Towards the Definition of an e-Government Benchmarking Status Methodology

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Abstract. The main concern of a city that wants to adapt eGovernment systems promoting online processes, services and participation is to identify its IT legacy systems and technological infrastructure and to analyze and identify potential gaps and opportunities in its infrastructure and IT systems that would enable it to provide better eGovernment services, like more local democracy and enhanced local decision – and policy-making. This paper proposes a Benchmarking Status Methodology with primary goal to support a city to gain an integrated insight of its technological situation by identifying and reviewing the status of its IT systems and infrastructure capabilities and constraints. It will then be in a position to distinguish necessary developments and enhancements to be adapted bringing the city technologically at the desired position providing apt eGovernment services.

Keywords: e-Government, e-Services, Benchmarking Methodology, B2B, B2C

1. Introduction

EGovernment aims to deliver better quality of public services that are accessible for all. It aims to increase the productivity in the public sector, so that services can be provided by various channels, at a lower cost and time and in a personalized style.

The development in Europe and the rest of the world suggests a potential for more efficient and user-centered ways to deliver public-services. Thus, awareness by users of these services, their willingness to use them, ease of use and delivery of benefits with the services are important factors in the developments of eGovernment (SEC, 2003). Two different strategies for improvement of services are identified, *process integration* (back-end) and *service delivery* (front-end). The first one refers to the degree to which the service is reengineered by the responsible authority in the transformation from an off-line service to e-service, while the second refers to the channel and distribution strategies in the provision of government services (Top of the web, 2003). Relevant channel and distribution strategies are critical for future advancement of e-services to achieve accessible, customer-focused and responsive services.

In the new European society / economy city eGovernment has become a competitive advantage for urban government in the provision of services to Citizens, Business and among Administrations. However, even if eGovernment services have been launched or implemented by most of the European Member States and the rate of initiatives is continually evolving, the current state-of-the-art of deploying Information Communication Technologies (ICT) for urban eGovernment seems to ignore the benefit of such a competitive advantage. Only little has been done towards the definition of an appropriate framework, supporting a city in identifying its current ICT situation with regards to requirements, potential gaps and opportunities comparing with Best Practices, and open technological mechanisms and constraints for the proper delivery of eGovernment that will allow cost effective and speedily transmission of information among Governments, Government and Business and Government and Citizens as well as the type of IT applications installed for interactive and efficient communication between participating actors.

The purpose of this paper is to present an innovative eGovernment Benchmarking Status Methodology developed, considering the aforementioned urban ICT eGovernment and eGovernance (throughout this paper we assume that when referring to eGovernment we imply all the intrinsic values and implications entailed by the concept of eGovernance) open issues with the main focus to enhance the contribution of ICT to the achievement of 'Good Government' principles and goals in European urban decision-making in the context of the Knowledge Society and Sustainable Development. More specifically, a city will be able to assess its current gaps and opportunities comparing with Best Practices for the apt delivery of urban eGovernment services.

The paper is structured in 6 sections. Section 2 makes a reference to the role of ICT in eGovernment. Section 3 gives an overview of related studies for defining best practices on eGovernment services. Section 4 presents vital methodology considerations, section 5 defines a three level eGovernment benchmarking status methodology, and section 6 concludes this paper.

2. Outlining the Role of ICT in eGovernment

Citizen and business oriented government are of the most important considerations for the governments all over the world who are busy steering their respective countries into the provision of more responsive and accessible eGovernment services. With the awareness levels of the common people on the rise, citizens and businesses demand more access to governmental information and an effective and easy interface in their dealings with it. A more informed citizen is for example in a better position to exercise his / her rights, and better able to carry out his / her responsibilities within the community. It is clear therefore, that even more citizens and businesses these days expect to be involved in the process of government and to receive a higher standard of service and care from their Governments. In the digital age of today, Information and Technologies provide the best answer to this need. EGovernment promises through the use of ICT a plethora of benefits to citizens and businesses by accelerating and automating government-citizen / business interface and bringing about transparency in government functioning.

