Improving the delivery of services by local governments through the application of information and communication technology

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1.   Introduction

Since public administration was first developed in ancient times many new tools and instruments were introduced to improve service delivery. The seal, the double-entry and single-entry bookkeeping system, the typewriter and computer changed the way public services were produced and delivered. The benefit is tremendous. The effectiveness and efficiency of today's public administration wouldn't be possible without them. Nonetheless, they always were just tools and it depended and still depends on the skilful use of these tools to assure good governance and improvement of public services.

The introduction of Information and Communication Technologies (ICT) is only one of the very last modernisation efforts and its full extend and impact is just emerging. It is not too long ago that even in developed countries the relevance of such tools was not taken for granted. For example, when I submitted to a journal in Germany in 1994 my first article discussing opportunities of wide area computer networks in local and regional research the reviewer questioned not the quality of the article but the relevance of the subject.[1] Even colleagues in the research institute where I worked at the time and in other leading European institutes questioned in the mid 1990s if tools like the internet and the at that time brand new world wide web could ever be of relevance for their work. Well, eventually my article was published in the following year but in the meantime its relevance was no controversial issue anymore. It took not long until all colleagues had their own email address and some became even actively involved in the development of new tools and instruments. Applications which have been developed since, e.g. for service delivery by local governments, go far beyond what we imagined in the mid 1990s.

Today it seems bizarre that the relevance of ICT tools could be discussed with such fierceness. Nowadays the relevance of ICT tools is a fact in almost every sphere of our life and consequently the discussion is no more about the relevance as such of these tools. Instead, the discussion is more differentiated according to specific situations and demand in a given context[2]. Theses discussions and related development efforts usually follow one or several of the following subject lines: access, connectivity, content and education.

Comparing the situation of today with the one in the early and mid 1990s, another difference is apparent. While in the early 1990s those had a difficult standing who promoted the oppor-

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[1] Graute, Ulrich, 1995: Weiträumige Computernetze in Raumwissenschaft und Raumplanung. Möglichkeiten und Grenzen eines neuen Arbeitsinstrumentes. In: Raumforschung und Raumordnung, 53. Jahrgang, Heft 6, 1995, 460 – 469.

[2] Visser, Wikus and Hossana Twinomurinzi, E-Government & Public Service Delivery: Enabling ICT to put "People First" – A Case Study from South Africa. In: Journal of Systemics, Cybernetics and Informatics, volume 6, number 6, 2008, pages 36-41. UNDP: Pro-Poor Public Service Delivery with ICTs, Making local e-governance work towards achieving the Millennium Development Goals, APDIP e-Note 11, 2007. United Nations, United Nations E-Government Survey 2010, New York, 2010

tunities of ICT tools, it is today reverse. After the introduction of so many electronic devices and communication instruments it seems at least for many that this process is open ended and will keep on changing our live. This might be true but there are at least some indications that we, the human beings using all these devices, are limited in our capabilities to adapt to the new opportunities with the same speed as they are developed. Therefore, we might factually slow down and put breaks to the technological revolution which we are currently facing. Certainly, the development and application of ICT tools should be always seen and appreciated in relation to their users.

Aim of this presentation is to stimulate the discussion about envisaged and achieved improvements in the delivery of services by local governments through the application of ICT. In doing so it is not possible to give a full picture on all developments, nor can all differences in the various parts of the world be sufficiently reflected in this paper. Instead, examples were chosen to point to some outstanding challenges and developments and to discuss them in the wider context of citizen centred delivery of public services.

2   Access, connectivity, content and education in a (divided) digital world

Despite integration, digitalization and globalization the world of Information Technology has and probably will always have a local dimension. Each user needs an access point where connectivity with a certain quality is provided, and the respective situation varies very much from country to country but also within countries. A homeless person in New York still may have the opportunity to get access to a cost free high speed internet access provided e.g. by the public library. In contrast to this, if a person looses a job in a rural and remote area, e.g. in the US State of Montana, he or she may own a house and a car but broadband internet connectivity may still be a dream not achievable.

The digital divide makes it difficult to speak about priorities for ICT development in general terms. Setting high standards for internet connectivity makes only sense where there are the means to provide services accordingly. Where there is no access yet the discussion about high speed connectivity seems to be less relevant, while for those with access the connectivity becomes key e.g. to economic competitiveness of online services. Not surprisingly, discussions of those having high speed access focuses more on the substance and content of services and on the education of users and services providers. The digital divide exists with respect to access, connectivity, content and education.

 The question of *access* to ICT and the ownership is most fundamental. There are countries like Finland where access goes without saying and where the government will make even broadband access a legal right for its citizen from 2011 on. At the same time there is the other side of the digital divide where access is still limited to smaller parts of the society and even they may suffer a lack of access if no electricity is available. In addition, access is related to the question of ownership. Who owns the networks and provides access to them has a powerful position. Because of this the governance of access on the international level is highly relevant for service delivery also on local level.

The *connectivity* is the second subject line of concern. In the above mentioned case of Finland from July next year, telecommunications companies will be obliged to provide all Finnish residents with broadband lines that can run at speeds of at least 1 megabit per second[3]. In many parts of the world governments and providers would not be able to guarantee this quality. Accordingly, users have more or less advantages of ICT tools depending on their location. For local governance this means that the planning of future ICT applications should be based on a

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[3] Finland makes broadband access a legal right, The Guardian, 14 October 2010;
http://www.guardian.co.uk/technology/2009/oct/14/finland-broadband

realistic prognosis of the development of connectivity for public authorities, citizens and other users of public services.

