THE WORLD BANK
Washington, DC

Good Urban Governance through ICT: Issues, Analysis, and Strategies

A Knowledge Product (KP)

By: Gaurav Relhan, Kremena Ionkova, Rumana Huque

Africa Urban & Water Sector Unit (AFTUW)
The World Bank

Table of Contents

FOREWORD **3**

SECTION I: URBAN DEVELOPMENT AND ICT **4**

1.1. THE DIMENSIONS OF URBAN CHANGE 4
1.2. THE ICT REALITY 6
ICT in the Urban System *7*

SECTION II: ROLE OF ICT FOR CITY GROWTH, IMPROVED GOVERNANCE, AND SERVICE DELIVERY **9**

2.1. LOCAL GOVERNANCE AND ECONOMIC DEVELOPMENT 10
Outline of Issues *10*
What can ICT do? *11*
2.2. INTERGOVERNMENTAL FISCAL RELATIONS AND MUNICIPAL FINANCE 17
Outline of Issues *17*
What can ICT do? *18*
2.3. URBAN POVERTY AND SLUM UPGRADING 22
Outline of Issues *22*
What can ICT do? *23*
2.4. URBAN PLANNING, LAND AND HOUSING 27
Outline of Issues *27*
What can ICT do? *28*
2.5. URBAN ENVIRONMENT AND CLIMATE CHANGE 32
Outline of Issues *32*
What can ICT do? *33*
2.6. WATER AND SANITATION SERVICE DELIVERY 37
Outline of Issues *37*
What can ICT do? *38*

SECTION III: ICT TOOLS/APPLICATIONS FOR URBAN & WATER MANAGEMENT **43**

3.1. E-GOVERNANCE TOOLS 43
3.1.1. Tool 1: e-Revenue (e-Billing, e-Taxes) *44*
3.1.2. Tool 2: e-Authorization (e-Registration, e-Permit, e-Contract) *45*
3.1.3. Tool 3: e-Procurement *46*
3.1.4. Tool 4: Financial Management Systems *47*
3.1.5. Tool 5: e-Citizen Development: e-Employment, e-Health, e-Education, etc *48*
3.1.6. Tool 6: e-Municipality *49*
General Methodology for Successful E-Governance Implementation *50*
3.2. SOCIAL ACCOUNTABILITY TOOLS 51
3.2.1. Tool 1: Surveys (Forecast/Retrospective) *52*
3.2.2. Tool 2: Citizen Outreach *53*
3.2.3. Tool 3: Digital Publication of Performance data *54*
3.2.4. Tool 4: e-Participation mechanisms (blogs, discussion groups, social networking, etc) *55*
General Methodology for Successful Social Accountability Implementation *56*
3.3. GIS SOLUTIONS 57
General Methodology for Successful GIS Implementation *59*

SECTION IV: POSSIBLE WBG ROLE AND NEXT STEPS **60**

4.1. MENU OF OPTIONS FOR THE WBG: SUGGESTIONS FROM WORLD BANK PRACTITIONERS *61*
4.2. MENU OF OPTIONS FOR THE WBG: SUGGESTIONS FROM READERS *61*

Foreword

Dear Reader,

Africa is currently experiencing the world's fastest urbanization rate at 3.5% annually -placing increasing pressure on resource-constrained local governments to maintain and improve livability standards of their cities. But simultaneously, an 'Information and Communication Technologies' (ICT) revolution has swept across the continent -as evidenced by vastly improved telecommunications and internet infrastructure, leapfrogging mobile communications penetration rates, and emergence of a successful homegrown IT applications industry. Successful e-initiatives in South Asia, Latin America and the Caribbean and other regions have demonstrated that harnessing of ICT can enable a range of activities when integrated into the urban development agenda, such as strengthened financial management systems, social accountability initiatives capturing citizens' feedback and so forth. In this context, this report seeks to explore similar strategies for transforming capabilities of urban agencies in the Africa Region through the power of ICT.

In view of the World Bank Group's (WBG) commitment towards promoting sustainable urban development, the objective of this analytical report is to support the strategic direction, focus, and action plan in governance reform by implementing ICT within the urban development framework of the Africa Region. With a focus on replicating successful ICT-Urban Governance strategies in Africa, this report aims to (i) synthesize the role currently played by ICT towards improved governance, management and accountability of urban service providers in Africa as well as other Regions, (ii) explore current ICT initiatives that are relevant to the World Bank's thematic concerns, (iii) reconcile existing deficiencies/barriers towards potential for replication, and (iv) develop a roadmap to render easy strategy implementation by project teams.

Section I outlines evolving trends in urban governance and presents ICT as a potential tool in the environment of modern governance. Section II discusses the role of ICT in some of the Bank's core areas of urban focus, namely: Local Governance & Economic Development; Intergovernmental Fiscal Relations & Municipal Finance; Urban Poverty & Slum Upgrading; Urban Planning, Land & Housing; Urban Environment & Climate Change; and Water & Sanitation Service Delivery. An analysis of fundamental ICT methodologies employed is discussed in Section III. Section IV, in conclusion, suggests an action-plan for enhancing ICT initiatives as a component of the Bank's lending activities.

But essentially, this report is a work in progress -and requires your inputs to finish! We encourage you to join in the discussion and help shape the World Bank's roadmap towards applying ICT for urban improvement. Are you aware of any interesting ICT application or methodology that could transform Africa's cities? Do you have feedback or suggestions on what the World Bank's next steps should be in this direction? Or simply have questions or need clarifications on the material already presented in this report? Then do let us know! Your views will be incorporated (with accreditation to your name if permitted) in Section IV, building upon some of the ideas already contributed by Bank staff. Thoughts, suggestions, and comments can be conveyed to us using the online feedback form or by emailing grelhan@ifc.org. If you are on Facebook, post your suggestions to the World Bank Africa page. On Twitter, reply to @WorldBankAfrica

Hope to hear from you soon. Happy Reading!

Best Wishes,

Gaurav Relhan

Section I: Urban Development and ICT

From the founding of ancient Harappa–Mohenjodaro, to the ascent of Rome and Constantinople, to the flourishing of today's teeming cities, urban agglomeration bears testimony to humanity's transitioning from agrarian existence towards opportunity-laden clustered inhabitation. Now for the first time in history, more than half the world's population lives in urban areas.[1] Over 90 percent of urbanization is taking place in developing countries, with the Africa Region experiencing the highest rate of urbanization at 3.5 % annually.[2] But while rapid urbanization is transforming urban centers into drivers of economic growth, it can increase poverty if not managed well and may reverse earlier development gains. It also places enormous pressure on cash-strapped governments to meet rapidly increasing demand for services. To this end, the ensuing sub-sections observe salient aspects of the current urbanization context, and in view of the challenges posed to sub-national governments by such phenomena, present the possibilities for ICT to act as an enabler of positive change in the realm of urban governance and management.

1.1. The Dimensions of Urban Change

The following paragraphs delineate emerging trends in the urban agglomeration scenario, namely, Urbanization and the Growing role of cities as engines of economic growth:

Urbanization: Driven by rapid population growth and increased rural population influx, urbanization has become a defining phenomenon of this century, with nearly 2 billion new urban residents expected in the next 20 years and a likely doubling of urban populations in South Asia and Africa.[3] Urban areas in low- and middle-income nations today have more than a third of the world's total population, nearly three-quarters of its urban population and most of its large cities. They contain most of the economic activities in these nations and most of the new jobs created over the last few decades.[4] Many African states, notably, Botswana, Tanzania, Mozambique and Swaziland have had

[1] Source: WHO, (2010)
[2] Source: UNEP, *Africa Environment outlook, Past, Present and Future Perspectives* Available at: http://www.unep.org/dewa/Africa/publications/aeo-1/203.htm
[3] Source: The World Bank Urban and Local Government Strategy Report (2009)
[4] Source: IIED working Paper: *Adapting to Climate Change in Urban Areas – Possibilities and Constraints* (2007)

urban population growth rates more than twice the annual rates of natural increase for the overall population.[5] But while such rapid urbanization can be a means for wealth creation, associated costs of congestion, crime, pollution, etc., pose serious challenges to a city's performance.

To cope with such unprecedented urbanization phenomenon**,** many African countries have transferred power, resources and responsibilities to their sub-national urban governments through the process of decentralization, with South Africa, Uganda and Kenya spearheading the process particularly fast.[6] However, although decentralization has helped transfer greater fiscal autonomy and responsibility to local governments, bestowing them with greater say on ordinance formulation, revenue collection & budget allocation, they now find themselves lacking in the necessary resources and capacities required to fulfill their mandates.

Growing Role of Cities as Centers & Drivers of Economic Growth: The benefits of agglomeration and accompanying productivity gains constitute the basis of cities to emerge as engines of economic growth, with cities accounting for nearly 70 % of global GDP today.[7] One of the main drivers of this trend is that firms in many industrial and service enterprises value agglomeration as they prefer to concentrate close to other firms in the same or related product lines, and in locations with good access to domestic and international markets.[8] For instance, 50 % of China's GDP is generated in coastal urban agglomerations comprising only 20 % of the territory.[9] In India, liberalization in the early 1990s led to greater concentration of industry in port cities and metropolitan areas, enhancing economic activity in urban regions multi-fold.[10] Thus, the benefits of urbanization underscored by rising productivity, fluid labor markets, and greater market access has led to the recognition that urbanization can constitute a vital force for growth and poverty reduction.[11]

To cope in the wake of decentralization and the increasing importance of cities as engines of growth, the key objective of urban local governments should be effective urban governance with sustainable development linkages. To this end, municipalities are increasingly seeking greater assistance in

[5] Ibid
[6] Source: UN Paper (Dec 2007), *Political Decentralization in Africa: Experiences of Uganda, Rwanda and South. Africa*
[7] Ibid
[8] Ibid
[9] Source: McKinsey Global Institute (2008), *Preparing for China's Urban Billion*
[10] Source: World Bank Draft Report (2009), *Shrinking Distance Identifying Priorities for Territorial Integration*
[11] Source: The World Bank Urban and Local Government Strategy Report (2009)

strengthening governance mechanisms, planning service strategies, and making city management more effective to enable cities deliver on their mandate, which includes delivery of vital services to the urban poor.[12]

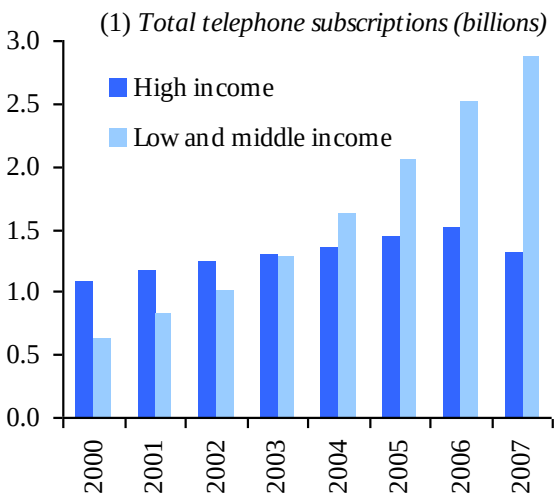
1.2. The ICT Reality

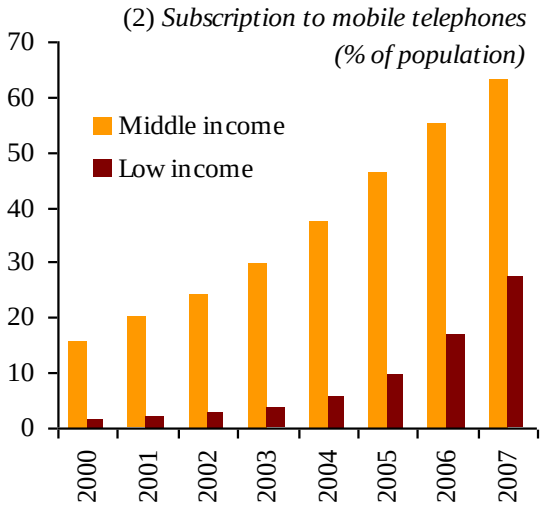
No longer limited to the developed world, there has been exponential growth in access to and use of ICT across the developing world, which includes the entire range of telecommunications networks, information technologies (IT), and electronic services (e-services). From telephone services over wireline and wireless networks, to the Internet and related multimedia applications, ICT has had a significant economic and social impact. Since 2008, there are more than 4 billion wireless telephone subscribers and 350 million broadband Internet subscribers worldwide.[13] The number of telephone subscriptions in the low- and middle-income countries exceeded those in high-income countries back in 2004 (see Chart 1).[14] Driven primarily by the rapid growth of wireless telephony, the developing world now has a widespread telecommunications infrastructure, and a deepening number of users (Chart 2).[15] Particularly noteworthy is the virtual explosion of mobile phones in many African countries, which surpassed 200 million subscribers in early 2007 (providing mobile telephony access to almost 50% of the continent's population) and continues to grow at higher rates than any other region.[16]

As these ICT networks spread, they create new economic and social opportunities. By rendering a platform over which businesses, governments, and citizens can communicate, engage in commercial activities and participate in public life, ICT has ushered a change in the way of doing business and interacting socially in developing countries. They connect otherwise separate markets, link people with each other, and allow global coordination of economic activities—creating jobs, increasing incomes, facilitating trade, and reducing costs associated with distance and time. It is estimated that every 10 % increase in the market penetration of mobile phones boosts GDP growth by 6 percentage

[12] Source: The World Bank Urban and Local Government Strategy Report (2009)
[13] Source: ITU, World Bank data, 2008
[14] Ibid
[15] Ibid
[16] Source: 10th Africa Partnership Forum (2008), *ICT in Africa: Boosting Economic Growth & Poverty Reduction*

points.[17] Another estimate suggests that for every 10 % increase in broadband Internet service penetration in a particular area, employment would increase 2 to 3 percentage points per year.[18]





ICT in the Urban System

The extensive prevalence of ICT can be leveraged to extend the reach and quality of public services. Already, the widespread mobile phone platform is being used to provide basic financial services in countries as diverse as Kenya, the Philippines, and Afghanistan. These services can target subsidies or cash payments from local governments to citizens better and more efficiently. Healthcare professionals are also using ICT—the Internet and the telephone—to manage their resources and patients better. Simple applications such as appointment or immunization reminders or services that are more complex, for instance, drug-inventory control is possible.[19] Connected citizens can also provide feedback or register their grievances quicker, leading to improved accountability mechanisms and enhanced service quality.

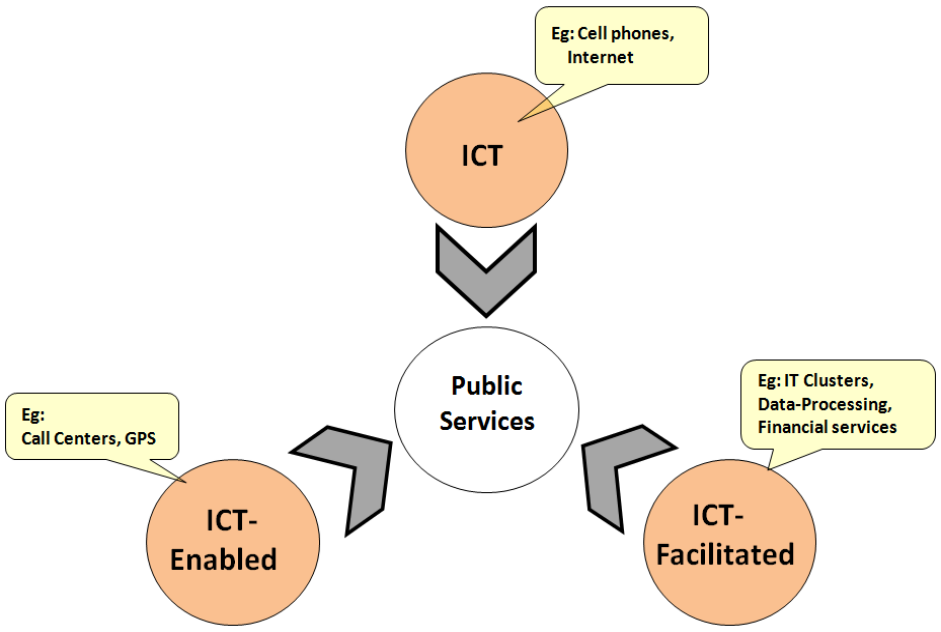
In view of the profusion of mobile services, a salient aspect to note is that these can be harnessed effectively by local governments as well. For instance, Mobile telephone-based payment systems (m-payment) have helped cash transfer programs overcome obstacles to distribution. Without a working

[17] Source: Asheeta Bhavnani, Rowena Won-Wai Chiu, et all, *The role of mobile phones in sustainable rural poverty reduction, World Bank Global ICT Department,* June 15, 2008
[18] Source: Robert Crandall, William Lehr and Robert Litan, *The Effects of Broadband Deployment on Output and Employment, Benton Foundation*, June 2007
[19] Voxiva, mHealth: http://www.voxiva.com/solutionspage.php?catname=mHealth

banking or insurable fund transfer system, the Democratic Republic of Congo (DRC) has turned to m-payments to distribute allowances as part of its program to demobilize and reintegrate ex-combatants. Since 2006, the Government has made m-payments of US$50 million to 100,000 ex-combatants.[20]

Interestingly, the ICT sector itself can have a significant economic impact on urban communities. Cities in the Silicon Valley in California, or Bangalore or Hyderabad in India are testament to the surge in investments, job creation, and tax revenues following the clustering of IT companies given a positive business environment. Improved connectivity with global markets, and the use of ICT (using GPS devices) to improve the efficiency of transportation, for instance, can also result in great cost savings and economic growth. Indeed, investments in ICT infrastructure (telephone, cellular and radio services, and electronic communication), and related services, such as financial, banking, insurance, and other various forms of trade, were the primary boosters of growth in 39 of the 245 fastest growing cities in the developing world.[21] The various ICT strategies that can assist in the direction of improving urban public services are shown in Figure 1 below.

Figure 1: ICT for Public Services



[20] World Bank Operations Policy and Country Services (2008), *Cash transfer programs in emergency situations: A good practice and guidance note*

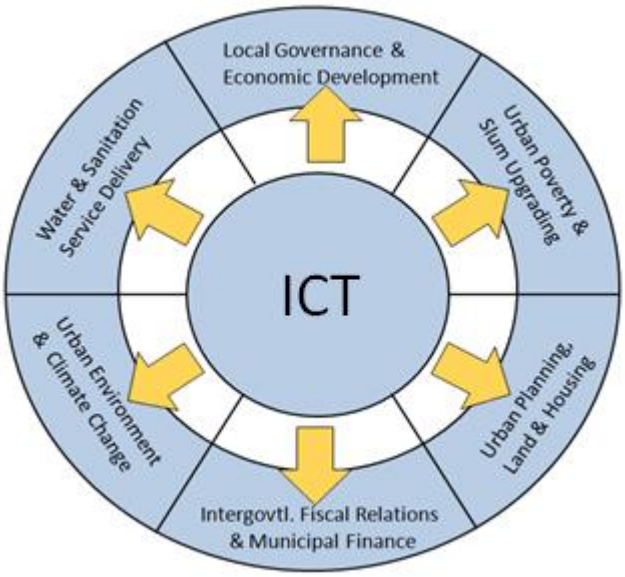
[21] UN Habitat, State of the World's Cities 2008/2009: Harmonious cities, 2008

Section II: Role of ICT for City Growth, Improved Governance, and Service Delivery

As observed in Section 1.1, the processes of urbanization, decentralization and the emergence of cities as drivers of growth are placing stress on the resources and capabilities of local governments. In the urban context of many developing countries, access to public-sector services in basic sectors such as water and sanitation services, public safety, housing, and roads is often limited and increasingly constrained. But a number of innovative applications that harness ICT are helping developing countries improve the daily lives of citizenry by transforming the delivery of services and reforming operations in most sectors of the economy. Cities - long the ICT hubs and focal points in their countries - can utilize these new technologies and applications to amplify the benefits of urban agglomeration, thereby serving their citizens and businesses better.

