- FLWs with pass marks get a certificate after completing course.
- Accessible across all major operators
- 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

India (M-Agriculture)

- Reuters Market Lite (RML) is an award winning mobile based information service that provides localized and customized information to farmers.
- SMS based service. Local Language.
- Farmers get customized information on weather forecasts, crop prices, agricultural news etc.
- Helps them plan better, minimize risks and maximize profit.
- In 8 local languages
- Available on all telecom operators and handsets
- As per farmer's individual preferences
- Providing local content
- Over the counter at low subscription cost
- All (content) as per the stage of the crop cycle
- The content provided by RML is generated by a team which has experts with in-depth knowledge of the subject along with an adept and specialized content management team which manages external data.

- The current revenue model for RML's service is subscription and the service is available through major mobile networks.

1. *Perceived benefits of the RML service:*

Benefits of RML service

■ # of claims (total 381)

Benefit	# of claims
Improved crop/product quality	7
No measured benefit yet	25
Knowledge through agricultural news	25
Greater market knowledge/understanding	54
Weather risk managed	66
Increased profit (real and expected)	99
Improved general knowledge of crop, cultivation	105
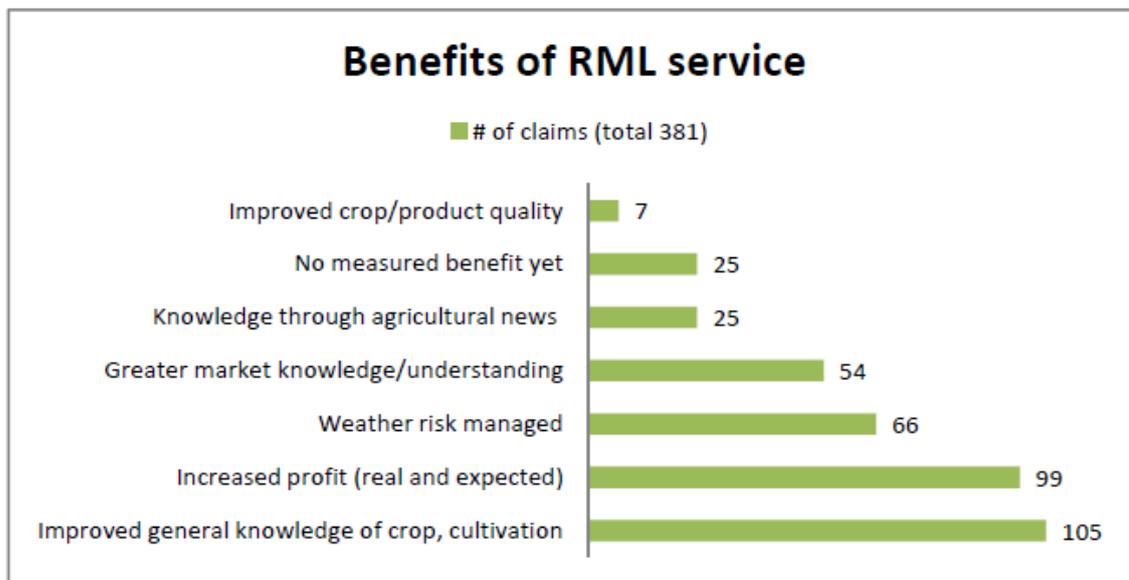
Source: "Voice of customers" feedback, July 2009

[8] ICRIER report, "India: the impact of mobile phones", January 2009

Some mobile phone applications from Nepal

Name, reference URL, service type and setting	Description
SLC Results on SMS http://sparrowsms.com/ results/slc-results-nepal , http://slc.ntc.net.np/ Government Service SMS Urban and rural	For a number of years, SLC results were published on the government newspaper – Gorkhapatra. The result was long lines in front of the Gorkhapatra offices from early in the morning, going through thousands of symbol numbers to figure out if you had passed, marksheets obtained weeks and months after the first release of results and so forth. Now, it has become simpler. SLC results for this year came out just last week. Some VAS providers like SparrowSMS and telecom operators like Nepal Telecom are offering SMS services that allow users to find out the results by sending one SMS. For SparrowSMS, type SLC <symbol> and send to 5001. For NT, type SLC <symbol> and send to 1400 to get the results. The same service is also available for +2 board exam results and some of Tribhuvan University exams as well.
Nepal Police Traffic SMS Services http://www.myrepublica .com/portal/index.php?a ction=news_details&ne ws_id=55274 , http://www.nepalpolice. gov.np/police-sms- services.html Government Service SMS Urban	Nepal Police offers a range of SMS services to the public; from information about traffic updates to reporting lost vehicles and reporting suspect taxi tampering, and has recently started another SMS service for users to get the actual taxi rates according to the route they are travelling in.
Vehicle Tax Information on SMS http://dotm.gov.np/en/ news/26 Government Services SMS Urban	Department of Transport Management allows vehicle owners to keep track of their vehicle tax through SMS.
Bank of Asia's iTouch Mobile http://www.boanepal.co m/products- services/services/mobile -banking/ Financial /Banking Urban	
Nepal SBI Bank Limited's Mobile Sakha http://nepalsbi.com.np/ content/mobile- sakha.cfm Financial /Banking Smartphone Urban	