In the frame of this work two main key elements of ICT have been taken into consideration: (a) Technological Infrastructures and (b) Information Technology (IT) legacy Systems, offering potentially beneficial effects to eGovernment.

2.1 Technological Infrastructures

Technological Infrastructures create a wealth of electronic connections supporting the communication aspect of eGovernment ranging to: Connections within government, connections between government and NGOs / citizens – strengthening accountability, connections between government and business / citizens – transforming service delivery, connections within and between NGOs – supporting learning and concerted action, and connections within and between communities – building social and economic development.

2.2 IT Legacy Systems

IT Legacy Systems improve three main domains related to eGovernment: (a) Government processes: e-Administration, (b) Connecting citizens: e-Citizens, and (c) Building external interactions: e-Business.

2.2.1 Improving Processes: e-Administration

Such initiatives deal particularly with improving the internal workings of the public sector. They include:

- Making strategic connections in government: connecting arms, agencies, levels and data stores of government to strengthen capacity to investigate develop and implement the strategy and policy that guides government processes. Examples of such connections are central-to-local, ministry-to-ministry, executive-to-legislature, and decision maker-to-data store. Digitizing existing information channels supports this. The rationale is to provide clearer direction for public sector and state processes and to provide for a more evidence-based approach to policy and process.
- Creating empowerment: transferring power, authority and resources for processes from their existing locus to new locations. Typically that transfer is to lower more localized levels of the public sector and may be seen as decentralization. Transformation supports this by creating new information flows to decision makers and process implementers in new locations. The rationale is to reduce the costs and

increase the speed of processes and decision-making and / or to create more flexible and responsive processes.

2.2.2 Connecting Citizens: e-Citizens and e-Services

Such initiatives deal particularly with the relationship between government and citizens: either as voters / stakeholders from whom the public sector derives its legitimacy, or as customers who consume public services. These initiatives include a broader remit:

- Talking to citizens: providing citizens with details of public sector activities. This mainly relates to certain types of accountability: making public servants more accountable for their decisions and actions. This is supported by providing new information flows from government to citizens on which accountability depends. The rationale is to increase the pressure on staff to perform well and to improve public understanding of government.
- Listening to citizens: increasing the input of citizens into public sector decisions and actions. This could be flagged as either democratization or participation. This is supported by providing new information flows from citizens to government. The rationale is to make public decisions more responsive to citizens' view or needs.
- Improving public services: improving the services delivered to members of the public along dimensions such as quality, convenience and cost. This uses all the potentials of ICTs to deliver the informational components of public services to citizens in digital form. The direct rationale is clear from the definition, but there is also an indirect rationale of releasing citizen time and money that would otherwise be captured by inefficient service delivery.

2.2.3 Building External Relations: e-Business

Such initiatives deal particularly with the relationship between public agencies and other institutions – other public agencies, private sector service providers, non-profit and community organizations – and with the relationship between civil society institutions. They include:

- Working better with business: improving the interaction between government and business. This includes for example digitizing procurement services to business to improve their quality, convenience and cost. This uses all the potentials of ICT to deliver the informational components of public services to business in digital form. It also includes digital support for opening up government to business through outsourcing and other public—private partnerships. The direct rationale is to drive costs down and quality up within government, but there is also an indirect rationale of improving the efficiency and responsiveness of local business.
- Building partnerships: building government partnerships: strengthening relations between government and other institutions such as NGOs or international organizations. The rationale is to create a strong economic, social and political 'fabric' within society.

3. Related Studies for Defining Best Practices on eGovernment Services

Different studies defining methods of identifying worldwide best practices (INTELCITIES, 2004) on eGovernment and eGovernance services in general and on urban eGovernment implementation specifically have been examined. The aim was to select those studies on which the definition of an appropriate methodology, for classifying identified and reviewed IT legacy systems and infrastructures implementing urban eGovernment, can be based. Four of the most related studies are described below:

The study conducted by Marc Holzer and Seang-Tae Kim (Holzer & Kim, 2003) provides a comparative and comprehensive analysis of eGovernance in municipalities world-wide. This study is the first research effort to evaluate eGovernance in municipalities throughout the world based on their population size, the total number of individuals using the Internet and the percentage of individuals using the Internet. The cities were chosen using the “Internet Indicators” (2002) statistics from the International

Telecommunication Union (ITU), an organization affiliated with the United Nations (UN). The survey examined the largest city in each of 98 countries with the highest percentage of Internet users.

