Innovation and M-Governance : The Kerala Mobile Governance Experience and Road-Map for a Comprehensive M-Governance Strategy

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Abstract— **The M-Governance project in Kerala, is a comprehensive Mobile Governance project covering ninety odd Government Departments. The objective of the project is to integrate the advancements in mobile technology with various Government departments with an aim to create cost effective, efficient and round the clock Government information systems. The three channels of mobile communication(Voice, Signalling and Data) and a wide range of technologies(Voice Applications, Applications using signalling channel and data service based Applications) are being used for this purpose. A comprehensive and integrated Service Delivery Platform is being created to roll out the various services and the M-Governance strategy is being formulated. This paper examines the approach adopted to identify services and design solutions, wherein the primary focus has been to leverage the existing networks and available wireless technologies. The core platforms being used for M-Governance are based entirely on Open Source Technologies. The paper also tries to present the various challenges faced while trying to implement M-Governance, and the solutions deviced to address some of those challenges, with relevant case studies. The Service Delivery models for various M-Governance Services, some of which have already been frozen, and others that are being considered are also being discussed. The paper also tries to examine the strategy adopted for deployment of these services.**

Keywords— **M-Governance: Mobile Governance, ICT: Information and Communication Technologies, ROI: Return On Investment, FRS: Functional Requirement Specification, SMS: Short Message Service, MMS: Multimedia Message Service, GPRS: General Packet Radio Service, OBD: Out Bound Dialer, IVR: Interactive Voice Response, API: Application Programming Interface, WAP: Wireless Application Protocol, OS:Operating System**

I. INTRODUCTION

The state of Kerala has always been in the forefront when it comes to the utilization of Information and Communication Technologies (ICT) for governance and reaching out to its citizens. E-Governance is all about making available conventional Government services to the citizens through Internet portals, through Internet connected computers. The project M-Governance is envisaged to propel the functioning of the Government, at the next higher level. The rapid diffusion of mobile ICT gadgets such as laptops, mobile phones, PDAs (Personal Digital Assistants), along with emails, instant messaging and other networking services have rapidly fuelled the mobilization of interaction. M-Governance is defined as the strategy and implementation involving the utilization of all kinds of wireless and mobile technology services, applications and devices for improving benefits for citizens, business and all Government units. The project derives its strength from the lessons learnt from the implementation of the e-Governance project in the state. The focus is to build a centralized platform into which the service for each and every department can be integrated, to avoid duplication of efforts by individual departments. A citizen-centric approach has been adopted and uniformity of service has been maintained across all M-Governance services.

II. WHY M-GOVERNANCE

People, vehicles, air traffic, post and information have become more and more mobile around the world and our society is increasingly being recognized as a nomadic or mobile society. All these clearly indicate the burgeoning public interest in mobility and various issues relating to 'being mobile.' Mobility is being regarded as a new paradigm in computing. The new paradigm shift will be marked by mobile, "Always- on" citizens, government, as well as the transient on-line communities. Citizens are able to save time and energy by accessing and communicating with government networks through mobile phones and other wireless devices. Providing Information and Services to citizens on the go will help improve the quality of information and services incredibly. Transparency of the Goverment mechanism is also enhanced.

The explosive growth of wireless subscribers – 1.2 million new users added daily in emerging economies [1] around the

globe – is changing the society. Users are captivated by the freedom, security, and enhanced productivity that mobile phones make possible. The total impact of mobile telephony is driven primarily by its level of penetration in a given nation – that is, the number of wireless subscribers as a percentage of total population. A report on the socio-economic impact of mobile technology by a team of researchers led by Professor Rajat Kathuria of the Indian Council for Research on International Economic Relations (ICRIER) has found clear evidence to suggest that mobile penetration facilitates economic growth. It shows that Indian states with 10% higher mobile phone penetration will enjoy an annual average growth rate 1.2% higher than those with a lower teledensity[6]. The state of Kerala is the ideal playground to test the concepts of mobile governance comprehensively, as it has a much higher tele-density (above 80 percent currently), compared to the national average of 47.89 percent[5].

Mobile phones present us with the following unique advantages[1]:

Remote Availability

Mobile phones can reach areas where the infrastructure necessary for Internet services or wired phone services is difficult to set up. The ability of reaching rural areas is an important feature that will enable m-governance.

