Bringing M-government to South African Citizens: Policy Framework, Delivery Challenges and Opportunities

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Abstract

The paper aims to provide a framework for m-government deployment in South Africa. It examines major factors affecting m-government use by citizens, business and government; and it highlights implementation challenges. The paper argues that synergy between e and m-government should be exploited to avoid unnecessary duplication of services. Sustainability of m-government depends on its ability to provide value-added services. Healthy m-government program depends upon national strategy, infrastructure support, appropriate technology platform, low access cost, and increased awareness generation especially for citizens in underserved areas. It cautions that real success comes from universal access to services and the provision of low cost services through increased competition.
Keywords: m-government, policy framework, e-government,

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1. Introduction

Globally, mobile phone users are expected to surpass the one billion mark by 2005 (Repacholi, 2005). Africa's use of mobile phones is said to be growing much faster than anywhere else in the world (Foreign Investment Network, 2005). The rate of growth of mobile phone use now exceeds that of fixed-line (Center for Public Service Innovation, 2003). Consequently, the efficacy of using the Internet to close the digital divide in Africa has come under scrutiny. Growing concerns about the access inequality to e-government has led to consideration of mobile technology as an alternative service distribution channel. Most African countries have low per capita telephone lines, and weak Internet penetration has fueled the need to leapfrog mobile government on the continent.

Difficult questions are, however, now being asked about the impact of e-government on public service delivery and organizational efficacy. Although countries have spent billions on e-government over the past decade, little organizational change has resulted (www.localegovexpo.uk). Millions of less privileged individuals without access to the Internet still have no realistic chance of accessing government services. M-government is now looked upon as a viable alternative solution. As the South Africa Government (SAG) grapples with how to make e-government citizen centric and widely available to all categories of citizens, m-government is emerging as the next logical extension of, or complement to on-going e-government efforts.

Some policy makers are convinced that it is "too early in the season" to consider m-government when e-government has not even reached maturity. Others argue that it is inappropriate to seek m-government prior to conducting a thorough audit of the kind of transformation that e-government has brought about. In South Africa (SA), how to evaluate e-government impact or measure its outcomes is still being debated (Farelo and Morris, 2006). The case for m-government will depend to a large extent on its potential to optimize e-government rather than depreciate efforts gained with e-government so far. Therefore, there is need to understand the extent to which m-government is a complement, substitute or even distraction to e-government.

The limited adoption of m-government in SA deserves attention from both researchers and policy makers. A rapid adoption of m-government prior to the development of a long term strategy for its deployment could be construed as naïve. Perhaps a well calculated and steady pace of m-government implementation could reduce the risk of turning a prudent initiative into a stillborn one. In contrast, the opportunity cost of adopting a "wait and see attitude" may be high in a fast-paced technology environment. The objectives of this paper are, therefore, to develop an m-government framework and describe related policy development. Secondly, the paper examines key factors affecting the application of mobile technologies to information and service delivery. Thirdly, the paper highlights the potential relationship between e-and m-government and the challenges that lie along the road to m-government.

1.2 Background: From E-government to M-government in SA
As part of its information society strategy, SAG established a number of Gateway Projects to support e-government across the country. Prominent among them are the Cape and Gauteng Gateway Projects in the Western Cape and Gauteng province respectively. At the national level, a Batho Pele Gateway, a one-stop shop for e-government information and services was also established. A wide range of services meant for citizens and businesses are now available via the Internet portal. In the case of Cape Gateway, a Walk-in Center (WIC) and Call Centre (CC) complement the web-based portal in providing information services

to citizen customers. However, e-government in SA faces a number of challenges: (1) Islands of automation and weak inter-agency information sharing, (2) inadequate integration of poor citizens into e-government, (3) slow pace in multi-lingual content development due to lack of content development specialists, (4) lack of empirical research to evaluate impact of e-government on citizen livelihoods, (5) privacy and security concerns and (6) lack of an empirically validated model for e-government development in Africa. In the midst of these challenges, a new wave of m-government has descended on SA. Without doubt uncertainty exists about whether m-government is entirely a new revolution or just an addendum to e-government. Despite all these uncertainties, the ability to harness mobile technology could play a significant role in reducing growing frustrations and restlessness associated with poor service delivery, especially at the local government level. Whether SAG will fully embrace m-government and at what pace and form remains unknown.