In context of urban development in Africa, the World Bank currently focuses on Local Governance & Economic Development; Intergovernmental Fiscal Relations & Municipal Finance; Urban Poverty & Slum Upgrading; Urban Planning, Land & Housing; Urban Environment & Climate Change; and Water & Sanitation Service Delivery. With the help of various examples, this section illustrates how mainstreaming ICT into sub-national government functions can assist development organizations to design programs within key thematic arenas to support African cities in fulfilling their service obligations effectively (Figure 2).

Figure 2: ICT & Transformation across urban concerns in Africa



2.1. Local Governance and Economic Development

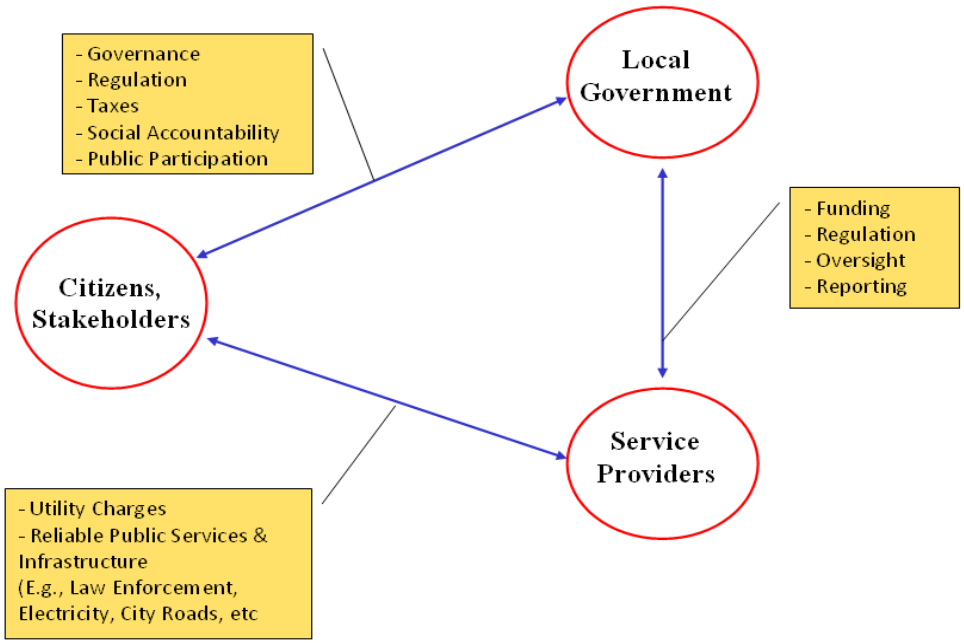
Outline of Issues

Decentralization provides an opportunity to assess how local governments can adopt ICT for bridging deficiencies in resource capabilities to achieve good urban governance and city management. As a result, there is growing recognition that good governance requires tools to enable the inclusion and representation of urban stakeholders, as well as ensure accountability and integrity of local government actions.[22] For instance, cities need tools/solutions to transparently smoothen tax revenue mobilization, enhance data collection, achieve monitoring at the city level, and consequently obtain market-based financing. In addition, efficient and accountable service delivery platforms are needed to improve productivity as well as build trust, confidence and respect amongst citizens towards local administrations.

Simultaneously, local government agencies are facing increasing pressures of youth unemployment, crime and poverty, due to a rapidly growing urban population. Thus, in view of the strong linkages between economic growth, job creation and enhanced governability,[23] creating ICT strategies for improved urban governance will also entail formulation of wealth-creation measures by fostering economic development in cities. To build economic competitiveness, the city should be able to respond to market opportunities efficiently through its factor markets (i.e., labor, capital, etc.) and infrastructure provision. It should also be able to attract investments and industrial development that relates to its specific competitive advantages.[24] Further, the local administration and regulatory environment should be business-friendly and responsive to market needs.[25]

In context of Local Governance and Economic Development, the various issues observed along the linkages connecting urban actors are illustrated schematically below:

[22] Source: The World Bank*, Partnerships for Development*
[23] Source: IFC, *Corporate Governance: A Powerful tool in the Battle against Poverty*
[24] Source: The Grey Chronicles (2009), *Competitiveness According to WEF*
[25] Ibid



What can ICT do?

As shown in Table 2A.1, ICT can play a significant role in improving city governance as it supports public participation, simplifies information flows & increased transparency while reducing discretion. Also, a modern ICT infrastructure contributes to enhancing economic competitiveness.

Table 2A.1 – ICT for Urban Governance & Economic Development

Reform Objectives	ICT Uses, Impact	ICT Examples[26]
Enable Participatory Governance	**1]** Widespread access to ICT allows citizens to be closer to government by improving citizen engagement and institutional responsiveness. **2]** 'Connected' citizens provide feedback, register their grievances quicker, improving accountability of government officials as well as service quality. **3]** By maintaining anonymity of users, ICT eliminate entry barriers for all citizens.	**1]** The city of Tartu in Estonia has begun an "m-Tartu" program allowing citizens to simplify and accelerate their interactions with government. For instance, the program enables people to pay for parking using their mobile phones. Already, over 50 percent of parking payments in Tartu are made over the mobile phone, while a "City phone 1789" service allows citizens to report issues such as non-working street lamps, broken park benches, pot-holes, etc. SMS alerts are distributed from the police to neighbor-watch teams, bus and taxi drivers. **Tools applied: Mobile Phones, e-Municipality** **2]** A new mobile application in Caracas, Venezuela allows people to report crimes to the police through SMS text messages. The messages go to a central server, which plots them on a map, allowing police officials to devise strategies and tactics to solve problems in their assigned area. **Tools applied: Mobile Phones, Online Mapping (using GIS)**

[26] Please refer to Section III for in-depth explanation of Social Accountability, E-Government, GIS tool categories

Foster Economic Development	**1]** Access to global talent, technology, capital, and knowledge facilitates partnerships between businesses, citizens and municipalities. **2]** High quality, affordable ICT access allows cities to attract and support businesses **3]** ICT *(Broadband connectivity, SME Clustering, industry Partnerships, etc)* helps cities improve competitiveness by increasing overall productivity, supporting trade, and making factor markets more efficient. **4]** Municipality e-services such as e-Registration, e-Permit, etc enhance convenience of establishing businesses in cities.	**1]** A web-based service provided in London, UK offers city residents a way to receive concise and relevant advertisements for IT, sales and marketing jobs. After a prospective employer enters relevant information at the website, the service broadcasts the advertisement via SMS directly to the mobile phones of subscribers who fit the required profile. **Tools applied: Internet, Mobile Phones, e-Participation** **2]** The 'Smart City' ICT initiative of Cape Town, South Africa has allowed the city to manage its resources more efficiently and help create a citizen-focused environment. See **Case Study in Box 2A.1** for an in-depth description.
Increase Transparen-cy, Reduce Corruption	**1]** Real-time monitoring of systems and resources makes it easier to expose wrongdoings. **2]** Simplifies government to citizen and business transactions by eliminating intermediaries. **3]** Budget monitoring by citizens is critical for enabling citizens hold local governments accountable.	Through the 'BRIS' ICT application implemented in Rajshahi, Bangladesh, the process of granting Birth Certificates to citizens has been simplified, vastly reducing the scope for corruption and inefficiencies. Also, ICT-enabled incentives motivate citizens to avail of this service. See **Case Study in Box 2A.2** for an in-depth description.

BOX 2A.1– Cape Town's 'Smart City' Strategy

Despite the City of Cape Town being one of the most productive city in South Africa, it recognized that its output per capita is less than one-sixth that of industrialized countries and large sections of the community live in poverty, unemployment and ill health. Thus the city administration of Cape Town launched in 2002 its award-winning 'Smart City' strategy, the objectives of which were to achieve:

- A city where 80% of residents, businesses and institutions are connected to each other and the world through well-developed ICT skills;
- A city where 80% of the population will be able to interact with the city administration through the use of ICT, allowing citizens to deal with local government services in an integrated manner, via "one-stop-shops";
- More customer-friendly and citizen-oriented local government via easy, timely access to relevant, accurate Council information.

As components of the 'Smart City' strategy, a number of initiatives were implemented:

'Externally' focused projects included 'Smart Cape Access' (which made computers with free internet access available to any citizen in six public libraries); 'Library Business Corners' (providing accessible information and support networks for starting and running SMEs); 'Digital Business Centers' (providing telephones, faxes, scanners, etc and business services such as accounting, legal, tourism, etc); 'Training Learnerships in ICT' (ICT training opportunities to unemployed, disadvantaged individuals).

Through the *'Internally'* focused projects**,** the City administration initiated standardized IT services within the organization, as well as enabled internal electronic communications (intranet, emails,); developed the City government Web Site and provided training on ICT to city administrators. In addition, a comprehensive IT solution for managing financial, revenue, HR, operations and other municipality services on a single system was implemented.

Results: The complexity of municipal processes is now vastly reduced. Duplication has been minimized, manual processes have been automated and location and distance are no longer limiting factors. This project has enabled the city to facilitate the merger and transformation of the ICT systems of seven previous autonomous local authorities. These factors have helped increase productivity of the local government.

This ICT initiative has allowed the city to manage its resources more efficiently and help create a citizen-focused environment. Access to the city's new system is available from more than 500 sites across the city, where all citizens have access to a consistent level of service. Improved visibility and transparency of information, the possibility for citizens to pay their accounts at any municipal pay point and the implementation of a call centre to address billing queries has reduced the possibility of corruption and has reduced 'trust deficit' amongst citizens.

Further, ICT capacity-building focus for both city administrators and underprivileged citizens highlights the importance attached to ICT towards spurring economic competitiveness of the city.

BOX 2A.2– BRIS (Birth Registration Information System) – Rajshahi City Corp, Bangladesh

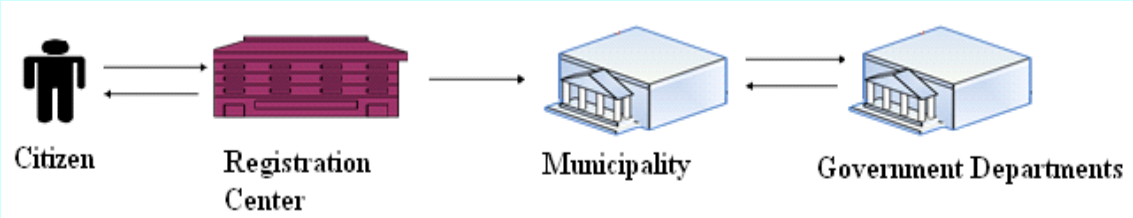
E-Governance has spurred reform in Rajshahi City Corporation (RCC), a municipality in Bangladesh via the implementation of an electronic birth registration procedure. Birth registration, or provision of Birth certificates is an essential document for obtaining admission in schools, health facilities and other welfare services. Prior to this ICT application, all data pertaining to new-borns had to be entered by hand at the municipality. This manual process led to a number of problems:

- **Inefficient:** A simple query -such as the number of girls registered- took a very long time to answer, since all register books had to be personally searched & separate tally sheets prepared.
- **Lacked Accuracy:** The manual process was subject to delays and, in transferring data, errors, duplications and inconsistencies arose.
- **Poor Coordination:** Local government agencies for immigration, elections, education, statistics, and health services all undertook separate registration activities and processes, leading to unnecessary redundancies and duplication.

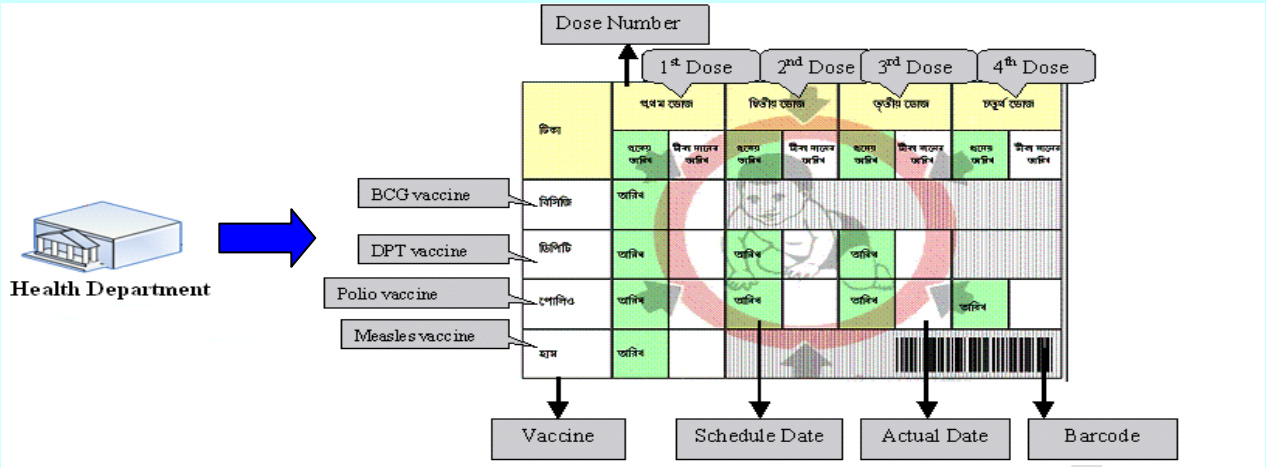
Moreover, poor citizens were unmotivated to perform birth registration, as the manual registration process was time-consuming (which meant sacrificing valuable labor days), and also involved transport costs and bribes.

The E-Governance tool developed to tackle this situation -the Birth Registration Information System (BRIS) - is a good example of how the municipality and health department can cooperate to provide incentives to citizens for performing birth registration, as well as providing them a means for doing so efficiently.

Through this tool, the process of awarding birth certificates is computerized. Here, citizens can visit designated centers located within the city to get birth certificates via computers. Particulars of the child, such as his name, address, Date of birth, etc get stored in the municipality's database and automatically transferred to the city's health and education departments.

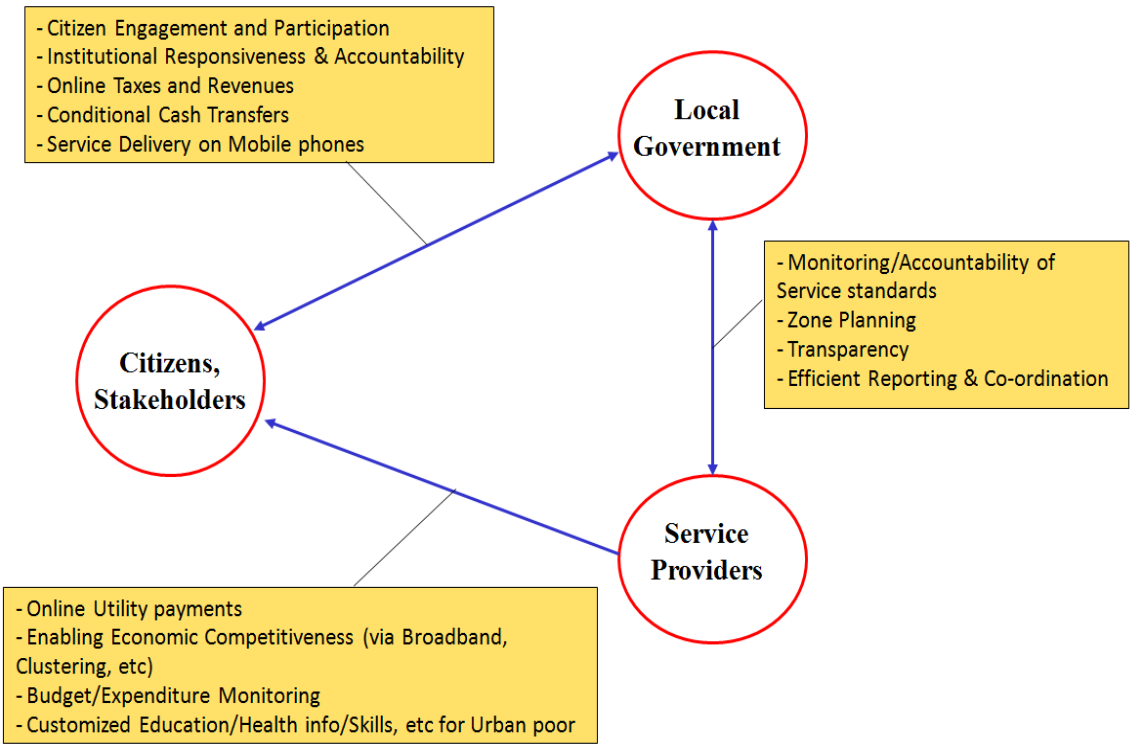


Simultaneously, the Health Dept processes new entries from RCC's e-Registration database on a daily basis. An important incentive for poor parents to obtain birth certificates for their children is the automatic generation of electronic immunization schedule which helps parents and municipal health workers keep track of the new-born's vaccination program. The electronic immunization schedule is provided to parents along with the birth certificates. With every visit to the health center, health records for the child can be updated by means of the barcode.



A target list of children whose immunization is due or overdue for a particular center is printed. City health workers use the list for house visits, knowing the child, address, vaccination required. Significantly, the system also supports vaccine usage and supply.

Uses of ICT for resolving issues affecting urban actors in the domain of Urban Governance & Economic Growth can be illustrated graphically as follows:



Potential for Africa:

ICT is increasingly being integrated into the development programs of Africa Region sub-national agencies, as highlighted by their prominent position in the New Partnership for Africa's Development (NEPAD) agenda.[27] In this regard, to bridge the digital divide in the context of local governance, steps are being taken to gradually institutionalize ICT tools in the administration mechanism of African municipalities to establish more efficient, effective and transparent systems. Cognizant of the challenges which exist for this transition to be successful, Table 2A.2 discusses salient arenas for electronic tools to spur local governance services and economic competitiveness within the urban sector framework of the Africa Region.

