A Proposed Framework for E-Government Knowledge Infrastructures for Africa's Transition Economies

Nixon Ochara-Muganda and Jean-Paul Van Belle

University of Cape Town, Cape Town, South Africa
Jean-Paul.VanBelle@uct.ac.za

_____

Abstract

This paper proposes an empirically founded framework for building E-Government knowledge infrastructures in transition economies such as those in Africa. The proposed framework builds on the concepts of nomadic information environments. The framework, under the acronym NECE (Nomadic E-Government Co-Evolutionary) framework, caters for the three levels of government: national, regional and local. At the national level lies the responsibility of building Flexible Infrastructures. The regional level concentrates on the creation of nomadic networks. The local level addresses the fostering of confident communities. The framework recognizes explicitly the links and dependencies between the various levels. The strength of the framework is its systemic view in recognizing the roles of social, human resources, digital and physical resources required for addressing the possible social exclusion resulting from traditional "Western style" E-Government implementations in developing countries. Importantly, e-government should not be conceptualized primarily as from a technological perspective but as a tool to build of social, human, digital and physical resources in order to empower individuals, communities and whole societies

Keywords: Framework, E-Government, Transition Economies, Nomadic computing, Information Infrastructures, Africa.
_____

Introduction

Mazlish (1993) claims that societies derive their power, wealth and meaning from their possession of information and knowledge. Castells (2004) refers to this society as the network society in which the Internet is the crucial technology dominant in a new technological paradigm of informationalism[1]. This network society is characterized by a duality of inclusion and exclusion in which there is selective diffusion of the various Information and Communications Technologies (ICTs) which impacts on peoples local experiences, while globalization structures production, consumption and power (Castells, 2004). This research elevates the role of Internet diffusion as the foundational core of a national information infrastructure (NII) policies and how this impacts on local experiences using the logic of inclusion and exclusion.

E-Government, introduced in African countries under the banner of New Public Management (NPM), is envisaged to improve governance in developing countries. The imported model of E-Government is therefore transferred to African countries as a panacea to bad governance by carriers such as international donor agencies, consultants, Information Technology vendors and Western-trained civil servants. Improved governance is expected to impact on the socio-economic development of these countries implementing E-Government, as an NPM instrument. This article recognizes that E-Government success, which is critically dependent on the World Wide Web, requires success frameworks that are conThe debate on

---

[1] Castells (2004): Informationalism is a technological paradigm based on the augmentation of the human capacity of information processing and communication made possible by the revolutions in microelectronics, software, and genetic engineering. Computers and digital communications are the most direct expressions of this revolution. Microelectronics, software, computation, telecommunications, and digital communications at large, are all components of one same and integrated system.

inclusion and exclusion at the global level is a concern for the adequacy of information infrastructure of developed versus developing countries (Heeks, 2002), while at national and local levels of developing countries, policy makers are grappling with *twin economies[2]* as a key feature informing crafting of telecommunications infrastructure policies. Interest in the global diffusion of technology is spurred by arguments that it may increase knowledge diffusion through improving communication efficiency (e.g. Jovanovic and Rob, 1989), improve political engagement (Norris, 2001), and allow developing countries to 'leapfrog' traditional methods of increasing productivity (Steinmueller, 2001). The 'leapfrogging' phenomenon remains an open question given that the digital divide remains a pressing problem for African countries in what Fuchs and Horak (2008) refer to as 'digital apartheid' which is characterized by unequal distribution of resources through systematic exclusion.

In local contexts of national economies, the debate on the locus (specific aspects) of telecommunications policies in developing economies as the anchor to a responsive 'organizing vision[3]' of NIIs for African countries finds traction in studies that have been exposing challenges to the realization of 'economic and non economic activities' (Sing, Das & Joseph, 2008) that are dependent on the telecommunications infrastructure (see Heeks, 2002; Johnston et al., 2007; Brown et al., 2007; Muganda-Ochara, 2008). For instance Muganda-Ochara(2008) brings to the fore the rationale for adoption of E-Government in Kenya as that of a galvanizing metaphor for increased ICT investments in an environment where more than 80% of the population have no access to 'constituent technologies' (Wolcott et al, 2001[4]) of the Internet. Johnston et al (2007) points out that having a responsive infrastructure is one of the critical issues of concern for Chief Information Officers (CIOs) in South Africa, while Brown et al (2007) tease out how stifling regulation has favored the first economy in favor

of the second economy of South Africa with regards to Internet diffusion and its determinants. Overall, the studies point to social exclusion as a persistent problem in African economies.