Hong Kong is an example of a developing nation with one of the highest mobile penetration rates exceeding 85 percent and mobile technology has become a substitute for fixed line (Xavier and Yan, 2002). The Scandinavian countries are also at the forefront of ICT service penetration (Falch and Henten, 2000). South Africa currently has about 23 million subscribers out of population of 45 million and it can therefore draw useful lessons on how to improve mobile penetration rates (IT Web Informatica, 2005).

In the early stage of development, a conscious choice about synergy between m- and e-government is critical for meeting diverse citizen service demands and to avoid costly duplication. This is particularly important for SA where half of its population resides in remote rural areas, informal settlements and townships where they risk being by-passed by digital government initiatives. If deployed with a vision, m-government has the potential to provide additional value for tax Rands to the citizens, expand socio-economic development, and enhance SAG's citizen centered service delivery.

The paper consists of six parts. Section 2 describes the framework for m-government deployment in SA. The third section provides a discussion on factors affecting the development of mobile government services in SA. In the fourth section, a hierarchy of m-government prime drivers is presented and the relationship between m-and e-government is briefly assessed. The fifth section addresses hurdles in enabling m-government. Finally we conclude the paper by providing a case for broader perception of m-government as means for comprehensive socio-economic development and government information services delivery especially to the marginalized communities.

2. PROPOSED FRAMEWORK FOR M-GOVERNMENT DEPLOYMENT IN SA

The issues mentioned above are policy-related. In this section, therefore, we present a framework that can be used to guide m-government policy formulation in SA. Other African countries are likely to find the framework valuable to their m-government initiatives. However, before we can discuss a possible framework and the factors surrounding m-government deployment in SA, it is crucial to define exactly what we mean by the term mobile government. In our paper we perceive m-government as the delivery of government services and information via mobile technology which includes wireless network (WAN, Wifi, WiMax, etc.). We distinguish between mobile devices such as regular cell-phones, smart phones and personal digital assistants (PDAs) from lap-tops that can be plugged from one spot to the other which is more about "portable government" than specific mobile government. Mobile government is synonymous with "unplugged government".

2.1. M-Government Policy Framework
Figure 1 shows the proposed framework for m-government policy development. We have attempted to construct the framework through a process of reverse engineering. That is to say, we have worked backwards by first examining the lay-of-the-land in m-government in SA and then identified the various

aspects and components, as well as their relationship. We have then represented this diagrammatically in Figure 1. Essentially, the framework shows the different issues that an m-government development and deployment policy must address. In the following, we discuss these issues.

2.1.1. Government institutions: In SA, the constitutional division of the government function into a tiered system (National, Provincial and Local Governments) makes itself felt in e-service delivery, as each of these provides e-services. A crucial issue to be addressed by policy is, therefore, that of cooperation and collaboration among all three levels, as well as the harmonization of their efforts.