[27] Source: IDRC, *From e-Government to e-Governance: a paradigmatic shift*

Table 2A.2 – ICT Potential in Africa for Urban Governance & Economic Development

Issue	Description	ICT Potential
Limited technology resources discourage public participation in urban governance.	Poor ICT infrastructure, low ICT penetration levels, diverse demographic & geographic conditions lead to unequal/inadequate access to affordable telephones, computers, Internet, etc required to enable citizen participation in governance. Also, imported ICT solutions often result in local requirement mismatches or incompatibility with technical systems already in place.	In view of high installation costs and expenses associated with the use of broadband, satellite dishes, etc., more affordable alternative technologies (e.g., mobile technology, Social Accountability on cell-phones, etc) could be considered to ensure public access to urban governance. To bridge language, culture and technology-divides, locally-based development of ICT contents and applications can play a big role.
Prerequisites for decentralization are still to be achieved in many African cities.	Despite a number of agencies in Africa having embarked upon the process of decentralization, clear legislative and regulatory environments, which are key for decentralization, are still being framed in many African countries - especially within those emerging or just emerged from conflict or crisis.	To facilitate appropriate 'hand-off' and co-ordination mechanisms required for the decentralization process, ICT can portray readiness of cities to assume greater responsibility from the State by ensuring basic transparency, accountability and operational efficiency at the municipality-level.
Economic growth is hindered by weak governance capability, fraud, and corruption within local agencies.	To stimulate economic development in African cities, a proper/robust regulatory framework is required for enabling secure, trustworthy business transactions and information exchanges between governments, citizens and businesses.	Adoption of information management systems can induce better responsiveness of sub-national agencies as well as build regulatory environments in cities through enhanced monitoring and streamlined business transactions. An example of the efficient use of ICT to fight corruption is the launching of the Electronic Graft Management (EGM) project in Kenya. The EGM project offered a corruption reporting facility in six towns with existing Internet infrastructure. Anonymity of users was ensured and reports were transmitted to EGM centers for analysis and follow-up with relevant authorities.
Many post-conflict and in-transition countries have inadequate procurement systems	The absence of effective frameworks for regulating public work contracts, such as streamlined award processes, fair and transparent bidding processes, clear establishment of obligations, etc hinder efficient and economical use of public resources.	ICT such as e-procurement can help overcome inefficient procurement systems and supply chain management by opening up a diverse range of service needs to contractors. Processes such as bid tendering, evaluation of bids, etc can be streamlined and made transparent. Through this system, transaction costs on government contracts can also be reduced.

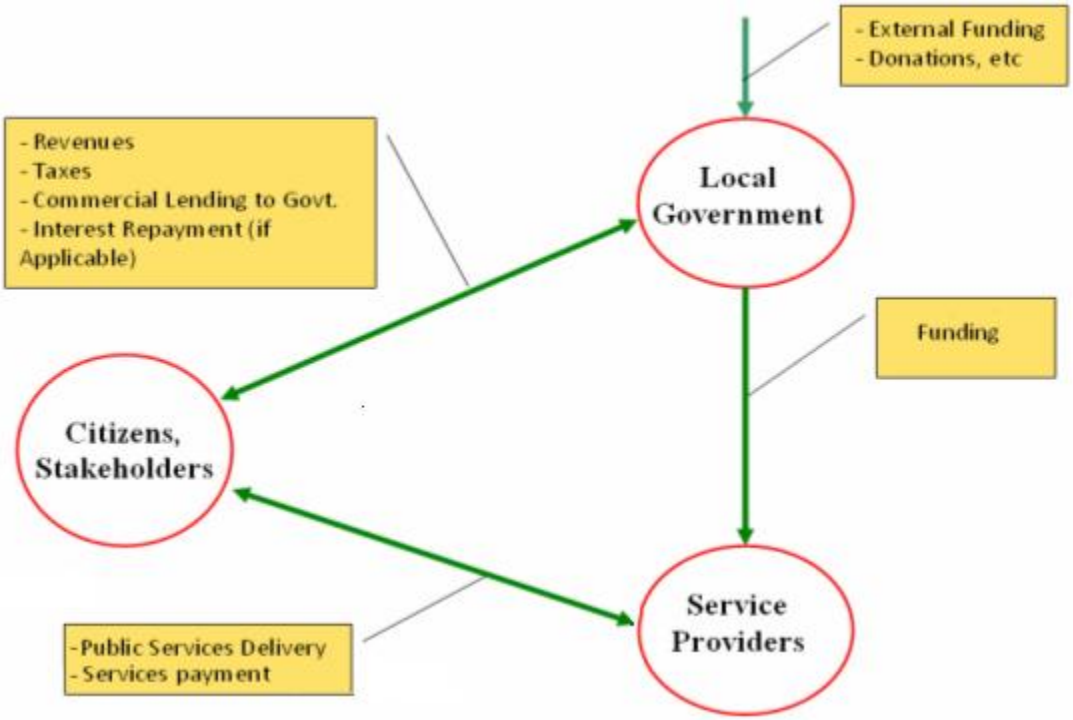
2.2. Intergovernmental Fiscal Relations and Municipal Finance

Outline of Issues

Decentralization has led to sub-national governments assuming greater fiscal responsibility in many developing and in-transition countries. Cities also depend on grants and intergovernmental transfers to sustain operations. In both cases, transparent and sound fiscal management involving effective revenue mobilization at the local level is required to ensure that cities have adequate financial resources and are able to spend these resources judiciously. Municipal bodies often aim at incorporating fiscal and financial discipline to avoid reduction in essential services or increase taxation levels to citizens and businesses in order to reduce financial gaps. Also, for municipalities with access to commercial banking, lower credit ratings assigned to financially unsustainable municipalities can squeeze essential services on account of increased borrowing costs, adversely affecting urban life-quality and economic growth in the city.[28] For instance, consultancy firm Booz Allen Hamilton estimates that by 2030, cities will raise up to $40 trillion worldwide for investment in urban development, so lower borrowing costs will indeed have a major impact on the ability of cities to compete globally. This is especially important for developing countries, whose cities will need about $25 trillion of this amount to fund their urban infrastructure development.[29]

In context of Intergovernmental Fiscal Relations and Municipal Finance, the various issues observed along the linkages connecting urban actors are illustrated schematically below:

[28] See: http://www.suntimes.com/news/2570066,city-bond-rating-downgraded-080510.article
[29] Viren Doshi, Gary Schulman, and Daniel Gabaldon, Lights! Water! Motion! strategy+business, Issue 46, Spring 2007



What can ICT do?

By facilitating information exchange among agencies, within and outside cities, ICT can improve the management of urban agencies' financial resources via improved internal efficiencies, data security and cost control. This is discussed further in Table 2B.1 below:

Table 2B.1 – ICT for Intergovernmental Fiscal Relations & Municipal Finance

Reform Objectives	ICT Uses, Impact	ICT Examples[30]
Better Financial Management	Using IT-enabled financial management systems, cities can: **1]** Track their spending and improve policy-oriented budgeting **2]** Put financial data online to improve transparency **3]** Engage citizens in budget development and resource allocation **4]** Improve credit worthiness for enhanced municipal bond ratings	Using a Financial Management Information System (FMIS) as a component of its e-government services, the city of Tallinn, Estonia is able to track its public spending, devise policy-oriented budgeting, and put financial data online to improve transparency. The system also makes available e-procurement tools to maximize use of public funds by reducing corruption and accessing prices that are more competitive. **Tools applied: IFMIS**

[30] Please refer to Section III for in-depth explanation of Social Accountability, E-Government, GIS tool categories

Effective Revenue Collection Mechanisms	**1]** Improve and streamline tax collection. Already, Internet-based tax filing systems for both businesses and citizens are widespread. **2]** Automation makes monitoring of revenue collections easier, improving overall compliance and regulation. **3]** Registering local businesses and compiling land records using ICT boosts tax/revenue collections, by avoiding avenues for corruption.	**1]** The administration of Chandigarh, India launched project 'Sampark' to establish electronic-service providers at various locations. As there are no jurisdiction limitations, the system provided different municipality billing services such as Payment of Taxes, Payment of Water, Sewerage, and Electricity Bills, Issue of Bus Passes, etc under a single roof thereby reducing transaction costs, reducing possibilities for corruption, and saving customer time. **Tools applied: e-Billing** **2]** The Contribution Network Project (CNP) in Mauritius facilitates electronic payment of tax to municipalities for all large and medium employers in the country. See **Case Study in Box 2B** for an in-depth description.
Transparent and efficient monitoring of expenditures, revenues, and assets.	**1]** Integrated Financial Management Information Systems (IFMIS) enable prompt and efficient access to financial and non-financial data and help strengthen local government financial controls. **2]** Selling surplus assets and services online can bring new revenue streams to municipalities.	
Efficient Intergovernmental Transfers	**1]** Structured data transmission between organizations by electronic means can reduce turnaround times from bid to allocation whilst improving transparency and accountability. **2]** Intergovernmental transfers done through electronic fund transfer mechanisms improve efficiency and transparency.	In Ulaan Baatar, Mongolia, an e-financials solution connects the Central Treasury with the Central Bank, commercial banks, the capital city treasury and 9 distrICT. A Treasury Single Account (TSA) was created using the system to capture all expenditures and revenues. The Chart of Accounts (COA) was configured to manage 4787 budget entities and 69 multi-funds. This IT solution provides strong budgetary controls at several levels - (1) the budget approved by Parliament and allocated to local governments, (2) Summary level, (3) Item level, (4) Check controls. As a result of improved expenditure control, a USD 50 million surplus was recorded in 2005. **Tools Applied: IFMIS**

BOX 2B– The 'Contribution Network Project' of Mauritius

The Contribution Network Project (CNP) in Mauritius is a Government-to-Business (G2B) initiative of the Ministry of Finance that allows electronic payment of tax to municipalities for all large and medium employers in the country. Through a public-private partnership, the project has set up secured networks and ICT applications allowing a fully electronic tax collection in Mauritius.

General objectives

Contributions and taxes constitute an important revenue stream for the local governments of Mauritius. Income Taxes and VAT account for around 34% of the government annual revenue. Tax collections are handled by 3 different government departments (Income Tax Department, the VAT Department and the

Ministry of Social Security, National Solidarity & Senior Citizen Welfare and Reform Institutions). Despite the computerization of these various departments since 1993, tax collection remained a paper based, time consuming and cumbersome process. Hence, the overall objective of the Contributions Network Project (CNP) is to increase the efficiency of the revenue collection process through the use of ICT to allow electronic submission of returns and corporate information as well as payment of taxes and fees.

The CNP has implemented two alternate methods of electronic submission of returns:

1] For large employers i.e. companies contributing over 12 million Rs (400,000 USD) as monthly VAT payment, an 'Electronic Data Interchange' (EDI) software (available for download through the website) is used to input all the data, which is then translated into special messages, processed and routed to the relevant government departments and commercial banks.

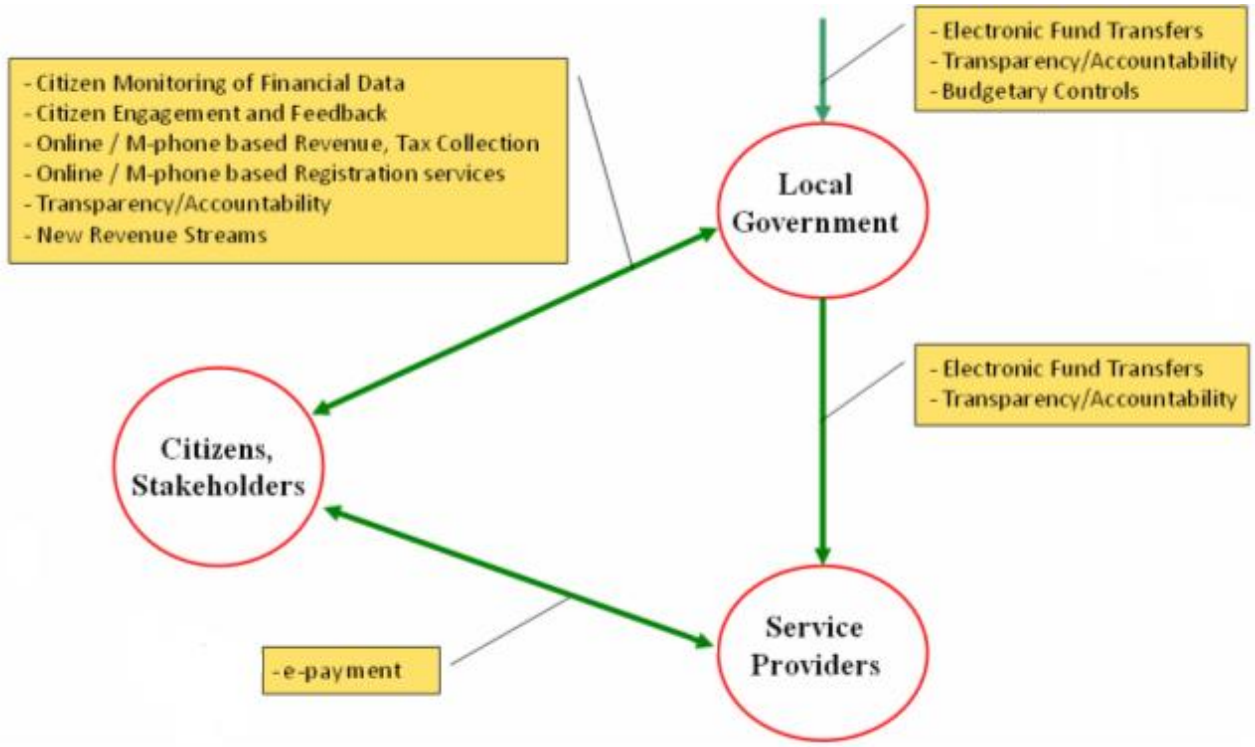
2] For smaller employers, instead of EDI software, a simpler web-based tool allows them to submit their returns securely through common Internet browsers.

Upon receipt of a return, automatic acknowledgment is sent to both the employer and the relevant government department. The employer's bank is notified and instructed to execute the necessary fund transfer to the government's account. Credit and debit notification messages are then relayed to both parties including all the details of the transaction. Special provisions have been put in place to ensure that duplicate contributions are annulled.

Benefits:

- Redeployment of government staff to more productive tasks.
- Faster electronic processes of tax collection.
- Unified Tax Id number and filing process (as opposed to the different paper-based processes in each tax agency).
- Eliminate paper returns and paper payments.
- Guaranteed confidentiality and security of confidential information.
- Convenience of doing the submission directly from home/office, hence avoiding the time-consuming physical movements to the various government departments.

Uses of ICT for resolving issues affecting urban actors in the domain of Intergovernmental Fiscal Relations and Municipal Finance can be illustrated graphically as follows:



Potential for Africa:

The task of efficient revenue mobilization for local governments is more complex and urgent in low capacity/post-conflict environments as there are immediate financing needs for provision of basic essential urban services (such as sanitation, electricity, and roads). But in the face of political and cultural factors, disorganization of public structures, human resource deficiencies, conflict scars, etc., many countries in Africa face problems with regards to arrears in payments to municipality workers, lack of an effective internal control system, and are unable to confirm the quality of sub-national level fiscal data by reconciling bank accounts with accounting records.

Implementation of effective decentralized financial management in Africa requires tools and related capacity-building to overcome the above hindrances. In this regard, ICT such as IFMIS can help municipalities build credibility by enabling public monitoring of funds and placing effective record management controls (For instance, Processing only those transactions that are truly relevant to municipality mandate; recording only authorized transactions; and once recorded, ensuring the assets that they represent actually exist). Further, it can help municipalities effectively allocate funds/resources to balance budgets, and show compliance with budget execution guidelines.

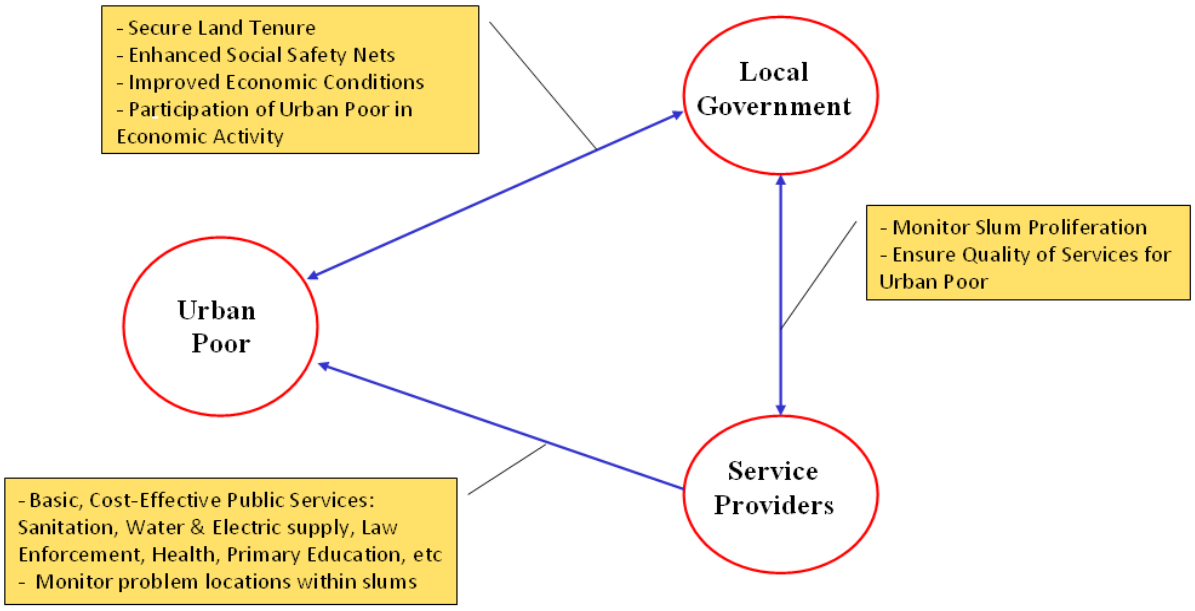
2.3. Urban Poverty and Slum Upgrading

Outline of Issues

Numerous studies have documented the potential of slums as incubators for upward social and economic mobility. [31] But as informal settlements with poor quality housing, limited access to services, and insecure land tenure, the urban poor remain at constant risk of eviction which prevents them from fully participating in income-generating activities. It is estimated that today around one-third of the urban population in developing countries - or nearly one billion people - live in urban slums in developing countries. By 2030 this number will swell to almost 5 billion, with urban growth mainly concentrated in Africa and Asia.[32] While Millennium Development Goal (MDG) 7 stipulates the objective for urban poverty alleviation by improving the lives of at least 100 million slum dwellers,[33] countries farthest from reaching this target are mainly in Sub-Saharan Africa, where an estimated 72 % of the urban population lives in slums due to rapid urbanization, migration, and incapacity of local governments to accommodate new residents.[34] Effective land management, social safety nets, improved economic conditions, reliable public services provision, and sanitation are some of the key issues where local governments require urgent solutions to enable slums become vibrant, productive and well integrated parts of a city.

In context of Urban Poverty and Slum Upgrading, the various issues observed along the linkages connecting urban actors are illustrated schematically below:

[31] UN HABITAT, Twenty First Session of the Governing Council, April 2007
[32] See http://www.unfpa.org/pds/urbanization.htm
[33] See *Systems of Cities*, The World Bank Urban and Local Government Strategy Report, Pp 13
[34] UN HABITAT (2006)



What can ICT do?