The paper has four main sections, three of which are structured from figure 1. In the first section, the authors reflect on the African context by highlighting how the locus of telecommunications policies in South Africa, Nigeria and Kenya are fostering social exclusion of major segments of the population (part A of figure 1). The second section exposes whose dominant interests are addressed by the telecommunications policies (part B of figure 1). The third presents a framework rationalized through philosophical assumptions of Critical Realism[5] (CT), as a philosophy which rejects relativism in social and scientific discourses and re-orientates social sciences towards emancipatory goals. The fourth and last section presents the conclusion of this study.

Internet Diffusion Trajectory in Nigeria, South Africa and Kenya

Nigeria is the most populous country in Africa with a population of over 150 million (UN-WPP, 2008). It has large mineral wealth and a productive agro-base, powered by the proceeds of the petroleum sector. With a fifth of sub Sahara's population, Nigeria has been one of the slumbering giants in terms of African Information and Communication Technology (ICT) Infrastructure. Possible influencers of connectivity[6] infrastructure of the Internet stems from a general desire by the Federal Government of Nigeria to diversify its sources of revenue from the traditional oil revenue sources on which the former military dictatorships relied (Muganda, O., F. Bankole and I. Brown, 2008). The continued efforts aimed at liberalizing the sector is therefore strongly linked to economic growth and development objectives characterized by initiatives such as the Community Communication Centre Universal Service Provision Fund, the Wire Nigeria Initiative and the State Accelerated Initiative (Ndukwe, 2007). The perceived value of the Internet as an enabler

---

[2] Nassimbeni, M. and P.G. Underwood (2007). When referring to the twin economies of South Africa, described it as comprising two societies: the one (first economy) modern and well developed, the other (second economy) characterized by masses of people living in dire poverty.

[3] Swanson and Ramiller (1997) in "The organizing vision in information systems innovation", *Organization Science* **8** (1997) (5), pp. 458–474; describe the concept as comprising interpretative, legitimization and mobilization activities.

[4] In Wolcott et al (2001), the Global Diffusion of the Internet (GDI) framework is presented as a measurement framework for assessing the diffusion of the Internet and determinants.

[5] Sayer (1992) discusses Critical realism as the hallmark of the Bhaskarian version of scientific realism in the social sciences which recognizes the existence of reality independent of human consciousness and causal powers are ascribed to human reasons and social structures

[6] Wolcott et al (2001) refers to cconnectivity infrastructure as the extent and robustness of the physical structure of the network and is measured by the aggregate bandwidth of the domestic and international backbones, the number and type of inter-connection exchanges, and the type and sophistication of local access methods being used (Wolcott et al., 2001).

of economic growth by the civilian government since 1999 appears to be the overriding determinant for continuous liberalization of the telecommunications sector.

Despite the positive changes linked to the role of the government in establishing a stable regulatory regime, the Internet user base still remains low compared to the total population. Internet World Statistics (IWS) estimates the number of Internet subscribers in Nigeria to be 8 million in 2008. Thus, the proportion of the total population to the number of Internet subscribers by mid 2008 is 5.5%. This may partly be attributed to low penetration levels of various constituent technologies of the Internet, which translate directly to low demand by individual users. For instance the United Nations reports that the personal computer per 100 users in Nigeria is 0.91 (UN, 2008).