Next to the connectivity is the question of *content.* Of course, the field of content is the one where public services really come to play a major role. Some municipalities have only a simple web page with some basic information, the advice that the web page is under construction and will be updated soon. Such web pages don't improve any service, but there are many local online services which go far beyond this. As an example, the case of the twin cities Hyderabad and Secunderabad in India will be described later in this paper (chapter 3.1). The development of content may have a major impact on public administration as it is traditionally organized. In the example of the twin cities the services of 14 different departments and other private services were combined into a one-stop-shop which didn't exist before.

Finally, to make the best use out of the access, connectivity and content for the people who use ICT, it needs a proper *education.* It is necessary to educate the developer and provider of services but also users. What makes this even more challenging is that ICT and related tools are still developing in a dynamic way. At the same time, the opportunities to use ICT and the forms of content grow in number and quality. For those, who are confronted for the very first time with ICT it is important that they are offered an introduction on how the tools work and how to handle the content. But even for ICT practitioners each new tool open new questions and demand for training.

Considering the before mentioned, ICT and related tools are introduced into our live without providing in advance the answers to all questions. As a matter of fact, the development of the technology usually comes first and only then public and private institutions, companies and citizens learn how to adapt and react.

At the global level the United Nations organised the World Summit on the Information Society (WSIS) in Geneva in 2003 and in Tunis in 2005[4]. The 2005 United Nations Summits emphasized the importance of Information and Communication Technologies (ICT) in achieving the internationally agreed development goals, including the Millennium Development Goals (MDGs). They also identified the need for a global forum that would comprehensively address cross-cutting issues related to ICT in development. With respect to global efforts to coordinate the development of the internet the Internet Governance Forum (IGF) is to be mentioned[5].

The UN Department of Economic and Social Affairs (DESA) is involved in all related activities but goes even beyond them by providing a number of own studies and advisory services. In 2007 a first compendium of ICT applications was published. [6]Most outstanding are the World e-Parliament Report[7] and the UN e-Governance Survey[8]. The UN E-Government Survey assesses the E-Government Development of the 192 Member States of the UN according to a quantitative composite index of e-readiness based on website assessment, telecommunication infrastructure, and human resource endowment. ICTs can help reinvent government in such a way that existing institutional arrangements can be restructured and new innovative arrangements can flourish, paving the way for a transformed government. Of course, global surveys on E-Government or the World E-parliament Report analyse predominantly national development. To

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[4] Website of the World Summit on the Information Society: http://www.itu.int/wsis/index.html

[5] http://www.intgovforum.org/cms/

[6] United Nations: Compendium of ICT Applications on Electronic Government, Volume 1: Mobile Applications on Health and Learning, New York, 2007

[7] United Nations, World e-Parliament Report 2010, New York, 2010
http://unpan1.un.org/intradoc/groups/public/documents/un/unpan039336.pdf

[8] United Nations, United Nations E-Government Survey 2010, New York, 2010
http://www2.unpan.org/egovkb/global_reports/10report.htm

get a full picture it is necessary to include the subnational level and analyse especially the application of ICT tools at the local level by local authorities and citizen.

3   Application of ICT tools to improve local delivery of services

Since ICT first were developed more and more local and regional governments started experimenting and introducing various tools like websites, electronic administrative procedures or digital radio. Meanwhile this is happening around the world (including least developed countries[9]) in so many cities and municipalities that this chapter does not even try to report about all of them. Instead it aims at presenting examples of and opportunities for improved service delivery. By selecting only a few examples it is possible to describe these cases more in detail and, at the same time, to discuss opportunities for the use of ICT in a wider context of local governance.

The first example is taken from the twin cities of Hyderabad and Secunderabad in India where city authorities provide since 1999 a large number of standardized administrative services according to the approach of a one-stop-shop. Purpose of choosing this example is to demonstrate that e-governance services can ease and especially fasten many otherwise time consuming administrative procedures.

The second example looks at local health systems and where e-services can be introduced in this system to improve the delivery of health services. What makes this example specific is the view at citizen-centred health systems where – as the name says – the individual citizen is the centre of concern. Although, social contact and direct cooperation are central, ICT tools can be of use in many respect in this citizen-centred context.

The third example examines another case where ICT tools are used together with other tools and means to improve service delivery. This time the subject is not citizen-centred but it is about monitoring risks and preventing floods in river catchment areas as part of disaster preparedness of governments. Here too, the example will demonstrate where e-governance tools can make a difference and improve service delivery.

In the fourth subchapter the subject is on city-to-city cooperation and how it can help to overcome isolation and other disadvantages of cities and municipalities. Compared to e-health and disaster prevention the level of technology needed is low (internet and world wide web) but, nonetheless, it is worthwhile to describe existing opportunities. The low demand for technical infrastructure might even increase the attractiveness of related applications.

3.1   E-GOVERNANCE: Using ICT to improve day-to-day citizen services

E-governance is a relatively new term. B. Srinivas Raj states that e-governance "essentially implies upgrading of efficiency and effectiveness of the administrative machinery through the combination of Information Technology and sophisticated multimedia to deliver better, cost-effective and speedy services to the citizen"[10]. This description can be misunderstood in a sense because it gives the impression that services are one-way services 'to the citizen' and therefore not interactive. Of course, citizen services can consider needs and demands of citizens only if they are at least at some point interactive. Nonetheless, the wording is correct in the sense that it underscores that the basic concept of the public service is that it serves the citizen and not the other way round.

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[9] The city of Ouagadougou, Burkina Faso, has on its website several online information sources including a municipal radio station; http://www.rmofm.bf/rmo.htm

[10] Raj, B. Srinivas, E-governance Techniques, Indian and Global Experiences, New Delhi, 2008, page 120.

E-governance services developed and mushroomed very fast over the last decade. Many local authorities in the world gained in one way or another first experiences with the conceptualization, development and introduction of such services. To demonstrate how manifold and complex e-governance services by local governance can be, this paper describes in more detail the case of e-Seva[11].