ICT can contribute towards helping cities improve the lives of the urban poor and socially vulnerable in slums by playing a key role in extending service delivery, strengthening social safety nets, and creating new opportunities for economic activity and slum improvement. This is explained further in Table 2C.1:

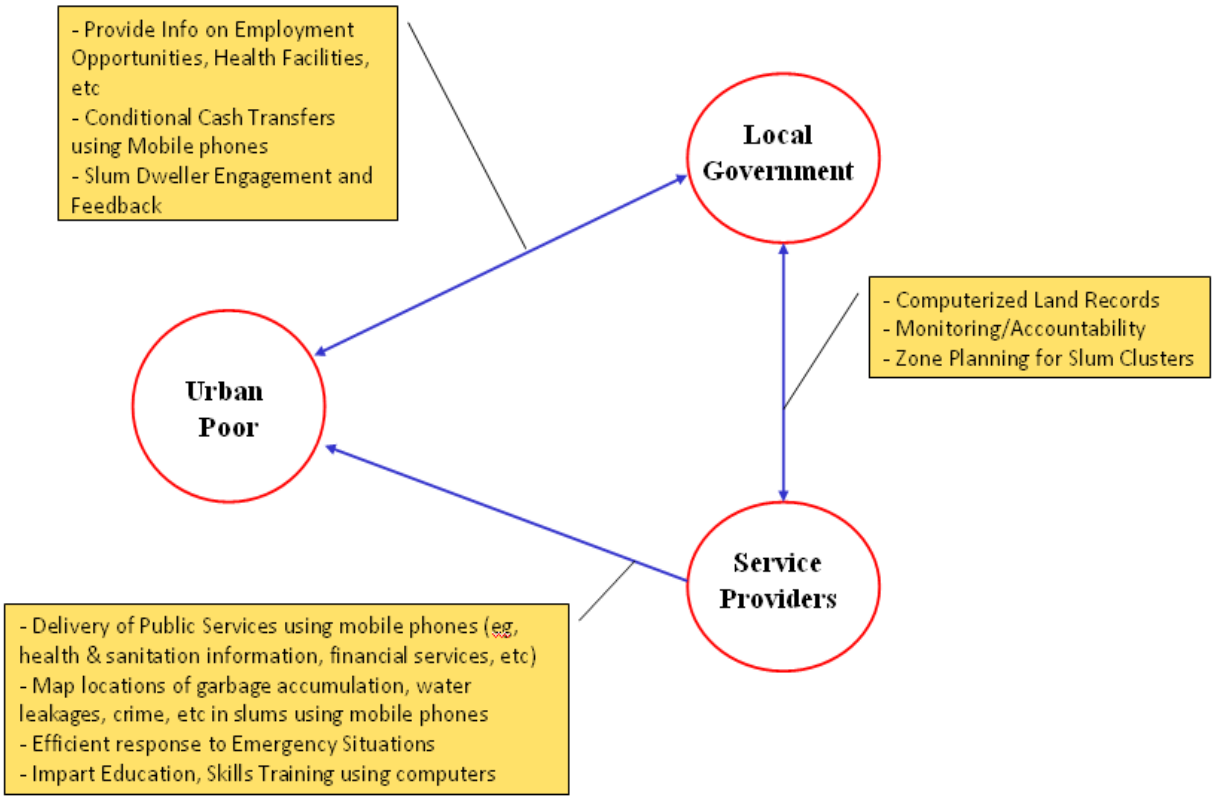
Table 2C.1 – ICT for Urban Poverty and Slum Upgrading

Reform Objectives	ICT Uses, Impact	ICT Examples[35]
Extend Public & Social Services	**1]** Use of mobile phone based health applications can improve the access of the urban poor to municipal medical services. **2]** Access to online/mobile phone banking, registration, municipality permits, etc can help reduce transport costs for the poor. **3]** The information collection, management, and sharing functions of ICT can help cities respond to crime and other emergency situations efficiently.	**1]** In remote Ginnack, Gambia, nurses in municipal clinics for the poor use a digital camera to record patient's symptoms and then send pictures electronically for diagnosis in a nearby town by more qualified doctors, or send them abroad to get a specialist's view. **Tools applied: Mobile phones, e-Health** **2]** In Vancouver, Canada, 'CompStat' (COMPuter STATistics) ensures the accountability of police departments towards the urban poor. CompStat sources information from lower-income neighborhoods via mobile phones or online, and employs GIS to map crime and identify problem areas. This allows police officials to reduce crime, and ultimately improve quality of life in their assigned area. **Tools applied: Mobile phones, Online Mapping/GIS**

[35] Please refer to Section III for in-depth explanation of Social Accountability, E-Government, GIS tool categories

Improve Socio-Economic Conditions of the Urban Poor	**1]** Conditional cash transfer programs that are triggered by (for instance) vaccinations or school attendance can be effectively implemented through mobile phones. **2]** ICT can provide improved access to information about employment opportunities, health facilities, schools, laws, etc	In urban slums of Rio De Janeiro and Sao Paulo, Brazil, an NGO created 110 Computer Science and Citizenship Schools using very limited resources. The schools train more than 25,000 young students per year in ICT skills that give them better opportunities for jobs, education, and life change. Social education on human rights, non-violence, environmental issues, and health is also provided through ICT. As a result, many participants developed renewed interest in formal schooling, resisted lure to join drug gangs, and greatly increased their self-esteem. **Tools applied: e-Employment, e-Health, e-Education, (Category: E-Government)**
Enhance Governme-nt and Service-provider response/focus towards Disadvantaged Groups	**1]** Empowering slum dwellers and other local communities through information on government and NGO services, facilities. **2]** Enabling slum-dwellers to provide grassroots level information and feedback on slum upgrading schemes.	In 2010, an outbreak of cholera in Haiti triggered fears that the disease will spread to the 1,300 refugee camps in the capital, Port-Au-Prince, where sanitation is poor. To tackle spread of the epidemic, aid agencies joined forces with mobile-telecom providers to disseminate awareness on clean water and sanitation via text-messaging relevant information/precautionary measures to camp residents. **Tools applied: Mobile phones, Citizen outreach (Social Accountability)**
Slum Improvem-ent & Governance	**1]** Empowering slum dwellers and other local communities through information on government and NGO services, facilities. **2]** Computerized land records can control further mushrooming of slums by classifying city zones. **3]** ICT can help bring to municipality attention location of leaking pipes, garbage accumulation, etc in slums.	To reclaim land for vitally needed urban infrastructure improvement in Sangli, India, , 29 slums were prioritized for relocation. With a view to avoid disruption of employment, health, education, etc access of slum residents, mapping tools recorded current location of slums, analyzed city layout and assigned relocation sites such that new colonies were located only 2-3 Kms from major places of work, hospitals, etc. **Tools applied: Online Mapping/GIS**

Uses of ICT for resolving issues affecting urban actors in the domain of urban poverty & slums can be illustrated schematically as follows:



Potential for Africa:

The growing use of information technology in sub-Saharan Africa Region points to the availability of ICT for improving slums, reducing poverty and increasing the number of opportunities available to the urban poor. A study in Nairobi's slums found that many city dwellers are already using mobile phones to operate small businesses and obtain information on housing availability & other basic services.[36] Further, studies indicate that lack of capital-building information – rather than discrimination *per se* – is a primary reason why poor communities remain poor.[37] In this light, as discussed below, there exists immense potential in Africa towards utilizing ICT for developing the urban poor:

[36] Rasna Warah, Divided City: Information Poverty in Nairobi's Slums, UN Chronicle, June-August, 2004
[37] Ibid

Table 2C.2 – ICT Potential in Africa for Urban Poverty Alleviation and Slum Upgrading

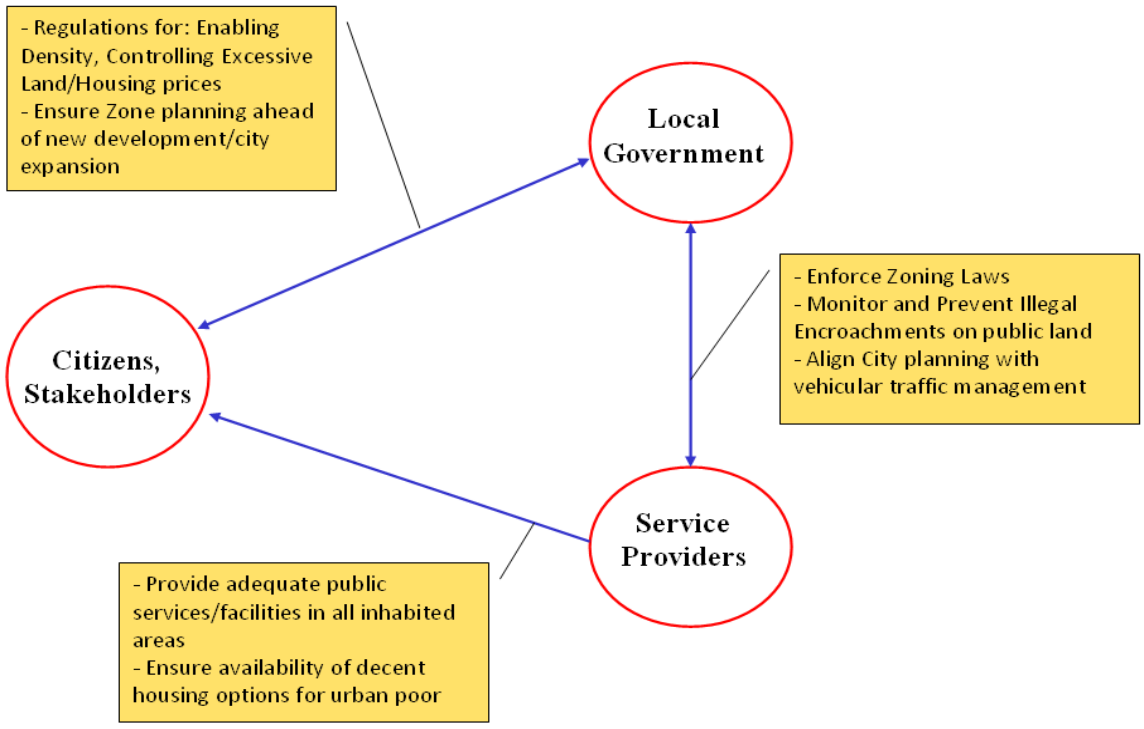
Issue	Description	ICT Potential
Very low availability of credit access hinders SME development (for urban poverty reduction) in Africa	Urban SMEs pay proportionately more for business services and transactions, such as legal, administrative and communication costs and require more responsive credit schemes, such as micro-credit.	As demonstrated by M-PESA schemes in Nairobi, ICT can improve access to credit and reduce the costs of doing business for urban SMEs.
Women suffer disproportionately from urban poverty, as they also provide for children and manage households.	Economic empowerment for women requires integrated approaches including education, training, entrepreneurship and leadership development and access to resources including micro-credit.	ICT can play a key role towards economic and political empowerment of women by disseminating vital skill development tools, as well as information on health, domestic violence redress mechanisms, etc. ICT can also increase access to micro-credit for women entrepreneurs.
Ensuring urban food security remains a vital, yet unaddressed component of urban poverty reduction strategies in Africa	Urban agriculture, which is increasingly being practiced in SSA cities, can be an important source of food for the urban poor, as well as an effective and cost-efficient end-use of urban waste. It may thus vastly contribute to urban sustainability.	ICT (such as land-mapping/GIS tools) can enable local governments incorporate urban agriculture in land-use planning
Lax zone planning deprives urban poor of secure tenures and encourages unauthorized construction.	Without security of tenure, access to credit is almost impossible as is the willingness of public authorities, the private sector and the urban poor themselves to invest in housing construction and improvement.	ICT (such as land-mapping/GIS tools) can enable local governments to effectively chart separate low-income housing zones for the urban poor and better regulate land zones.

2.4. Urban Planning, Land and Housing

Outline of Issues

The extension of cities beyond 'core' zones occurs usually in advance of urban planning work and provision of public facilities. However, the costs of not dealing now with the rapid expansion of cities in the Africa Region will be excessive and difficult to reverse in the future. To illustrate, more than 50% of the city streets in the Sub-Saharan Africa region have no names or addresses, especially in the poorest neighborhoods.[38] In 2009, poor urban planning (drainage and unenforced zoning laws) has been blamed for flooding in West Africa, affecting nearly 600,000 people.[39] So, as urbanization continues to put increasing pressure on already limited access to land, cities require new strategies to update their urban planning regulations for enabling density, and preventing demand pressures for scarce housing and land to bid up prices excessively. [40]

Uses of ICT for resolving issues affecting urban actors in the domain of Urban Planning, Land and Housing can be illustrated graphically as follows:



[38] See Catherine, Farvacque *Urban Planning in Africa: Addressing, Mapping and their Applications*
[39] See Voice of America (VOA), *Poor Urban Planning Partly to Blame for Flooding in Africa*, 16 Sept 2009.
[40] See Catherine, Farvacque *The Future of Africa Cities: Challenges and Priorities for Urban Development*

What can ICT do?

Table 2D.1 shows how ICT can potentially enable policy makers, planning agencies and communities conduct and formulate urban planning measures:

Table 2D.1 – ICT for Urban Planning, Land and Housing

Reform Objectives	ICT Uses, Impact	ICT Examples
Better monitoring, data collection, and processing	**1]** ICT can provide, in real-time, detailed property information on urban housing projects. This includes information on existing stock, upcoming projects, time series such as price and rental indices, and land transaction details. **2]** By conducting regular surveys and monitoring using ICT tools, it is possible to cross-check and validate (for example) new encroachments, authorized/illegal constructions, etc **3]** Faster, transparent approval process encourages residential and commercial construction, a major contributor to economic development.	City officials of Addis Ababa, Ethiopia utilized a GIS solution to facilitate the collection of vital information for efficiently creating urban planning proposals, managing services, and collecting tax revenues. See **Case Study in Box 2D** for an in-depth description.
Improve participatory planning.	**1]** In-depth, instant understanding of infrastructure and social service needs, creating opportunities for cities to deploy resources to fill these gaps effectively **2]** Citizen's feedback can influence city administration decision-making.	**1]** In the aftermath of hurricane Katrina, the Louisiana Recovery Authority launched a 'Louisiana Speaks' interactive blog site for reaching out to the public and conducting surveys to chart the rebuilding and planning process of New Orleans. The outreach resulted in over 27000 responses to a survey and thousands of participants in meetings and workshops. **2]** 'Planetizen', an urban planning –related news website, launched a debate on the future development of Mumbai slum Dharavi. This brought the topic of 'slum clearance versus upgrading' to local and global attention amongst urban planners, enhancing their knowledge of urban planning best practices pertaining to slum redevelopment. **Tools applied: e-Participation, online discussion forums, online surveys, etc (Category: Social Accountability)**

Avoid speculation and unnatural land price increases	**1]** Computerized land records , urban zoning, etc can control land grabbing, property tax rates and proliferation of illegal construction. **2]** Cooperation and concerted action by local authorities and communities can avoid "pricing" of the urban poor out of the formal housing market.	Singapore's Integrated Planning and Land Use System (iPLAN) is populated by citizens using mobile phones or the internet. The objective is to convey vital information for enabling municipalities effectively plan and survey spatial information such as parcels, zoning, land use, addresses, transportation networks, etc. The system can then process several map layers and produce intelligent reports (which can be shared with citizens over the web) to facilitate well-informed urban land planning. **Tools applied: Mobile phones, Online Mapping/GIS**

BOX 2D– The 'Information for City Development' project of Addis Ababa, Ethiopia

In 2005, city officials of the City of Addis Ababa, Ethiopia, decided to take advantage of the potential of GIS technology. Up to this point, the City had been severely lacking vital information, thus hampering its ability to create urban planning proposals, efficiently manage services, and collect tax revenues.

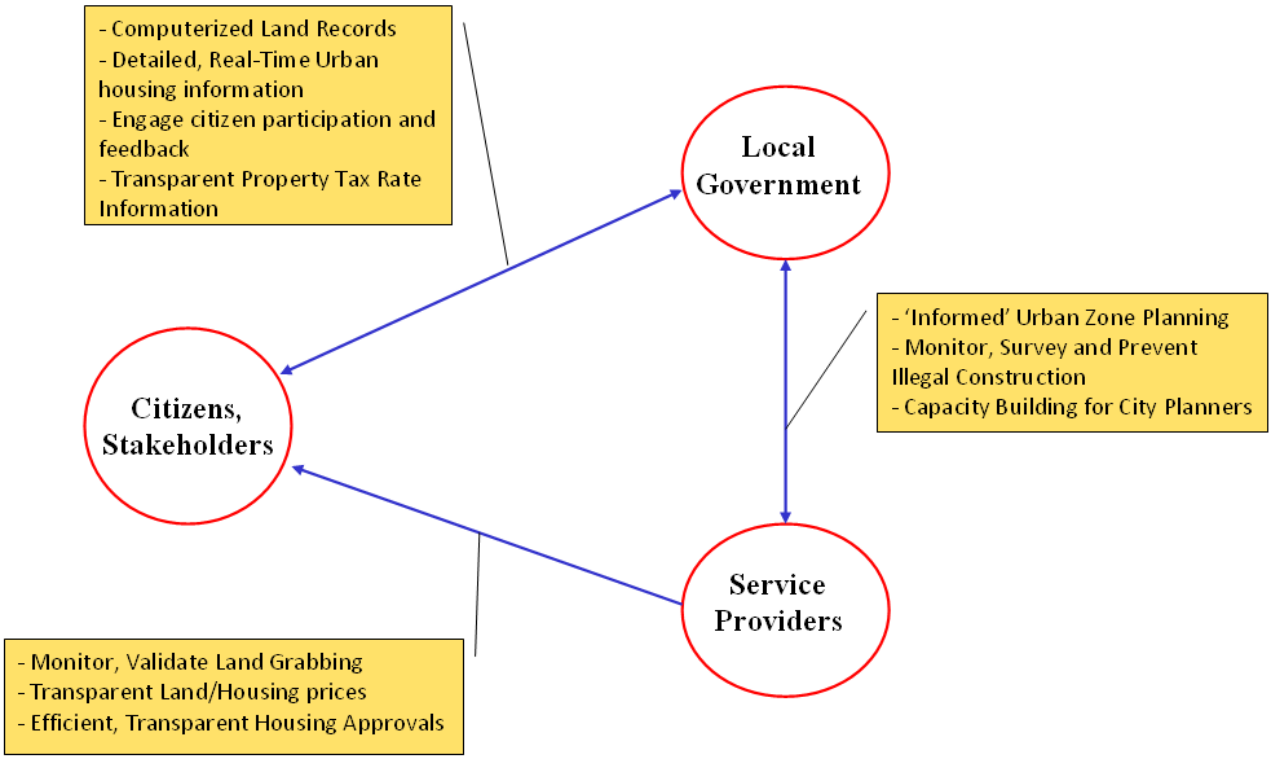
City administrators began their project by developing a 'geodatabase' that would include various socioeconomic and housing status data on the City's nearly 3 million residents and about 400,000 housing units. As the majority of the City was built in an unplanned manner with slum areas and illegal housing in every part of the City, the task was indeed massive.

Nearly 4,000 data collectors were deployed over a period of 10 months, visiting each household in the City and filling out the questionnaires designed to collect the various types of data that the City needed. These surveyors also took measurements of buildings and parcels, and based on these measurements, sketches were drawn. Once the completed questionnaires began coming to the project office, about 240 data encoders began encoding the data into the computer using database software.