Low Cost and Efficient ROI

Mobile phones are a relatively low cost technology as compared to Internet technology and is more affordable.

Easy Learning Curve

Usage of mobile devices is fairly simple thus making it easy for any common person to use it and access needed information. Mobile technology promises to help overcome the hurdles that hinder the progress of many e-governance applications. Internet mandates certain basic infrastructural requirements such as electricity, communication lines and computer workstation besides knowledge of English. Also some basic training has to be imparted in order to educate citizens about computer and internet. On the other hand, no effort is required to train citizens to use mobile phones. Voice applications make mobile phones even more suitable for the people with limited reading skills.

Location Based Services

Mobile platform has the potential to provide location specific information with regard to emergency services, locating a nearby Bank /ATM, information regarding traffic and weather conditions in that locality etc.
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III. THE APPROACH

The approach adopted to identify services for M-Governance in Kerala has been based on Consulting. The project managers would initially establish contact with Heads of various Departments and discuss the possible applications of Mobile and Wireless Technologies. After shortlisting potential areas, field-studies would be conducted for a thorough as-is analysis. In the next stage a detailed Functional Requirement Specification(FRS) would be prepared for the proposed solution. The project implementation would commence after the FRS has been approved by the project stakeholders, ie the Government Departments.

The consulting model has proved to be ideal for M-Governance, as it is hard to conceive one-size-fits-all solutions. More often than not, the requirements are very unique even though they may not pose huge technology challenges. The major challenge has been to build solutions that are

- Accessible to the masses, irrespective of their socio-cultural and educational background.
- Scalable to such an extend that the entire population benefits from them.
- Acceptable by and deployable across all the Telecom Operators(Kerala currently has the presence of more than 10 operators)
- Replicable and Deployable with minimal changes, for similar requirements.

The team working on Kerala M-Governance has tried to keep these points in mind while designing solutions. While the solutions developed for the masses depend on Voice Applications, the ones designed for students/Goverment officials depend more on signalling(texting). The solutions developed for surveillance depend on imaging technology and Data Service based applications.

All the solutions deployed for M-Governance services are based on Open Source. The SMS, Voice and Data servers that are being used for M-Governance are based on Open Source technology and run on Linux. The technologies used are Linux-Ubuntu, Asterisk and My SQL. Along with Bulk-SMS pushing capability, the SMS server also supports regional languages and Flash SMS.

IV. CASE STUDIES

A. M-Gov Service Delivery Platform

The M-Gov Service Delivery Platform has been designed to include the necessary core infrastructure for current operations and future expansion of M-Governance.

The core components of the SDP are:

1) *e-SMS, The official SMS gateway for GoK:* The eSMS is an exclusive SMS Gateway established by the Kerala State IT Mission for use by various Government departments. It is being used by the department officials for intra and inter departmental communication. e-SMS has proved to be very effective for sending notifications/alerts etc. The officials who have access to the gateway can login to the web interface and send messages to a list of

numbers in a single mouse-button click. Unlike in the internet based email systems, the messages are delivered instantaneously via e-SMS. The delivery reports can also be viewed by the user who sends SMS via e-SMS.

The e-SMS platform has been developed using Open Source platforms like php, symfony and linux.

2) *Out Bound Dialers:*A dedicated Out Bound Calling facility has been set up for M-Governance. OBD that is used for M-Governance is based on Open Source and uses Asterisk for making calls. 60 simultaneous calls can be made using the OBD infrastructure. This facility would be made use of by all services coming under M-Governance. It is also planned to provide the facility for recording of voice prompts, transliteration from English to Malayalam and scheduling of Voice SMS as additional services .

3) *Bluetooth Kiosks:* Bluetooth Kiosks would play an important role in information dissemination. Bluetooth Kiosks would be deployed in places like bus-stations, railway stations and airports. Citizens can turn on bluetooth in their handsets and receive information regarding Government schemes, tourism etc on their phones.

4) *The Shortcode 537252:*Short codes (also known as short numbers) are special telephone numbers, significantly shorter than full telephone numbers, that can be used to address SMS and MMS messages from mobile phones or fixed phones.The shortcode '527252' which corresponds to 'KERALA' in the non-QWERTY mobile keypad has been opened with all the operators in the region. This shortcode will be used exclusively for Government Services. It is an effort towards bringing a wide range of Goverment services under the same umbrella.