Originally, a pilot project TWINS (Twin Cities Integrated Network Services) provided citizens of the twin cities Hyderabad and Secunderabad in the Indian State of Andhra Pradesh to handle up to 112 services pertaining to 14 different departments and other private services for delivery on a one-stop mode. When the project started to spread out to other major towns and municipalities the State of Andhra Pradesh got engaged and the project was renamed e-Seva, which is its name since.

The vision of the State Government of Andhra Pradesh is "to create a knowledge society by using Information Technology in all aspects of development and governance. Pioneering efforts are being made to reach the benefits of IT to the citizens - urban and rural, rich and poor, literate and illiterate. The Government is conscious of the dangers of the 'digital divide', and is making special provisions for reaching the 'information have-nots'."

The entry point to e-Seva is its website[12] but in line with the before mentioned vision citizens are not required to have an own computer and internet access because 46 e-Seva centres with 400 services counters are spread over the twin cities. The centres are operating from 8.00 am to 8.00 pm, on all working days and 9.00am to 3.00pm on holidays (second Saturdays & Sundays). All 400 service counters are facilitated with an electronic queuing system. There are no jurisdiction limits, i.e. any citizen in the twin cities can avail of the services at any of the 46 e-Seva service centres.

Pictures: e-Seva counters

E-Seva offers a wide spectrum of citizen services as a one-stop-shop that saves citizens the bother of running around various departments (compare table 1). Online services are linked to eForms, eFiling and ePayments. Payments are made by cash, cheque, credit card and online payments.

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[11] E-governance: A case Study of E-Seva, in B. Srinivas Raj: E-governance Techniques, Indian and Global Experiences, New Delhi, 2008, pp 118-127.
[12] http://www.esevaonline.com/

Table 1:   List of services provided by e-Seva

Payment of Utilities Bills
- Bills: Electricity, water and sewerage bills
- Telephone bills (BSNL & TATA Tele Services)
- Taxes: Property and Sales Tax

Certificates
- Registration of births / deaths
- Issue of birth / death certificates
- Registration Department : Issue of encumbrance certificates *
- Issue of Caste/Nativity Certificates *

Labour Department
- License New Registration
- License Renewal

Permits / Licences
- Medical and Health Department: Renewal of Drug Licences *
- Issue / renewal of trade licences

Transport Department Services (available at Banjara Hills Centre only)
- Change of address of a vehicle owner
- Transfer of ownership of a vehicle
- Issue of learners' licences
- Issue / renewal of driving licences (non-transport vehicles).
- Registration of new vehicles

Information
- Transport Department Procedures *
- Registration Department: Market value assistance *

Reservation
- Reservation of APSRTC bus tickets
- HMWSSB: Reservation of water tanker
- Tourism: Reservation of tickets/ accommodation *

Other Services at E-Seva Centres
- Sale of passport application forms
- Receipt of passport applications
- Receipt of applications for new telephone connections.*
- Registration Department: Sale of non-judicial stamps
- Registration Department: Document writing service *
- Collection of small savings *

Internet Services
- Internet-enabled electronic payments
- Downloading of forms and Government Orders (GOs)
- Filing of applications on the web
- Receipt of complaints or requests in connection with citizen services *

B2C Servcises
- ATM: Cash withdrawals and deposits *
- ATM: Issue of statements of account *
- Mutual Funds: Collection of applications *
- Mutual Funds: Transfer of shares *
- Cell Phone Bill Payments

Polices Services
- Payment of Inquest/Panchanama fees 50 Rs.
- Payment for First Information Report 50 Rs.
- Payment for Inquest/Panchanama fees 50 Rs.
- Payment for Post Mortem Report 50Rs.

Note: * Yet to be started

A manual available on the website lists all services and provides contact information of responsible local authorities. This is done with reference to the Right to Information Act of India (2005), which mandates timely response to citizen requests for government information[13]. In deed by providing contact information e-Seva eases efforts by citizens interested in obtaining information held by public authorities. The manual not only lists responsible officers and other employees with office address, phone and mobile number but also their monthly remuneration (chapter 11). Citizens who want to obtain information will find in the manual also a listing of types of information made available where and by what facility (chapter 15 and 16).

To analyse the impact and citizen's perception of e-Seva a survey was carried out[14]. Questionnaires and data were collected from 31 localities and 100 respondents in the twin cities. 100 per cent respondents were happy about the introduction of e-Seva, while many had at the same time problems with important elements like a lack of staff courtesy, not suitable working hours and that the computers were down for long hours in some of the centres. The overall very high appreciation can be explained with the main advantage of the system: time saving. "Before instruction of e-Seva services, when inquired about multiple problem areas, 51 respondents have said that it was long waiting queues, 45 respondents said time consuming, 38 respondents said they have come across unprofessional/discourteous staff, 33 respondents said delay in service/ response, 9 respondents said records were not updated and 6 respondents have mentioned high corruption in getting things done. However, 94 per cent of the respondents mentioned that these problems were overcome after the introduction of e-Seva and only 6 per cent said not yet."[15] The time saving is usually of about two hours for paying a water bill, property tax or to get a caste/nativity certificate.

In conclusion of this subchapter it can be said that e-governance offers ample opportunities to improve the delivery of services by local governments. Nonetheless, the new tools of 'e-governance' are not the solutions for wider citizen participation but only the tools. The described services itself are not linked to citizens engagement. It will depend on how the new tools are applied in the context of overall programmes and policies. Raj concludes: "These tools may be utilized to increase citizen participation, but there are many other factors involved which affect that utilization, and because of these factors, one cannot accurately predict future changes and consequences that may be wrought by new technology"[16]. The same seems to be true with respect to the question if these new tools may change the relation between citizen and governments. The examples described generates a higher customer satisfaction with public services but – for the time being – no basic change in the relationship between local governments and citizen.