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Name, reference URL, service type and setting	Description
Nepal Investment Bank Limited mBanking http://www.nibl.com.np/index.php?option=com_content&view=article&id=115&Itemid=114 Financial /Banking Smartphone/SMS Urban	Nepal Investment Bank Limited offers its SMS banking facilities through a Banking app available for most smartphones. Currently, bank is working to bring all unbanked and underbanked people into financial inclusion by introducing Mobile Banking. This will be used for general banking purpose, payment system, domestic as well as internal remittance including Visa Mobile Payment System (similar to Visa card, the mobile banking can make payments against purchase of any service or products), utility payments, e-commerce payments, interbank transfers/payments including Wallet concept. Coupon dispensing, loyalty program, redemption of loyalty programs are functionalities in pipelines.
Kumari Bank Mobile Cash http://www.kumaribank.com/Contents/what-is-kumari-mobile-cash-.html Financial /Banking Smartphone Urban	Kumari Bank offers SMS Banking as well as a Mobile Cash service to its account holders. Mobile Cash allows users to user their mobile phones as digital wallet and utilize cashless transactions with select merchants and utility bill payments.
Hello Paisa http://www.hellopaisa.com.np/	Hello Paisa service is not bank-specific and can be used with its many banking partners.
F1Soft FONEPAY and FONEBANK http://www.f1soft.com/products/fonebank-mobile-banking.cfm Financial /Banking Smartphone Urban	F1Soft International have developed the Mobile Application for transaction banking, like Mobile Virtual Wallet, Mobile Air Ticketing, Secure Mobile Banking Solution, Mobile Payment Gateway, etc. which are being used in many Banking and Financial Institutes along with Corporate Houses. Its products FONEBANK and FONEPAY power many of the mobile banking solutions offered by banks and financial institutes in Nepal.
eSewa https://esewa.com.np/home Financial /Banking Smartphone Urban	This service allows the user to create a digital wallet that can be accessed over the internet or via your phone. You can add funds through internet banking, mobile banking or eSewa Top-Up card. eSewa is powered by F1Soft's fonePay
AEC-FNCCI Market Price List on Telephone Voice Notice Board http://www.aec-fncci.org/viewlatestupdates/17 Agriculture IVR Rural	Agro Enterprise Centre (FNCCI) offers daily market price list from Telephone Voice Notice board for a couple of local markets. The main Kalimati market in Kathmandu was the only one available for some time. They have also started another notice board for Surkhet area recently. The Agro Enterprise Centre website offers more comprehensive market price bulletin to its registered members.
National Immunization Programme Measles Rubella Campaign 2068-69 http://nip.org.np/mrcampaign Health SMS Rural	With an aim to reduce illness and deaths caused by measles and rubella, the Ministry of Health and Population is conducting measles-rubella vaccination campaign in all the districts of Nepal. Health workers have been trained to send coverage data using Mobile SMS messages which is then aggregated in a central server and updated in this website www.nip.org.np in real time. As campaign will proceed throughout the country, data will be available for respective regions and districts simultaneously.