Once the database began yielding outputs on land maps (using GIS tools), the demand for outputs by the various departments of the City Administration became very high. Based upon analysis of these land maps, the Urban Works and Development Bureau (BWUD) has now started issuing title deeds and title books for property owners in the City. GIS provides accurate property transaction information; therefore, in just the first year, it has been able to increase the revenue generated for the City Administration from Ethiopian birr 5 million to 36 million per year.

Using this data set, the Finance Bureau evaluates all taxes related to land and, again, has been able to increase the City Administration income. With the watchdog GIS in place, property owners can no longer misrepresent their actual holdings. This benefit alone significantly adds to the return on investment for GIS.

Capabilities of ICT towards enhancing Urban Planning, Land & Housing are illustrated as follows:



Potential for Africa:

In keeping with the recommendations of the 'NEPAD cities' program, which aims to address rapid urbanization and its consequences in order to make African cities more attractive for economic investment, the Governments of Botswana, Tanzania, Zambia, Kenya, and Nigeria have shown a strong willingness to improve policies and legislation geared towards sustainable urban planning.[41] Their commitments include making flexible town planning laws to suit the needs of the low income; evolve achievable development standards; relax development control; provide serviced plots and provide funds and materials for house construction.[42] To meet these goals in Africa, there is immense scope for ICT to play a very valuable role:

[41] UN-HABITAT, *Reassessment of Urban Planning and Development Regulations in African Cities*
[42] Ibid

Table 2D.2 – ICT Potential in Africa for Urban Planning, Land and Housing

Issue	Description	ICT Potential
Need for more flexible town planning concepts that relate with local on-the-ground realities and conditions.	In many growing cities of the Africa Region, majority of the inhabitants are often unemployed and the informal sector economy dominates. This means that work, recreation and housing usually occur in one place. Hence, the western concept for urban planning based on labor-based employment might not be suitable as a town-planning 'blueprint'.	ICT-enabled participatory urban governance can play a vital role in devising local city-planning solutions, where leadership of neighborhoods as well as occupational groups, chambers of Commerce, youth, NGOs, etc are closely involved in general consultations and recommendations.
Expansion of cities often takes place in advance of municipal town planning or authorization.	More than 50% of the city streets in the SSA region have no names or addresses, especially in the poorest neighborhoods. In such areas, neighborhoods largely lack access to basic infrastructure services.	City-mapping using GIS systems and monitoring can check illegal construction and also assist authorities in charting out zones which require necessary infrastructure. Also, ICT can enable creation of urban information databases for planning and naming city streets, neighborhoods, etc.
Poor town planning worsens vehicular traffic management.	Many areas in African cities lack proper demarcation for commercial and residential purposes, leading to heavy vehicular traffic in residential areas. In addition, many markets lack proper parking space or parking facilities are designed in such a way that visitors departing the premises have to back out onto busy streets to leave, often blocking traffic.	GIS tools can enhance urban planning officials by not only helping demarcate residential and commercial areas, but also by contributing to better layout of these areas. This can lead to improved traffic flow in urban areas.
Corruption combined with poor town planning hinders poverty reduction, quality-of-life parameters of residents.	At the urban level, corruption and lack of transparency abets land grabbing, land speculation and poor delivery of urban services which mostly affect the urban poor. During the 2005 flooding in West Africa, unfinished drainage projects and unenforced zoning laws constricted rain water and sewage flow, affecting nearly 600,000 urban residents.	E-Government tools can promote efficiency and accountability of municipalities, public works departments, and public-sector housing agencies. Social Accountability renders a mechanism for citizens to provide their feedback, real-time monitoring and complaints to relevant departments.

2.5. Urban Environment and Climate Change

Outline of Issues

With energy use in urban electricity, transport, and industry contributing up to 77 percent of Global Greenhouse Gas (GHG) emissions, cities constitute a major source of GHG emissions.[43] But not only are cities significant contributors to climate change, they are also most likely to disproportionately suffer its consequences on account of their proximity to coastlines or water bodies and are thus susceptible to flooding and drought.[44] Climate-change induced floods are already having very large impacts on urban centers in many African nations. (For instance, heavy floods affected Maputo, Mozambique in 2000, floods and mudslides brought heavy damage to urban East Africa in 2002, and the very serious floods in Port Harcourt, Nigeria and in Addis Ababa, Ethiopia in 2006 forced tens of thousands to leave their homes.)

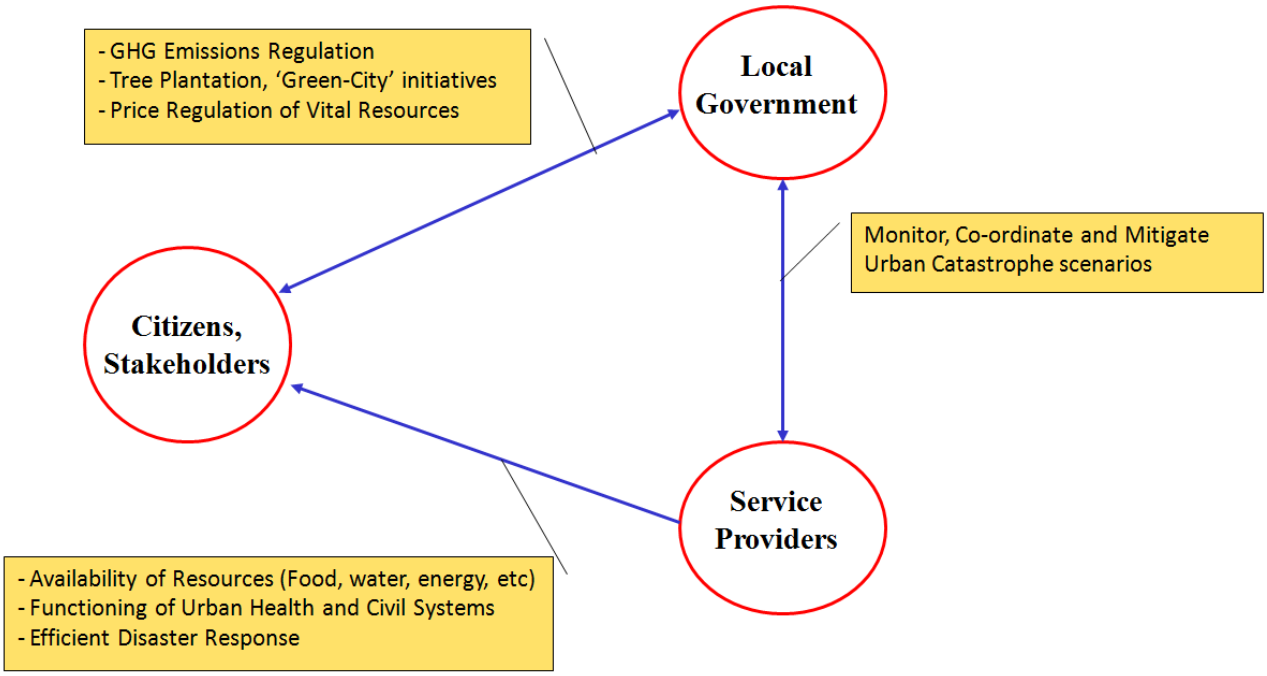
Secondly, being dependent on a range of resources such as food, water, energy, and land, whose availability and prices vary in response to climatic changes, as their largest and most dense consumers, cities will be affected. Finally, climate change will have unpredictable impacts on urban health and civil systems, as global warming-induced changes in disease vectors or evolving pathogens can have devastating impacts on dense urban clusters.[45]

A schematic representation of Urban Environment, Climate Change and Hazard Management issues is shown below:

[43] World Resource Institute, World Greenhouse Gas Emissions Flow Chart, available at http://www.wri.org/chart/world-greenhouse-gas-emissions-flow-chart; David Satterthwaite, Cities' contribution to global warming: notes on the allocation of greenhouse gas emissions, Environment and Urbanization 2008 20: 539-549

[44] Nicholls, R.J., Hanson, S., Herweijer, C., Patmore, N., Hallegatte, S., Jan Corfee-Morlot Jean Chateau, and Muir-Wood, R., Ranking of the world's cities most exposed to coastal flooding today and in the future, OECD Environment Working Paper No. 1, 2007

[45] Vora N., Impact of anthropogenic environmental alterations on vector-borne diseases, Medscape J Med. 2008. Vol 10:238. October 2008



What can ICT do?

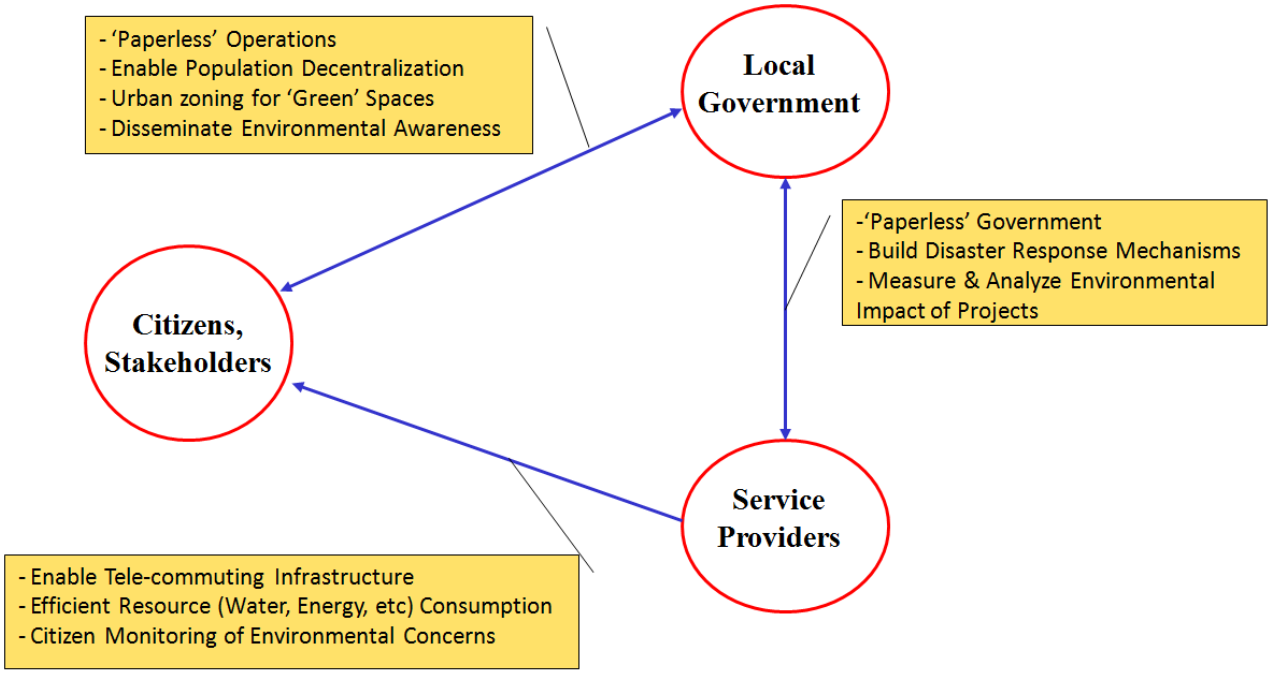
While the relationship between ICT and the urban environment seems distant, Table 2E.1 shows how ICT can be a powerful tool for urban society to protect environment, enhance response to climate-change induced disasters and other natural calamities:

Table 2E.1 – ICT for Urban Environment and Climate Change

Reform Objectives	ICT Uses, Impact	ICT Examples
Reduce pollution	**1]** By providing more useful metrics/ information and enabling population decentralization, ICT can play an important role in the fight against pollution. **2]** ICT play a role in preventing deforestation by reducing paper consumption through paperless government, paperless office operations.	**1]** Large-scale telecommuting enabled by broadband infrastructure can help reduce vehicular emissions. **2]** E-Mail, Electronic document flows, etc leading to reduced paper usage.

Efficient resource utilization	ICT help reduce the consumption of energy, water and other essential natural resources through monitoring and enabling more efficient household and industrial procedures.	**Tools applied:** **'SmartGrid', 'Smart Logistics' systems**
Environm-ental disaster manage-ment	Through constant mapping of natural resources, ICT can be deployed extensively to monitor, predict and respond to environmental disaster.	**1]** 'Flood Hazard' maps generated by GIS tools can identify a community's flood risk. The city of Honolulu launched in 2007 the 'Flood Hazard Assessment Tool' (FHAT) which involved community participation in the survey of river flows, storm tides, rainfall and other topographical features. On a map, the compiled data helped delineate flood zone classifications ranging from low to high risk. Residents were able to assess their property's vulnerability to flooding online by one of three ways: location, street address, or zip code. **Tools applied: Online Mapping/GIS** **2]** In the aftermath of the 2010 earthquake in Haiti, NGO 'Ushahidi' launched a Social Accountability-based disaster response system to assist fire, police, medical personnel coordinate relief efforts. This online tool aggregated information collected from local witnesses, citizens and on-the-spot relief agencies using SMS messages and pinpointed relevant data on interactive maps, saving over 100 lives. **Tools applied: Online forums +** **Mobile phones, Online Mapping/GIS**
Enhance Environm-ental capacity-building	Communities can harness ICT to communicate environmental knowledge, facilitate citizen monitoring of environmental issues, and encourage environmental activism.	**1]** Since 2009, Social Networking tool 'Urban EcoMap' provides urban communities with relevant data regarding the primary GHG contributors—transportation, waste, and energy. The objective is to build awareness, foster a sense of community connection and responsibility, and provide actions for citizens to take to enable the reduction of GHG. In addition, it supports decision-making for policymakers and business organizations, as well as for urban design, development and operations, and the research of urban, earth, and social scientists. **Tools applied: e-Participation, online discussion forums, online surveys, etc** **2]** Environment-friendly businesses have been incubated in recent years through ICT-enabled incubation facilities. One such incubated facility in Kenya helps reduce GHG emissions and energy consumption. By gaining access to high-speed internet, online networking & training opportunities with experienced engineers and venture capitalists, Kenyan entrepreneurs established an indigenous wind-turbine production facility for delivering clean power to Nairobi. **Tools applied: Online forums**

The uses of ICT towards Urban Environment, Climate Change & Disaster Management are represented in the schematic below:



Potential for Africa:

Urban environmental problems in Africa are highly correlated with the processes of urban development in the region, namely rapid urbanization, motorization and poverty of a large proportion of urban dwellers. For instance, up to 80 % of the urban population in Nigeria is denied decent urban life due to the high rate of environmental deterioration in the cities.[46] But as Africa's various regions expand in urban and industrial growth, as discussed in Table 2E.2, ICT can offer vast scope for local agencies and citizens to devise patterns and processes of development that are suitable for resource conservation and urban environment management.

[46] See Adedeji Daramola & Eziyi Ibem, *Urban Environmental Problems in Nigeria: Implications for Sustainable Development*, Journal of Sustainable Development in Africa (Vol. 12, No. 1, 2010)

Table 2E.2 – ICT Potential in Africa for Urban Environment and Climate Change

Issue	Description	ICT Potential
Local topographical data, vitally needed to tackle urban environment issues, is often lacking or outdated	To address urban environmental issues, a large amount of geographical data collection, environmental information, and monitoring pertaining to local features is required. For example, Zambia's Ministry of Environment and Natural Resources has been assigned the task of formulating policies for environmental intervention and management. But it lacks necessary data pertaining to urban landforms, drainage, parks and green spaces, etc to conduct meaningful analysis.	Municipalities and citizens can use ICT tools such as Mobile phones and digital cameras to help construct up-to-date databases and city maps depicting all kinds of geographic features. Agencies can then employ GIS tools on these maps to conduct useful analysis for environmental management.
Lack of disaster cause-and-effect knowledge and planning capacity	There is lack of awareness amongst analysts, citizens and decision makers regarding the relationships between resource use and ecological impact, hindering their ability to plan for future catastrophes.[47] Also, most local agencies do not fully comprehend the underlying processes of urbanization, disaster, disease, and poverty.	GIS tools can help users through various techniques that can be used for forecasting and what-if scenarios. Examples may include drought repercussions on wildlife, dam influences on urban economies, burn clearing strategies on flora and fauna, and even the spread of communicable diseases in cities. GIS tools can also be used by agencies for researching the impact of population growth on a township's economic development, increase in pollution levels, vulnerability to natural calamities, etc
Awareness of environmental sustainability issues is considered very low in SSA compared to other social phenomenon such as conflict, corruption and food security.	Widespread illiteracy and poverty in Africa has meant that poor families and local agencies are more concerned about daily survival than keeping an eye on environmental issues. There is also weakness in regulatory frameworks and policies regarding environmental management. in Africa.	Social Accountability tools can strengthen environmental activism in the region by enhancing capacity building amongst environment practitioners, policy makers and urban residents in Africa.

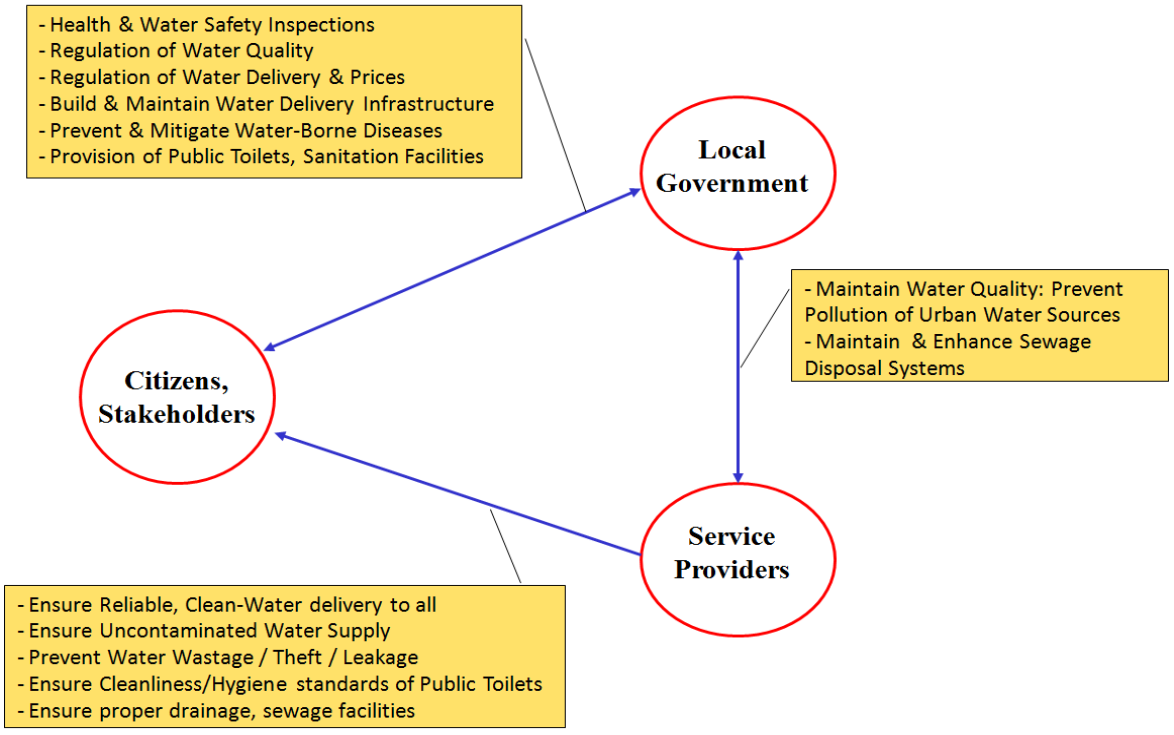
[47] See Emanuel Ekpenyong, *Envirnmnt. Awareness as a Panacea for Sustainable Environment Management in Africa*

2.6. Water and Sanitation Service Delivery

Outline of Issues

In many cities, demand for water greatly outstrips supply resulting in water delivery to households only for a few hours each day or for certain days of the week. It is estimated that as many as 500 million urban residents have inappropriate access to water services or experience water scarcity, and at least 50% of African urban population remains unconnected to official utility networks, relying on alternative sources for water supply instead. Reliable access to clean and affordable water is often unavailable to the urban poor, who may be spending long hours waiting in line to get water (often of questionable quality) that they may be forced to store in unsanitary conditions. Further, up to 40% or more of all water that enters the distribution system can be unaccounted for through theft, illegal hook ups or leakage. Pollution of urban water resources is also now a growing concern, as many cities dump untreated human wastes, along with industrial and agricultural wastes, into the same rivers or lakes, from which other cities (or other neighborhoods of the same city) extract their water supply.