The particular research evaluated the official Web sites of each city by using almost 100 measures over five core areas most of which are relevant in supporting urban eGovernance. The main city homepage is defined as the official Web site where information about city administration and online services are provided by the city. Each measure was coded on a scale of four-points (0, 1, 2, 3) or a dichotomy of two-points (0, 3 or 0, 1). Based on this, an overall score for each municipality (on a 100-point scale) was derived by giving equal weight to each of the five categories. The evaluation components used, regarding proper identification and analysis of city and municipal websites (eGovernment web systems) were based upon security and privacy, usability, content, services, and citizen participation. Henceforth, the top ten cities identified, with Seoul to lead the table and Hong Kong SAR, Singapore, New York and others to follow.

In Charles Kaylor's (Kaylor et al., 2001) benchmarking method, cities can evaluate their progress by measuring their web-enabled eGovernance municipal services and functions. The list of functional dimensions across which this study assesses eGovernment implementation among U.S. cities include amongst other: Payments, registration, permits, customer service, communication, licenses, images, audio / video, documents, applications, and e-Procurement. Rather than evaluating matters such as the design or organization of cities web site, the method of this study is focused on the functions and services that cities provide. A four point scale and an overall score are used for ranking a number of U.S. cities.

The outcome of this study gave that most highly developed websites tend to have a set of similar functions accessible from their websites. While there is a great deal of variation across these cities in terms of how this information is organized, for the most part, leading edge cities seem to have invested in a fairly finite set of functions. The study outlines several features (e-Commerce, registration and permits, customer service, communication, documents and information, and participation) that separate those sites with the highest e-scores from those with more modest ones.

Moreover, in a study conducted by Cap Gemini Ernst & Young (Cap Gemini Ernst & Young, 2003) a benchmarking method ranking European countries based on the provision of public services to Citizens and Business is given. Some of the public services examined with regards to: the service for citizens (income taxes, job search, social security benefits, personal documents, car registration, etc.), and services for business (social contribution for employees, corporate tax, VAT, registration of a new company, etc.). Based on the abovementioned services, the country ranking per service in Europe for 2003 was: Denmark, Austria, Sweden, Finland, Ireland, UK and so on.

Finally, in a recent study promoted by the European Union and carried out by the IFIB and by the Danish Technological Institute (January 2004) analyzed and discussed the back-office organization and presented the "Reorganization of Government Back Offices for Better Electronic Public Services – European Good Practices". (European Commission, 2004)

This report focused on changing the relationship between the front and back-office. In addition, emphasized the relevance of reorganization in processes and procedures in public administrations as a necessary step to offer new and better services to citizens and businesses. From this perspective, network technologies are considered as drivers of efficiency in governments and a tool for a more direct contact and interaction with "customers". Integration and interoperability are conditions to enable innovation in government organizations at multiple levels, by facilitating cooperation and scale economies in projects and services. Key findings of the report reveal that, if participation and interaction are components of successful eGovernment initiatives (from efficiency and e-commerce to effective decision-making processes), eGovernance requires paying attention to the methods and tools to foster citizens and end users inclusion in service management as well as in service (and policy goals and programs) design.

In this context, information technologies able to increase transparency, quality of information management and service provision, have to be coupled with communication tools and other technological

applications oriented to foster community's participation to decision-making processes. The attention for open source standards at the European level demonstrates the intention to sustain technology development paths able to facilitate integration and interoperability on an international scale, with limited problems in terms of costs and legacy issues. Eventually, the policy of European Union is investing to go beyond the "new economy approach" where technologies were primarily source for efficiency and promote new research and investments for a deeper use of ICT in business domains and in the society (e-society).