The argument is that low penetration levels of these access technologies dampen individual demand, thus less need by private sector players to invest in the telecommunications sector. Thus the negative demand forces for the pervasiveness[7] of the Internet are primarily those of low penetration levels of *constituent technologies* which consequently lead to lack of appreciation of the value of the Internet by large segments of the population. The ggeographic dispersion[8] of the Internet is moderate with Internet Points of Presence (POPs) located in multiple first-tier political sub-divisions of the country. However, most of these are in the major urban centers given the minimal fixed line infrastructure in the rural areas. While the Internet POPs are moderately there are large segments of the population that are still secluded geographically because of an unreliable public electricity supply (Ndukwe, 2007). Poverty levels in Nigeria are high with official statistics putting the figure at 67% living below the poverty line, most of them in the rural areas or in slum dwellings in urban centers (Akinsola et al, 2005).

The situation is not very different in Kenya, a country whose Internet population is estimated to be 3.5 million. Despite the positive trends of Internet growth depicted, the Internet is still among the least accessible telecommunications services. According to an Internet Market study by Communication Commission of Kenya in 2006/2007, this state is largely attributed to low literacy levels (, lack of infrastructure and lack of

relevant local content (CCK, 2007; Eldon, 2005). The total costs (connectivity, equipment costs, maintenance) of Internet access also remain high, despite continued drop in both bandwidth costs and connections costs to end users arising government efforts of zero rating duty on the personal computers and creating an enabling environment for industry competitiveness (PCs) (Eldon, 2005).

Computer literacy is high, with an estimate that only about 15% of the population having operated a computer before (Håndværksrådet, 2006). There are also low levels of electricity penetration with only 15% of the population having access to electricity (KPLC, 2007). The physical infrastructure condition, when linked to the low level of electricity penetration, is thus unfavorable to dispersion since power is a requirement for the constituent technologies of the Internet (*constituent technologies*). There is also lack of a developed venture capital system for entrepreneurs interested in investing in the underserved rural and urban areas which maybe hampering rapid development of the physical infrastructure of the Internet by the 78 licensed operators, yet only 35 are operational (Muganda, N., J.P. Van Belle and I. Brown, 2008).This further works to discourage investments by licensed operators and may partly point to an inability of the government (through CCK) to craft a strategy for overcoming this bottleneck.

These bottlenecks in Kenya have resulted in an Internet diffusion trajectory which is in favor of urban centers, while the rural population and some segments of the urban population remain unconnected. The lack of proper articulation of ICT as a national priority within a knowledge-based society in earlier years of Internet commercialization, and the subsequent inability to show urgency in the process of its crafting and adoption maybe contributing to this skewed development[Waema and Mitullah, 2007]. The structural organization of the government is also ill prepared to handle the challenges of building a national NII which will enable faster diffusion of the Internet (Muganda et al, 2008). For instance, the government of Kenya has two ministries: the Ministry of ICT which is mostly charged with universal access issues, and the Directorate of E-Government which is seemingly tasked with co-coordinating back office integration of government.

In South Africa, the government recognizes the existence of the twin economy and is implementing policies that are meant to address the negative consequences of the increasing divide. The existence of these economies has continued to inform the policy directions for the fight against poverty and development under Mbeki's government. The three pillars of policy

---

[7] Wolcott et al (2001) considers Internet *Pervasiveness as* a measure of the number of individual Internet users in a country relative to the total population while

[8] Geographic Dispersion measures the physical dispersion of the Internet within a country. The dimension looks at the number of Internet points of presence (POPs) in the first-tier political subdivisions

directions focuses on encouraging the growth and development of the first economy in order to increase its ability to create jobs; implement programs to address challenges of the second economy and to meet the objectives of poverty alleviation (Padayachie, 2004). Specifically with regard to policy initiatives that are relevant to Internet diffusion, the Department of Communications envisages programs that support economic growth in the ICT sector and examine new ways of accelerating the advancement of ICT in the second economy.