In context of Water and Sanitation Services (WSS), the various issues observed along the linkages connecting urban actors are illustrated schematically below:



What can ICT do?

Ensuring that good quality water is distributed equitably, reliably and efficiently is the objective of the regulator. In this regard, Table 2F.1 highlights the potential of ICT solutions in assisting relevant local agencies towards improving their water supply and sanitation services:

Table 2F.1 – ICT for Water and Sanitation Service Delivery

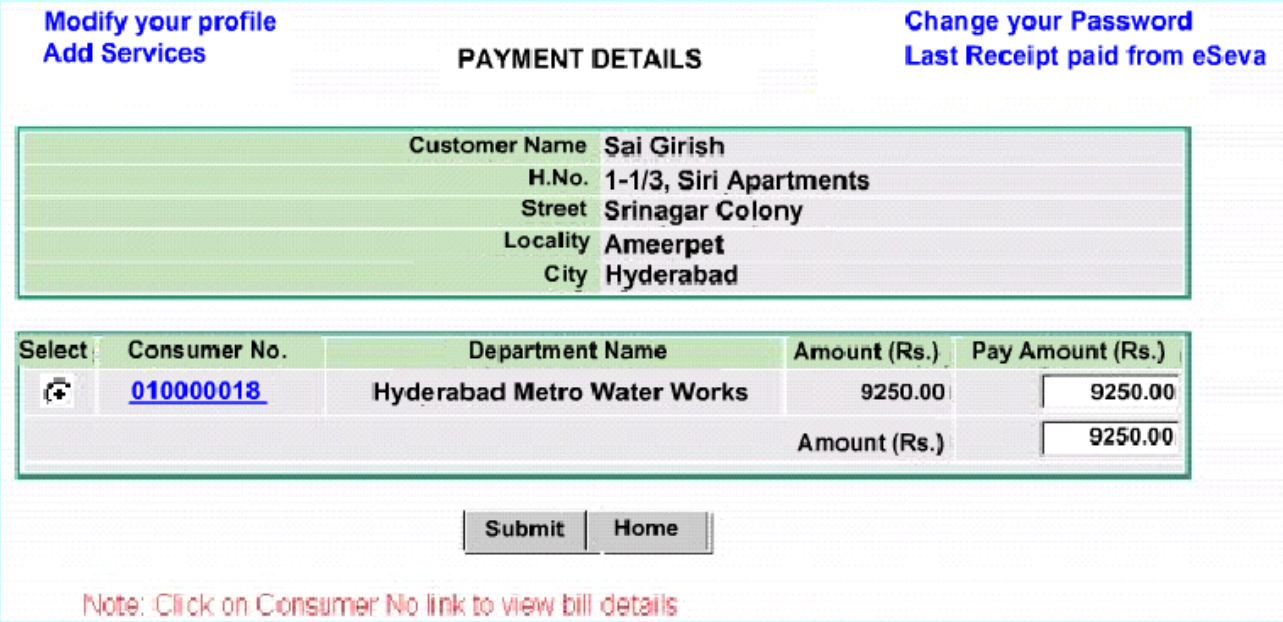
Reform Objectives	ICT Uses, Impact	ICT Examples
Encourage citizen participation in attaining water quality standards	ICT can enable public participation in making water supply decisions, or providing monitoring assistance to achieve reductions in leakage, unaccounted-for water, and identify location of polluting sources.	Using an Online Report Center ('The Seoul Environment Pollution Information Center'), citizens can report and file cases of environmental pollution including water pipeline leakage, sanitation/sewage problems and water pollution along with corresponding location. To manage water supply facilities, a GIS system monitors these reports on a real-time basis and plots problem areas on relevant maps. Administrative support is being handled by e-Cyber Customer Center, which deals with online payment of water rate and meter-reading. The municipality has incorporated e-services to provide environmental information to citizens in the form of an online newsletter and other digital modes of public broadcasting. **Tools applied: Online Mapping/GIS + e-Municipality, e-Billing, e-services**
Better management of water-services, drainage	**1]** ICT can achieve transparent billing and collection procedures that are accurate and thus better accepted by the community. This can also lead to focused cost-recovery strategies for investment purposes. **2]** Improved water system reliability through ICT-enabled monitoring of safe water supply, illegal connections, enforcement of watershed protection measures, etc, can help cities meet the water demands of urban residents.	**1]** In Allahabad, India, the various problems and gaps plaguing the existing water-supply system were assessed in a GIS framework through municipality collaboration with a number of water-governing boards. Through this initiative, various features pertaining to existing state of the water supply and topography of water bodies were recorded and plotted on maps. Consequent GIS modeling (in 3D) led to the formulation of solutions for addressing water supply problems. **Tools applied: Online Mapping/GIS** **2]** Madagascar's Safe Water Project, Care Madagascar, provides analysis of water quality problems and urban community constraints by employing GIS tools to plot bacteriological analysis results (indicating water quality in each location) and the distance between households and sources on a map. **Tools applied: Online Mapping/GIS** **3]** GIS tools can help plan for urban waste collection and disposal. For instance, In Westminster, U.K., sensors were installed to monitor sewage flows, with corresponding data relayed to GIS mapping tools in real-time. The pin-pointing of accurate bottleneck locations using this technique vastly improved the city's ability to deal with escalating sewage problems in densely populated sectors. **Tools applied: Online Mapping/GIS with telemetry**

Formulate citizen-centric solutions	**1]** To enable urban communities choose among different combinations of municipal tariff and service level, ICT can provide community members transparency in the costs of supplying and distributing water via accurate representation in user tariffs. **2]** ICT-enabled WSS call centers can provide reliable customer-oriented service to urban communities.	In Hyderabad, India, the 'e-SEVA' application enables digital monitoring/metering of water consumption for each individual household in a transparent manner. See **Case Study in Box 2F** for an in-depth description.
Raise awareness level of public hygiene	ICT-enabled programs aimed at changing sanitary and hygiene behaviors, such as hand-washing and proper disposal of waste, can greatly reduce morbidity and mortality rates from hygiene-related diseases, achieving immediate, cost-effective public health impacts.	In 2010, an outbreak of cholera – a water-borne disease - in Haiti triggered fears that the disease will spread to the 1,300 refugee camps in the capital, Port-Au-Prince, where sanitation is poor. To tackle spread of this epidemic, aid agencies joined forces with mobile-telecom providers to disseminate awareness on clean water and sanitation via text-messaging relevant information/precautionary measures to camp residents. **Tools applied: Mobile phones, Citizen outreach (Social Accountability)**

BOX 2F– 'e-SEVA' Online Water & Sewage Billing, Hyderabad Metro Water Works, India

Then:
The Hyderabad municipality had to keep track of thousands upon thousands of customer billing accounts manually. The system was so inefficient, that the Corporation struggled to make ends meet and invest further in infrastructure development due to poor revenue collection and monitoring mechanisms. Citizens themselves were unmotivated to pay bills on time as it involved physical transportation to the billing dept, waiting in long queues, etc. Besides, the repercussions of not paying bills on time or not paying at all were seldom severe as middlemen could be bought out using bribes. In addition, people in slum clusters enjoyed political patronage for free water. Importantly, since the system was not based on digital metering, it was almost impossible to assess water consumption on a per household basis. Water charges per community were divided up by the number of households, leading to scarce financial incentives to conserve water for households per se.

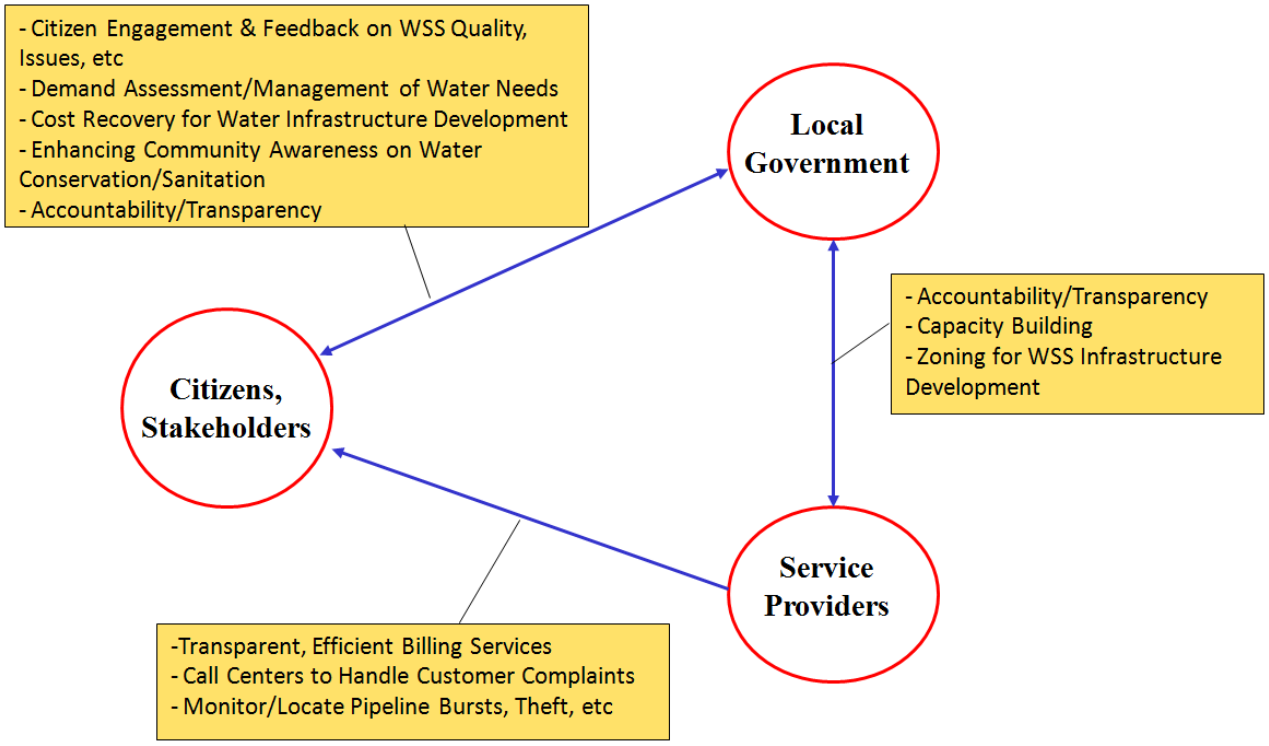
Now:
But by virtue of e-SEVA, all the above problems are resolved. By digitally monitoring (as shown in the figure below) who has paid bills, it is now possible to impose repercussion measures on defaulters. As a result, the Corporation is able to recover its revenues and invest in new projects.



Salient Aspects of e-SEVA:

1: For those without internet access or credit cards, payments can be made at any one of 46 e-SEVA centers located throughout the city.
2: A transaction number and receipt is awarded after each payment.
3: Citizens are not charged for using this service. Instead, utility companies charged Rs 5/transaction.
4: 66 municipality services are offered by e-SEVA.
5: Every interaction is made completely transparent.

Uses of ICT for resolving issues affecting urban actors in the domain of Water & Sanitation Services Delivery can be illustrated graphically as follows:



Potential for Africa:

MDG Target 7c calls on countries to "Halve, by 2015, the proportion of people without sustainable access to safe drinking-water and basic sanitation." But yet, in Nigeria, for example, out of the 85 million people living in urban and semi-urban areas, less than half have reasonable access to reliable water supply.[48] Data and project experience in SSA suggests clear linkages between poor Water Supply & Services (WSS) standards and low scores in health, education and productivity indicators due to impacts of disease, higher infant mortality, and high absenteeism in schools and at work.[49] Most often, these problems arise in the region as WSS is unreliable, of low quality, and unsustainable due to difficulties in management, operation and pricing and failure to recover costs. To this end, and in view of achieving the objectives specified in MDG 7, Table 2F.2, discusses the scope for ICT to strengthen WSS in Africa by improving maintenance of systems, generating revenues for operation and increasing utilization of existing capacities.

[48] Ibid
[49] World Bank Report (2000): Federal Republic of Nigeria-Water Supply & Sanitation Interim Strategy Note

Table 2F.2 – ICT Potential in Africa for Water and Sanitation Services Delivery

Issue	Description	ICT Potential
Decreasing piped-water coverage in urban areas.	Due to rapid urbanization, each year, the share of the urban population in Africa that gets its water through wells and boreholes rises by 1.5 percent, compared to a mere 0.1 percent for piped water Alarmingly, an additional 0.6 percent of the urban population turns each year to surface water.[50]	GIS tools can help decision makers plan development of water supply infrastructure by surveying availability/quality of water resources, location of underserved communities, possible routing of pipelines, etc.
Weak regulatory roles in the urban water sector	Due to recent decentralization, nascent local WSS regulators in SSA face the challenge of gaining stature, establishing a track record of sound decision-making, and acquiring competent staff. In this regard, there is a need to make progress in improving transparency of regulatory decisions based on the adoption of well defined technical tools for regulation, while also achieving accountability.	Regulatory activities and decisions could be reached through transparent processes using ICT (such as E-Government) that would be publicly available and defensible. Social Accountability tools can enable consumer participation in the regulatory process.
Lack of Demand Management Capacity	Scientific methodologies to reliably estimate water requirements and arrive at meaningful pricing are lacking in the region. An assessment of demand management among water utilities and meaningful pricing can only be reliably performed for those with high metering coverage.	Monitoring consumer/community water usage through e-Billing mechanisms can play a big role towards effective demand management and pricing. These systems also provide an adequate cost signal to customers by ensuring the applicability of metering towards calculating volumetric charging and tariffs.
Low Financial Sustainability of water utilities	To service growing unserved areas, municipalities need to make investments in new water-supply networks funded from internally generated revenues of service providers. But the low financial sustainability and consequent low investment and poor service quality of these utilities adversely affect optimal resource allocation in the sector.	Continuous enforcement of automated cost-recovery services (using e-Billing) and water-monitoring processes enabled by ICT can help ensure financial sustainability.
Inadequate hygiene education	Millions of poor residents are afflicted each year by preventable diseases caused by low sanitation awareness. Women and children are often the main victims.	ICT can serve as an effective platform for launching community hygiene/sanitation awareness programs. Sanitation campaign broadcasting on Mobile phones, Internet, and Social Accountability tools can reach millions of people on account of the Region's increased ICT access.

[50] Source: Africa Infrastructure Country Diagnostic (AICD), *Ebbing Water, Surging Deficits: Urban Water Supply in sub-Saharan Africa,* Background paper 12 (phase I)

Section III: ICT Tools/Applications for Urban & Water Management

To ensure that cities strengthen key parameters of sustainable development, notably those related to livability, competitiveness, good governance, management, and bankability, many public-sector entities and municipalities across the world have adopted ICT to trigger 'Smart City' development for their respective constituencies. Recognizing that such technology can transform the way cities benefit from agglomeration while minimizing adjustment ('*grime, crime & time'*) costs, introducing ICT in the governance system of cities can transform urban & water services development. To aid WBG's initiatives on sustainable urban and water development in the Africa Region, this section discusses the three fundamental ICT methodologies employed internationally towards urban governance and water management, namely, E-Governance, Social Accountability, and GIS[51]. The objective is to identify and discuss cost-effective tools employed within these ICT methodologies to enable replication initiatives in urban Africa.

3.1. E-Governance Tools

By eliminating intermediaries and simplifying government to citizen and business transactions -making them more accessible to a wider audience - E-Governance seeks to reduce opportunities for corruption through supporting transparency and accountability measures. The ability of any citizen to efficiently and securely access municipality services/information around-the-clock and from any location reduces the potential for bribery—that could harm the poor—or discrimination—that could dissuade minorities from using the service. Along with PCs, widely diffused mobile telephones now also allow more citizens to deepen interactions with public-sector urban agencies. As a result, mainstreaming ICT-based E-Government systems into functions of sub-national level entities can transform municipalities by supporting officials in providing better governance and management capabilities.

The different tools and systems that facilitate achievement of desired objectives through E-Governance are well established and widely used. These are detailed in the following sub-sections, and include 1] e-Revenue, 2] e-Authorization, 3] e-Procurement, 4] Financial Management Systems/IFMIS, 5] e-Citizen Development, and 6] e-Municipality.