Mobile service delivery in Bhutan

Name, reference URL, service type and setting	Description
ICIMOD near real-time forest fire alert system http://www.nepalnews.com/archive/2013/apr/apr12/news09.php Disaster Management / Recovery SMS Rural	An operational remote sensing-based forest fire detection and monitoring system for Nepal is in operation in collaboration between ICIMOD and the Ministry of Forest and Soil Conservation (MoFSC) The system is also equipped with an automated alert system, which sends email and SMS notifications to subscribers, including District Forest Officers and focal persons of the Federation of Community Forestry Users in all 75 districts. The system is the first of its kind in the region, and ICIMOD is planning to implement similar systems in other countries. (ICIMOD is already working with Min of Agriculture in Bhutan to establish similar mechanism and an email based system is implemented – mobile is being discussed)
Weather report and forecast Voice Mail Service http://www.mfd.gov.np/ IVR Urban and rural	Meteorological Forecasting Division has started a voice mail service that users can dial to listen to the daily weather report and forecast for the next 24 hours. Currently, the system gives information for the country as a whole, sometimes differentiating between the different regions. Localization would be needed to gain popularity.
UK Visa Application tracking http://www.vfs-uk-np.com/additionalservice.html Urban	VFS Global offers UK Visa applicants SMS service to keep track of their visa applications via SMS. VFS Global manages visa application centres for the UK Border Agency in Nepal.
nLocate http://pivot.mobilenepal.net/idea/nlocate, http://www.http://nlocate.com/ Smartphone Urban	Mobile app providing location finding services (ATM, ambulance, college, embassy, cinema, coffee shop etc around your GPS location). Currently implemented for iOS, Android phones. Nlocate is also the winner of PivotNepal mobile app development competition.
NepalSutra http://www.nepalsutra.com/ Smartphone Urban	NepalSutra Travel App for Nepal is your personal travel companion as it provides addresses of places of interests on a location map as well as the location name in Nepali fonts so that you can point that to a taxi driver for easier communication. Available for Android and iOS phones.
Sparrow Digicard http://snowfinch.sparrowsms.com/digicard/ Urban	SMS based Digital Visiting Card
Nepal Load Shedding Schedule https://play.google.com/store/apps/details?id=com.cms.xml Smartphone Urban	Shows the updated load shedding schedule for Nepal. Before six month it was completely free, no advertisements were displayed. Now it uses Adsense for making money. (Android phones)
Batti Gayo https://itunes.apple.com/us/app/batti-gayo/id536189446?mt=8 Smartphone Urban	Almost similar to the above. Shows updated load shedding schedule. No payment options. Completely free. Also has torch option that turns the camera flash on if it exists on the phone. (Apple iOS based)

Mobile service delivery in Bhutan

Name, reference URL, service type and setting	Description
Nepali Patro https://play.google.com/store/apps/details?id=np.com.nepalipatro&hl=en Smartphone Urban	Nepali (Bikram Sambat) calendar app. Converts English date to Nepalese. Shows Nepalese festival days. Exchange rates. (Android)
Nepal Khabar https://play.google.com/store/apps/details?id=com.braindigit.nepal.khabar&hl=en http://pivot.mobilenepal.net/idea/nepalkhabar-news-leading-nepali-online-news-portals-one-app Smartphone Urban and rural	News app. Targeted mainly for Nepalese audience, the app brings popular online Nepalese news portals and BBC under one app. Sources for this app include Kantipur, BBC, Nagarik News, Himal Khabar, My Sansar, Karobar, HamraKura, Image Channel, My Republica, Nepali Times and Online Khabar. (Android)
Nepal Telecom Notice Board Service http://www.ntc.net.np/PSTN/pstn_vms_noticeBoard.php IVR Urban and rural	Supplementary service of PSTN VMS (Voice Mailbox Service) in which the mailbox can be used as a Notice Board by the subscriber. Suited for schools, colleges for emergency closure notices. Travel Agencies, airlines and film halls to keep their callers updated on recent information/updates. Government during emergency / disaster to get key information to people who still have access to telephones.
Self-Help http://www.vawhack.org/project/self-help Under development Urban and rural	Self-help is an android application that create awareness to the women on violence to the people in their locality and also gives information on how to tackle problems in worst case scenario. Third place in Violence Against Women Hackathon on June 16, 2013. World Bank will be working towards implementing these.

Annex K   More on mobile money

In July 2013, while this report was being drafted, there seemed to be news items and reports published on mobile money every few days. The box below reproduces just one of these which seemed especially relevant to Bhutan; others are identified in the bibliography (Annex L). The rest of this annex reproduces the existing mobile credit transfer and e-topup descriptions from B-Mobile and TashiCell websites.

Latest on Branchless Banking from Indonesia

The past six months have finally seen exciting regulatory change in Indonesia which may well break the deadlock around growth in both eMoney and Branchless Banking. In December 2012, new regulation was passed allowing full encashment of person to person (P2P) transfers on electronic wallets at agents. The Regulation on Funds Transfer also allows cash payment points to provide a cash-out service without requiring an individual funds transfer licence per agent. While wallet sizes remain relatively constrained, Mobile Network Operators (MNOs) are now moving aggressively to build agent networks and refocus efforts around their eWallet functionality.