This formal recognition is laudable, however the impacts of government initiatives is not visible. Nassimbeni and Underwood (2007) report that in the academic sector 10% of the schools have access to the Internet despite the theme of information society enjoying prominence in recent years. They also point out that the South African government still lacks a coherent policy that integrates information technology, telecommunications and the information sector. It points to persistent lack of national conceptualization as a basis for advancement of ICT in the second economy (despite the formal recognition of its existence) that influences policy directions. For instance, one of the policy pillars is to focus on the first economy (13% of the population) as a creator of jobs for the second economy (87% of the population) (Nassimbeni and Underwood, 2007). The contention in this paper is that this focus on the first economy is further exacerbating the social exclusion problem since the ability of the first economy to create jobs for the second economy has not worked before (Kirsten, 2006). It suffices to say that the policy focus of governments in developing countries seem to be favouring those already able to afford Internet services, yet those who are marginalized (second economy) continue to suffer low ICT literacy levels, poverty, lack of access to constituent technologies of the Internet and an inadequate social support network to enable them make adoption decisions (Wafula-Kwake and Ocholla, 2007).

The policy directions that are meant to impact positively on Internet diffusion are therefore unlikely to result in mass adoption of the Internet in the second economy. Policy interventions address the high poverty incidences in the second economy, high ICT illiteracy, the lack of access to constituent technologies of the Internet (low PC ratios, lack of power) and low geographic dispersion of the Internet. The next section attempts to presents an information infrastructure perspective that presents an integrative and long term view of building national information infrastructures for the benefit of all. It is not intended as a 'silver bullet' solution to NII building, but as a way of conceptualizing the process in order to

appreciate that experiences of those who have succeeded require a long term perspective (Ciborra, 2004).

A Nomadic Co-Evolutionary E-Government Knowledge Infrastructure Framework

Dubbed the NECE framework, the critical dimensions focus attention on the macro level of building of *Flexible Infrastructures*; the meso level building of *Nomadic Networks of Governance* and the micro level building of *Confident Nomadic Communities* (Muganda-Ochara, 2008). The critical linkages at the various levels focus on having in place the social resources, human resources, digital resources and physical resources that are necessary for addressing social exclusion (Warschauer, 2004). The framework is based on a synthesis of various literature sources on nomadic information environments and those with a specific focus on e-commerce and e-government as critical activities requiring a mature[9] ICT infrastructure. The proposition also finds justification from empirically-based data to motivate for a different approach to building NII in Africa. Figure 1 presents on the proposed critical dimensions of the framework.
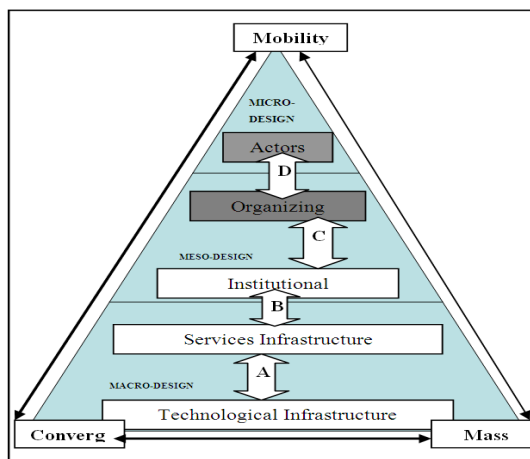

Fig 1. The NECE Framework

---

[9] Singh and Das (2008) link successful adoption of e-commerce and e-government activities partly to the state of ICT infrastructure in a country since infrastructure limits the proportion of the citizenry that can be served by e-services. Countries with higher per-capita GDP are in a better position to afford pervasive, high-quality physical ICT infrastructure. With enhanced levels of ICT access, citizens are more likely to conduct their affairs online.

Critical Features of the NECE Framework
The aspects that characterize the framework are its nomadic and evolutionary nature. The relevance of *nomadicity*[10] is best understood by looking at the cluster of technologies that support the Internet (PCs, servers, file systems, mobile phones, software applications, various portable computers as well as the various transmission media). There is therefore an impressive variety of these technologies that influence users to be like nomads (Kleinrock, 1995). Nomadicity is driven by technologies such as particularly portable computers ranging form laptops, notebooks, Personal Digital Assistants, Smart Card devices, and now mobile telephony. In addition, the capabilities of these devices have been increasing tremendously. Thus the combination of portability of these devices and increasing capability has given prominence to the concept of nomadic computing, which is changing the way information processing is regarded (Kleinrock, 1995). Nomadicity is relevant as metaphor for NII conceptualization, especially when the explosive growth of explosive growth of mobile phone adoption in African countries is taken into account.