3.2   E-HEALTH: Using ICT in citizen-centred health systems

3.2.1   Primary care as a hub of coordination

Modern medicine and medical research are since several decades technology oriented. Large amounts of electronic equipment are common in most hospitals but even smaller hospitals in remote areas require basic electronic equipment like electrocardiogram (ECG) or ultrasonic devices. ICT tools bring a new dimension into medical services by allowing the linkage of services and equipment at different locations to improve medical service delivery. Local authorities play a key role in organizing the health system on their territory. E-health, which basically im-

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[13] http://righttoinformation.gov.in/

[14] Raj, B. Srinivas, E-governance Techniques, Indian and Global Experiences, New Delhi, 2008, pages 121-26

[15] Raj, page 124

[16] Raj, page 137

plies use of digital data in support of health care, gives public and private actors in local health systems the opportunity to further improve the delivery of health services to their citizens.

The example chosen for this paper is specific insofar as it is not focussing on e-health and ICT in the first place, but on citizen-centred health systems. Services provided by health systems have a vital impact on the life of citizen. Consequently, related services and the use of ICT in the context need to be developed having an eye on the needs of the citizen.

To improve the health system and medical interventions depends often on an integrated set of measures[17]. Private providers of health services alone can not provide such measure but require support from other actors in the health system like local and regional authorities. In general, "a shift towards the need for more comprehensive thinking about the performance of the health system" [18] is recognizable in public health. To that end, the *World Health Report 2008* promotes the setting up of a system for primary health care. Its scope is people-centred and thus goes beyond conventional ambulatory medical care and disease control programmes (compare Table 2).

Table 2   Aspects of care that distinguish conventional health care from people-centred primary care[19]

Conventional ambulatory medical care in clinics or outpatient departments	Disease control programmes	People-centred primary care
Focus on illness and cure	Focus on priority diseases	Focus on health needs
Relationship limited to the moment of consultation	Relationship limited to programme implementation	Enduring personal relationship
Episodic curative care	Programme-defined disease control interventions	Comprehensive, continuous and person-centred care
Responsibility limited to effective and safe advice to the patient at the moment of consultation	Responsibility for disease-control targets among the target population	Responsibility for the health of all in the community along the life cycle; responsibility for tackling determinants of ill-health
Users are consumers of the care they purchase	Population groups are targets of disease-control interventions	People are partners in managing their own health and that of their community

The people-centred primary-care approach brings promotion and prevention, cure and care together in a safe, effective and socially productive way at the interface between the population and the health-care system. WHO found evidence that person-centredness contributes to the quality of care and better outcomes: [20]

(a)   Improved treatment intensity and quality of life;

(b)   Better understanding of the psychological aspects of a patient's problem;

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[17] United Nations: Mainstreaming of health issues and human capacity-building in public administration, Economic and Social Council, ECOSOC: E/C.16/2009/4, 13. January 2009
[18] WHO (2008). World Health Report 2008. Director-General's Message, Geneva.
[19] WHO (2008), page 52, Geneva.
[20] WHO (2008). page 47, Geneva.

(c)   Improved satisfaction with communication;

(d)   Improved patient confidence regarding sensitive problems;

(e)   Increased trust and treatment compliance;

(f)   Better integration of preventive and promotive care.

Looking at the administrative and managerial side of this approach the related challenge becomes visible: Each centre for primary health care should offer a comprehensive range of integrated diagnostic, curative, rehabilitative and palliative services. It needs to be ensured that these distinctive features become directly and permanently accessible, without undue reliance on out-of-pocket payments and with social protection offered by universal coverage schemes. Another set of arrangements is critical for the transformation of conventional care – ambulatory- and institution-based, generalist and specialist – into local networks of primary-care centres:[21]

(a)   bringing care closer to people, in settings in close proximity and in direct relationship with the community, relocating the entry point to the health system from hospitals and specialists to close-to-client generalist primary-care centres;

(b)   giving primary-care providers the responsibility for the health of a defined population, in its entirety: the sick and the healthy, those who choose to consult the services and those who choose not to do so; and

(c)   strengthening primary-care providers' role as coordinators of the inputs of other levels of care by giving them administrative authority and purchasing power.

This brings a lot of changes and challenges to health care workers and teams but also to the people and communities. Support from specialized services, organizations and institutions outside of the community are also required. The coordination of this set transforms the primary-care pyramid into a network. The relations between the primary-care team and the other institutions and services are no longer based only on top-down hierarchy and bottom-up referral, but on cooperation and coordination. Thus, primary care becomes a hub of coordination (figure 1).

The coordination function provides the institutional framework for mobilizing across sectors to secure the health of local communities. WHO regards this not as optional extra but as an essential part of the remit of primary-care teams and sees also the policy implications: "coordination will remain wishful thinking unless the primary-care team has some form of either administrative or financial leverage. Coordination also depends on the different institutions' recognition of the key role of the primary-care teams. Current professional education systems, career structure and remuneration mechanisms most often give signals to the contrary. Reversing these well-entrenched disincentives to primary care requires strong leadership." (WHO 2008, page 57)

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[21] WHO (2008). page 55.