2.1.2. Regulatory institutions: A major development in the regulatory arena was the establishment of the Telecommunication Act in 1996. The act provides for among others, universal and affordable telecom services, customer centeredness, and fair trading practices (Barendse, 2004). In 1999, the SAG established a parastatal called State Information Technology Agency (SITA), and tasked it with responsibility of e-government deployment. As the first port of call for IT resources, the technical research and development challenges of automated government service delivery are its core functions. In terms of industry regulation, the Competition Commission of SA's (CCSA) an equivalent of the US Anti-Trust Regulation has the responsibility to investigate cases of collusion, and other exploitative tendencies by industry firms. Although it does not have prosecuting authority, the CCSA has power to recommend action that could result in heavy fines for violators. The Universal Service Agency of SA is responsible for expanding rural ICT access, licensing requirements in underserved areas and the establishment of phone-shops.
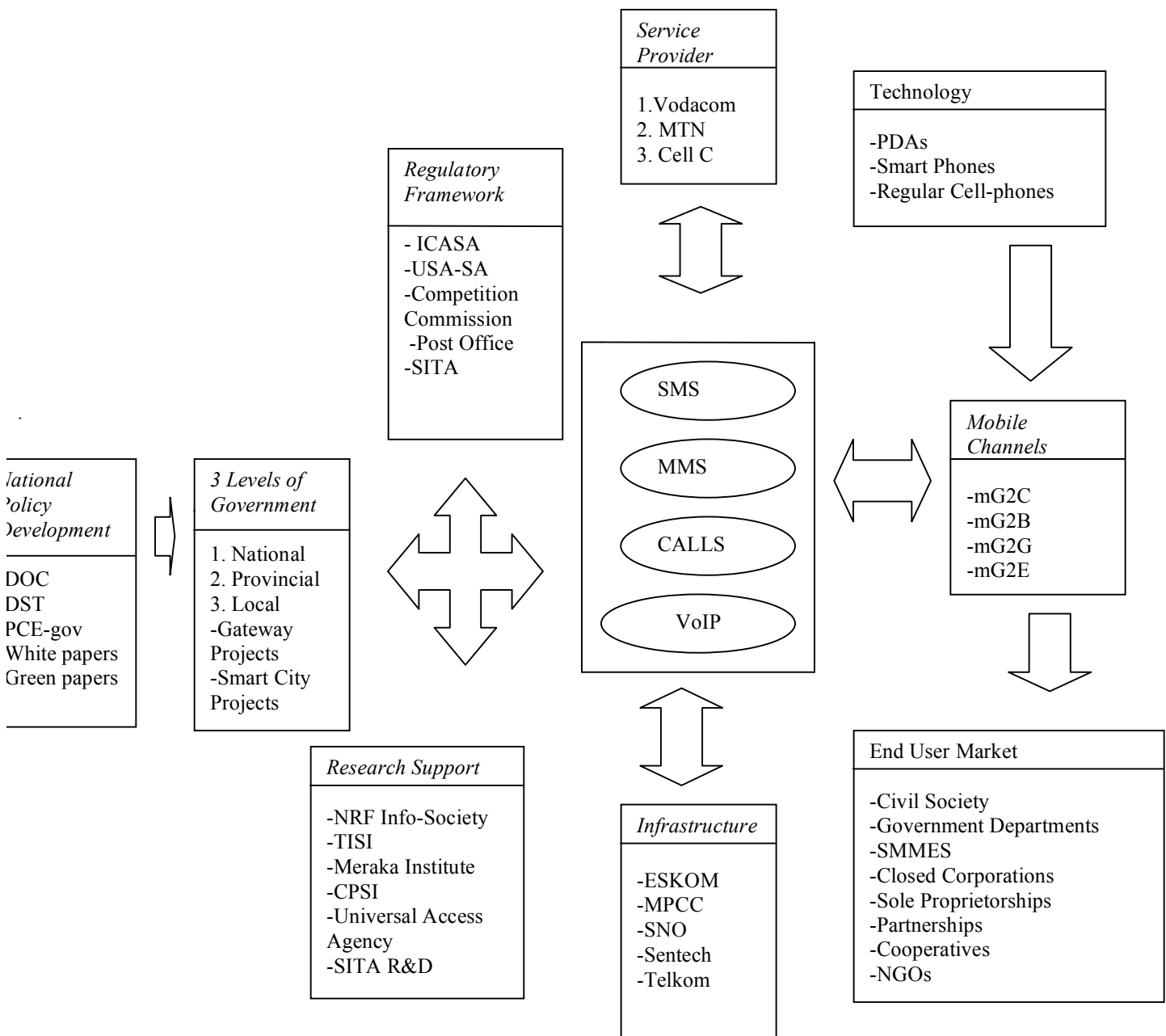
2.1.3. Research support: The State Information Technology Agency (SITA) has the responsibility to provide the technology needs for SAG. Through its Research and Development Unit, SITA is expected to drive the evidence-based technology development choices for m-government. But as a government agency, it should partner with private sector, other research bodies and academic institutions to provide objective diagnosis of requirements for the m-government infrastructure landscape in SA.

2.1.4. Service providers: The mobile phone industry is underpinned by cartel of three service providers namely Vodacom, MTN and Cell C. In terms of market share, Vodacom is the industry leader followed by MTN and Cell C in that order. Virgin Atlantic has been earmarked as the next key player in the SA mobile market.

2.1.5. Delivery mechanisms: A wide range of technology platform to support m-government will be needed. Given high levels of illiteracy in SA and Africa generally, (UNESCO, 2004) policy makers working in m-government should consider the use of text (email and SMSs), voice, and multimedia (MMS) to ensure that as many users as possible are comfortable with this new service delivery format. Without flexibility in technology platform, access equality will not be achieved making the goal of closing digital divide through inclusive information society unattainable.

2.1.6. Infrastructure: The physical telecommunication infrastructure is dominated by TELKOM, although a second Network Operator has been mooted. A government-owned monopoly, ESKOM is responsible for urban and rural electrification program in SA. The growth of digital government in remote rural areas is strongly supported by Multipurpose Community Centers (MPCC). They provide improved access to digital government services. From a policy perspective, issues that address infrastructure availability, reliability, expansion, modernization, sharing, etc., have to be formulated.