In early May 2013, Bank Indonesia (BI) also released long-awaited Guidelines for Banks and Mobile Network Operators to outsource some banking operations to agents, known as "UPLK"s (Unit Perantara Layanan Keuangan) or Financial Intermediary Service Units. The guidelines are expected to pave the way for full regulations to be released by December 2013. Five banks and three mobile network operators will engage in pilots, kicking off late May to early July. A wide range of banks are also waiting to see what the final regulations include before launching initiatives of their own. Key provisions of the guidelines include:

a.   **requirement to implement in rural areas**, although some banks may attempt to push back on this in order to promote greater initial uptake;

b.   **invitations for bank-led, telco-led and hybrid (or jointly implemented) products**, although bank-led models appear to dominate. Pre-pilot, 95% of all eMoney transactions originate from banks for transportation and some retail payments through contactless cards;

c.   include the ability for outsourced agents to provide cash in and cash out services, but **still maintain full KYC requirements** related to any related bank account formation;

d.   require agents, but not agent network managers, to be **agent exclusive** to their partner bank/MNO during the pilot;

e.   allow the pilots to be conducted in a **maximum of two regions**, with a maximum of three kecamatan per region;

f.   be initiated between May and August 2013, subject to final BI approvals.

The limited nature of the pilots means that banks are not yet committing significant marketing funds or teams. Many banks expected to see loosening of KYC requirements, which were not included. The guidelines are simple and high level, without specific directives in terms of internal controls, etc., designed to provide an opportunity to understand the new channel as a first step to regulation. Only limited attempts at product adaptation have been attempted thus far, given short implementation time lines. More serious work can be expected after the full regulations are released. Hardware innovations will include use of Tablets and M-POS units, as well as card-less ATM.

Source: http://www.cgap.org/blog/latest-branchless-banking-indonesia?goback=%2Egde_3209639_member_257625742 (accessed on 14 July, 2013)

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Existing mobile credit transfer facilities offered in Bhutan

Bhutan Telecom (from http://www.bt.bt/?page_id=190)

ELOAD

eLOAD (electronic recharge) is a paper-less recharge facility. The eLOAD is environment friendly, customer friendly and risk free. It will enable the distributors, dealers and retailers to sell recharge talk-time directly from handset via SMS and also enable the customer to transfer his/her balance to another customer. This ensures our customer with the flexibility of recharging their account with any amount starting from as low as NU 5 and secure recharge transaction with SMS notification confirming the transaction to both the parties (sender & receiver).It can be used by our prepaid customers.

SUBSCRIBER TO SUBSCRIBER ELOAD TRANSFER

1. Using this facility, customers can transfer their balance to another customer.

2. The amount possible for such a transaction is from NU 5 to NU 500. A fee of NU 5 will be deducted for every transfer.

3. A Minimum balance of NU 10 is required in a customer's account to do a customer to customer eLOAD transaction.

4. One Day Validity will be given if the customer does not have existing validity from previous recharges.

5. Dial *170# or Call 123 to check the account and validity period after the transfer.

PROCEDURE FOR ELOAD SUBSCRIBER TO SUBSCRIBER TRANSFER

REGISTRATION PROCESS (Mandatory)

STEP 1: type Reg <SPACE> <mobile no> sent to 158

A confirmation mgs will come>> that generate password.

CHANGE PASSWORD

STEP 1: Dial *127# (for user menu)

STEP 2: select/enter/answer/press 2 [send]

STEP 3: Enter old password [password generated by system]

STEP 4: Enter new password [desirable password eg. 1324]

STEP 5: select/enter/answer/press 1 to confirm.

You will receive a confirmation mgs.

TRANSFER TO ANOTHER PREPAID NO.

STEP 1: Dial *127# (for user menu)

STEP 2: select/enter/answer/press 1 [send]

STEP 3: Enter MOBILE NO which you want to transfer

STEP 4: Enter AMOUNT [eg.10]

STEP 5: Enter your password [new password]

STEP 5: select/enter/answer/press 1 to confirm.

Both sender and receiver will receive a confirmation mgs.

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DISTRIBUTER TO DEALER TRANSFER

Step 1: Dial *130# (the user will get a menu)

Step 2: Select/enter 1 (Press reply/Answer, enter 1 and send)

Enter Mobile No/MSISDN (Press reply/Answer, enter Mobile no and send)

Enter Amount to be transferred (Press reply/Answer, enter amount and send)

Enter PIN (Press reply/Answer, enter PIN and send)

Enter 1 to confirm and send it. (Press reply/Answer, enter 1 and send)

The distributor and dealer both will get a confirmation SMS with a transaction ID.