Figure 1   Primary care as a hub of coordination: networking within the community served and with outside partners[22]
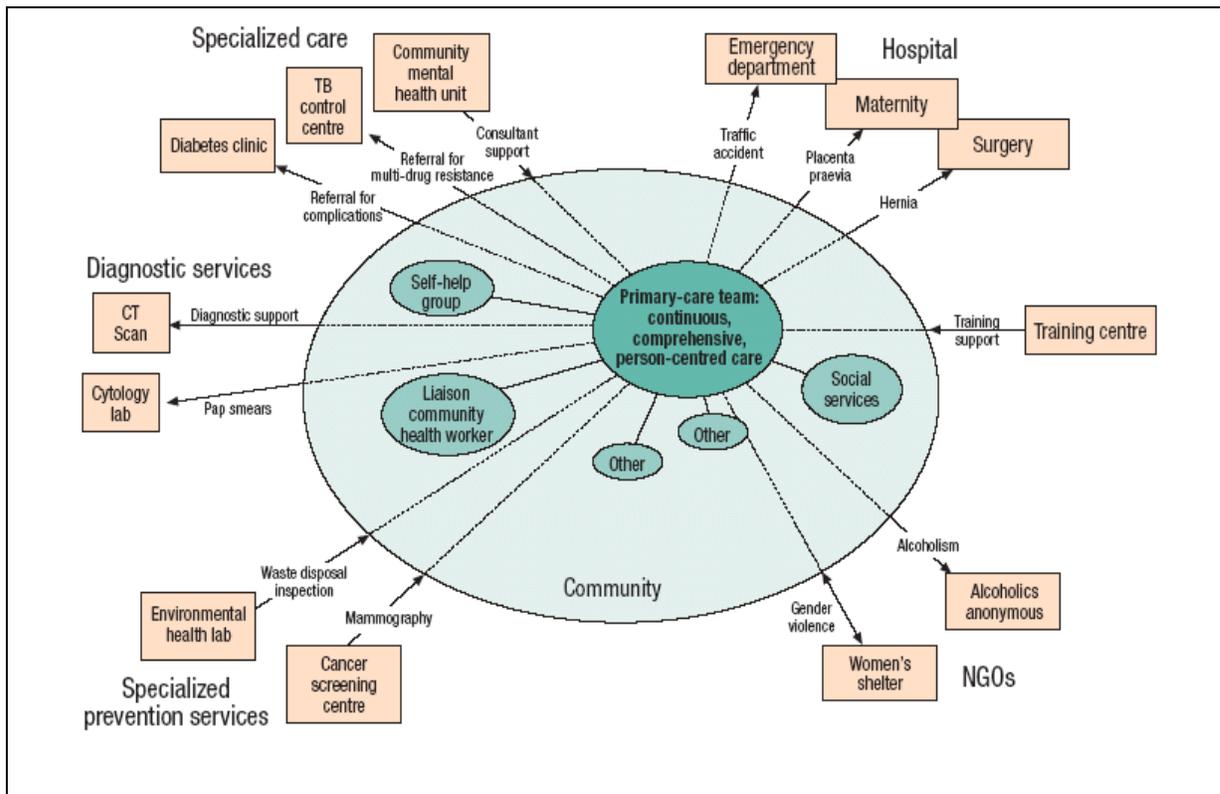
3.2.2   Opportunities for the use of ICT to strengthen the role of primary care as hub of coordination

The need to develop and organize new ways of providing efficient health-care services has resulted in a dramatic increase in the use of information and communications technology (ICT) applications in health care, collectively known as e-health or telemedicine. E-health is the use, in the health sector, of digital data - transmitted, stored and retrieved electronically - in support of health care, both at the local site and at a distance. Today, e-health can support the different functions of the health system, providing a unique opportunity for strengthening its information, intelligence and knowledge processes. Of course, it also allows for an easier promotion of alternative or traditional medicines. In addition, ICT facilitates interlinking between health authorities, other departments and the public. According to WHO, e-health should be an essential component of any plans and strategies for health-system reform in the twenty-first century. Developing countries' needs include capacity-building and the ICT training of public servants. Today the integration and assimilation of e-health into the everyday life of health-care workers is becoming a reality in developing as well as developed countries, though one of the open questions is whether activities in e-health would divert precious resources away from basic needs in poor countries in want of everything.

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[22] WHO (2008), page 55.

ICT can be applied in principle for all networking functions within the community served and with outside partners (compare figure 1). All arrows pointing to or from the primary-care team represent an opportunity for the use of ICT. Among these opportunities are[23]:

- By connecting primary health workers to primary health-care centres and connecting these centres electronically to departments and referral centres in hospitals for the exchange of data a significant improvement in access and cost effectiveness.

- Direct tele-consultation between the community health worker and a relevant hospital specialist can reduce professional isolation and provide opportunities for continuing education to the community health practitioner (e.g. tele-cardiology founded on the exchange of digitalized ECG, digitalized echocardiology or digitalized stethoscopy and tele-radiology based on the exchange of digitalized X-ray images). Tele-consultations take specialists to the primary health-care level.

- Electronic Health Records enable easy communication of patient data between different healthcare professionals (general practitioners, specialized prevention services, diagnostic services, specialized care, hospitals, care team, pharmacy). According to WHO Access to comprehensive, secure electronic health records has been shown to improve the quality of care and patient safety. Improved knowledge of the patient's history and previous medical interventions facilitates appropriate treatment.

- Tele-consultations may reduce the need for patients to attend hospitals, saving them both time and money. Hospitals can then focus their resources on patients who may benefit from treatment at the secondary level of health service.

- Consumer Health Informatics (or citizen-oriented information provision) enable to inform healthy individuals, patients and NGOs on medical topics.

In spite of all optimism WHO is also cautious in appraising eHealth. The preferred use of terms like 'can' and 'may' in its Strategy 2004-2007 underscores that ICT are just tools. Of course, the improvement of service delivery depends as before the introduction of ICT on many other factors like the quality of health workers and availability of medical infrastructure other then ICT.