4. Methodology Considerations – A Three Level Review Methodology

In the frame of the related work presented above, a number of cities were selected to be reviewed in respect to their eGovernment technological infrastructure and IT legacy systems currently in use. The selection was a combination of cities ranked very high or identified as best practices and cities ranked lower in the implementation of eGovernment processes and support. The reason of the diversity in cities selection was mainly based upon to the necessity of assessing the ICT gap between them, providing a valuable insight for the approach, dimensions and the completeness of the methodology development.

Consequently, a three level methodology has been designed for better reviewing and quality evaluating city's technological infrastructures and IT legacy systems currently used on urban level for the management of internal and external eGovernment operations and services. The methodology takes into consideration a number of issues closely related on urban eGovernment implementation.

At first it identifies generic IT issues related to urban eGovernment like:

- Formal *IT strategy* and its implementation plan.
- *IT mission* / vision of a city related to eGovernment.
- *Driving actors* in promoting eGovernment in the city (mayor, city department, IT companies, citizen groups, community, etc.).

Furthermore, in a second level, the methodology examines issues enabling a categorization of the current city's IT situation in *ways of technological infrastructure communication*, in *IT systems domains and functional areas*, in *e-Democracy areas* (e-Participation, e-Inclusion, e-Involvement) and in *environmental and socio-economic sustainability areas*. More specifically, the following issues supporting eGovernment in a city are analyzed by the methodology: (a) Specification of technological infrastructure communication ways supporting eGovernment in a city (connections within government, between government and NGOs/citizens, between government and business/citizens, within and between NGOs, within and between communities), (b) specification of IT systems supporting urban eGovernment in specific domains (e-administration, e-citizen, e-business) and functional areas that they cover (public procurement, communication provision, provision of citizen's service, provision of companies' advice and services, registration, e-Payments, licenses / permits, public procurement, communication / information provision, citizen services providing financial and social benefits, e-Procurement, e-Health), (c) specification of IT systems promoting e-Participation (by means of ICT, enhancing active participation of citizens and supporting the collaboration between actors for consultation and policy-making purposes, whether acting as citizens, their elected representatives, or on behalf of administrations, parliaments or associations within the political processes of all stages of governance), (d) specification of IT systems promoting e-Inclusion and access, including public access points, (e) specification of IT systems promoting e-Involvement (by means of ICT include broader and/or new groups in the democratic processes), (f) specification of IT systems promoting environmental sustainability (for example resource productivity and dematerialization, energy consumption, land use and management, waste management, intelligent transport systems, air quality traffic and transportation, biodiversity, resource management, uban agriculture), (g) specification of IT systems promoting socio-economic sustainability (long-term local economic viability and competitiveness, economic productivity, locational factors, corporate responsibility, networking community, economic and social inclusion, creating enterprising communities, safety).

Eventually, at the lower third level of the methodology, a more focused review is provided supporting a further analysis of identified infrastructures and IT Systems supporting eGovernment based on their technological characteristics. Such an analysis includes issues like: Security, reliability, interconnectivity and interoperability, compliance with any EU or international standards as far as the exchanging of data and information is concerned, flexibility to adopt any latest technological advancements or alterations, encompass of open standards undersigned by the EU, effectiveness (is the information and processes relevant to the business process? Are they delivered in a correct, consistent and usable manner?), efficiency (is the most economical and productive manner of using the available resources to fulfill the governmental and business objectives provided?), integrity and transparency (is the information accurate and complete? Is it valid and in accordance with the business practices and values?), system transparency and code auditability, existence of any Government Data Network; Connectivity speed and tolerance of the current infrastructure, openness of the infrastructures, use of broadband connections by the main communication networks, type of technological infrastructure (PKI, Public Key Infrastructure or any other securities), use of mobile / wireless technologies to facilitate services promoting e-Democracy.

5. Definition of a Benchmarking Status Methodology

A methodology for benchmarking the status of a city's eGovernment ICT implementation (*see* Figure 1) by categorizing its IT legacy systems and infrastructures supporting eGovernment is presented in this section.