The *co-evolutionary* term in the framework name recognizes a number of aspects that are relevant in building national information infrastructures. The first concerns the evolutionary approach used in the building of information and knowledge infrastructures in which the building of infrastructures never start from scratch but build upon existing infrastructures (Hanseth, 1998; Heeks, 2002; Ciborra, 2004). Therefore, the framework captures the evolutionary, as opposed to a revolutionary approach to the development of NII for supporting activities such as e-commerce and e-government. Co-evolution exalts the notion of heterogeneity of various information infrastructures that support these activities either horizontally or vertically, that are eventually integrated in order to realize certain objectives.

The pyramid structure captures increasing *personalization* of services to take into account user (actors) characteristics. Increasingly, the focal nodes of interaction are also reduced tending towards the actors. In order to address the digital divide that characterizes large technology-based projects such as E-

Government, the proposition is to consider the problem of the digital divide as a social exclusion problem (Warschauer, 2004). The framework thus recognizes that the key technological drivers that underlie the development of computing technology are *mobility, digital convergence*, and *mass scale* (Lyytinen and Yoo, 2005). These drivers therefore canvass the framework to show their influence in all the aspects and any envisaged relationships in the dimensions of the model. At the apex of the framework, is *mobility*, which captures the diverse modes of services available to the users which are highly dependent on the capability of the portable computing devices. Services are also available through various interfaces such as websites which can be accessible on a global scale.

Prior research on mobility has primarily focused on the "physical" mobility part of nomadic computing (Bellotti and Bly, 1996, Luff and Heath, 1998). However, there is currently an explosion of concepts such as social networking that may play a critical role in a reconsideration of the concept of social mobility. Social mobility refers to the ways in which and the ease with which individuals can move across different social contexts and social roles, and be still supported by the technology and services (Lyytinen and Yoo, 2001). This is expected to increase as the society continues to become more fluid and dynamic; there are therefore increased avenues for social interactions amongst the various actors.

Digital *convergence* implies that data will be captured in digital format, a trend largely enabled by low cost digitization and open standards while the third canvass of the framework promotes the notion of *mass scale*, implying that the deployment and the use of nomadic information environments will take place in principle at a global level characterized by massive scale in service volume, service types and the number of users (Lyytinen and Yoo, 2001). Achieving *convergence* of technologies is therefore possible through flexible standardization through a strategy of modularization (Braa et al, 2007). *Vertical modularization* is aimed at achieving layering of services and technologies, such as in the OSI model. Flexible standardization, through *virtual modularization* can be achieved by separating the various data elements (from the numerous information sources throughout the country) from the technical elements. *Horizontal modularization* is a strategy of encouraging the use of several standards for different sub-domains of the infrastructure rather than have one universal standard (Braa et al, 2007). This is inevitable since E-Government is being deployed

---

[10] The term nomadicity was coined by Kleinrock (1995) while discussing nomadic computing as a combination of portable computing and that access to computing and communications is necessary, not only from one's "home base", but also while one is in transit. Desirable characteristics include independence of location, of motion, of platform and with widespread access to remote files, systems and services

in a heterogeneous environment where there are counter networks, diverse communities and different technological and human capacities. Inevitably, *gateways* are needed for translation of protocols between the various networks. These gateways can either be software-based or manual depending on a particular context. In cases where individuals depend on an intermediary, then the gateway service can be in the form of written procedures (Braa et al, 2007)

The NEII Framework Dimensions
Lyytinen and Yoo (2001) propose two layers that are critical in building a nomadic information infrastructure: the *infrastructure layer* and the *services layer*. The proposed NECE refers to these as the *technological infrastructure* as well as *services infrastructure* respectively. The lower technological infrastructure layer based upon open and flexible standards expected to provide a stable platform on a mass scale. Such an infrastructure is technically heterogeneous, geographically dispersed, and institutionally complex without any centralized coordination mechanism (Lyytinen and Yoo, 2001).