2.1.7. Technology: End-user interface devices in SA include landline phones, cell-phones, smart phones, personal digital assistants (PDAs), and laptops with wireless infrastructure. Policies here must address wireless interface issues, such as bandwidth limitations, micro-browser and micro-screen restrictions, memory and storage capacities, usability, etc.

Service Provider

1.Vodacom
2. MTN
3. Cell C

Technology

-PDAs
-Smart Phones
-Regular Cell-phones

Regulatory Framework

- ICASA
-USA-SA
-Competition Commission
-Post Office
-SITA

SMS

MMS

CALLS

VoIP

Mobile Channels

-mG2C
-mG2B
-mG2G
-mG2E

National Policy Development

DOC
DST
PCE-gov
White papers
Green papers

3 Levels of Government

1. National
2. Provincial
3. Local
-Gateway Projects
-Smart City Projects

Research Support

-NRF Info-Society
-TISI
-Meraka Institute
-CPSI
-Universal Access Agency
-SITA R&D

Infrastructure

-ESKOM
-MPCC
-SNO
-Sentech
-Telkom

End User Market

-Civil Society
-Government Departments
-SMMES
-Closed Corporations
-Sole Proprietorships
-Partnerships
-Cooperatives
-NGOs

Key
CPSI- Center for Public Service Innovation
DOC-Department of Communication (DOC)
ESKOM- National Electricity Supply Authority
ICASA-Independent Communications Authority of SA
NRF-National Research Foundation
USA-SA Universal Service Agency of South Africa
TISI-The Information Society Institute (TISI)
SITA-State Information Technology Agency
mG2B-Governmnet to Business
mG2C- Government to Citizens
mG2G-Governmnet to Government
mG2E-Governmnet to Employee
PCE-gov- Presidential Commission on E-government
SMMEs- Small Micro and Medium Enterprises
SNO-Second Network Operator
Universal Service Agency

Figure 1: South Africa's Mobile Government Architecture, 2006

2.1.8. Mobile channels: Traditionally, the development of e-government (i.e., internal and external) interactions have led to four basic avenues of collaboration between parties involved. These are government-to-citizen (G2C), government-to-employee (G2E), government-to-government (G2G) and government-to-business (G2B) interface. In SA, these operations occur at three levels of government as already highlighted. A straight line adaptation of m-government would suggest that mobile government to Citizen (mG2C), mobile government to employee (mG2E), mobile government to mobile government (mG2G), and mobile government to business (mG2B) linkages.

2.1.9. End-users: The figure shows a diverse group of users of e-services. Policies are needed to address the impact of e-services through mobile technologies on the different types of users and, by extension, society as a whole. In SA, as in other developing countries, with diverse linguistic and cultural groups of citizens, support for different languages is a crucial issue. In the Western Cape Province of South Africa support of the three predominant languages (isiKhosa, English and Afrikaans) is provided. In the foregoing framework, it is clear that the SA m-government architecture comprises multi-stakeholder partnerships in areas such as policy development, service provision, infrastructure, research and development, technology, with a diverse range of potential beneficiaries including civil society and businesses.

3. FACTORS AFFECTING M-GOVERNMENT DEPLOYMENT IN SA

The next section describes factors affecting successful implementation of m-government in SA. The factors are illustrated in Figure 2. Firstly, it is important to sate that in order to yield meaningful m-government, the factors must be addressed collectively. Secondly, the presentation below does not imply any order of importance in enabling m-government. Thirdly, effort must be invested in the timing and sequencing of the factors that support m-government.

3.1. National Strategy on m-Government
At the core of mobile government in SA is the need for a national strategy to guide the deployment of mobile government at all three levels of government. Current efforts appear to be evolving without a comprehensive national m-government strategy, although an overall policy directive on information and service delivery has been espoused through the Presidential Information Society Commission. After crafting the m-government strategy, coordinated implementation at all three levels of government is needed. A key part of the policy framework is the development of institutions to support m-government security and privacy concerns. The strategy should not be limited to legal risks, but should cover client health risks from exposure to radiofrequency associated with mobile technology (Repacholi, 2001).

3.2. Content Development
As the m-government policy space opens, new content is required to support its deployment. Available e-government content is not necessarily ideal for m-government use. Due to low bandwidth and small screen nature of mobile technologies, successful development of m-government requires dedicated content specialists. Unless policy makers in SA realize the need for content development in all the eleven official local languages, the anticipated widespread usage of mobile government could not be translated into actual use. Open source software because of its lack of licensing requirements and the fact that it can be copied or modified without redistribution restrictions is more suitable for m-government use.