The Example of a new Health Information System for local use in India

"Ca:sh" is a project using handheld-based electronic medical records (EMR) in Balabargh, India. The system is designed for paramedical health workers serving remote areas, giving them access to large medical databases in the field. The system addresses two important problems: prenatal care and child health. Data collected by the mobile health workers can be used for better understanding of disease patterns in a community and for optimal health resource allocation. It is also useful to link data from ongoing health surveys that can be used in public health research programmes.

Source: United Nations Information and Communication Technologies (2003) The Role of information and Communication Technologies in Global Development, ICT Task Force Series 3, New York

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[23] World Health Organization: eHealth for Health-care Delivery, Strategy 2004-2007, Geneva.

3.3   E-PLANNING: ICT tools to support local and regional planning

3.3.1   Integrated use of ICT for disaster prevention and preparedness

Disasters are extraordinary events. None the less, in all parts of the world local authorities have to face and be prepared for disasters. This challenge is specifically complex. Even where authorities know by historic experience that their territory is vulnerable to a certain type of disaster like earth quakes, flooding, draughts or hurricanes they don't know in advantage when the next disaster will happen and what damage has to be expected. In such situations ICT tools can not answer all questions but they can help to improve preparedness, monitor risks and their management.

In the case of heavy rainfall, flooding occurs in many urban areas, whose consequences are large damages to buildings and the city infrastructure. This situation is a challenge for local governance because it needs to get prepared for floods and, if possible, reduce and prevent possible damage. Therefore, flood and risk management became a constant task in related urban areas but the challenge remains complex.

It is difficult to justify major investments and other measures without prove that a disaster of a certain level will occur within a foreseeable future. But even when a disaster becomes apparent it often remains difficult to predict what is to be expected. For example, during the 2002 flooding of the Elbe/Labe river in Czech Republic and Germany when upstream inner cities like Prague were already under water other cities downstream could not estimate what a certain water level in Prague would exactly mean for a city 100 or 200 km downstream. Unfortunately, without exact calculation of all impact indicators (like the flood level upstream, water levels of tributary rivers, ongoing rain in the catchment area, absorption capacity of water by retention areas or the impact of the relief of the river valley on the flood level) it remains difficult to assess the risk and to decide on evacuation and other alert measures.

What can help local authorities is a combination of ICT and traditional planning tools. This begins with monitoring and includes measures like the following[24]:

- computation of flow paths at the surface in urban and natural watersheds on the basis of a digital elevation model (DEM) and geographic information systems (GIS)
- development of physically-based simulation models (e. g., by shallow water equations) for the surface water
- coupling of the flow in the sewer system and at the surface
- visualization of simulation results and parameter fields in the GIS
- model-based investigation of the interactions between surface drainage and groundwater
- development of fine-grained surface meshes from laser scan data for urban areas

The monitoring results can be applied in the following areas:

- modelling and computation of floodwater events in (peri-) urban areas, including the estimation of flooding risk by model rainfall
- computational proof of official regulations (e.g. European general water directive EN 752: Drain and sewer systems outside buildings)

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[24] The following listing was developed in context of the flooding of 2002 and other events by Fraunhofer Society
http://www.itwm.fraunhofer.de/en/sks__projects__sks_hochwasser_und_risikomanagement/hochwasserundrisikomanagement_meta/
For more details see also the website of the ELLA project http://www.ella-interreg.org/
and of the Dresden Flood Research Center http://www.dresden-frc.de/en/projects.htm

- planning of prevention measures against flooding after strong rainfalls
- determination of damage quantity and quality, e. g., depending on the water level
- planning scenarios for the connection of new building sites to the drainage system and for the renewal of entire sewage systems
- problems of insurance industry
- emergency management

Based on tools like the above mentioned it was possible to develop another ICT tool. It is called INGE[25] and serves as an interactive risk mapping tool of the state of Saxony in Germany for local flood management. This software visualises basic data for alert situations and gives an overview on the expected risks for objects in relation to a current or to be expected water level.

Screen shot: Interactive Risk Map of the inner city of Pirna (Saxony, Germany) as produced by the software INGE[26]
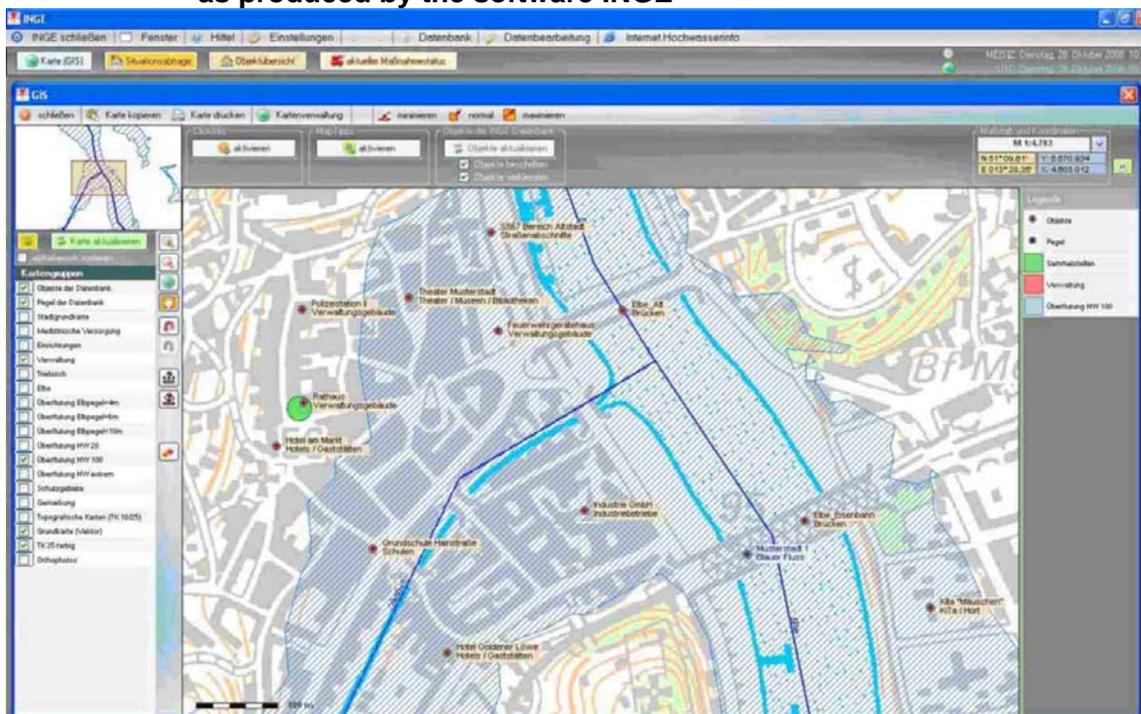
The software INGE allows in combination with other tools like GIS, data bases, digital photos, spatial data and traditional elements of disaster preparedness the useful combination of necessary data. This can ease and fasten the work of disaster prevention and management. INGE can serve the local authorities as a tool for decisions in the planning and implementation of disaster response.