For instance, there is normally various information infrastructures envisaged at the national level, some of which are functionally-based. There are infrastructures belonging to railway systems, which in large measure cover major segments of the country. There are water and electricity infrastructures and there are also telecommunications infrastructures (both physical and wireless). The concept of the 'installed base' (Ciborra, 2004) recognizes that potentially, the existing infrastructures, though heterogeneous, are possible starting points for building information infrastructures. The key challenge is technical: ensuring that the existing networks can form the base for the services infrastructure for E-Government

The services infrastructure layer requires personalization, dynamic mobility for services and users, and associated channel adaptation. The services infrastructure, though concerned with personalization, should be focused on providing translation services to recognize the diversity of different population groups. The services infrastructure can be the layer targeted to address for instance, the issue of computer illiteracy and the irrelevance of digital content in developing countries, which in most instances is due to the language problem (Muganda-Ochara, 2008). Given the heterogeneous nature of both the *technological* and the *services infrastructure*, flexible standardization offers away for growth without major disruptions in the process. In many different countries, there are many infrastructures which are complimentary: railroads, power, telecommunications, postal services, road networks, etc.

All these infrastructures potentially provide a physical base for a telecommunications infrastructure for the transmission of different types of information such as voice, video, image and data. The high information and computer illiteracy and minimal access to physical resources in developing dictate that governments should focus on simple solutions. One such example is to focus on technologies that can translate audio (voice) into digital format. Such technologies are especially critical given the high information and computer illiteracy in the rural and even urban settlements. Community knowledge and broadcasting can be tapped into via the use of community radios and this can then be translated into digital format. Audio technologies are already evident in the explosive growth of Internet phone and is a practice already being experimented with in countries such as India (UN-ICT Task Force, 2005).

Therefore the focus of the standardization should be on how to tap into community knowledge by using simple solutions that are currently understood and accepted by community members. Radios have been used in Kenya and many other developing countries for decades. Further still, the use of audio does not require someone to know how to read and write (part of literacy requirements), but to speak. The challenge is how to use *natural speech* as the input in building the *knowledge base* of the communities. Community knowledge then becomes the foundation for government policy interventions, since decisions can be made based on knowledge. Wireless data access can also be explored as a next step since given that despite decades of investments in physical telecommunications media; the telephone density is still quite low, thus contributing to low Internet diffusion. Further, investing in wireless data options such as Wi-Fi currently makes much more sense than continued investments in expensive switches and copper line to each household.

The NEII framework therefore is modified from the Lyytinen and Yoo's (2001) model. However, the contribution of the model presented here recognizes other levels: the need for strengthening institutions (formal institutions of governance), use of other forms of interaction (organizing forms) as well as a specific focus on the individuals (citizens, civil servants, businesses) as actors. The model referenced does not address how the formal institutions, the organizing forms and the actors do interact, especially given the unique differences between developed and developing countries and the assumptions that inform the setting up of formal institutions of governance (see Heeks, 2002; Muganda-Ochara, 2008). The proposed NEII

framework makes additions to the technology and services layers by taking into consideration the additional formal institutions (*institutional infrastructure*), *organizing forms* (mentioned in Heeks model) and the role of actors.

The point of departure from prior models stems from postulating that the linkages between the various layers arise from priorities that should emphasize the building of social, human, digital and human resources (Warschauer, 2004). These act as the 'glue' to the various institutional forms (institutional infrastructures and organizing forms, Heeks, 2002) and the services and technological infrastructures (various sources such as Lyytinen and Yoo, 2001; Hanseth, 1998; Ciborra, 2004)

Summary of the NECE Dimensions
The structure of the model therefore expresses the relationships by addressing the various concerns of social exclusion (physical resources, digital resources, human resources and social resources), which links the various layers as A, B, C, D. The framework has five layers of technological, services, institutional; organizing forms and actors' layers and clustered together using various resources (social, digital, human and physical), the result is three primary dimensions: *Confident Nomadic Communities*, *Nomadic Networks of Governance* and *Flexible Infrastructures*.