3.3. Technology Platform
A wide range of technology platform to support m-government is needed. Given low levels of literacy in Sub Saharan Africa (i.e., about 60 percent) (UNESCO, 2004) policy makers working in m-government should consider the use of text (email, SMMs, MMS), voice and or internet to ensure that as many users

as possible can access the new services. Without flexibility in technology platform, access equality will not be achieved making the goal of closing the digital divide through inclusive information society unattainable.

3.4. "Batho Pele" Principles: The Role of m-Government

The term "Batho pele" means people first in Sotho. SA is committed to maximize service delivery to citizens and this process is based on the *Batho Pele principles*. Its embedded values remind civil servants about the need to be citizen customer focused. The *Batho-Pele Principles* are synonymous with the "customer is king" philosophy in private sector marketing approaches. Therefore, the aim of the SAG is to offer people-centered, high quality, value-added services in a timely fashion. Changing entrenched mindsets of public officials who view citizens as "inferior", "subordinates" and or "an unnecessary burden" is a key element in making m-government a reality. The expected flexibility, timeliness, and the *anywhere, anytime* access will enhance the service m-government experience of citizens and business. Citizens just like ordinary customers are likely to provide loyalty when they derive greater utility in service provided by government. Traditional impersonal government has been abandoned in favor of responsive modern government as citizens become more articulate about their rights and demand better and improved service delivery. In order to fulfill its obligation to deliver top quality services SAG has adopted "Batho-pele" principles. In addition, to avoid geographic disparities, special investment incentives should be granted to foreign mobile firms that are willing to invest in rural areas as the case in China (Low, 2005).

3.5. Effective Demand for M-government From Citizens and Businesses

Supply driven m-government deployment must be balanced with clear assessment of its potential demand. Growth of m-government depends on the experience of end users with service delivery and the utility derived from such channel. It is estimated that 65 percent of SMMEs in SA rely on mobile phones as business tools. Similarly, approximately 97 percent of the population has access to mobile phones. Given such a high mobile phone penetration rate it is important that researchers ask the basic question, whether or not citizens and businesses are willing and ready to use mobile technology assets to access government information services. Forecasting demand (and sensitivity analysis) provides key information to global firms still undecided about whether or not to enter the mobile market. Of concern is the view that majority poor do not afford air time so they simply use their phones to receive voice and text messages (SMS) only. This is collaborated by the fact that tariffs for cell-phone use in SA far exceed that of comparative countries and even some developed countries. With a large segment of its population classified as "poor" to "ultra-poor" and also majority of the business are in the small, micro and medium enterprise (SMME) range, justification for a pro-poor m-government may be hard to justify. In contrast, overwhelming evidence that citizens and business are ready and willing to use mobile technologies makes it easy to convince SAG to allocate budgetary resources for m-government.

3.6. Best Practice Model for M-government

E-government is still in its infancy in Africa. M-government is not even receiving policy attention by most governments. Much of m-government is proceeding on ad-hoc basis. African governments seem to be currently pre-occupied with launching e-government projects and thus relegating m-government to secondary if not peripheral policy status. As SA introduces m-government, understanding and documenting the m-government trajectory will provide lessons for other African countries. Currently, there are not yet best-practice models to bench mark m-government development, yet the existence for such a model could minimize hesitation that characterize m-government deployment. However, Hong Kong though still fighting the problem of high interconnection fees between mobile and fixed network operators, has an impressive record of network development and modernization.

3.7. ICT Infrastructure Needs for m-Government Development in SA.

M-government deployment requires substantial investment infrastructure. Most of the people who have been sidelined by internet revolution reside in rural areas. In SA more than 60 percent of the population lives in the rural areas. Much higher proportion of rural dwellers can be observed in other Southern African countries (70 percent in Zimbabwe, and 80 percent in Mozambique). Communication infrastructure that is needed to kick-start m-government varies from VSAT, MAP, HAP and WiMAXs. While VSAT is costly, WiMAX could offer an opportunity to enroll disadvantaged communities into the knowledge economy. Besides m-government ought to be preferred than e-government because of the later relies on more expensive fixed line grid. In SA TELCOM dominates supply of rural telecommunication infrastructure. Low cost technology solutions such as open source software provides viable alternative to proprietary software. The State Information Technology Agency (SITA) has the responsibility to provide the technology needs for SAG and has a Research and Development Unit to support its work.