Main concern of a city that wants to adapt eGovernment systems promoting online processes, services and participation is to identify its IT legacy systems and technological infrastructure and to analyze and identify potential gaps in its infrastructure and IT systems that would enable it to provide better eGovernment Services, like more local democracy and enhanced local decision – and policy-making. The main goal of proposed benchmarking status methodology is to support a city to gain an integrated insight of its technological situation by identifying and reviewing the status of its IT systems and infrastructure capabilities and constraints. It will then be in a position to distinguish necessary developments and enhancements to be adapted bringing the city technologically at the desired position providing apt eGovernment services.

The benchmarking status methodology is based on the considerations of the three level review methodology described in the previous section, placing special emphasis on the identification of the technological status of a city by using a combination of Level-2 and Level-3. *Level-1* refers basically to a higher level of consideration examining mostly city's formal eGovernment IT strategy, mission and Vision and not on the actual IT city implementation to be benchmarked.

A benchmarking scoring scheme for the second and the third review methodology level is presented below. The main core of the methodology is composed of the interrelated Levels-2 and Level-3.

Level-2 is describing, as explained in the previous section, the city *technological infrastructure*. The city has to examine the following communication ways for identifying the completeness and characteristics of its infrastructure:

- Connection with Government
- Connection Between Government and NGOs / Citizens
- Between Government and Business / Citizens
- Within and between NGOs
- Within and between Communities

For scoring the status of a city's technological infrastructure, supporting eGovernment, a five-point scale is used counting the different communication ways**.**

Level-3 composed of the IT *Legacy Systems* a city has to examine. Those systems are referring to three categories:

(a) Supporting Specific Domains. Those domains are e-Administration, e-Business and e-Citizen. Each one of these may support core Functional Areas that the reviewer city must incorporate in order to be considered fully on-line across all governmental fields. More specifically: (a) The e-Administration Functional Areas could be: public procurement, communication provision (conversation forums, scheduled e-meetings, human resources system, department's registration list), provision of citizen's service and provision of companies' advice and services; (b) the e-Business Functional areas could be: registration (new company), e-Payments (social contributions, VAT, customs declaration), licenses / permits, public procurement (bids on-line) and communication / information provision (business conversation forums, schedules e-meetings, human resources system, customer relationship management, companies' registration list); and (c) the e-Citizen Functional areas could be: registration (civil registration, car), payments (taxes, fines, utilities), licenses / permits (passport, parking, building permission, drivers, enrolment in higher education, taxi, dog, business), citizen services providing financial benefits (job search / job applications (labour and skill system), unemployment benefits, social insurance benefits, civil benefits (rent subsidization), student grants), citizen services providing social benefits (public libraries, police services, on-line information / documents / surveys / consultation, politicians public weblogs, property assessment history lookup, conversation forums, land survey system (GIS), land security service, citizen relationship management service, human resources system (professional training participation), audio / video streaming of city council meetings, schedules (hours of operation)), e-Procurement (bids on-line) and e-Health.

(b) Promoting e-Democracy Domains. This category has to be examined upon the following Functional Areas: e-Participation, e-Inclusion & Access and e-Involvement.

(c) Promoting environmental and socio-economic sustainability Domains. The Functional Areas for *environmental sustainability* could be: resource productivity and dematerialization, energy consumption, land use and management, waste management, Intelligent transport systems, air quality traffic and transportation, biodiversity, land survey systems (GIS,) resource management, urban agriculture etc.; while for *socio-economic sustainability* could be: long-term local economic viability and competitiveness, economic productivity, locational factors, corporate responsibility, networking community, economic and social inclusion, creating enterprising communities, safety to mention but a few.