[51] Synthesized from http://www.urbaninsight.com/articles/egov0902.html

3.1.1. Tool 1: e-Revenue (e-Billing, e-Taxes)

Description	e-Revenue systems attempt to offer citizens and businesses an assurance that calculation of municipality charges/fees/Tax Returns/etc is arithmetically correct and these payments can be processed efficiently. In association with IFMIS (see Tool 4), these systems are also designed to provide necessary tools for the comprehensive administration of working capital finance mechanisms for municipalities and service providers. They encompass software for: automated generation of invoices regarding utility service charges, fees; municipal tax appraisals for citizens and businesses; and digital revenue collection mechanism for local governments. This technology can also assist in demand assessment and management of essential utilities (electricity, water, etc.). For instance, monitoring electronically-generated water bills (based on volume of water consumed) for a particular household or community (over a period of time) helps service providers accurately predict seasonal water requirements.
Potential merit	1] e-Billing leads to efficient, streamlined collection of service charges and fees from citizens as well as transparency in collection processes. 2] Through effective utility demand assessment and management, service providers can plan for adequate resource allocation to meet consumption requirements. 3] Through online tax filing systems, governments can aim to reduce corruption in tax processing and build public trust. 4] An organization can save 1-2% of turnover by replacing paper invoices and optimizing the related processes with web-based services. Electronic and automated invoice processes can result in savings of 60-80% compared to traditional paper based processing. Thus the payback time on investments in E-Invoicing projects can be as short as six months.[52]
Success factors	1] Ensuring data security for financial transactions. 2] Performing financial transactions online requires the presence of sufficiently developed banking infrastructure (digital accounts, credit cards, etc). 3] Appropriate regulatory approvals from respective central banks, finance ministry, etc., need to be in place before web-based financial transactions can take place. 4] Utilities require a certain maturity and capacity before they can produce dependable performance data (for demand assessment purposes).
References	FRIENDS – online payments to the Government in Kerala, India (http://www.egov4dev.org/success/case/friends.shtml SMS eGov for Report, Database, and Transaction (http://news.smsegov.info/2010/07/20/sms-egov-for-report-database-transaction-india/)

[52] Source: http://isistimes.wordpress.com/2009/08/

3.1.2. Tool 2: e-Authorization (e-Registration, e-Permit, e-Contract)

Description	e-Registration, e-Permit and e-Contract are online channels that enable citizens and businesses to seamlessly engage into various forms of certification and deeds with the local government in a transparent and cost-effective manner. Such online mechanisms are widely applied with the objective of improving economic competitiveness of cities /enhancing productivity through automation of time-consuming regulatory processes (for instance, computerized approvals for establishing enterprises, obtaining birth certificates, registering vehicles, land titling, etc). These services include automation and interconnectivity of local registrars, ability to register over the web, and electronic distribution of registry information.
Potential merit	1] Automation reduces the barriers to starting a business, as measured by the Doing Business indicators. In countries with electronic registration, starting a business takes less time, requires fewer procedures, and costs less – leading to greater entrepreneurship.[53] 2] These services often provide authentication support, ensuring safe and secure transactions by protecting integrity of data. 3] By streamlining processes and enabling transparency, scope for corruption is vastly reduced.
Success factors	1] Ensuring necessary data security for financial transactions may be challenging in a lax legal environment. 2] Building in-house capacity for information management (document classification and archiving) 3] Appropriate regulatory approvals from respective central banks, finance ministry, etc., need to be in place before web-based financial transactions can take place. 4] Significant investments are often required for the purchase, implementation and upkeep of necessary hardware and software. 5] Successful e-Authorization processes typically require integration of all municipality informational and outreach centers/offices into computer network
References	e-Birth Registration at Rajshahi City Corporation, Bangladesh (http://www.egov4dev.org/success/case/rajshahi.shtml

[53] Source: 2007 World Bank Entrepreneurship survey

3.1.3. Tool 3: e-Procurement

Description	With the objectives of reducing the time and cost of doing business for both municipalities and vendors (goods and services providers), E-Procurement systems digitally link local government departments, agencies and local bodies with their vendors to create a single-stop shop for all procurements. This facilitates online tendering to provide 'any where any time' access to the vendors/bidders for participating in tendering, thereby eliminating the non value-adding activities like: manual sale of tender documents, manual opening and reading of bids, preparation of comparative statements (as they are automatically available), audit/cross check of comparative statements, time spent in movement of files from one person to another, manual creation of purchase order and delivery schedule etc. Often, to aid municipalities adhere with budget cuts and reduce scope for corruption e-procurement tools have in-built mechanisms to levy various controls on government purchases and expenditure. They may also provide or process information concerning various aspects of procurement, such as government suppliers, procurement prices, and acquired items.
Potential merit	1] By doing away with paper forms, e-procurement not only helps eliminate errors, but also reduces postage costs and the expenses and space considerations surrounding paper-based record storage. 2] By closely tying actual demand with in-house handling/storage capacity, the amount of inventory and services municipalities must purchase is reduced - allowing for efficient supply chain management. 3] Through E-procurement systems, municipalities can consolidate orders for similar items with one supplier, resulting in deeper volume discounts and cost savings. 4] Better value for money spent can be realized through increased vendor competition and the prevention of cartel formation.
Success factors	1] To achieve full efficiency, suppliers and service providers to municipalities need also possess the capacity to perform electronic transactions. 2] Ensuring necessary data security for financial transactions may be challenging in a lax legal environment. 3] Standardizing the procurement processes across government departments/agencies may be a challenging task.
References	'CompraNet' – Local Government procurement system in Mexico (http://www.hidalgo.compranet.gob.mx:8008/html42/ingles.html)

3.1.4. Tool 4: Financial Management Systems

Description	With the objective of forecasting the total liquid cash resource available to the government at a point in time, IFMIS provide an integrated financial package for public resource management by computerizing the budget management and accounting systems. It consists of several core sub-systems which plan, process and report on the use of public resources. IFMIS sub-systems normally include accounting, budgeting, cash management, debt management and related core treasury systems. In addition, some governments also include non-core sub-systems such as tax administration, procurement management, asset management, human resource and pay roll systems, pension and social security systems.[54]
Potential merit	If set-up and used well, IFMIS facilitates improvement of - 1] More realistic and standardized budget formulation and execution 2] Historic information on expenditures 3] Improved resource allocation, revenue and expenditure control 4] Asset, liability and cash management 5] Financial Risk management and control systems 6] Access to reliable and timely information to support decision making 7] Customer service 8] Auditable financial statements
Success factors[55]	1] Vested interests might perceive municipal finance reform as a threat to financial control and authority: can be reduced through communication, training, participation, identification of win-win scenarios, etc. 2] A comprehensive budget management law for management of public funds and property needs to be in place. 3] IFMIS systems require extensive staff training. However, most staff need to know only specific features of the system.
References	IFMIS implementation in Kosovo, Tanzania, Slovak Republic, Tanzania, Ethiopia: (http://www.u4.no/helpdesk/helpdesk/query.cfm?id=196)

[54] *The Implementation of Integrated Financial Management Information Systems,* Transparency International
[55] Source: http://www.slideshare.net/icgfmconference/ifmis-planning

3.1.5. Tool 5: e-Citizen Development: e-Employment, e-Health, e-Education, etc

Description	By harnessing the reach and resources of local governments, e-governance applications can be leveraged to deliver customized socio-economic services to citizens (such as targeted employment opportunities, Health information, Skill development opportunities, etc). As greater number of urban residents in developing countries gain technology accessibility through rising ICT penetration levels, e-Government systems providing Web-enabled or mobile-phone based government services can now address a wider audience including disadvantaged groups. e-Citizen Development programs can involve public broadcasting mechanisms (over mobile phones, internet) for disseminating vital information (for instance, recommended sanitation measures, location of ongoing recruitment campaigns, etc). Public computer centers/Training labs have been launched to impart Educational/skill development programs for specific target groups such as women, disabled citizens, etc. Also, by incorporating (for instance) specific search parameters in local government websites, on-demand/customized opportunities can be provided to citizens (for instance, relevant employment opportunities, etc).
Potential merit	1] In view of the strong linkages between socio-economic conditions and governability, improved economic conditions of citizens can, for instance, reduce dependence on law enforcement and hazard management agencies for public safety. 2] Greater awareness of citizens on health measures through e-governance can reduce future spending on disease prevention measures and treatment. 3] Targeted citizen-centric solutions can vastly help reduce 'trust deficit' between citizens and local governments.
Success factors	1] Sustainability issues: Should citizens be charged for availing such services? If not, make the economic case for investment in building, maintaining these applications. 2] Literacy levels, citizen awareness levels need to be assessed prior to devising appropriate solutions. 3] Constantly updating databases might require extensive staff training or further automation.
References	Electronic Immunization Registry and Tracking System in Bangladesh (http://www.egov4dev.org/health/case/banglaimmune.shtml) Mobile-phone based Urban Resource Center of Ahmedabad Municipal Corp, India (http://timesofindia.indiatimes.com/city/ahmedabad/SMS-a-carpenter-soon/articleshow/5942747.cms)

3.1.6. Tool 6: e-Municipality

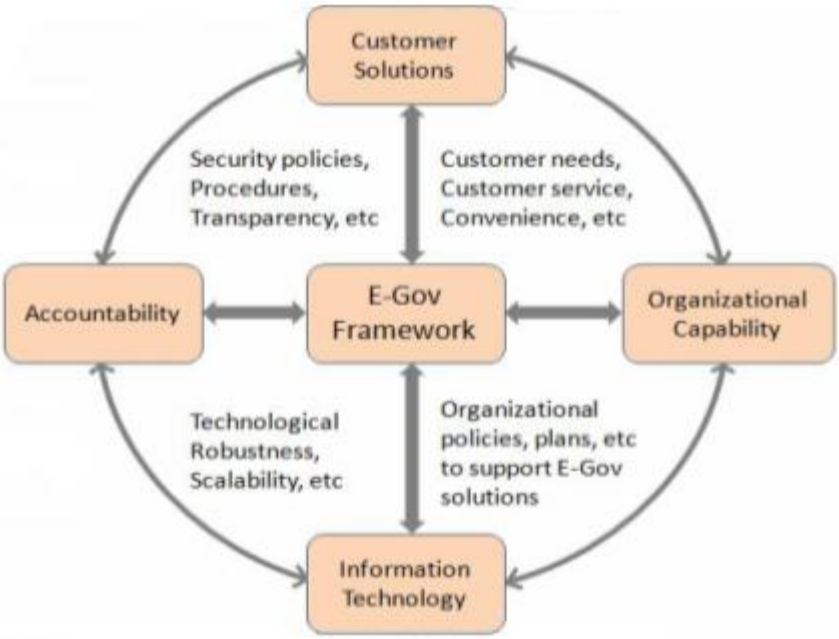
Description	By integrating the overall activity of the municipality (administrative service delivery as well as financial activities) into a unified system, this tool aims to incorporate all essential features for introduction and operation of e-Government. e-Municipality refers to the virtual integration of all municipal departments/functions within a city to create a seamless 'one-stop-shop' access point for citizens. Such systems handle interactions for every kind of activity between citizens, businesses, public employees and government departments on the electronic platform. For instance, through e-Municipality systems, users can fill out digital forms only once and the data gets automatically transferred to all relevant departments immediately - avoiding the scope for needless duplications, redundancies and confusion. Typical modules incorporated within e-Municipality integrated systems include: Registration of municipal property (issuance of deeds of municipal ownership and maintenance), Rental of the municipal property, Real Estate Appraisal (automation of appraisal procedures related to municipal land and buildings), Cashier's office (automation of cash and bank transfer payments on municipal charges – housing, land, administrative services, etc), punitive ordinances (Issuance, registration and printing of punitive ordinances for offenders), etc
Potential merit	1] Ensuring effectiveness and efficiency in public administration 2] Equal access for everyone 3] Integrated network 4] High quality and rich information 5] Improved ease of service 6] Cost saving 7] More transparency and ease of access to government units
Success factors	1] Government employees (initially used to working only in manual mode) need to adapt to automated way of functioning. 2] Appropriate policy choices in favor of computerization (but making sure that idle manpower and lay-offs do not affect morale of local government workers). 3] Resolved technical incompatibilities between various municipal departments (to hasten the establishment of a one-stop-shop for citizens). 4] Availability of significant amount of resources for the purchase, implementation and upkeep of necessary hardware and software.
References	e-Municipality in Kadikoy (**http://www.kadikoy.bel.tr**), Project Sampark (http://www.spicindia.com/sampark.aspx)

General Methodology for Successful E-Governance Implementation

As shown in Figure 3:

- To achieve well-designed, successful E-Governance applications using internet or mobile phones, a secure-transaction environment (to protect data security) must be created for making municipalities more accountable and transparent.
- Typically, streamlining of business processes for enhancing municipal capability towards servicing citizen/stakeholder needs and concerns may be required.
- The underlying Information Technology (IT) structure should have the flexibility for alterations and modifications over time to suit evolving citizen/customer requirements and yet ensure intended accountability of municipalities.
- To ensure continuous high-level support for E-Governance from local governments, these applications must be devised based solely on policies and objectives stipulated by official authorities.

Figure 3: Configuration of E-Government systems



3.2. Social Accountability Tools

Social Accountability tools (such as online blogs, forums, discussions) render a platform for large-scale citizen review/feedback/dialogue on public-sector policies and services via up-to-the second news, meeting notes, postings, data, images, etc. These multiple-format mechanisms offer new barrier-free models of public participation in which real-time collaboration, experience-sharing and participation amongst citizens are becoming the norm. This enables authorities to constantly remain in touch with people in order to make governance more effective and representative. In view of the growing accessibility of ICT in most African cities, citizens and stakeholders are in an increasingly powerful position to leverage mechanisms for Social Accountability.

The various tools that support ICT-based Social Accountability mechanisms in the framework of Urban/water services are discussed in the ensuing sub-sections, and include: 1] Surveys (Forecast/Retrospective), 2] Citizen Outreach, 3] Digital Publication, and 4] e-Participation.

3.2.1. Tool 1: Surveys (Forecast/Retrospective)

Description	Citizen surveys are investigations of the behavior, preferences, attitudes or opinions of a target group sample, collected through online questionnaires. Ex ante (or forecast surveys) can help government & utilities to shape future plans, such as investment/infrastructure plans to expand services, institutional changes and tariff changes. Post ante surveys (or retrospective surveys) can constitute effective mechanisms for conveying citizen's viewpoints and review of public projects and services to authorities. Surveys may cover particular sub-groups or geographical communities within the service area or the whole service area. Ex ante/forecast surveys may measure willingness to pay or preferences (for example) service levels and tariff structures. Post ante surveys can be used to evaluate and monitor performance of urban projects and services from the citizen's point of view. A wide variety of online applications exist for conducting surveys using the Internet. Through mobile phones, respondents can submit their choices using SMS messages, touch-tone number punching, interacting with voice messaging systems, etc.
Potential merit	1] Targeted forecast surveys are a useful tool for consultations on service development and improvement. Retrospective surveys can give agencies insights into problems being faced by citizens and bring pressure to bear for their resolution. 2] Within the targeted population group, there exists equal access for everyone. 3] Although surveys can be expensive to conduct, those high costs may be warranted for large planned activities – results are often used to create change. 4] Surveys can be institutionalized into normal utility or municipality operations
Success factors	1] Design and execution determine the integrity of the results. 2] Options considered must be within actionable range of utility. 3] Transparent publication of methodology and data. 4] To achieve impartial evaluation/feedback, target groups must be carefully selected to reflect balanced socio-economic conditions of citizenry. 5] Surveys require considerable financial and human resources as well as experience with statistical techniques.
References	Electronic Water Use Survey, Texas Water Development Board (http://www.twdb.state.tx.us/wrpi/wus/form.asp) Mobile phone based surveys in Palestine ('AidLink' Alerts) (http://www.chfinternational.org/node/33830)

3.2.2. Tool 2: Citizen Outreach

Description	Outreach can be a first step to two-way dialogue and consultation – although it is mostly a one-way process, with information flowing from utility companies/municipality to the public through SMS messages & alerts or e-mail notifications. Citizen outreach pertains to efforts by agencies to connect directly with the public for purposes of disseminating vital information/messages pertaining to (for example) necessary health precautions, location of skill development workshops, change in tariff levels, tax payment information, etc. Outreach can also be used to provide information on the utility, including works and service disruptions, and on how to use complaint and consultation mechanisms.
Potential merit	1] Community outreach can establish a basis for accountability by building trust and making utility/municipality staff more accessible. 2] It can be customized to reach specific/targeted communities or groups. 3] Cash costs are modest; costs for consumers are low; can be organized in parallel to other activities of urban and water-sector agencies. 4] Outreach activities can be easily made routine
Success factors	1] Should be well targeted and tailored to the groups and individuals who are meant to be reached. 2] Ad hoc utilization, misuse or exploitation of this tool by agencies (for instance, as a marketing/product promotion medium) needs to be avoided to maintain accountability.
References	SMS alerts to citizens, Surat Municipal Corporation (India) (http://timesofindia.indiatimes.com/city/surat/Now-get-SMS-alerts-on-tax-dues/articleshow/6502234.cms)

3.2.3. Tool 3: Digital Publication of Performance data

Description	An effective way of ensuring accountability of local governments and service companies is by making performance data of these entities available through online publishing of annual reports/metrics or disseminating relevant information using SMS messages. Such reports provide a mechanism for public overview of agency activities and a tool to monitor performance. It can be a powerful tool for citizen and consumer advocates demanding change as well as for community representatives monitoring utility performances, particularly if it provides data on service performance as well as finances. As utilities already send e-bills to consumers, this provides a valuable channel through which additional data can be provided.
Potential merit	1] This tool offers high sustainability once a performance management system is place. Setting-up these systems can be strongly encouraged by formalization through enforced laws or guidelines. 2] Effectiveness of publishing data can be easily enhanced based upon the relevance, quality, timeliness, and format of the information provided. 3] Publication of service and performance data provides the basis for accountability.
Success factors	1] For the public-at-large, which would not normally read formal reports, summarized plain-language data and visual presentation can make data more accessible. 2] Developing reliable data collection mechanisms, quality-control systems, and user-friendly materials can be expensive. 3] Utilities require a certain maturity and capacity before they can produce dependable performance data.
References	City of Ottawa - The Municipal Performance Measurement Program (http://www.ottawa.ca/city_hall/ottawa_performance/mpmp/index_en.html#P15_2363)

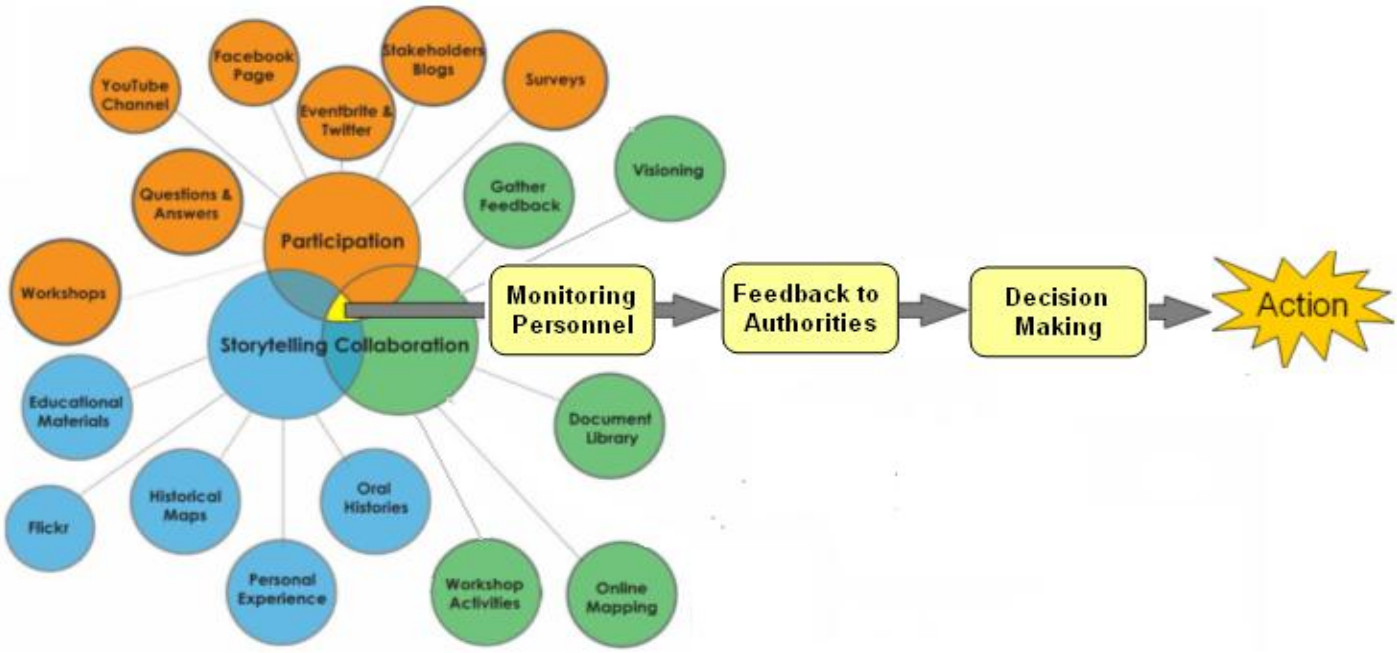
3.2.4. Tool 4: e-Participation mechanisms (blogs, discussion groups, social networking, etc)

Description	E-Participation mediums such as blogs, citizen forums, on-demand information channels (for instance, YouTube, Facebook), online chat rooms, etc., render a virtual feedback, review, critique and complaint loop between citizens and concerned authorities/service providers. The goal of such mechanisms in governance is to enable greater citizen participation in managing and monitoring city administration. Through e-participation, people can interact with local officials and make their voices heard. It allows citizens to immediately see how and why their representation is functioning the way they are, and enables citizens to share their comments and views on the functioning/performance of local agencies. Public officials/agencies can judge the prevailing mood of citizens and take corresponding course of action based on popular sentiment. This helps voters better decide who to vote for in the future or how to help the public servants become more productive.
Potential merit	1] It is possible for users to remain anonymous while providing feedback to local administrators. 2] The extension of Social networking tools to Mobile communications can vastly enhance the participation levels of ordinary citizens in governance 3] Access to Social Networking tools is by-and-large cost-free to citizens, enabling even the urban poor to participate in governance.
Success factors	1] Inaccessibility to ICT equipment and infrastructure, especially amongst the urban poor, can lead to unfair/undemocratic planning initiatives. 2] Lack of awareness amongst individuals regarding the capability of Social Networks towards enhancing governance diminishes its transformational power. 3] This technique only works effectively in the presence of citizen-centric or responsive sub-national urban agencies - open and tolerant to feedback and criticism from citizens. 4] Dedicated staff for monitoring e-Participation mediums and relaying feedback to officials is required.
References	New Mobile-phone Based Social Networking Applications in Kenya (http://www.moseskemibaro.com/2010/07/29/1304/)

General Methodology for Successful Social Accountability Implementation

Figure 4 below[56] shows how ICT-based Social Accountability constitutes a mechanism towards inculcating more citizen-centric governments by providing residents the opportunity to conduct open dialogue, feedback, situation monitoring and idea-exchange with local governments and municipalities. As illustrated, ICT applications for Social Accountability helps develop well-informed, aware citizens by fostering collaboration, participation, and idea-exchange (or 'storytelling') and puts them in real-time contact with elected officials or their offices. This allows voters to have a direct impact and influence on their local government, as officials are urged to take appropriate action based on prevailing views of constituencies.