3.3.2   Integrated use of ICT for settlement and open space development

The best local authorities can do to prevent or minimize the impact of disasters is to be prepared. Part of this preparedness is the monitoring of settlement and open space

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[25] http://www.umwelt.sachsen.de/de/wu/umwelt/lfug/lfug-internet/wasser_15685.html
[26] The software INGE and its use are described on the website of the Free State of Saxony, Germany; http://www.umwelt.sachsen.de/de/wu/umwelt/lfug/lfug-internet/wasser_15685.html

development which is a basis also for urban and regional planning in general. One should think that local and regional authorities know their territory, but in reality it is difficult to keep track with all land use changes. Even where a landscape register is in place, the use of the territory changes often without notification. In addition, landscape registers don't include data like the quality of soil sealing. The soil of open spaces over the time may be severely damaged, completely removed or covered (sealed).

In Germany, a monitor of settlement and open space development has just been developed to close this gab[27]. The monitoring system will describe the state and the development of land use especially in regard to its sustainability for the entire Federal Republic of Germany. To this end, for the first time ever it makes use of topographical geobasis data (digital landscape model of the Authoritative Topographic-Cartographic Information System). These data allow for a more precise spatial and content-wise description of land use than that of the land register data, which serve as the basis for the official land use statistics. On the basis of the geobasis data an automatic calculation of indicators from the fields of settlement, open space, nature reserves, population and traffic occurs. The indicators are depicted in thematic maps, thus allowing for spatial and chronological comparisons. In addition to administrative spatial units (federal state, district, municipality), the indicator values are also presented in scales of various cell widths.

3.4 E-COOPERATION: Using ICT to overcome geographic isolation and other disadvantages of cities and municipalities

3.4.1 Local and regional cooperation without ICT

Looking for external support is nothing new for governments. Whenever citizens and their leaders couldn't solve a problem with own means they started looking beyond the borders of their community. Therefore, it is not surprising if today local authorities who want to improve local services also look for external support. There are many ways to do this. Often it may be sufficient to visit a neighbouring village or the next city to learn how neighbours are dealing with a problem which is common to the entire region. Exchange of experience, exchange of staff (twining), a joint task force or training sessions and eventually joint investments may be other steps to solve local problems by local and regional cooperation.

Unfortunately, these activities either are not always sufficient or their implementation is not even possible. Be it because of its geographical isolation or be it because the same problem is not faced by its neighbours, local area cooperation is not always the way to find the solution for a given problem. Possible examples of this kind include:

- A city in a small mining region may be faced with the decline of mining on their territory. Due to the small size of mining it is not acknowledged as a relevant problem on national level and therefore doesn't get all the support necessary to deal with the economic, social and environmental consequences of the closing of mines. Neighbouring municipalities are already outside of the mining region and therefore the city is alone with its problems.

- Another community in the rural part of a country may have a national park or other natural heritage on its territory. The community wants to save the heritage and protect the nature but it also wants to stimulate economic development. Unfortunately, the community is small and can not afford economic development programmes and it has not even the

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[27] Meinel, Gotthard: Monitoring of Settlement and Open Space Development on the Basis of Topographical Spatial Data - Concept, Realization and first Results, in: ISPRS, Haifa/Israel, 15.-17.3.2010, Proceedings.

know-how on how to combine nature protection with prosperous economic development. Again, its neighbours are in a different situation and can not help.

- Last but not least, there may be a city with the image of an old industrialized town without future. Local authorities are convinced that the reality is far better then the image. Visitors confirm that but there are too few to change the image.

Overcoming related disadvantages generates first of all opportunity costs, e.g. for travelling to allow personal encounters. Important as personal encounters may be they are relatively costly and it often is the case that their impact is very limited. A visit either may be too short to collect all useful information and exchange all relevant experience, or it turns out that the delegation sent out doesn't cover all competences needed to discuss all subjects in-depth, or the timing for the visit is simply wrong and doesn't allow achieving intended results. There are cases of cultural or religious communities in isolated locations who managed to communicate with sister communities over long distances and long periods, but these are more the exception then the rule. In general, the opportunity costs are just too high.

One exception from this rule was the Hanseatic League (also known as the Hanse or Hansa)[28]. It was an economic alliance of trading cities and their guilds which established and maintained a trade monopoly. It stretched from the Baltic to the North Sea (13th–17th centuries). The member cities of the league had their own law system and furnished their own protection and mutual aid, thus having a sort of a political autonomy and in some cases creating political entities of their own. The league certainly had to cover opportunity costs related to the long distance cooperation but these were more then counter-balanced by the trade profits.