The following scoring could be used for Level-3:

- For the categorization of IT systems supporting urban eGovernment in specific domains (e-administration, e-citizen, e-business) a two-point scale is used (0: domain addressed, 1: domain not addressed).
- For the categorization of IT systems supporting urban eGovernment in functional areas that they cover, a two-level scaling can be used (0: functional area addressed, 1: functional area not addressed). If a functional area is addressed a further three-point scaling is used (1: weakly addressed, 2: good addressed 3: very well addressed).
- For the identification of IT systems promoting e-Participation, e-Inclusion, e-Involvement, environmental sustainability, socio-economic sustainability a four- point scale (0: not addressed, 1: weakly addressed, 2: good addressed 3: very well addressed) will be used.

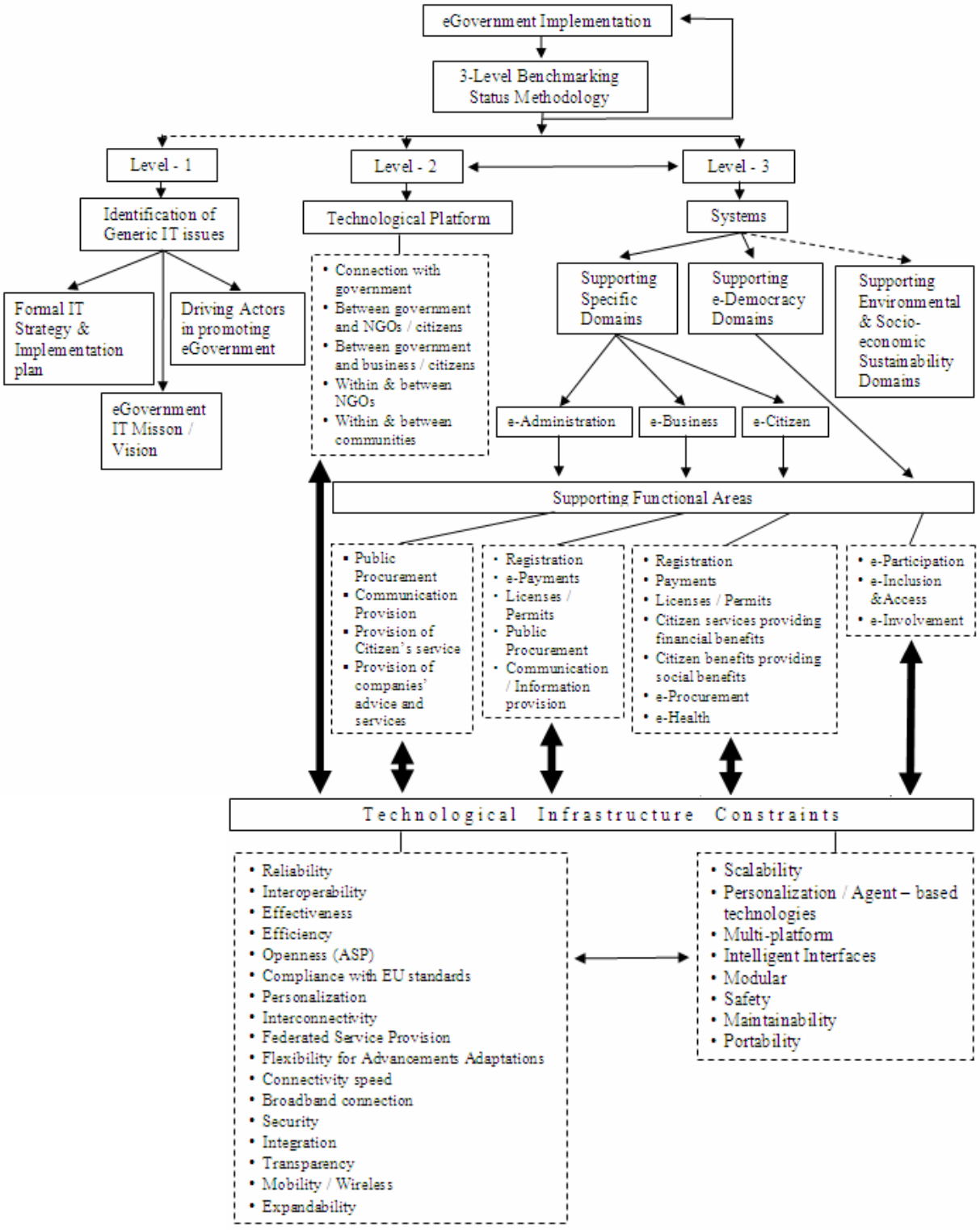

Figure 1. Three-level Benchmarking Status Methodology

Both Levels 2 and 3 are also to be scored on their technological constraints. Such constraints may be composed from the interrelated features given below:

- *Technological Infrastructure*: Reliability, interoperability, effectiveness, efficiency, openness, compliance with EU standards, personalization, interconnectivity, Federated Service Provision, flexibility for advancements adaptations, connectivity speed, broadband connection, security, integration, transparency, mobility / wireless and expandability.
- *IT Systems*: Scalability, personalization / agent based technologies, multi-platform, intelligent interfaces, modular, safety, maintainability and portability. In order to have the most appropriate functionality and smooth interconnection of all the parts most of those elements must be embedded in their most optimized form.

- For the categorization of the technological constraints a four-point scale (0: not addressed, 1: weakly addressed, 2: good addressed 3: very well addressed) is applied to all the issues used.

An overall score, resulting from the summation of the two level scores is the final outcome of applying the proposed benchmarking methodology.

To conclude with, the suggested benchmarking status methodology, applying the scoring scheme particularly to every designated IT component, has to be adopted by a city in order to be able to review and classify its current IT situation at all levels. The main difficulty a city has to overcome is the large number, the divergence and peculiarities of all the vertical and horizontal components, articulate the governmental mechanism, that have to be analyzed and work together in an integrated and interoperable manner. The particular methodology attempts to give a practical solution to this problem by defining a technological frame allowing a city to clearly identify its current status confronting eventually with the revealed gaps and opportunities for improving its provision of eGovernment IT services.

A practical implementation of the methodology is presented in the deliverable report of the IntelCities Project (INTELCITIES, 2004) applying all the above notions onto the best, primary and selected cities as a test bed. The outcome of such a benchmarking scheme over a number of cities is a ranking of best practices IT legacy systems, based on domain, functional areas, e-Democracy, environmental and socio-economic sustainability along with their technological issues addressed, identified to be used for eGovernment implementation.

6. Conclusion

Throughout this paper the definition of an eGovernment Benchmarking Status Methodology has been presented. A Third Level Classification Methodology has been designed for the better review and quality evaluation of a city's *technological infrastructures* and *IT legacy systems* currently used on urban level for the management of internal and external eGovernment operations and services, in an attempt to justify the needs for eGovernment policy reform from the perspectives of increased efficiency and effectiveness of practice.

At a first level, the methodology identifies generic IT issues related to urban eGovernment like Formal IT strategy, IT mission / vision of a city's related to eGovernment and Driving actors in promoting eGovernment in the city. At a second level, the methodology examines issues enabling a categorization of the current city IT situation in ways of technological infrastructure communication (connections within governments, between governments and NGOs / citizens, between governments and business/citizens, within and between NGOs, within and between communities), in IT systems domains (e-administration, e-citizen, e-business) and functional areas of the different domains, in e-Democracy areas (e-Participation, e-Inclusion, e-Involvement) and in environmental and socio-economic sustainability areas. At the third level of the methodology a more focused review is provided supporting a further analysis of the identified infrastructures and IT Systems supporting eGovernment based on their technological characteristics such as security, reliability, interoperability, effectiveness, efficiency, openness, and use of broadband connections.

Moreover, the proposed Benchmarking Status Methodology provides a correlated and efficient environment with all the necessary mechanisms and procedures that one city could follow to identify its current status with regards to its governmental infrastructure potential gaps, weaknesses, and opportunities. It will then be in a safe position to undertake corresponding actions for improvement that will lead to the establishment of a common, integrated and open Pan-European platform, complying with all the rules and regulations, where all the governmental and external / business systems offering eServices will be integrated and operate in a smooth way.

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