- Building *Confident Nomadic Communities* is aimed at economically empowering the individuals to enable them embrace services which rely on the Internet. Improving the Social Resources of Communities enhances their Social Capital and therefore helps them in building their confidence
- Building *Nomadic Networks of Governance* is targeted at linking of disparate organizing forms (informal structures such as churches, schools) and the administrative institutions of governance to 'mainstream' there functions towards achieving community and government goals. The focus is on building human resource capacity to debunk the myth associated with concepts such as e-government and e-commerce in order to enhance perception of value, access and acceptability. The concept of network as a metaphor is invoked to highlight the critical role of ICT in shaping social transformation (Castells, 1996; 2004).

Building *Flexible Infrastructures* process straddles two dimensions: the Technological Infrastructure and the Services Infrastructure. The resources that enable the effective use of an information infrastructure are the physical (labeled A) and digital resources (labeled B). The building of a flexible infrastructure emphasizes the necessity for a responsive physical infrastructure of heterogeneous technologies. The responsive physical infrastructure should provide the support base for building a service infrastructure based on heterogeneous needs of the population (such as localization of content), possible through flexible standardization (Braa et al, 2007). Therefore in order to achieve mass scale adoption, Braa et al (2007) advocate the need for scaling[11] through replication. For instance, the social exclusion occasioned by the predominance of English on most websites requires a focus on the *content (digital resources)* rather than the conduit used for the transmission of the content (Warschauer, 2004). This is the link that cements the Services Infrastructure dimension to the Technological Infrastructure. While the technological infrastructure aims at the building of a physical resource, the services infrastructure focuses on the building of digital resources. However, the relevance of digital content would dictate adoption of the services that depend on the NII on a mass scale

Conclusions
Given that building NII is a long' term project that can take years to develop, governments in developing countries need to focus on certain priorities in order to incrementally build an evolving infrastructure. This requires that governments in developing countries consciously set out to assess their national status to determine the *current installed base* that can be used as a foundation for evolution of the NII. The NII is required for a number of activities such as e-commerce and e-government.

The proposed NECE (Nomadic E-Government Co-Evolutionary) framework recognizes the importance of having a robust NII to achieve the goals of e-government. The e-government divide is prominently reported in various assessments that attempt to categorize countries at various levels of e-government maturity. African governments are consistently poor performers in these rankings (UN, 2008). In response, Heeks (2002) proposes a strategic *generic* model that elevates the best practice of *customization* to match African realities. The proposed NECE framework considers the problem of the e-government divide as a *social exclusion* problem (Warschauer, 2004) which is likely to be exacerbated by local e-government implementation practices.

---

[11] Scalability is identified as a basic requirement for successful IS development in developing countries (Sahay and Walsham 2005). Scale is referred to as the *scope of an IS* (how many users use the system), and scaling as the e*xpansion of the system in scope and size* (expanding the use of the system across geographical areas, as well as technical areas).

The new conceptualization of e-government presented in the NECE framework can be seen to have some practical implications. The NECE framework lays emphasis on the building an e-government infrastructure which is linked to the presence of various resources, which on the surface do not appear remotely connected to e-government. The conceptualization advocated for in the NECE framework recognizes that e-government is not only a technology solution, but also a social system that elevates the need for empowered individuals, communities and whole societies through the building of social, human, digital and physical resources. Thus the adoption of e-government should pay attention to the 'localities' within which the artifact is finding expression and that it is difficult to achieve successful implementation as long as it remains foreign and a myth.

Local adaptations and accommodation of e-government conceptualization requires re-contextualization and re-interpretation of the e-government organizing vision to fit in the long term, macro-economic, social, legal and political objectives of the government. Fitting the e-government vision at these levels, is hoped, elevates their visibility and diffusion at various levels. The NECE framework provides a way of perceiving e-government that allows for elevating the visibility of e-government to fit in these broad societal objectives of governance.

References

Brown, I., et al (2007). Global diffusion of the internet XI: Internet diffusion and its determinants in South Africa: The first decade of democracy (1994-2004) and beyond. *Communications of the Association for Information Systems, 19*(9), March, 2007.

Castells, M. (2004). *The Network society: a cross-cultural perspective*. Northampton, MA: Edward Elgar.