3.8. Service Providers

In SA the provision of m-government will use Vodacom, MTN and Cell C, the three leading mobile phone service providers in the country. Currently the three mobile firms rely on telecommunication infrastructure provided by TELKOM. Pricing competition appears to be missing while price collusion among these firms is a distinct possibility. Only Vodacom, the largest of the three is capable of providing advanced mobile services (i.e. 3G and 3G HSDPA) network that involves large data transfers. The absence of second network operator implies absence of effective price competition in the foreseeable future. Non-price competition in the form of network migration, favorable interconnection arrangements, dispute resolution, degree of social responsibility and zero tolerance for customer discrimination remains limited unless clients receive affordable rates. Access equality can not be guaranteed under a cartel pricing mechanism.
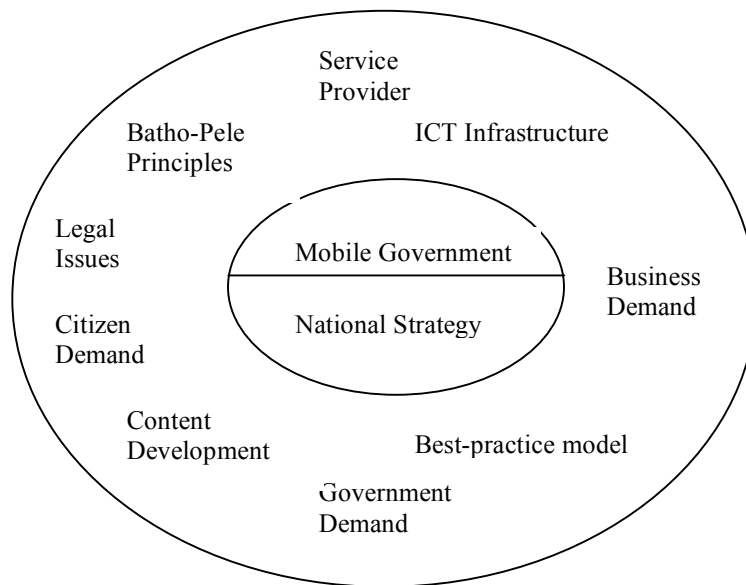

Figure 2: Mobile Government Development Wheel in South Africa, 2006

3.9. Legal Issues

Dispute resolutions as new network operators enter a mobile technology space, privacy issues related to sensitive and confidential information exchange, law suits arising from chronic health risks associated

with mobile technology use are some of the legal aspects surrounding m-government. Liability issues also arise from moral hazard in the design of biased mobile telephone contracts. For instance, foreign workers do not carry SA identity books and they face resistance from mobile firms when applying for new contracts. The legal framework needs to be well crafted to ensure smooth application of m-government services. As SAG builds its "information highways", the issues of scalability, replication and flexibility will become critical. In addition, m-government should target unmet demand for services, underserved areas, customer centered approaches, human capacity building, security, and the developments of balanced content that covers the cultural and language needs of diverse users.

## 4. HIERARCHY OF PRIME DRIVERS FOR M-GOVERNMENT IN SA

As m-government evolves it is clear that its architecture is underpinned by multi-stakeholder partnerships. To conceptualize this further, we identify six prime movers for successful m-government deployment in SA. Figure 3 provides the key ingredients that form a "healthy diet" for m-government development. These "prime drivers" have been formulated through interaction with policy makers in SA, and an examination of the limited literature on mobile government. It is critical that m-government should be driven by a *national strategy* that demonstrates both visionary leadership plus a commitment to align budgetary resources to its priority functions. The second prime driver is *physical infrastructure* and emphasis here is placed on rural areas that lag behind urban areas in mobile technology investments. The needed infrastructure includes MAP, VSTAT, WiFI, WiMax to support the expansion of m-government service delivery. The third prime driver is the *usability or technology platform*. Technology platform refers to available channel options, appropriateness of the technology (e.g. PDAs, regular and smart phones, etc.) and their contribution to service quality. The fourth prime driver is *human capital development* to support internal operations for the transformation of government service delivery to citizens and businesses. Inadequate skills and high staff turnover in SAG tends to undermine progress in m-government service innovation. The fifth prime driver deals with *access cost and equality*. The sixth prime driver is *awareness generation*. Once a national strategy has been promulgated and received commitment from cabinet, infrastructure investments made, technology usability assessed, cost implications analyzed, awareness generation is the next logical step to enhance m-government uptake. Although these prime movers appear basic if not common knowledge, surprisingly it is the lack of attention to these basic ingredients for a healthy m-government program that could lead to its stunted growth.