3.4.2 Local and regional cooperation with support of simple ICT tools

Be it the Hanseatic League or other city-to-city cooperation, until the 1980s and early 1990s all this was done, of course, without the opportunity to use ICT. This changed with the introduction of emails and the internet. When the European Community started growing by number of states and by the size of its territory it slowly began to realize that the territory matters for this Union, which originally aimed only at an economic integration. Regional disparities became more and more visible. To overcome the risk that regions lagging behind would do so permanently and to prevent that these disparities would drive the members of the young Community apart from each other, the European Community and later the European Union developed gradually a Regional Policy and Structural Funds to allow regions which performed below the average of the Union to catch up with the driving forces of development.

Regions and local authorities gladly accepted funding from Brussels which usually was distributed through national channels according to a quota agreed ex ante among Member States and through a process monitored by the European Commission. Opportunity costs in the 1970s and 80s were limited to the facilitation of negotiations among member states and the European Commission. Since all this was covered by national governments local authorities had no directs costs but at least they could benefit from funds provided via their national authorities.

In 1990s the European Community increased its efforts to stimulate local and regional cooperation firstly in border regions and secondly across the entire territory of the Union. Working as expert and programme manager in this field I observed the introduction of new communication instruments and how they affected the cooperation. The first step was the introduction of the fax machine which allowed the transfer of documents across Europe without time delay. Local authorities involved in European funding programmes started using the new tool but the time

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[28] http://www.hanse.org/en/the_hansa/die_hanse_historic

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gain offered by the tool was not fully used, because all official documentation which was sent by fax still had to be sent by postal service. Signatures on a fax printout were not considered as a legal document and therefore authorities waited for the original coming by postal service.

At the beginning of the millennium this changed gradually. Now documents were sent by email and often didn't bear any signature but gained more and more acceptance as legal document. Consequently, the delivery of these public services gained speed. For example, in the IN-TERREG III B CADSES programme and it was possible to handle applications, contracts, correspondence and many other documents related to 178 projects with 1800 mostly local and regional partners from 18 countries with a relatively small programme staff[29].

The big surprise came when it was realised that in the overall programme management there was no notable time gain despite of the use of high speed internet connectivity and state-of-the-art computers. The reason for this was the lagging behind of inter-governmental cooperation among the large number of representatives from 18 countries and the European Commission participating in this and other programmes. The internet helped to exchange data across Europe within seconds but the negotiations on agreements between member states on programme documents still could take a year or even more. Thus, email services eased communication but the tools itself could not improve cooperation and help to overcome different views among partner states. Nonetheless, none of the partners involved would go back to the old times where the ICT were not available. Despite of the lack of added value for the transnational negotiations, the electronic communication eased every other step of cooperation and management.

Funding programmes like INTERREG III B CADSES did use ICT tools not only for programme management but also for cooperation among project partners, and here the main added value became visible:

- Small mining areas in central Europe came together in the project READY, exchanged experience, realized common challenges and searched for common solution either by pilot actions in one area and using the results in other areas or by building together a political lobby at European level.[30]

- Local and regional authorities in the Elbe/Labe river catchment area in Czech Republic and Germany in the project ELLA for the first time developed a joint approach and common tools to monitor risks and strengthen cooperation.[31]

- Similar networks were built by small cities spread across Europe who wanted to better manage their natural heritage with their limited resources and at the same time strive for economic prosperity.[32]

Thanks to the combined advantages of financial incentives (provided by the programme) and modern ICT tools local authorities could overcome part of their isolation and other disadvantages by looking for partners with similar challenges. Together they exchanged experience,

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[29] Joint Technical Secretariat, Ulrich Graute (Ed), 2008: Advancing Territorial Co-operation. INTERREG III B CADSES Results, Issue 3, Dresden;
http://www.cadses.net/en/projects/propublic/CADSES_Results.html
[30] Uhlmann, Tina (2008): Former mining areas – Chance for perfect landscapes or moonscapes without perspective? In: Joint Technical Secretariat, Ulrich Graute (Ed): Advancing Neighbourhood Co-operation. INTERREG III B CADSES Results, Issue 2, Dresden, 24-28.
[31] Joint Technical Secretariat, Ulrich Graute (Ed), 2007: INTERREG III B CADSES Results. Advancing Transnational Co-operation, Dresden, 12-17
[32] Hahn, Anke (2005): Joint Efforts or rural regions to increase competitiveness and sustainability, in: Technical Secretariat, Ulrich Graute (Ed): Advancing Territorial Co-operation. INTERREG III B CADSES Results, Issue 3, Dresden, 17-22.

gained new insight and developed new approaches to overcome local problems in a way which wouldn't have been possible without this new form of cooperation.

4   Conclusions

The variety of ICT tools available for local governance is very big. There are the simple tools like the use of the internet by sending emails and establishing websites but there are more and more sophisticated combinations of hardware and software. These provide support for local governance with a new dimension and quality, but they require also a higher technical know how. For all ICT tools it can be said that successful application to improve public services depends on both the right choice of tools and the education of users.

In developing local strategies for the application of ICT to improve the delivery of public services it has to be differentiated between the access to the tools, the quality of connectivity, the content (i.e. the services to be improved) and the necessary education of staff and citizen.

When assessing the appropriateness of budgets to be invested local authorities, of course, will do it on the basis of funds available from own or external sources. In addition, it is important to consider the following criteria:

- Citizen satisfaction (e.g. if administrative procedures are less time consuming)

- Quality increase of services (e.g. if integrated tools and ICT supported cooperation generates added values)

- Long-term benefits (i.e. if the investment in ICT supported preventive measures reduce long-term risks and costs)