Figure 4: Configuration of Social Networking systems



[56] Adapted from *Social Networking for Urban Planning.* Available online at: http://www.slideshare.net/placevision/social-networking-for-urban-planning-1532502

3.3. GIS Solutions

Geographic Information Systems (GIS) are ICT applications that capture, store, analyze, manage, and present data linked to location on a map. As a result, GIS allow viewing, understanding, interpreting, and visualizing of data in many ways that reveal relationships, patterns, and trends in the form of maps, reports, and charts. Simple internet or mobile phone-based consultations with citizens can help cities procure data/information pertaining to urban & water infrastructure and service needs for plotting on a map, leading to improved and participatory planning. Such local governance induced by a wide range of contributing stakeholders facilitates a greater understanding of administrative needs in the city, thereby creating opportunities for municipalities to deploy resources to fill these gaps effectively. Since GIS applications can also process different kinds of information, its use is becoming increasingly crucial in enabling integrated land and water management / planning activities within local governments.

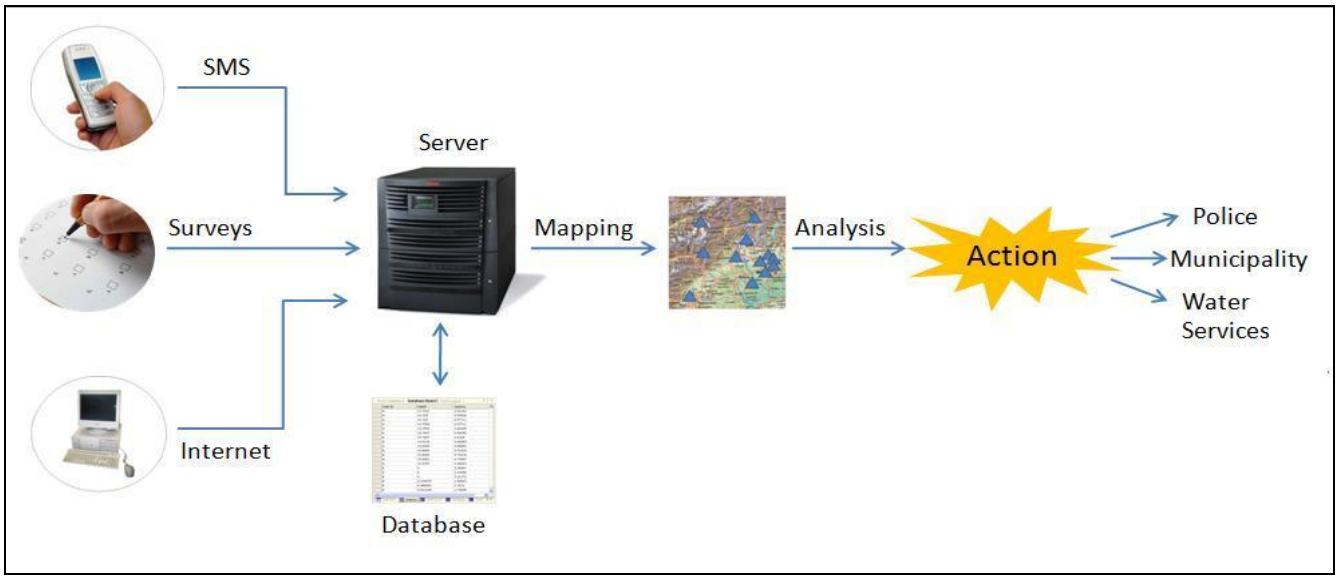
Description	Geographic information systems (GIS) is a set of tools and data that can help researchers, policy-makers, and community members visualize, explore, and interpret information across space to understand spatial relationships, patterns, and trends. GIS in its most simple form, can be thought of as a map with a database of information behind it. Click on a place in the map and text information will appear about that place. The map is constructed in layers - for example, a layer each for parks, transit, demography, schools, community gardens, fast food restaurants, property parcels, buildings, and major employers. A GIS integrates layers of geographic information in such a way that much more interesting questions can then be asked. For example, one can estimate how many children live more than a short walk away from a park, or what the median income is of neighborhoods with and without easy access to public transit. GIS is most often combined with other research tools and methods - for example, a research project might study the relationship between student health and the presence and number of fast food restaurants near schools. The GIS-based part of the research would consist of building a geographic database of schools and fast food places, and calculating proximity measures, while health researchers would enroll students in the project to for interviews, surveys, and health testing.

Potential merit	1] Besides the usual mapping functions, GIS tools often possess considerable additional capabilities for conducting data analysis and scientific modeling. 2] By providing a visual framework for understanding, conceptualizing and prescribing action, greater efficiency may be realized from better decision-making models. 3] By enabling access to information on land use, recreation areas, hazard-prone locations, etc., GIS can engage community participation in data gathering and analyzing for urban planning.
Success factors	1] More advanced mapping tools (such as 3D modeling) can involve expensive licensing. 2] GIS applications require availability of adequate computing power and extensive staff training. 3] Digital baseline maps, topographical data, etc., may not be readily available for all urban regions.
References	GIS Solutions for Urban Communities and Water Management in Africa (http://www.esri.com/library/brochures/pdfs/gis-for-africa.pdf) Mobile phone –based Urban Crime Mapping using GIS in Caracas, Venezuela (http://crimereportblog.wordpress.com/tag/crime-map/page/5/)

General Methodology for Successful GIS Implementation

GIS methodologies can be easily replicated using limited resources. Given that mobile telephones are not only ubiquitous but also increasingly multi-media (with SMS/ video/ still-camera, etc. capabilities), they can become tools to visually record and transmit information (requests for services, incident location, topographical features, etc.) to local administrations. Similarly, such information may also be transmitted via sensors (telemetry), PCs (using e-mail) or can be manually inserted from questionnaires, surveys, etc. A wide range of readily available GIS tools can process this data to accurately place information on appropriate maps for easy analysis to enable corresponding quick action by concerned sub-national level authorities. This methodology is illustrated in Figure 5 below.

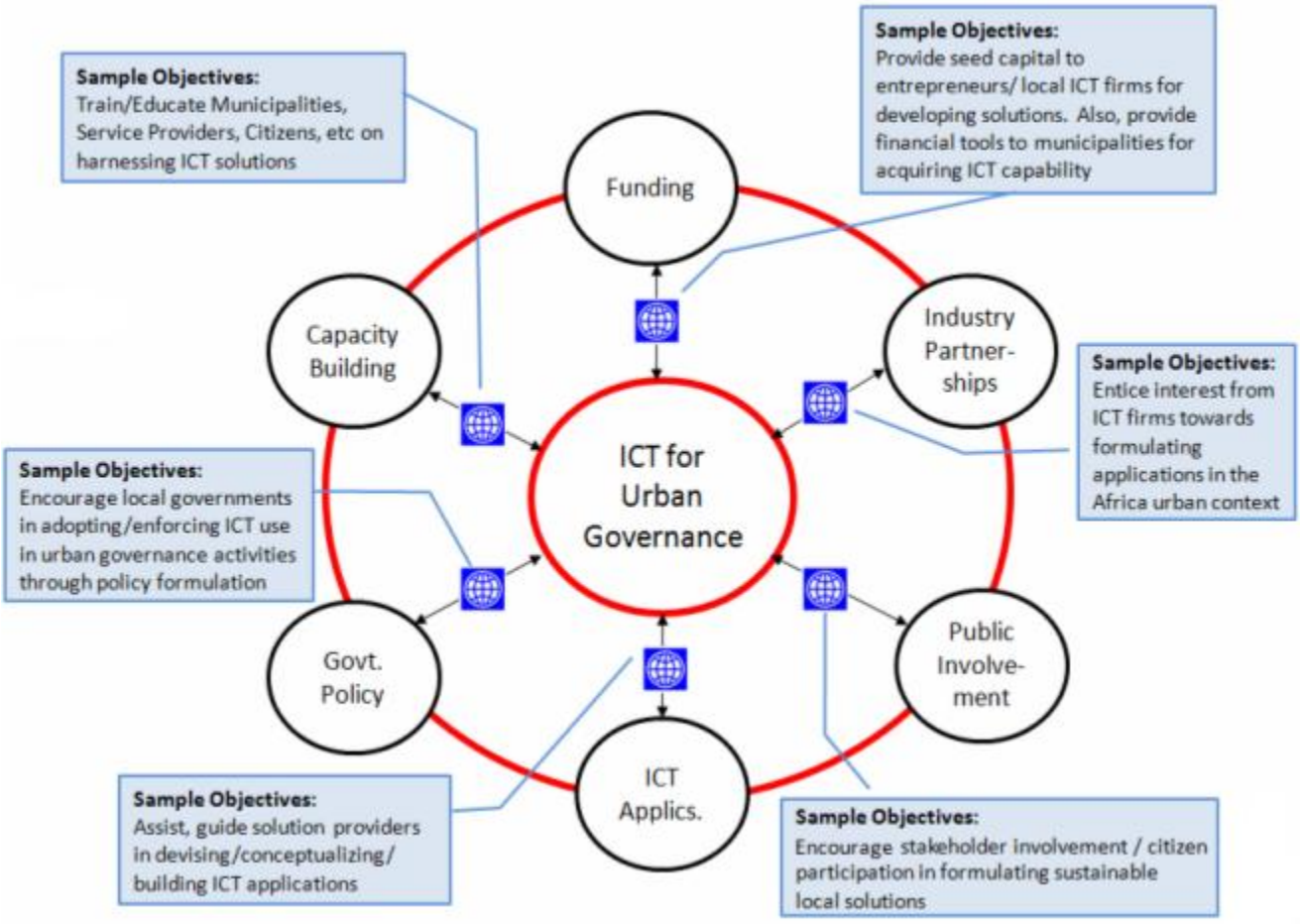
Figure 5: Configuration of GIS



Section IV: Possible WBG Role and Next Steps

As seen in this report, a number of innovative applications that deliver and harness ICT are helping developing countries improve the daily lives of urban citizenry by transforming the delivery of governance and services. However, many municipalities and service providers in the Africa Region do not possess the requisite know-how, financial or risk-taking capacity to apply ICT for improving urban governance and water services. In other words, the 'ecosystem' for pursuing urban reform objectives through ICT in many cities may be under-developed. To this end, as shown in Fig. 6, the World Bank Group (WBG) could have a role to play in strengthening possibly nascent or broken ecosystems where some of the key linkages are weak or lacking altogether.

Figure 6: ICT-Urban Governance 'Ecosystem'



Promising ICT - Urban governance strategies sometimes remain immaterialized because, at the points of intersection between various nodes of the ecosystem, the interplay is often insufficient or counterproductive. This is where promising solutions are often lost and the need for new approaches becomes essential.

4.1. Menu of Options for the WBG: Suggestions from World Bank Practitioners

Helping the WBG strengthen fragile ICT- Urban Governance ecosystems presents vast scope as well as challenge for concerned World Bank staff to apply their expertise. In view of its existing capabilities and comparative advantages within this domain, where should the WBG focus its resources and expertise in order to scale up ICT in Bank Interventions/Lending-activities for urban development in Africa? To address this question, through interviews with various urban development experts at the World Bank[57], a framework of options is developed to guide the proposed prioritization, both within current and future operational work. Avenues to be explored are as follows:

A] UNIT LEVEL STRATEGIES

- **Development of Business Case(s):** To trigger greater responsiveness & initiative-taking across the platform of key stakeholders (city-councils, service providers, ICT solution providers, etc.), a business case detailing the economic virtues of adopting ICT solutions within the Africa Region urban context is required. This would entail investment in research activities to conduct in-depth case studies/analysis of urban ICT initiatives to develop a solid business case highlighting:

  1] The economic benefits of ICT adoption for Africa Region municipalities/utilities (such as cost savings, efficiency, revenue enhancements, citizen convenience, etc).

  2] Lessons learned from African cities successful in ICT adoption, including identifying conditions necessary for success, pitfalls to be avoided, etc.

- **Dissemination of ICT Awareness:** Often, the bottleneck for incorporating ICT as a component of International Development Assistance (IDA) activities in Africa Region cities involves the lack of knowledge regarding ICT tools and their potential. Therefore, raising ICT awareness amongst the World Bank's Task Team Leaders (TTLs), and clients is vital.

[57] Consultations with: Ali Alwahti, Franck Bousquet, Madio Fall, Rumana Huque, Alex McPhail, Zara I. Sarzin, Elisabeth Sherwood, Luiz C. M. Tavares

A] To enhance focus on the ICT-Urban Governance dimension within the World Bank, seminars and presentations geared towards: **1]** Showcasing specific examples of ICT usage towards addressing project-level issues (e.g. exploring the use/implementation of ICT for replacing manual paper-based Citizen Scorecards with digital means); and **2]** Exploring the use of ICT in commonly used methodologies within projects (e.g. carrying out manually-based baseline surveys using digital technology), can play a major role towards internal knowledge enhancement.

B] For external clients (such as mayors, city-level staff, utility managers, private providers, etc), capacity-building activities related to ICT could be organized through workshops/training. In this regard, trust funds such as the Public Private Infrastructure Advisory Facility (PPIAF) and South-South Experience Exchange Trust Fund (SEETF) could be approached to conduct workshops/training sessions.

- **Inter-Departmental Collaboration on ICT:** Conceptualizing/implementing ICT solutions for urban development does not have to involve 're-inventing the wheel'. Various WBG agencies, such as InfoDev, Water and Sanitation Project, etc., have already garnered experience devising innovative ICT strategies. For instance, as part of a larger program on assisting clients in building sector information systems (SIMS), WSP has developed two complementary products/services for WSS purposes: 1] The 'WatSan' platform for mapping + information dissemination, and 2] mobile-based Performance monitoring of basic service delivery indicators, accounting and billing applications. These agencies remain open to collaboration with other departments and TTLs can benefit immensely through these linkages.

B] PROJECT LEVEL STRATEGIES

A paradigm shift towards achieving 'Realistic' ICT inclusiveness within current and future WBG project execution is a need of the hour. To this end:

- The identification of immediate project requirements for incorporating ICT will help the Bank pluck most visible low-hanging fruits (For instance, with respect to the Kampala Institutional Infrastructure Development Project (KIIDP), public relations campaigns for tax collection, citizen complaint mechanisms, etc are currently paper-based. Hence, there intuitively exists an immediate scope for ICT to digitize this process).

- While designing ICT activities for their projects, TTLs should:

  1] Try to focus on appropriate practical solutions for 'Informatization' of utilities/municipalities in the country-context (For instance, in Angola, the wide-spread utilization of very rudimentary cell-phones renders SMS use a huge challenge. So Automated teleprompt-enabled billing, rather than a text-based solution might be a more viable solution here).

  2] While creating a digital approach, select appropriate ICT strategies that can eliminate scope for user-error, thereby increasing the 'appetite' of municipalities and service providers for ICT solutions. (For example, in many regions, people are highly prone to commit typos/errors while paying bills through digital means. So, in a recent World Bank -sponsored WSS project implemented in Phnom Penh, city-level water utilization/metering details were automatically transmitted from the meters via a computer chip to the utility company, instead of relying on user's ability to pay bills via typo-prone SMS messages).

- TTLs are urged to approach Trust Funds to carry out feasibility studies for including ICT in projects under implementation. To justify TF proposals, it would be useful to refer to ICT in context of the Bank's Country Assistance Strategy (CAS) for the target country. A listing of prominent TFs that could be tapped to finance feasibility studies is presented below:

Trust Fund	Relevant Objectives of TF	Contact Points
Bank Netherlands Partnership Program (BNPP)	Foster cross-cutting issues linkages (capacity building, good governance, and gender), development of partnerships with government/private sector/civil society.	Helena Nkole (hnkole@worldbank.org)
Japan Social Development Fund (JSDF)	Test innovative methods that are new or alternative approaches at the project, country, or regional level	Roberto Tarrallo (rtarallo@worldbank.org)
Policy & Human Resources Development (PHRD)	Water, Sanitation, Flood Protection/Disaster preparedness (for example, in urban areas)	Roberto Tarrallo (rtarallo@worldbank.org)
Least Developed Countries Fund for Climate Change (LDCF)	Assess needs of LDCs whose economic /geophysical characteristics make them especially vulnerable to the impact of global warming and climate change	Bonizella Biagini (bbiagini@thegef.org) Jonathan Caldicott (jcaldicott@worldbank.org) Steve Gorman (sgorman@worldbank.org)
Korean Trust Fund (KTF)	Support activities that promote improved access to ICT and mainstreaming of ICT to enhance development programs	Catherine Burtonboy (cburtonboy@worldbank.org)

4.2. Menu of Options for the WBG: Suggestions from Readers

(Readers: Your suggestions, feedback, and comments will be posted here! Convey your inputs using the feedback form or via the various Social media channels through which this report is available)