CCK, (2008). *Internet Market Study*. Retrieved from http://www.cck.go.ke/internet_market_study/ (Accessed, 30th March, 2008)

Central Intelligence Agency (2008). World Fact book 2008. Retrieved from http://www.cia.gov/cia/publications/factbook/ns/factbook/] (Accessed April 22, 2008)

Ciborra, C. (2004). *The Labyrinths of Information- challenging the wisdom of systems*. Oxford University Press, 2004.

Eldon, M. (2005). ICT in Kenya, where are we now. Regional e-governance programme: progress from Tanzania*, 2nd EAC Regional Consultative Workshop* Nairobi, 28-29 June 2005.

Håndværksrådet. (2006). *Business Opportunities within the IT and Telecommunication Industry: Kenya*. Retrieved from http://www.um.dk.pdf.

Hanseth, O., and Monteiro, E. (1996). Information Infrastructure Development: The Tension between Standardization and Flexibility. In *Science, Technology & Human Values,* Vol. 21 No 4, Fall 1996, 407-426

Heeks, R. (2002). E-Government in Africa: Promise and Practice. *Information Polity*, 97(x), pp. 97-114.

Kleinrock L. (1995), Nomadic computing – an opportunity, Computer Communications Review, ACM SIGCOMM 25(1) 36–40.

KPLC (Kenya Power and Lighting Company), (2007). Rural Electrification boost in Mwala. Retrieved from http://www.kplc.co.ke/UserFiles/File/Press%20 Release%20-%20Mwala.doc

Mazlish, Bruce (1993). *The fourth discontinuity: the co-evolution of men and machines.*, Cambridge, New Haven, CT: Yale University Press

Monteiro, E. (1998). Scaling information infrastructure: the case of the next generation IP in Internet. *The Information Society*, 14(3).

Muganda-Ochara, N (2008). Emergence of the E-Government Artifact in an Environment of Social Exclusion in Kenya. *The African Journal of Information Systems*. Volume 1(1), pp. 18-43

Ndukwe, E. (2007). Promoting Internet-Based Businesses in Nigeria. Retrieved from http://www,ncc.gov.ng.

Oyelaran-Oyeyinka, Banji & Adeya, Nyaki, Catherine (2002). Internet Access in Africa: An Empirical Exploration. R*esearch Article*. The United Nations University: Institute for New Technologies, UNU/INTECH.

PRB (2008). Kenya: The Demographics of a Country in Turmoil. *Population Reference Bureau*. Retrieved from http://www.prb.org/Articles/2008/kenya.aspx (Accessed 9th June 2008).

Singh, H., A. Das., and Joseph. D. (2008). Country Level Determinants of E-Government Maturity. *Communications of the Association for Information Systems,* Volume (20)x, pp. 632-648.

Swanson, E.B, and Ramiller, N.C. (1997). The Organizing Vision in Information Systems

Innovation. *Organization Science*, Vol. 8, No. 5., pp. 458-474.

UN (2008). UN E-Government Survey 2008: From E-Government to Connected Governance. United Nations Publication. Retrieved from http://unpan1.un.org/intradoc/groups/public/d ocuments/UN/UNPAN028607.pdf .

UN-WPP (2008). Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, *World Population Prospects: The 2006 Revision* and *World Urbanization Prospects: The 2005 Revision*. Retrieved from http://esa.un.org/unpp.

Warschauer, M. (2003). *Technology and social inclusion rethinking the digital divide* (First ed.). Cambridge Massachusetts: MIT Press.

Wolcott, P., Press, L., McHenry, W., Goodman S., and Foster, W.(2001). "A framework for assessing the global diffusion of the internet", *Journal of the Association for Information Systems, 2*(6). Retrieved from http://mosaic.unomaha.edu/GDIIntro_2003.pdf.

Waema, T., Mitullah, W. (2007), E-Governance and Governance: A Case Study of the Assessment of the Effects of Integrated Financial Management System on Good Governance in Two Municipal Councils in Kenya. *ICEGOV2007*, December 10-13, 2007, Macao