4.1 Exploring the Link Between e- and m-Government
M-government offers the promise to improve internal performance, enhance efficiency, and above all enable broad-based inclusion of civil society in the information age. M-government solutions are not stand alone solutions. To achieve higher levels of performance and efficiency, policy makers need to identify the link between e- and m-government. Services ought to be streamlined in such a way that those that cannot be offered via e-government are routed through m-government. Understanding such synergies leads to optimization of both e-and m-government service delivery. M-government must be considered a complementary part of improving information and service delivery to citizens. Given sufficient resources to support the key success factors, m-government is bound to contribute significantly in closing the digital divide especially in under-served areas. Therefore, we argue that both e-government and m-government are key strategic instruments for the transformation of SA into a knowledge society.

4.2 Challenges Facing M-government Deployment in South Africa

A number of challenges confront the successful deployment of m-government. These include; (1) high access costs (i.e., connection and recharge rates), (2) making the technology accessible to physically
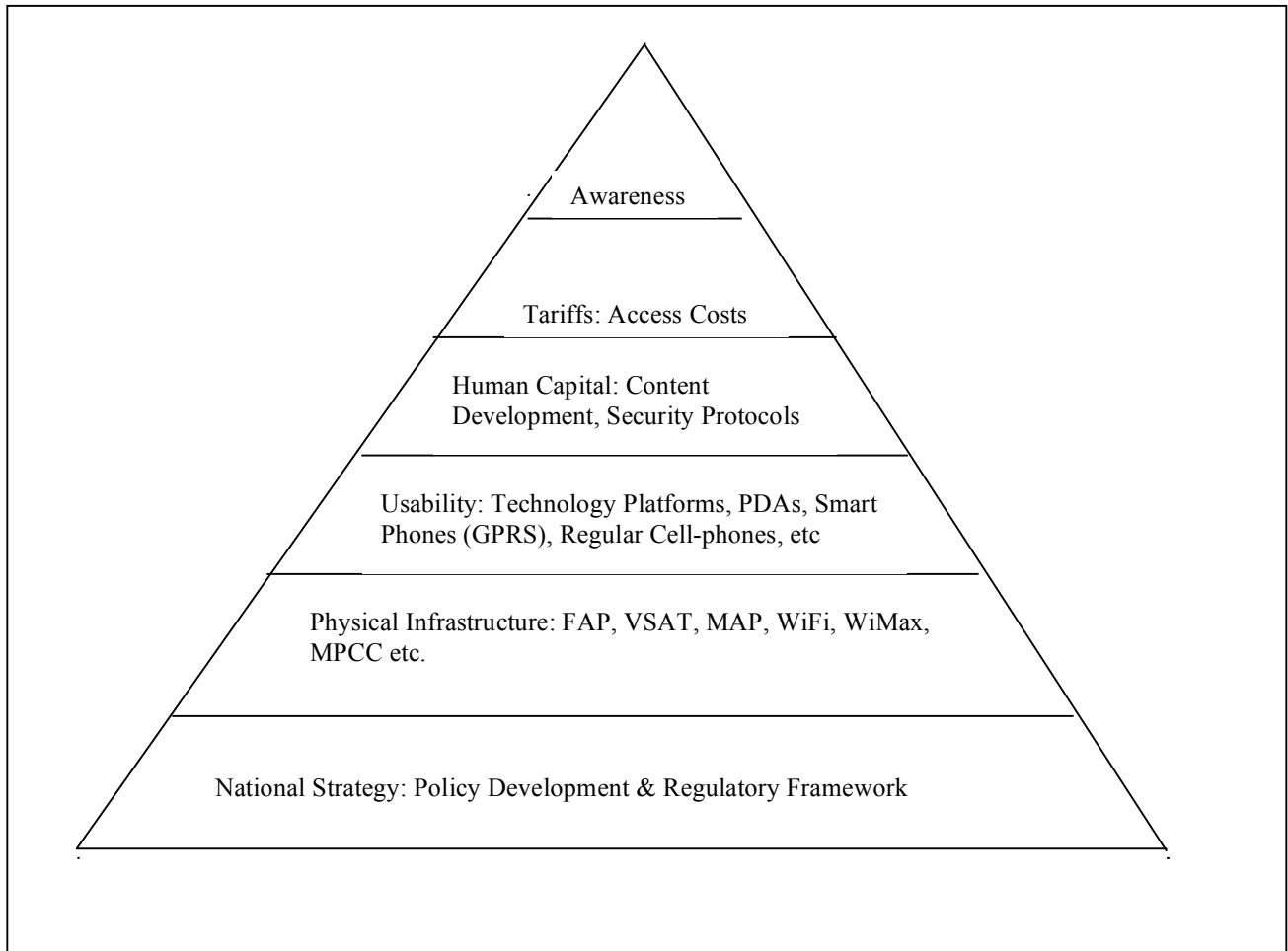
Figure 3: Hierarchy of Prime Drivers of m-Government Deployment, 2006