B. IVR based Survey for State Planning Board

The Sampoorna Oorja Suraksha Mission, is a State-level initiative aimed at achieving total energy security. The mission focuses on total electrification, energy conservation and tapping of renewable sources to meet the growing energy demands of the city. The initiative required conducting a statewide survey in order to identify households and other buildings without electricity. The conventional mode of surveying would require personnel plying throughout the state conducting the survey and recording the details in paper forms. Consolidation of the collected data would add another layer of work.

Instead, the Planning Board decided to use an IVR(Interactive Voice Response) based system for surveying. The IVR menu in the regional language was set up in a ten-digit number and this number was advertised in all the major dailies. Citizens were asked to call in to this number and speak out the details as required by the voice menu.

The IVR was up and running for about a month, during which approximately 25,000 calls were recorded. Now the major challenge was to convert the voice data into text.

Project Managers set out to check if there existed a voice recognition engine that could transliterate Malayalam language to text. Discussions were held with innovators who developed language-agnostic speech recognition engines, but a huge repository of voice samples and considerable time were required in order to train the engine. As a result, manual translation was resorted to. The personnel engaged in transliteration were found to convert 25-30 audio files per hour on an average.

C. The MCARP: Mobile Crime and Accident Reporting Platform.

MCARP is an exclusive solution devised for the police force, to tackle crime, accidents and traffic issues efficiently. MCARP can help the police control incidents such as riots, as well as curb traffic violators with apposite visual evidence. Images are captured using mobile phone cameras by policemen and uploaded to the central server instantaneously via MMS/GPRS.This would empower the control-room for informed decision making.

MCARP has been running succesfully in Cochin city, Kerala for more than a year. During this period, more than 20,000 photographs were uploaded from fifteen whitelisted mobile handsets. These handsets were used by the Cochin Police patrolling vehicles.

In the phase-I of MCARP, the solution depended on MMS for photo uploads to the central server. As the high cost of MMS made the operations rather costly, other alternatives were explored. In order to make the solution GPRS based, a mobile phone application was found necessary. The application envisaged would pop-up when the photograph is clicked and thereafter guide the user to upload the photograph to the central server. The major challenge was to develop a mobile phone Operating System-agnostic application. Even though the application was developed in Java, which made it suitable for most phones, it was impossible to avoid some components dependent on the Operating System. Developing an agnostic application remains a major requirement as mobile phone OS versions are updated quite frequently.

D. Audio Guide and WAP guide for Tourism.

Audio guide would give reliable information for tourists regarding places of interest. The tourists can call into the number and listen to the IVR menu in the preferred language. The IVR menu can be navigated using the mobile keypad and information ranging from the history of a location to the important contacts can be accessed.

WAP tourism guide is envisaged to replace the conventional tourist guide-books. The WAP guide would be available on the move and would contain reliable and latest information.

E. Other Major Services

Information services for many departments, like weather alerts for farmers form an important part of M-Governance. Information regarding departments would be available to citizens via text on their mobile phones. The services are made available either on-demand, wherein the citizen can send in the query via text, to which the answer will be send, or through subscribed services.

Complaint redressal systems also provided under M-Governance. Such systems leverage voice and text based mobile technologies. Complaint registering would typically be done by calling into the IVR system. The complaint registration number and periodic updates would be send via SMS. Alerts would also be send to concerned officials via SMS. Such systems would considerably reduce the turn-around time.

Exam results and notifications for students has proved to be a very useful segment of M-Governance.

V. CONCLUSIONS

The M-Governance services launched initially are in the pilot mode. In order to come out with a comprehensive M-Governance strategy, the feedback from these pilot projects would be analysed thoroughly. The services that need priority would be identified and the services deployed would be refined to make them even more citizen-centric.

One of the major objectives of project M-Governance is the standardization of Open API syntaxes and paradigms. It is envisaged to tap the 'wisdom of the crowd' for this objective.The APIs being used currently would be made available to the community of developers without compromising the security. The developers can use these APIs to develop unique applications catering to niche uses. These applications would be absorbed into the existing M-Governance repository after thorough testing. Such an initiative will also be a good test to measure the stability and reliability of the M-Governance platform.

It is envisaged that the M-Governance project in Kerala turns out to be the primary reference for future M-Governance initiatives elsewhere in the world.

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