HOW TO RECHARGE A SUBSCRIBER BY DISTRIBUTOR

Step 1: Dial *130# (the user will get a menu)

Step 2: Select/enter 3 (Press reply/answer, enter 3 and send)

Enter Mobile No (MSISDN)(Press reply/answer, enter Mobile No and send)

Enter Amount to be transferred (Press reply/answer, enter amount and send)

Enter PIN (Press reply/answer, enter PIN and send)

Enter 1 to confirm and send it. (Press reply/answer, enter 1 and send)

The distributor and dealer both will get a confirmation SMS with a transaction ID.

HOW TO RECHARGE A SUBSCRIBER BY DEALER

Step 1: Dial *130# (the user will get a menu)

Step 2: Select/enter 1 (Press reply/Answer, enter 1 and send)

Enter Mobile No/MSISDN (Press reply/Answer, enter Mobile no and send)

Enter Amount to be transferred (Press reply/Answer, enter amount and send)

Enter PIN (Press reply/answer, enter Reply and send)

Enter 1 to confirm and send it.(Press reply/Answer, enter 1 and send)

The distributor and dealer both will get a confirmation SMS with a transaction ID.

HOW TO CHECK BALANCE FOR A DISTRIBUTOR

Step 1: Dial *130# (the user will get a menu)

Step 2: Select/enter 2 (Press reply/answer, enter 2 and send)

The user will get the balance detail via SMS.

HOW TO CHECK BALANCE FOR A DEALER

Step 1: Dial *130# (the user will get a menu)

Step 2: Select/enter 2 (Press reply/answer, enter 2 and send)

The user will get the balance detail via SMS.

Mobile service delivery in Bhutan

VALIDITY OF EACH LOAD

NU 5 – Nu 20	14 days validity
NU 21 – Nu 50	22 days validity
NU 51 – Nu 100	37 days validity
NU 101 – Nu 300	52 days validity
NU 301 – Nu 500	60 days validity
NU 501+	90 days validity

[Click here to download E-load distributor Registration form](#)

TashiCell

From
http://www.tashicell.com/index.php?option=com_content&view=category&layout=blog&id=19&Itemid=58)

Balance Transfer:
A prepaid subscriber can transfer his balance to another person. The transfer can be done through IVR or USSD:

IVR Based: Dial 844

USSD Based: *733*pin code*amount*975mobilenumber#
Minimum amount transferable =Nu. 50/-
Maximum amount transferable =Nu. 500/-
Transfer Charges =Nu. 7/-
Example:*733*4518*50*97577234524#

Note: To create your pin code, please call 7700 or visit the nearest Customer Care Centre.

3rd Party Recharge:
You can recharge your friends account from Your account either by USSD or IVR:

USSD Based: Dial: *711*phone number to be recharged*recharge card secret code#
Example: *711*77621400*02994565948815#

From http://www.tashicell.com/index.php?option=com_content&view=article&id=48&Itemid=118

E-TopUp (GREEN RECHARGE)

Use Etop up and play an important part in Environment conservation. This is the best way to prevent littering of paper voucher and you have the greater advantage too! With our E-TopUp service, you can electronically recharge any amount from as low asNu.10 to as high as Nu.5000 at one go!

So, get rid of the hassle of scratching your recharge voucher and recharge yourself ELECTRONICALLY. It's easy, eco friendly and most of all, saves your time!

Mobile service delivery in Bhutan

Validity of E-TopUp Recharge:

AMOUNT	*VALIDITY*
Nu.10 - Nu.50	15 days Validity
NU.51 - Nu.100	30 days Validity
Nu.101 - Nu.200	45 days Validity
Nu.201 - Nu.300	45 days Validity
Nu.301 - Nu.499	45 days Validity
Nu.500 - Nu.999	75 days Validity
Nu.1000 - Nu.1999	90 days Validity
Nu.2000 - Nu.5000	120 days Validity

You can avail Easy Top-Up facility of TashiCell at our OUTLETS nearest to your home and office. Our Dealers and TashiCell Outlets will guide you.

Annex L   Bibliography

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Mobile service delivery in Bhutan

The GSM Association of mobile network operators provides links to a large collection of case studies and consultancy reports, some of which it has commissioned itself. These may be accessed notably in the development section of its website at http://www.gsmworld.com/mobilefordevelopment/.

http://www.textually.org is a blog which includes relevant items from all over the world – usually entertaining and occasionally also useful.

http://www.mobile-money-gateway.com/event/mobile-money-global-2013 Professional conference site with useful associated background materials.

Technical references

Explanatory materials

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