challenged and the ageing, (3) broad-based application of open source content to m-government service delivery, (4) full-scale liberalization of telecommunications to allow new players in network provision. SA has chosen a path of managed liberalization, partial privatization, and regulatory re-orientation (Barendse, 2004) or the so called "reforms with reluctance" mindset (Low, 2005) which could potentially slow technology deployment and uptake, (5) the absence of Best Practice Model to benchmark early m-government initiatives, (6) security and privacy concerns arising from upcoming legislation on listening in to personal calls, (7) competition for meager resources as SAG confronts greater threats from HIV and AIDs, pervasive poverty and growing youth unemployment, and (8) risks associated with m-government

fed by fears that it could "cannibalize" e-government resulting in win-loose solution and some evidence of chronic health risks such as cancer associated with prolonged exposure to radiofrequency magnetic fields (Repacholi, 2001).

5. CONCLUSION
The paper focuses on the m-government policy framework for SA and it discusses key factors affecting its implementation. We note that m-government is currently over-shadowed by an over-emphasis on e-government and lack of clarity on what value-added services it will bring. Of concern is the fact that m-government is now being implemented in some developed countries while developing countries are still pondering on what to do and how. The paper suggests that m-government should not be designed to replace e-government but should instead target new or additional services unavailable under e-government. Therefore, m-government should exploit the mobile aspect of the devices and must positioned as a complementary dissemination channel for e-government-- and both should be used to maximize service delivery to citizens. Prospects for m-government deployment in SA are bright given the higher penetration of mobile phones relative to the Internet. A number of prime drivers for m-government success in SA have been identified and these are; the development of national strategy, investment in physical infrastructure, usability requirement, human capital development, access costs and awareness generation. In addition, sustainable deployment of m-government requires prior assessment of its potential demand. In the short term, the use of m-government service delivery strategy faces some bottlenecks such as high access costs, lack of best practice model, the slow pace of liberalization of telecommunication services, suspicions of price collusion in the mobile industry, privacy and security hurdles, and the problem of building relevant content. Finally, the strategic pursuit of m-government is expected to stimulate the transformation of government public services and should help empower previously excluded historically disadvantaged communities through enhanced access equality and increased flexibility from wider menu of services provision.

REFERENCES

Barendse, A. (2004). Innovative Regulatory and Policy Initiatives at Increasing ICT Connectivity in South Africa. *Telematics and Informatics*, 21, 49-66.

Center for Public Service Innovation, (2003), Government Unplugged, Mobile and Wireless Technologies in the Public Service, Pretoria, South Africa.

Falch, M., and Henten, A (2000). "Digital Denmark: From Information Society to Network Society," In *Telecommunications Policy*, 24, 377-394.

Farelo, M., and C. Morris, (2006). The Status of e-Government in South Africa, Department of public Service and Administration, Pretoria South Africa. Paper Presented at the IST-Africa Conference, 3-5th May, 2006, CSIR International Convention Center, Pretoria, South Africa.

Foreign Investment Network, 2005. Mobile Phones in Tanzania,Winter, p32, available at www.finmagazine.com/.

Foreign Investment Network, 2005. Telecommunication and African Economy, Winter, 2005, p33, available at www.finmagazine.com/.

IT Web Informatica, 2005. Converging Communications: South Africa's Definitive Guide to the Convergence of Information and Communication Technologies, Jovan Regasek, Cape Town, South Africa.

Low, B., 2005. The Evolution of China's Telecommunications Equipment Market: A Contextual, Analytical Framework, *Journal of Business and Industrial Marketing*, 20(2):2005, pp.99-108.

UNESCO, 2005. "Education for All Literacy for Life," United Nations Educational and Scientific Organization, Paris, France.

Repacholi, M.H., "Health Risks From the Use of Mobile Phones," In *Toxicology Letters* 120(2001), pp.323-331.

Xavier, P., and X Yan, "Telecommunications Regulation in Hong Kong," In *Info*, 4(5):2002, pp.12-25.